



Summary of Fishery Surveys Butternut Lake, Price County, 2008-2009 and 2013-2014

WDNR's Fisheries Management Team from Park Falls completed fyke netting and electrofishing surveys in 2008-2009 and 2013-2014 to assess the status of important fish populations in Butternut Lake. Fyke netting in mid-October yielded useful information on black crappie. Fyke nets set shortly after the spring thaw targeted walleye, muskellunge, northern pike, and yellow perch. Electrofishing surveys in late-spring documented the abundance and size structure of smallmouth bass and bluegill populations. Quality, preferred, and memorable sizes referenced in this summary are based on standard proportions of world record lengths developed for each species by the American Fisheries Society. "Keeper size" is based on known angler behavior.

Survey Effort

On October 15th, 2008 when the water temperature was 55°F we set eight fyke nets in locations chosen to intercept black crappies—usually off shoreline points in water 6 – 10 feet deep, and we fished them overnight for a total of eight net-nights. On October 8th, 2013 we set eight fyke nets at or near the sites selected in 2008 and fished them for two nights (16 net-nights) when the water was 58-59°F.

On April 27th, 2009 we set eight fyke nets at locations chosen to intercept early spring spawning fish and fished them overnight for one night (eight net-nights) when water temperature was 48°F. On May 7th, 2014 we again set eight fyke nets near the same locations as the 2009 survey and fished them overnight for two nights (16 net-nights of effort directed toward gamefish) when the water temperature was 48-49°F. In 2014 we measured or counted panfish and other non-game species captured only in our second night of netting effort (8 net-nights directed at all fish species). Comparing measured water temperature with the optimal spawning temperature range of the target species, the timing of our spring netting surveys corresponded well with peak spawning activities of northern pike, yellow perch, and walleye. In both years we fished our nets a little too early at sub-optimal water temperature to fully represent the spawning muskellunge population. In 2009 and 2014 the Great Lakes Indian Fish & Wildlife Commission (GLIFWC) estimated adult walleye density.

With water temperatures at 58-61°F in 2009 and 69-70°F in 2014, our early June electrofishing surveys were well timed to represent the relative abundance and size structure of smallmouth bass and bluegill populations during their spawning activities. In 2009 we sampled 5.03 miles of shoreline for gamefish in 2.15 hours, 4.02 miles sub-sampled for bluegills in 2.45 hours, and 1.00 mile for all fish species in 0.60 hour. In 2014, we sampled gamefish throughout 5.14 miles of shoreline in 3.10 hours, including 2.04 miles sub-sampled for bluegills in 0.90 hour and 1.04 miles sub-sampled for all fish in 0.42 hour.

Habitat Characteristics

Butternut Lake is a 1,006-acre drainage lake in northwestern Price County and southeastern Ashland County. Average depth is 14 feet, and maximum depth is 32 feet. Substrate in the littoral zone is comprised mostly of sand (75%), with smaller amounts of rock/rubble (15%), muck (5%), boulder (3%), and gravel (2%). The lake has five inlet streams of various sizes, including Butternut Creek, Spiller Creek, and Schnur Creek. The outlet is Butternut Creek, which flows into the North Fork Flambeau River with an average discharge of 16 cubic feet per second. There is no outlet structure, and lake level typically fluctuates 3 to 6 inches naturally during the open-water season.

A forested watershed with numerous wetlands contributes brown, tannin-stained water to the lake. This results in typical Secchi disk visibilities of only 3-5 feet, even at times when algae are scarce (cold-water seasons). High concentrations of total phosphorus (49 parts per billion in summer 2004) and chlorophyll *a* (22 parts per billion) – an index of algal biomass – allow us to classify Butternut Lake as eutrophic (very productive biologically). Despite its high biological productivity, Butternut Lake rarely stratifies for prolonged periods of time. Its relatively shallow mean depth, combined with a north-south orientation, allows wind induced currents to keep the lake well mixed. Subsequently, formation of a true hypolimnion (cold bottom layer of water deficient in dissolved oxygen) is rare.

