

# LATE-SPAWNING SUCKERS OF NEW YORK'S ADIRONDACK MOUNTAINS



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The complicated taxonomy of the *Catostomus* species complex found in the Adirondack Mountains of New York State is slowly but steadily being resolved. Fred Mather's description of the June Sucker, *Catostomus utawana* (now known as the Summer Sucker since June Sucker is occupied by *Chasmistes liorus*) has been reinstated for some populations of late-spawning suckers of the region (Mather, 1886; Morse and Daniels, 2009). In addition, there are populations of late-spawning suckers, tentatively referred to as *Catostomus* sp. cf. *utawana*, that display different morphology and genetics when compared to both the Summer Sucker and the ubiquitous White Sucker (*Catostomus commersonii*). These populations of *Catostomus* sp. cf. *utawana* constitute another group distinct from Summer Sucker and White Sucker and will be referred to as the Elk Lake Sucker for the remainder of this article.

Mather based his description of the Summer Sucker (Figures 1–2) on a combined collection of fishes caught at both Big Moose Lake of the western Adirondack Mountains and Minnow Pond in the central Adirondacks. Big Moose Lake no longer appears to contain this species, but they are still found in some small ponds about 4 miles away (still in Herkimer County), 26 miles away in Hamilton County, and 46 miles away in Hamilton County. The Summer Sucker spawn at sizes from 6–11 inches and typically after mid-June and mostly in mid-July in small tributaries or lake outlets. Summer Suckers are substantially smaller and spawn later than White

Suckers of nearby lakes, lakes in other parts of the state, or of similar latitudes of the U.S.

Mather's other collection of late-spawning, small suckers is from Minnow Pond near Blue Mountain Lake, located in the central Adirondack Mountains. Current evidence suggests that this collection is part of a lineage of suckers now best known from locations 60 miles east in Elk Lake (Figure



Figure 1. Summer Sucker from a headwater pond in Hamilton County on June 20, 2007, female in spawning condition. (Photo by Doug Carlson)



Figure 2. Oswegatchie River tributary in St. Lawrence County with Summer Sucker in running ripe condition, male, on rock May 27, 2014, and with female running ripe with eggs on June 7, 2009. (Photos by Doug Carlson)

Douglas Carlson has interests in stream fishes, their distribution and conservation. Also, with the help of two other authors, he is completing an atlas of NY fishes for the Department of Environmental Conservation. Richard Morse is the collections manager for fish at the New York State Museum and his interests include the evolution of behaviors that lead to speciation. Evon Hekkala is an assistant professor of conservation genetics at Fordham University where she teaches and studies ecology and evolutionary biology. She is particularly interested in the role of museums in conservation.

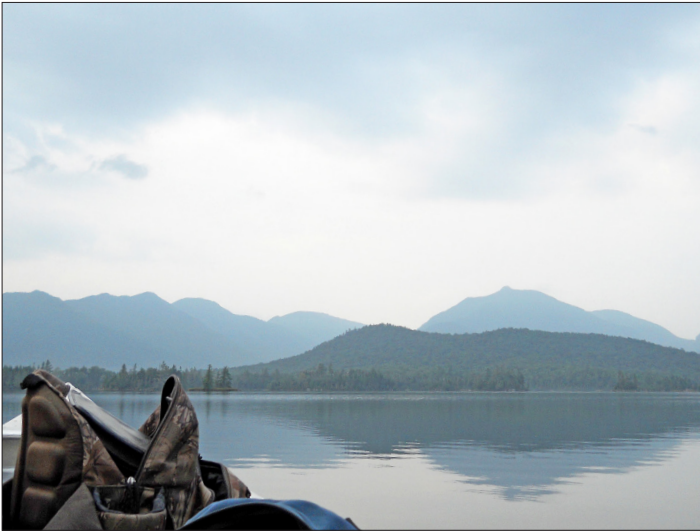


Figure 3. Elk Lake, July 2010. (Photo by Doug Carlson)

3), in a small pond 2.5 mi east in Hamilton County, and in a small pond 40 miles northeast in Franklin County. The sizes and spawning times described by Mather are similar to that described for populations sampled after the 1920s in ponds of the eastern, central, and western Adirondack Mountains. However, these central and eastern Adirondack fish, which we will call Elk Lake Suckers, look different from White Suckers and Summer Suckers of the western Adirondacks in minute but measurable ways (Figure 4). Differentiation with morphometrics and genetic testing has progressed in recent years for Elk Lake Suckers and the taxonomy will hopefully be better resolved in the near future.

