Federal Aid in Sport Fish Restoration
F16AF00354
F-57-R-35
Annual Performance Report

2016-17

Connecticut Fisheries Division

Walleye Management

Connecticut Department of Energy & Environmental Protection
Bureau of Natural Resources
Fisheries Division
79 Elm Street, Hartford, CT 06106
860-424-3474
www.ct.gov/deep/fishing
www.facebook.com/ctfishandwildlife

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

Grant Title: Inland Fisheries Research and Management
Study 2: Warmwater Fisheries Program
Project: Warmwater Management
Job 6: Walleye Management

Period Covered: April 1, 2016 to March 31, 2017

Report Prepared by: Brian Eltz and Christopher McDowell

Job Personnel: Gerald Leonard, Co-Job Leader
Christopher McDowell, Co-Job Leader
Justin Davis, Primary Staff
Brian Eltz, Primary Staff
Eileen O'Donnell, Project Leader
Robert Jacobs, Program Coordinator
Tim Barry, Assistant Program Coordinator

Date Submitted: September 4, 2017

Approved by: Peter Aarrestad
Director, Fisheries Division

William Hyatt
Chief, Bureau of Natural Resources

Find us on Facebook www.facebook.com/ctfishandwildlife

Cover photo: Former CT FD Fisheries Biologist, Gerald Leonard, happily stocking walleye fingerlings into Gardner Lake.

Summary

Walleye fingerlings were stocked into 13 Connecticut lakes in 2016. A spring 2016 population estimate of Walleye was conducted at Mount Tom Pond, first stocked in 2012, which indicated that approximately 51 legal size (18-inches) fish were present for Opening Day of fishing. Open water angler surveys were conducted in 2016 at Coventry Lake and Lake Zoar, and ice angler surveys were conducted at Mount Tom Pond during the winter of 2015-16 and at Coventry Lake during 2016-17. An estimated 199 Walleye were caught from Zoar and 121 from Coventry during the open water season, of which only 9 were harvested; all from Zoar. No Walleye were reportedly caught during the Mount Tom or Coventry Lake ice angler surveys, most likely due to the short periods of safe ice those years. Five trophy fish awards were awarded statewide for Walleye in 2016.

Background

The Walleye is one of the most popular gamefish in North America (Scott and Crossman 1973, Eddy and Underhill 1974). They grow to large size, can be caught throughout the year using a variety of techniques, and provide excellent table fare. Walleye are also efficient predators that can utilize overabundant forage fish populations. Overall, Walleye management is an important tool that adds to the diversity and quality of Connecticut's inland fishing opportunities.

Walleye populations in Connecticut Walleye Management Lakes (WMLs, see map Figure 1) are completely supported by annual fall fingerling stockings. No successful Walleye reproduction has been observed to date in any of the WMLs. Statewide Walleye regulations in Connecticut are an 18-inch minimum size limit and a 2-fish possession limit (one site, Lake Pocotopaug, has a 20-inch minimum length limit).

Photo of a typical 5-inch fingerling Walleye stocked during the fall into Connecticut lakes.

The Connecticut Department of Energy and Environmental Protection Fisheries Division (FD) continually explores new options to increase the effectiveness and efficiency of the Walleye Management Program. One priority is the assessment of angler harvest rates

to ensure that current regulations are adequate to sustain quality Walleye fishing.

The purpose of Job 6 is to evaluate and optimize Walleye fisheries statewide. This report summarizes work conducted during 2016-17.

Approach

Walleye fisheries are maintained by stocking four- to seven-inch fingerlings during late October-early November. Fingerlings are purchased with Federal Sport Fish Restoration funds from a commercial supplier in Minnesota. Two water companies and one municipality purchase Walleye from the same vendor and fish are concurrently shipped for stocking the same day into all WMLs. Relative abundance of adult Walleye (catch per hour or CPH) is assessed by boat electrofishing during early- to mid-April. Relative abundance of sub-adult Walleye is assessed during May. Walleye population size is estimated on selected lakes using trap nets and electrofishing (March to early April) with a Schnabel mark-recapture design (Everhart et al. 1975). Stratified random roving angler surveys (Malvestuto et al. 1978, for detailed methods see Lake and Large River Angler Survey report: Study 2, Job 2) are conducted as resources permit to estimate angler effort, catch and harvest for Walleye, as well as to determine angler opinions on current management.

