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Connecticut Inland Fisheries

Monitoring Warmwater Fish Populations in Lakes and Large Rivers



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State of Connecticut
Department of Energy and Environmental Protection
Bureau of Natural Resources
Inland Fisheries Division



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Study 2: Warmwater Fisheries Program
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Job 1: Monitoring Warmwater Fish Populations in Lakes and Large Rivers

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Cover photo: Boat electrofishing at Mansfield Hollow Reservoir. Photo by Eileen O'Donnell.

Summary

*Boat electrofishing surveys were conducted at 53 sites during the spring or fall of 2014. Two fish species, never previously reported from Connecticut, were discovered during 2014 sampling. The Bowfin population in the Connecticut River dramatically increased in number and range between 2002 and 2011 and the species continued to be common in 2014. Two species new to Connecticut were discovered in 2014. Brook Silversides (*Labidesthes sicculus*) were found in both Lake Lillinonah and Zoar and a Fat Sleeper Goby (*Dormitator maculatus*) was captured at Chapmans Pond on the Connecticut River. Dissolved oxygen (O₂) and temperature profiles were collected on 11 lakes between May and September 2014. Bass tournament weigh-ins were monitored at Gardner Lake between April 26 and October 29, 2014. Bass tournament angler catch rates were lower in 2014 than 2013 at Gardner Lake due to differences between the two years in resident bass population sizes, numbers of bass stocked into Gardner from other lakes, and vulnerability to angling of the transplanted fish stocks.*

Background

The Connecticut Department of Energy and Environmental Protection Inland Fisheries Division (IFD) has regularly monitored fish populations among the state's important lakes and large rivers since 1988. Fish populations vary among lakes and over time (Jacobs and O'Donnell 1996). Therefore, maintaining current fish population data is vital for fishery biologists to make informed management decisions. Anthropogenic influences such as winter drawdowns, chemical herbicide applications, dredging, the establishment of invasive species (e.g. Zebra Mussel, Tench and Eurasian Water Milfoil), changes in angler pressure, and climate change all have the potential to alter lake ecosystems. It is important to regularly monitor changes in fish populations among the state's important waterbodies to determine the potential effects of such influences so that effective mitigation and management strategies can be formulated.

Special management programs (e.g. Bass, Walleye, Channel Catfish and Northern Pike management lakes) require regular sampling to assess potential changes in fish populations within these waterbodies. Additionally, a variety of waterbodies also need to be sampled on a regular rotational basis to document overarching trends among Connecticut's lake and pond fish populations.

Water temperature and dissolved oxygen in the lower portions of a lake's water column are important indices of water quality. The presence of dissolved oxygen in lakes is vital to the survival of all fish species. During summer months, deeper lakes thermally stratify, i.e. separate into discrete temperature layers. Dissolved oxygen often becomes depleted in deeper water by summer's end. The more eutrophic (nutrient rich) a lake is, the more likely the deeper water

will become hypoxic (critically low in oxygen). Tracking long-term changes in water temperature and dissolved oxygen allows us to document the effects of nutrient loading and climate change on lake habitats.

The popularity of bass tournaments has increased greatly over the last thirty years. Moreover, bass tournament pressure is greatest on our largest public waterbodies. The recreational importance of these larger lakes and the increase in fishing pressure associated with bass tournaments justify monitoring these resources to ensure continued angling quality. Furthermore, bass tournaments are a cost effective way to collect important data on angler catch rates and bass population size structure.

Approach

Warmwater fish are sampled in selected lakes by standard night boat electrofishing from mid-April to the first week of June, and from the last week of September to the first week of November. All fish species sampled are identified and measured, and scales are taken from a subsample of important species for age-and-growth analyses (see Jacobs et al. 2011 for detailed methods). In selected lakes, oxygen/temperature profiles are taken during mid-summer at 1-meter intervals from the surface to the bottom using a YSI Pro-20 oxygen/temperature meter.



Bass tournament weigh-ins are monitored on selected waterbodies between April and October. All bass brought to the weigh-in are identified to species, measured to the nearest cm and released. Anglers are also asked how many bass greater than 12 inches they released (culled) during their day's fishing. The number of anglers and duration of fishing are recorded to determine angler effort (the total number of hours expended by all anglers, expressed as "angler-hrs"). In selected lakes, bass are given fin clips and recaptures are recorded to estimate population size using the Schnabel mark-recapture method (Ricker 1975).