Misidentifications and untested assumptions resulted in many years of overlooking these late-spawning suckers in the Adirondack Mountains. Mather (1886) did not know that he collected both Summer and Elk Lake Suckers and he did not distinguish between them. He simply stated that they were not White Suckers and he proceeded to describe



Figure 4. Elk Lake Suckers in spawning condition with tubercles, male above and female below. (Photo by Doug Carlson)

the Summer Sucker as a species new to science. Kendall and Dence (1929) only collected Summer Suckers and supported Mather's description for a new species. Greeley caught Summer Suckers (Greeley and Bishop, 1932; Greeley, 1935) as well as Elk Lake Suckers (Greeley and Greene, 1931; Greeley, 1934) but due to inconsistent identifiable field characteristics he called them all Summer Sucker, a subspecies (*Catostomus commersonii utawana*) of the White Sucker. Since he was unknowingly dealing with two distinct groups, this is not surprising. Dence (1948) worked with a population in Wolf Lake that he mistakenly split into what he thought were Summer Sucker and White Sucker. He also believed Summer Sucker to be a subspecies of the White Sucker. Webster (1973a, 1973b) worked with both Summer Suckers and Elk Lake Suckers and also referred to both of them as the same subspecies of the White Sucker. Beamish and Crossman (1977) studied the same population that Dence did and found no evidence to support that two species (presumably Summer Sucker and White Sucker) cohabitate in Wolf Lake. As it turns out, Beamish and Crossman were correct—there is only one species of concern in the lake—but it is neither the Summer Sucker nor the White Sucker. The Elk Lake Sucker can attain larger sizes at maturity and can start their protracted spawning season at an earlier date than what was originally described by Mather for the Summer Sucker. It is these characteristics, coupled with the past misidentifications mentioned above, that undoubtedly led to the confusion regarding the taxonomy of the Summer Sucker.

The new era of understanding these late-spawning suckers began after 1999 with research by Morse (2007) and Morse and Daniels (2009). The late-spawning suckers of the western region were officially labeled as Summer Suckers. Since then, the work of Morse and Morse and Daniels has been updated and combined with analyses of nuclear and mitochondrial gene regions (Hekkala et al., 2013). Surprisingly, genetic markers support the distinction between two groups in the Adirondacks. However, the markers failed to distinguish early and late spawning samples representing *C. commersonii* and *C. utawana*. Instead, samples for Elk Lake were genetically distinct from both *C. commersonii* and *C. utawana* populations to the west. In combination, these studies suggest that the Minnow Pond suckers collected by Mather in 1882 and that at least some of the suckers studied by Greeley, Dence, Webster, and Beamish and Crossman are neither Summer Suckers nor White Suckers, but may instead represent a separate lineage of Adirondack suckers. Genetic work is underway to revise the taxonomic and biogeography of Elk Lake Suckers.

Divergences in spawning season, body shape, and age of maturity have been described in several major lineages. Studies of Kokanee Salmon (*Oncorhynchus nerka*) in west-



ern Canada (Lemay and Russello, 2015) and for Lake Whitefish (*Coregonus clupeaformis*) in Quebec (Bernatchez et al., 2010) suggest that genetic divergence does not always correlate directly with ecological divergence and we are only now beginning to understand the complex genomic mechanisms of divergence during ecological speciation. The phenotypic and genetic characters observed in both the Summer and Elk Lake suckers suggest the possibility of parallel patterns of divergence in separate lineages, perhaps driven by the short summers in the high elevation lake systems of the Adirondacks.

### SIMPLE FISH COMMUNITIES AND SPAWNING TIMES IN MOUNTAIN PONDS

Harsh conditions in high elevation ponds of New York have brought about specializations in two fish species that are nearly always present, Brook Trout (*Salvelinus fontinalis*) and White Sucker. Growing seasons are short, nutrients are few, and sometimes acidification is limiting. Brook Trout have become specialized for these conditions and, depending on which region they come from, they have been named according to that locality as a strain. There are six or more strains currently recognized in the Adirondacks. Trout eat insect larvae until they grow to over 12 inches when they also eat fish, such as small suckers. While size and abundance of trout depends upon several habitat factors, they require deeper water areas that are rich in oxygen. Without special spawning areas with clean gravel and the best of these other conditions, they are often absent or rare. Studies from 1927–1979 show Summer Suckers to be habitat specialists in headwater lakes of the Adirondacks with geographic isolation. As the Summer Suckers became better adapted to the mountain ponds and streams, it was hypothesized that they allocated their resources to adapt to the short growing season, the less complex fish communities, and waters that were particularly nutrient poor. They matured at smaller sizes, less than 11 inches, and typically spawned later than mid-June.