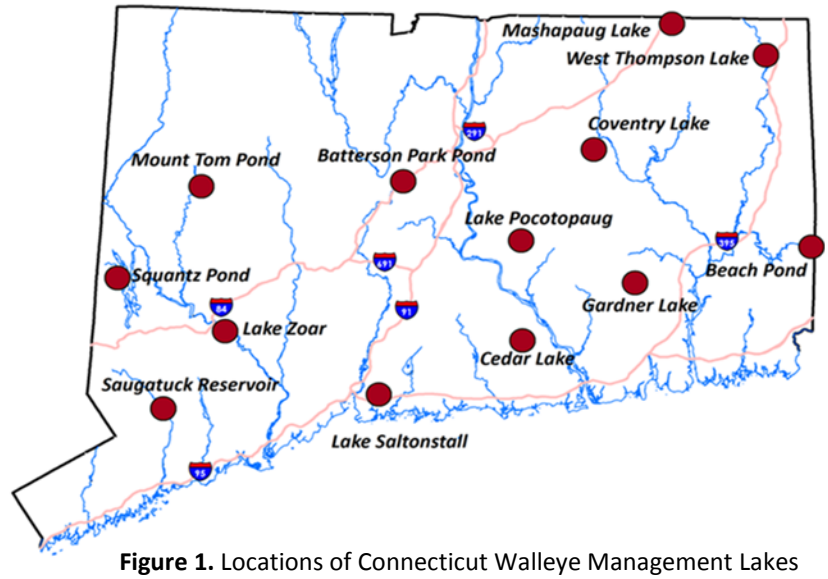

Figure 1. Locations of Connecticut Walleye Management Lakes

Note: The Connecticut DEEP Inland and Marine Fisheries Divisions were merged into a single Fisheries Division in January 2017. Although the majority of the work for this report was conducted while we were still Inland Fisheries, the new designation has been incorporated herein.

Key Findings

Stocking

Ten public WMLs, two water supply reservoirs that are open to fishing, and one semi-private lake were stocked with Walleye fingerlings in October 2016. Stocking rates ranged from three to fifteen per acre (Table 1). As in 2015, "large" fingerlings (7-inch avg.) were stocked in Gardner and Mashapaug lakes to determine if this larger size-at-stocking would improve recruitment to the fishery. All other public lakes were stocked with standard-size fingerlings averaging 5.1 inches in length. Stocking Coventry Lake with standard-size fingerlings was resumed in 2016. Stocking rates at this lake had been reduced in 2011 and then stocking was discontinued in 2013 to determine if reduced stocking rates might enhance Walleye growth rates (see Leonard et al. 2016 for more detail).

Table 1. Numbers, stocking densities (No. per acre), and average total length (inches) of Walleye fingerlings stocked statewide by FD and others in 2016.

Lake	Acres	Number	No. per acre	Length (in.)
Batterson	140	2,100	15.0	5.2
Beach	373	3,700	9.9	4.8
Cedar	69	1,035	15.0	5.2
Coventry	373	1,100	2.9	5.2
Gardner	529	2,270	4.3	**6.9***
Mashapaug	287	1,230	4.3	**7.0***
Mt Tom	56	840	15.0	5.1
Squantz	270	4,100	15.2	5.2
W. Thompson	239	3,600	15.1	4.8
Zoar	909	7,925	8.7	5.1
Sub Total		**27,900**		
Water companies and municipalities				
Pocotopaug	512	2,000	3.9	5.2
Saltonstall	422	3,135	7.4	4.9
Saugatuck	827	2,660	3.2	7.5
Sub Total		**7,795**		
Total stocked		**35,695**		5.5

*Gardner and Mashapaug lakes were experimentally stocked with "large size" fingerlings in 2015 and 2016.