Key Findings

Electrofishing Survey

The IFD sampled 53 sites via boat electrofishing during the spring and fall of 2014 (Figure 1 and Appendices 1a and 1b). Among the sites sampled were four unfished water supply reservoirs, one private lake, 27 special management lakes (for Bass, Walleye, Northern Pike or Channel Catfish), and the remaining were important Connecticut lakes and the Connecticut River which IFD had not sampled recently.

All data were entered into the lake and pond survey database. Species and catch rates (electrofishing catch/hr) for all lakes, ponds and large rivers sampled by the IFD between the 1980s and 2014 can be found here on our website:

http://www.ct.gov/deep/lib/deep/fishing/fisheries_management/Statewide_Lake_and_Large_River_Electrofishing_Survey.pdf

Most of the sites sampled in 2014 showed little change in fish community structure; however,



Figure 2. A 10-inch Bowfin captured in the Connecticut River

there were several noteworthy findings. The Bowfin (Figure 2) population in the Connecticut River dramatically increased in number and range between 2002 and 2011 and the fish continued to be common in 2014 samples. Bowfin captured during electrofishing ranged in size from 10 to 26 inches and were encountered in most backwater areas of the River from the Massachusetts border to Chapmans Pond.

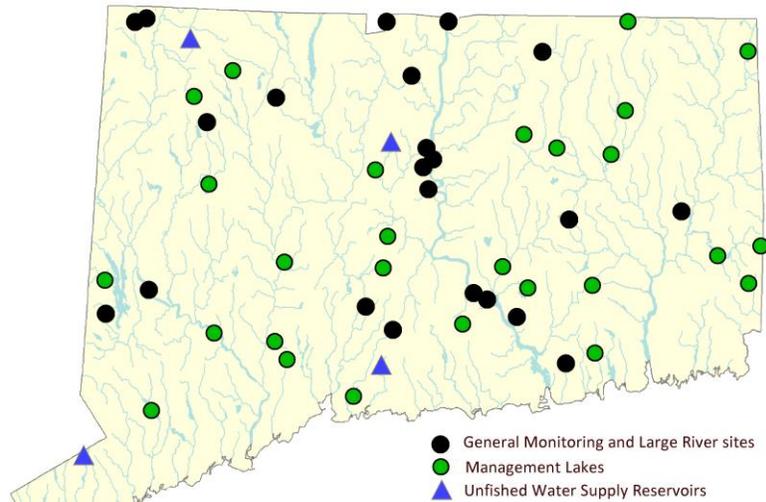


Figure 1. Electrofishing sites sampled in the spring or fall of 2014.

Two fish species new to Connecticut were discovered during sampling in 2014. A Fat Sleeper Goby (*Dormitator maculatus*, Figure 3) was sampled for the first time at Chapmans Pond. Their typical range is in brackish/salt waters from Virginia to the Bahamas. The Connecticut specimen



Figure 3. Photo of a Fat Sleeper Goby. Web photograph by R. Lepare.

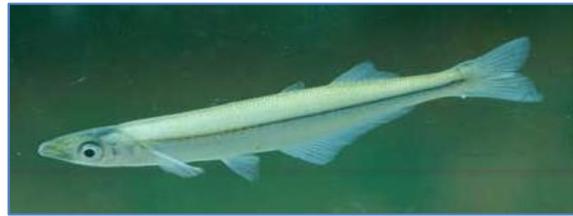


Figure 4. Brook Silverside file photograph from www.kentuckyawake.org.

is the most northeasterly occurrence reported for this species. It is unclear whether this single occurrence is the result of a range expansion or an aquarium release. Brook Silversides (*Labidesthes sicculus*, Figure 4) were observed for the first time in Lake Lillinonah and Lake Zoar during spring sampling. Numbers of fish sampled (29 at Lillinonah and 2 at Zoar) were sufficient to assume that a reproducing population has been established. The species is established in the nearby Hudson River drainage. The origin of the Connecticut population is unclear; however, it is plausible that they are the result of a bait bucket introduction.

Fish Age and Growth

Scales were taken for age-and-growth analysis from a subset of fish collected during 2014. A complete analysis of fish age-and-growth sampled during this segment (2011-16) will be presented in a final report for this job.