There are three resorts, one private campground, and approximately 170 private homes and cottages. There are four public access sites on Butternut Lake. The main landing, Hoffman's Rocks, on the northwest shore has parking for 25 vehicles with trailers, a courtesy boarding dock, and shoreline fishing access. A small gravel boat ramp is located on Butternut Creek on the northern end of the lake, and unimproved access exists on both east and west sides of the lake.

Summary of Results

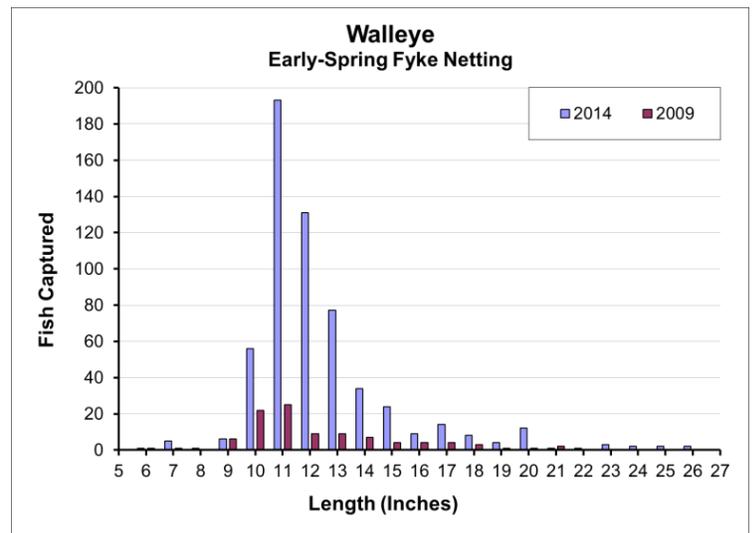
We captured 18 fish species in our netting and electrofishing surveys. Species diversity can be attributed to the connection to the Flambeau River through Butternut Creek. The principal predator species are walleyes and muskellunge. The principal prey species are yellow perch and white suckers. Four largemouth bass (3 – 11 inches) captured incidentally in fall 2008 fyke nets indicate trace abundance. We also captured a very large lake sturgeon in a spring 2007 netting survey that was measured at 76.5 inches and estimated over 130 pounds.

Walleye



Early-Spring Fyke Netting

	Number per net-night $\geq 10''$	Quality Size $\geq 15''$	Preferred Size $\geq 20''$	Memorable Size $\geq 25''$
2014	37	14%	4%	0.7%
2009	11	21%	3%	0%



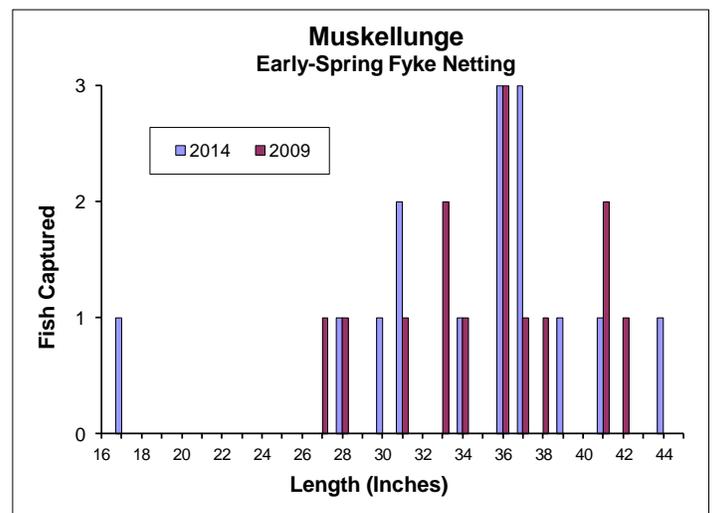
The walleye population has changed little over the past five years in Butternut Lake. Even though fyke net catch rates were much higher in 2014 than in 2009, population estimates completed by GLIFWC in 2009 (6.1 adults per acre) and 2014 (6.6 adults per acre) showed that the population remained steady within the *2005 Fisheries Management Plan's* goal of 4-8 adults per acre. The overall size structure also remained consistent in both surveys with few fish over 15 inches, falling short of the goal: of all walleye 10 inches and longer captured by fyke netting in early spring, 30-50% should be 15 inches or longer. The deficit of preferred-size walleyes stems partly from weak year classes produced in 2009 and 2010 followed by much stronger year classes in 2011 and 2012. Size structure should improve as 2- and 3-year-old fish grow to 15 inches. The primary causes of unsatisfactory walleye population size structure in Butternut Lake are slower-than-average growth rates and selective harvest of the fastest-growing walleyes. The regulation in place (no minimum size limit with one fish over 14 inches allowed) encourages harvest of the small, slow-growing walleyes and protection of the larger, faster-growing walleyes. Since walleye stocking ended in 2002, the stable population has been maintained through natural reproduction.