Population Estimate

The 2016 Walleye population size in Mount Tom Pond was estimated using 16 days of trap netting (3/23-4/8) and one night of electrofishing (4/13). Estimated population size was 78 Walleye ≥10 inches (95% confidence interval or "CI"= 48-127) (Appendix 1), of which 51 (95% CI = 28-94) were legal size (≥18-inch). This population size equates to 1.4 fish/acre which is a lower density than that estimated for Batterson Park Pond six years after first stocking (3.6/acre in 2007), Squantz Pond three years after first stocking (2.4/acre in 1996) and Gardner Lake three years after first stocking (1.8/acre in 1996), but higher than that of Beach Pond six years after first stocking (0.71/acre in 2007).

Walleye Relative Abundance

Electrofishing was conducted at four WMLs during March and April 2016 to estimate relative abundance of adult Walleye. Electrofishing catch per hour (CPH) of ≥ 18-inch Walleye was 4.7 at Gardner Lake, 0 at Coventry Lake, 16.8 at Mt. Tom Pond, and 0 at Lake Zoar (Appendix 2). The relative abundance of adult Walleye has been generally declining at Gardner Lake since the fishery matured in the early 2000s (see Appendix 2).

Electrofishing was also conducted during May in Gardner and Mashapaug Lakes to assess the relative survival of the experimental large fingerlings (avg. 7 inches) stocked the previous fall. Encouragingly, the May 2016 fingerling catch rates were higher at both lakes than during previous years when standard-size (4-5-inch) fingerlings had been stocked (Gardner 16.3 vs. 2010-14 avg. 1.6/hr; range 0-5.2/hr and Mashapaug 2.9/hr vs. 2010-14 avg. 1.1/hr; range 1.0-1.2/hr).

Lewis Stein with an 18-inch Walleye caught at Coventry Lake through the ice during the winter of 2017.

Angler Surveys

Angler surveys were conducted at Coventry Lake and Lake Zoar during the open water season of 2016 (Opening Day 4/9 - 10/31/16), and during the ice fishing seasons at Mount Tom Pond (1/14 - 2/22/16) and Coventry Lake (2/4 - 2/25/17). Directed angler effort for Walleye was 6.5% of total effort at Coventry Lake during the open water

season, but only 0.1% at Lake Zoar (Table 2). During the ice season, directed effort was 4.5% at Mt. Tom Pond and too low to detect at Coventry Lake (due primarily to the short number of days with safe ice). Among the lakes, directed catch and directed catch rate were moderate during the open water season and low during the ice seasons (Table 2). Estimated angler catch during the open water season was 121 at Coventry and 199 at Zoar with very few harvested. Most Walleye were caught incidentally by anglers fishing for other species. No Walleye were reported caught during the ice fishing season at either Mt. Tom Pond or Coventry Lake. However, one angler at Coventry Lake stated that he had caught and harvested a legal Walleye on a previous fishing trip. Overall, 78% of ice-anglers and 46% of open-water anglers interviewed at Coventry had caught a walleye before. Catch and effort were low during the ice angler surveys because the ice fishing seasons were short during both years. Mt. Tom Pond never completely froze during the winter of 2016 and much of the pond (~50%) was not fishable. Coventry Lake had an abbreviated ice season in 2017 and most of the lake's surface area was unsafe to fish throughout the season. See Lake and Large River Angler Survey report: Study 2, Job 2 for details on other species caught.

Table 2. Angler survey statistics for Walleye during the open water fishing season at Coventry Lake and Lake Zoar in 2016, and for Coventry Lake (2017) and Mount Tom Pond (2016) during the ice season. "(CL)" indicates that 95% confidence limits are shown in parentheses. "(Percent)" indicates percent of total angler-hours targeting Walleye in parentheses. Directed effort, catch and catch rate are those for anglers targeting Walleye.