Water Quality Indices

Dissolved oxygen (O₂) and temperature profiles were collected from 11 lakes between May and September 2014. Most lakes were sampled once during August, and the three Trout Management Lakes (TMLs) were sampled twice. These results will be compiled and presented in the 2016 final reports of both the Warmwater Monitoring and Cold Water Lakes Management jobs.

Bass Tournaments

Twenty-nine bass tournament weigh-ins were monitored at Gardner Lake during April 26-October 19, 2014. Angler catch rate (numbers of bass/angler-hr) of Largemouth and Smallmouth Bass combined (including culled fish) was 31% lower in 2014 than in 2013 (Table 1). There are several factors that likely influenced this decrease. Gardner Lake has been part of a Largemouth Bass stocking experiment that was conducted during 2013 and 2014 (Study 2- Warmwater Fisheries Management; Job 4- Bass Supplemental Stocking Study). In early spring of

2013, Gardner Lake was stocked with 345 naive quality size bass from an unfished reservoir; whereas in spring of 2014, Gardner Lake was stocked with fewer (201) quality size bass from a public lake (Mansfield Hollow Reservoir). Moreover, the bass stocked in 2013 were naive to fishing and catch rates of these fish were relatively high during the first few months of the season, which boosted the overall annual tournament catch rate. The Mansfield bass stocked in 2014 were apparently no more vulnerable to angling than the resident Gardner Lake bass and thus were caught proportional to the numbers stocked. Finally, the population estimate of resident quality size bass in Gardner Lake was 8% lower in 2014 than 2013 (see Warmwater Fisheries Management, Bass Supplemental Stocking Study progress report for details).

Table 1. Tournament summary data for Largemouth (LM) and Smallmouth (SM) Bass from Gardner Lake in 2013 and 2014. In the column labeled "Method", "Weighed-in" indicates catch rates of only those bass brought to weigh-ins, "+Culled" indicates catch rates of weighed-in bass plus those of bass ≥12 inches reportedly culled by the anglers. "Combined" is the catch rate of Largemouth and Smallmouth Bass combined.

Gardner Lake	No. of Tourns.	Angler -hrs	Method	Bass Catch Rate		
				LM Bass/Hr	SM Bass/Hr	Combined
2013	28	2,835	Weighed-in	0.43	0.02	0.45
			+Culled	0.89 ¹	0.07	0.96 ¹
2014	29	3,585	Weighed-in	0.40	0.02	0.43
			+Culled	0.63 ²	0.03	0.66 ²

¹ Includes bass from an unfished water supply reservoir that were stocked into Gardner Lake in 2013.

² Includes bass from Mansfield Hollow Reservoir that were stocked into Gardner Lake in 2014.

Discussion

Electrofishing surveys of Connecticut lakes and large rivers continue to supply the IFD with critical and timely information about our state’s fish populations. This year two new species to Connecticut waters were documented. The Fat Sleeper in Chapmans Pond may represent a natural range expansion. The Brook Silversides were certainly introduced by people. The occurrence and spread of non-native fishes and their possible effects on aquatic ecosystems is of concern to IFD and regular monitoring of affected sites should continue.

Sampling bass tournament weigh-ins continues to be a cost-effective tool for monitoring the status of bass populations in larger, recreationally important public waterbodies.

Expenditures

Total Cost:	\$162,664
Federal Share:	\$121,998
State Share:	\$40,666

References

- Jacobs, R. P. and E. B. O'Donnell. 1996. An electrofishing survey of selected Connecticut lakes. Federal Aid in Sport Fish Restoration. Final Report F-57-R-14. Connecticut Department of Environmental Protection, Hartford, CT.
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Appendix

Appendix 1a. General monitoring sites sampled by the IFD using boat electrofishing gear during 2014.¹