Suckers, including White, Summer, and Elk Lake, do well in deeper waters along with Brook Trout, and they also tolerate warmer areas and lower oxygen levels than Brook Trout. The ponds that are shallow with mostly silty or boggy bottoms often have an uncommonly high abundance of White Suckers, and they are often of smaller sizes due to stunting. These conditions are found in a small fraction of the 600 Adirondack ponds with White Suckers. An even smaller fraction of the Adirondack ponds have either the Summer Sucker or the Elk Lake Sucker. Both of these fish spawn later and grow slower than White Suckers from similar lakes and ponds in the Adirondacks.

Spawning time is a key factor in identifying Summer and Elk Lake suckers. White Sucker in these mountain ponds usu-



Figure 5. Spawning Elk Lake Suckers with tubercles (male, top, and female) caught in tributary of a mountain pond in Essex County on June 17, 2014. (Photo by Doug Carlson)

ally spawn in May, with larger individuals usually spawning in early May and smaller individuals spawning in late May. The Summer Sucker of the western Adirondack Mountains has some individuals spawning as early as late May, while others spawn in June, July, or August. Farther east in the Adirondack Mountains the Elk Lake Suckers sometimes spawn as late as June–July. Larger individuals often spawn in late May and smaller individuals mostly spawn in June. As a general rule, an Adirondack sucker found to be in spawning condition in June, July or, August should be scrutinized further to determine if it is a Summer Sucker or an Elk Lake Sucker. In addition, breeding tubercles are found on nearly every breeding Summer Sucker and Elk Lake Sucker female (Figure 5). White Sucker females are rarely tuberculated. The distribution of these fish is becoming more clear (Figure 6) and can aid in determining what type of sucker is being observed.

Historical accounts report that White Sucker and either Elk Lake Sucker or Summer Sucker lived in sympatry. Mather (1886) reported both species from Big Moose Lake. Kendall and Dence (1929) reported both species in the Oswegatchie River and Cranberry Lake (western Adirondacks). Greeley (1935) reported two species in Lower St. Regis Lake (eastern Adirondacks). Today only White Suckers can be caught in these lakes, perhaps because of the introduction