Lakes	Total Estimated Catch (CL)	Total Estimated Harvest (CL)	Directed Angler-hrs (Percent)	All Anglers Catch Rate (Catch/hr)	Directed Catch	Directed Catch Rate (Catch/hr)	Days of Safe Ice
Open Water							
Coventry	121 (96%)	0	399 (6.5%)	0.05	11	0.06	n.a.
Zoar	199 (121%)	9 (200%)	25 (0.1%)	0.01	0	0	n.a.
Ice Survey							
Coventry	0	0	0	0	0	0	22
Mt. Tom	0	0	68 (4.5%)	0	0	0	36

Table 3 compares open water angler survey statistics from Lake Zoar to other lakes with still developing fisheries (surveyed four-to-seven years after first being stocked with Walleye). Estimated Walleye catch at Lake Zoar was similar to that observed at Beach and Mashapaug lakes, but considerably lower than that at Coventry Lake. Although directed effort for Walleye only accounted for 0.13-3.0% of the total effort among the developing fisheries, these percentages approximately doubled by the time these fisheries fully matured (see Peak Directed Effort, Table 3).

Comparing ice fishing angler survey statistics from Mt. Tom Pond to other waterbodies with developing fisheries (surveyed two-to-three years after first being stocked with Walleye) reveals that the percent of total effort directed toward Walleye at Mt. Tom in 2016 was lower than that observed at any other lake except Beach Pond (Table 4.). Additionally, Walleye were being caught at all developing waterbodies except Beach and Mt. Tom ponds. In all, directed effort for Walleye accounted for 1.9-14.5% of the total effort among the developing fisheries; whereas, peak directed effort increased to 38-74% of total effort in all waterbodies except Beach Pond once these fisheries had matured (Table 4).

Table 3. Estimated catch, harvest, and directed effort (AH = angler-hrs) for Walleye during the open water season at four lakes four-to-seven years after being initially stocked. Peak directed effort is the highest percent of total effort observed among angler surveys on that waterbody.

Lake	Year First Stocked	Survey Year	Estimated Walleye Catch	95% CI	Estimated Walleye Harvest	95% CI	Directed Effort (AH)	% of Total Effort	Peak Directed Effort
Beach	2001	2007	**121**	132	**27**	187	493	3.0%	6%(2011)
Coventry	2001	2005	**660**	62	**--**	--	236	1.7%	5%(2009)
Mashapaug	2001	2008	**103**	96	**21**	212	455	2.9%	5%(2014)
Zoar	2011	2016	**199**	138	**9**	199	25	0.1%	n.a.

Table 4. Estimated catch, harvest, and directed effort (AH = angler-hrs) for Walleye during the ice fishing season at four lakes two-to-three years after being initially stocked. Peak directed effort is the highest percent of total effort observed among angler surveys on that waterbody.

Lake	Year First Stocked	Survey Year	Estimated Walleye Catch	95% CI	Estimated Walleye Harvest	95% CI	Directed Effort (AH)	Percent of Total Effort	Peak Directed Effort
Beach	2001	2004	**0**	--	**0**	--	19	1.9%	2%(2008)
Gardner	1993	1996	**63**	103	**30**	200	545	14.5%	74%(2000)
Mashapaug	2001	2005	**15**	153	**0**	--	312	9.5%	38%(2014)
Mt. Tom	2013	2016	**0**	--	**0**	--	68	4.5%	n.a.
Squantz	1993	1996	**34**	153	**6**	133	517	9.1%	53%(2007)

Despite low Walleye directed effort and catch rates, most anglers at Coventry Lake and Mount Tom Pond were 'In Favor'/'Highly in Favor' of Walleye stockings at the lakes surveyed (Table 5). Few anglers (0 to 7%) were opposed to Walleye introduction among the three lakes surveyed. Fifty-one percent of anglers at Lake Zoar were ambivalent about the Walleye program. This is

likely due to low awareness of the program coupled with low fish availability – only 42% of anglers interviewed during the open water season at Lake Zoar were aware that Walleye were being stocked vs. 72% and 100% at Coventry during the open water and ice seasons, and 60% at Mount Tom during the ice season.