Lake	Town	Date(s) Sampled (month/day)	Comments
General Monitoring			
Aspinook P.	Lisbon/Griswold/Canterbury	4/28	
Ball P.	New Fairfield	6/05	Grass Carp effects
Congamond L.	Suffield	5/07	
Crystal L.	Ellington/Stafford	6/04	
Dog P.	Goshen	9/29	
East Twin L.	Salisbury	5/19	Kokanee Salmon rebounding/ continued monitoring for effects from Zebra mussels
Gaillard L.	North Branford	5/13	Unfished water supply reservoir
Laurel Res.	Stamford	5/09	Unfished water supply reservoir
Lillinonah L.	Bridgewater/Brookfield/New Milford/Newtown/Roxbury/Southbury	6/02	Stocked with Northern Pike yearlings by private fishing association.
North Farms Res.	Wallingford	11/05	Bass in decline
Quonnipaug L.	Guilford	10/14	Catfish stocking stopped in 2012
Rainbow Res.	East Granby/Windsor	5/12	
Rogers L.	Lyme/Old Lyme	5/12	Dam repair with fish ladder for migrating Alewives completed during winter 2013-14
Wangum L.	Canaan	5/14	Unfished water supply reservoir
West Hartford Res. 1	West Hartford	5/19	Unfished water supply reservoir slated for complete drawdown
West Hill P.	Barkhamsted/New Hartford	5/01	Stocked with smelt eggs
West Twin L.	Salisbury	10/29	
Williams L.	Lebanon	10/01	The State might be getting access to the lake
Connecticut River Sites			
Mainstem North	Enfield	9/30	
Mainstem Central	Hartford	10/07	
Mainstem South	East Haddam	10/14	
Chapmans Pond	East Haddam	10/14	
Crow Point Cove	Rocky Hill	10/08	
Park River	Hartford	10/07	
Salmon River Cove	East Haddam	10/14	
Wethersfield Cove	Wethersfield	10/08	

¹ Species and catch rates (electrofishing catch/hr) for all lakes, ponds and large rivers sampled by the IFD between the 1980s and 2014 can be found here on our website:

http://www.ct.gov/deep/lib/deep/fishing/fisheries_management/Statewide_Lake_and_Large_River_Electrofishing_Survey.pdf

Appendix 1b. Special Management Lakes sampled by the IFD using boat electrofishing gear during 2014.¹

Lake	Town	Date(s) Sampled (month/day)	Comments
Bantam L.	Litchfield	5/22	Northern Pike
Batterson L.	Farmington/New Britain	4/03 – 5/05	Walleye/Catfish, population estimate
Beach P.	Voluntown	5/8, 5/21	Walleye
Bolton L. (Lower)	Bolton/Vernon	10/30	Bass/Catfish
Billings L.	North Stonington	5/29	Bass
Black P.	Middlefield	10/23	Bass/Catfish
Chamberlain L.	Bethany	5/15	Bass
Coventry L.	Coventry	5/06	Bass/Walleye
Gardner L.	Bozra/Montville/Salem	Spring and Fall	Bass/Walleye
Halls P.	Ashford/Eastford	11/04	Bass
Lakewood L.	Waterbury	10/16	Catfish
Mansfield Hollow Res.	Mansfield/Windham	4/16 – 4/22	Relocate 200 adult bass to Gardner L.
Mashapaug L.	Union	4/22 -5/28	Bass/Walleye, population estimate
Moodus Res.	East Haddam	10/23	Bass
Pachaug P.	Griswold	10/30	Northern Pike
Pataconk P.	Chester	10/09	Catfish
Pattaganssett	East Lyme	10/29	Bass
Pickarel L.	Colchester/East Haddam	10/15	Bass
Quaddick Res.	Thompson	10/06	Northern Pike
Saltonstall L.	Branford/East Haven	4/28, 5/29	Bass/Walleye
Saugatuck Res.	Weston	4/14	Walleye
Silver L.	Berlin/Meriden	10/30	Catfish
Squantz P.	New Fairfield/Sherman	4/17	Walleye
West Side P.	Goshen	10/20	Bass
Winchester L.	Winchester	10/06	Northern Pike
Wintergreen L.	Hamden	10/02	Catfish
Zoar L.	Monroe/Newtown/Oxford/ Southbury	5/28	Walleye

¹ Species and catch rates (electrofishing catch/hr) for all lakes, ponds and large rivers sampled by the IFD between the 1980s and 2014 can be found here on our website:

[http://www.ct.gov/deep/lib/deep/fishing/fisheries_management/Statewide Lake and Large River Electrofishing Survey.pdf](http://www.ct.gov/deep/lib/deep/fishing/fisheries_management/Statewide_Lake_and_Large_River_Electrofishing_Survey.pdf)