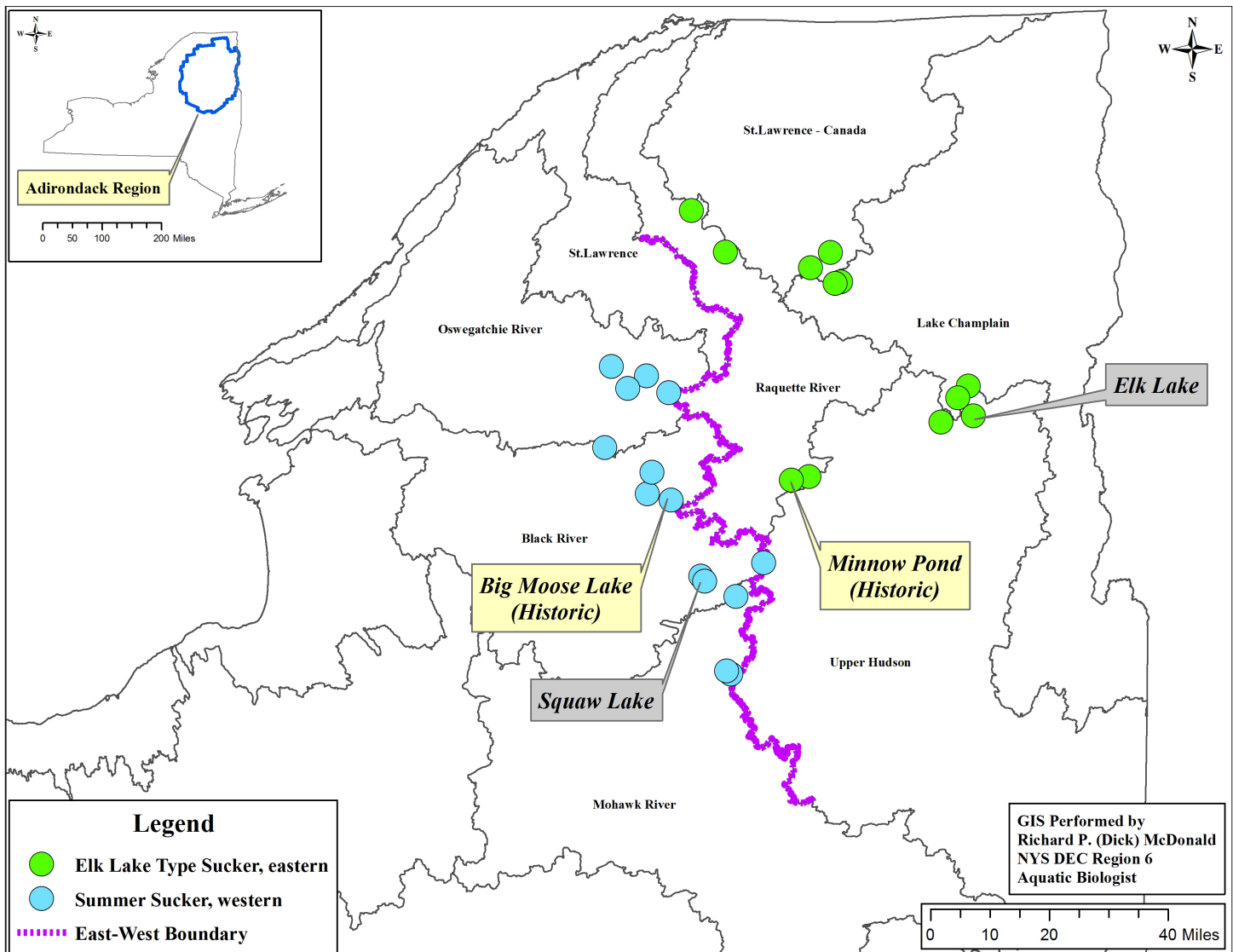


Figure 6. Distribution of Summer Sucker and the Elk Lake Sucker.

of large predatory fishes and the fact that Summer and Elk Lake suckers mature at small sizes and are more vulnerable to predation than large White Suckers. The fact that these small suckers persist in isolated, headwater lakes that lack these introduced predators supports this idea.

#### IN HOW MANY WATERS CAN THEY BE FOUND?

Summer Sucker are still known in 11 areas west of the Raquette and Upper Hudson watersheds (Figure 6). Squaw Lake is the most studied of these waters with Summer Sucker, and there are three others in the Black River watershed and three in the more southerly Mohawk watershed (Figure 6). The Oswegatchie watershed, much farther to the north, also has Summer Sucker in two headwater ponds and in two areas just upstream of Cranberry Lake. Another group of four waters were documented to have Summer Sucker earlier than 1932, and these included Big Moose Lake, Stillwater Reservoir, Star Lake, and Otter Pond. It now appears that Summer Suckers are no longer in these four bodies of water.

Elk Lake Suckers are still able to be caught in eight waters east of the St. Lawrence, Black, and Mohawk watersheds (Figure 6). Elk Lake is the best studied of these populations, with thousands of individuals caught in 1970–1973 and 2008–2014. In 2012–2014, two ponds in the Champlain watershed just east of Elk Lake were found to have Elk Lake Suckers, as well as two waterbodies in the Upper Hudson watershed. Elk Lake Suckers were also discovered in a body of water in the St. Regis basin of the St. Lawrence and in two waters farther north in the Raquette watershed (Figure 6). Records from earlier than 1934 showed four other waters in the Champlain, Raquette, and St. Regis watersheds contained small, late-breeding suckers, but recent efforts in these same ponds have caught none.

Conservation of these rare, late-spawning suckers is difficult without full knowledge of the taxa in question. So far, we have laid the groundwork for protecting the one unique sucker species in these western Adirondack Mountain ponds, the Summer Sucker. The Elk Lake Sucker is



cryptic, or somewhat secretive, and clearly hard to identify. Overall, we know of 27 waters with historic records and about half still contain suckers with those special characteristics. Since they are not found elsewhere in the state or country, it is possible that they both may be our only New York endemic fish.

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