Table 5. Angler attitudes toward stocking Walleye into Coventry Lake and Lake Zoar during the open water fishing season 2016, and Mount Tom Pond and Coventry Lake during the ice fishing seasons.

	Coventry (open)	Zoar (open)	Mount Tom (ice)	Coventry (ice)
In Favor/Highly in Favor	69%	43%	75%	100%
No Opinion	24%	51%	25%	0%
Opposed/Highly Opposed	7%	6%	0%	0%
Anglers Queried	190	560	56	18

Trophy Fish Awards

Five Walleye trophy fish awards were given to anglers in 2016: three from Lake Saltonstall and two from Lake Pocotopaug. To qualify for a trophy fish award, a Walleye must be larger than 23 inches for released fish and at least five pounds for kept fish. Since 1997, there have been 167 trophy fish awards given statewide for Walleye.

Marc Fontaine with a trophy Walleye from Beach Pond through the ice in 2014 (32", 13 lbs 8 oz). DEEP FD file photo.

Discussion

Available evidence (based on night boat electrofishing and angler catches) suggests that Walleye abundance at Coventry and Gardner lakes continue to fall below expectations. As mentioned in Leonard et al. (2016), possible factors for the cause(s) of these declines include: 1) increased predation on Walleye fingerlings; 2) changes in the forage base; and 3) changes in

habitat, water chemistry or temperature. These factors should be further investigated to gain insight into the observed declines at each lake. Although adult Walleye abundance remained low at Gardner in 2016, stocking larger-size fall fingerlings shows promise as spring fingerling abundance levels were higher in spring 2016 than what was observed during the springs of 2010-14 when standard-size fingerlings were stocked the falls prior to sampling. While initially promising, effectiveness of stocking large fingerlings needs to be further evaluated to determine if recruitment to the fishery improves.

Recent population estimate data suggests that Mount Tom Pond may be developing into a Walleye fishery after four years of stocking. However, at Lake Zoar, abundance sampling and angler survey data indicate that a Walleye fishery has yet to develop after five years of stocking. Therefore, further population monitoring is needed at Lake Zoar to determine if the program is going to be successful here and if the lake should continue to be stocked.

As reported by Leonard et al. (2016), the success of Connecticut Walleye fisheries varies among lakes. In order to fully understand these fisheries recent information is needed on all WMLs. For example, relative abundance sampling for Walleye at Beach Pond has not been conducted since 2011 and the only population estimate was conducted in 2007. Although State personnel resources are currently limited, regular sampling of the WMLs remains important in tracking the relative success among and changes within our state's Walleye fisheries.

Recommendations

- Investigate reasons for the declining Walleye abundance in the eastern WMLs compared to the successes in others to further hone our management strategies.
- Determine the effectiveness of stocking larger-size fingerlings.
- Determine if newly stocked Walleye lakes (Mt. Tom Pond, Cedar Lake, West Thompson Reservoir, and Lake Zoar) are developing into quality fisheries.

Expenditures

Total Cost:	111,372
Federal Share:	83,529
State Share:	27,843

References

Eddy, S., and J.C. Underhill. 1974. Northern Fishes. University of Minnesota Press. Minneapolis.

Everhart, H.W., A.W. Eipper, and W.D. Youngs. 1975. Principles of fishery science. Cornell University Press, Ithaca, New York.

Leonard, G.H., E.B. O'Donnell, C. McDowell and J. Bender. 2007. Establishment and assessment of Walleye fisheries in Connecticut. Progress Report. 2006. Federal Aid to Sport Fish Rest. F57R. Conn. Dept. Environ. Protection, Hartford.

Leonard, G, C. McDowell, J. Davis, B. Eltz, E. O'Donnell, R. Jacobs and T. Barry. 2016. Walleye Management. Final Report. 2015. Federal Aid to Sport Fish Rest. F57R35. Conn. Dept. Energy and Environ. Protection, Hartford.

Malvestuto, S.P., W.D. Davies and W.L. Shelton. 1978. An evaluation of the roving creel survey with nonuniform probability sampling. Trans. Am. Fish. Soc. 107(2): 255-262.

Scott, W.B., and E.J. Crossman. 1973. Freshwater Fishes of Canada. Bulletin 184. Fisheries research Board of Canada, Ottawa.

Acknowledgements

We thank all of the DEEP Fisheries Division staff who assisted with data collection during 2016-17. We also thank all the Seasonal Research Assistants who participated in data collection. We also thank the Burlington State Fish Hatchery for use of their trucks and personnel to stock Walleye. Special thanks to the U.S. Fish and Wildlife Service, Federal Aid in Sport Fish Restoration for providing most of the funding. We also thank Phil Goeden of Goeden Fisheries LLC and Mark Tanner of West Central Bait Company, Inc., located in Minnesota, for providing the quality Walleye fingerlings necessary to support this program. Finally, we would like to thank Gerald Leonard (recently retired biologist) for his hard work and dedication to providing quality Walleye fisheries in the state of Connecticut.

Appendix 1. – Schnabel population estimates by size category of Walleye at Mount Tom Pond (Spring 2016). Estimates are calculated from a combination of trap nets and electrofishing.

Lake	Year	No. of Year Classes	Size ≥ 10 in.	95% CI	Density #/ac	Size ≥ 15 in.	95% CI	Density #/ac	Size ≥ 18 in.	95% CI	Density #/ac	Size ≥ 20 in.	95% CI	Density #/ac
Mt. Tom (56 acres)	2016	4	78	48-127	1.4	60	36-98	1.1	51	28-94	0.9	32	9-122	0.6

Appendix 2. – Relative abundance (electrofishing catch per hour) for all sizes, quality size (≥15 inches), legal size (≥18 inches) and large size (≥20 inches) Walleye from lakes sampled during April 1995-2016. Initial year stocked with Walleye fingerlings in parentheses.

	Gardner (1993)				Coventry (2001)				Mount Tom (2012)				Zoar (2011)			
Year	All	≥15	≥18	≥20	All	≥15	≥18	≥20	All	≥15	≥18	≥20	All	≥15	≥18	≥20
1995	35.0	0.0	0.0	0.0												
1996	45.8	27.7	1.6	0.0												
1997	NS															
1998	NS															
1999	110.0	95.6	18.2	2.2												
2000	70.9	66.9	10.8	1.9												
2001	57.0	38.8	13.7	1.0												
2002	56.4	39.1	15.5	2.3												
2003	50.8	32.8	7.0	0.0												
2004	47.9	37.4	7.8	0.9	15.9	0	0	0								
2005	57.5	45.8	20.5	5.9	25.8	1	0	0								
2006	51.4	47.2	14.2	4.2	44.9	5	0	0								
2007	NS				15.3	4.7	0	0								
2008	123.9	116.7	36.1	8.4	22.5	2.6	0	0								
2009	19.2	19.2	3.6	1.2	27.6	9.2	0	0								
2010	42.6	17.0	6.4	0.0	NS											
2011	17.3	12.4	4.9	3.7	21.4	9.5	1.2	1.2								
2012	33.3	28.6	17.9	6.0	NS											
2013[a]	10.1	8.4	2.9	1.1	33.4	10.7	2.4	2.4								
2014[a]	8.0	7.5	1.8	0.0	NS											
2015	NS				14.8	9.1	0	0	19	15.8	4.7	0	3.6	1.2	0	0
2016	9.4	7	4.7	1.2	8	6.8	0	0	21	19.6	16.8	4.2	12.1	5.5	0	0

NS = Not sampled in that year

[a] Entire lake sampled at Gardner Lake, not standard sites.