Muskellunge



Early-Spring Fyke Netting

	Number per net-night $\geq 20''$	Quality Size $\geq 30''$	Preferred Size $\geq 38''$	Memorable Size $\geq 42''$
2014	0.9	93%	21%	7%
2009	1.8	86%	29%	7%



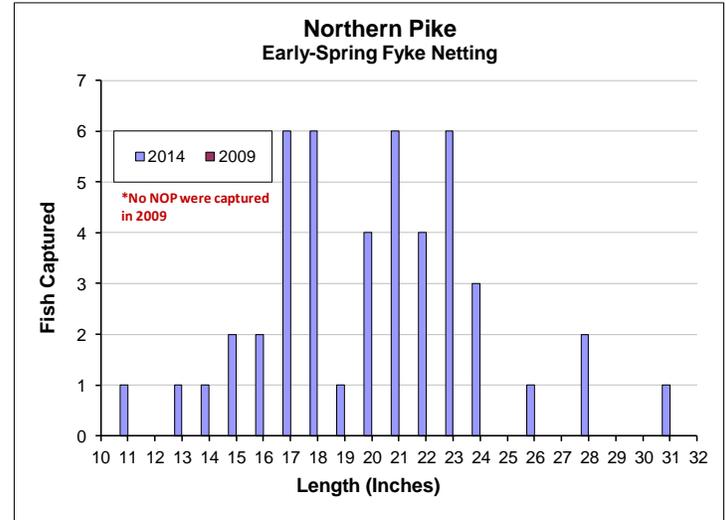
Muskellunge captured in our spring 2009 and 2014 netting surveys showed an increase in overall size structure from 2003 when only 9% of the fish captured were 38 inches or longer. In 2014 size structure still fell short of the goal in the fisheries management plan of 25-50% being 38 inches or longer. Since stocking ended in 1999, muskellunge have maintained a high abundance through natural reproduction. In efforts to reduce the population to a goal of 0.2 to 0.3 adults per acre, the Butternut & Schnur Lakes Association is encouraging selective harvest of muskellunge 28-39 inches and release of fish 40-45 inches. To facilitate this strategy the minimum length for Butternut Lake musky harvest was set at 28 inches in 2012 when the size limit on muskellunge increased from 34 to 40 inches statewide. In 2007, WDNR staff transferred 116 adult muskellunge from Butternut Lake to Lake Neshonoc in Lacrosse County to create a new musky fishing opportunity in southwest Wisconsin. Even with recent efforts, muskellunge density is still high and abundance of large forage (large yellow perch and white suckers) is not sufficient to support adequate growth rates. We observed many muskellunge in Butternut Lake from 30-40 inches that appeared to be skinny and slow growing.

Northern Pike



Early-Spring Fyke Netting

	Number per net-night $\geq 14"$	Quality Size $\geq 21"$	Preferred Size $\geq 28"$	Memorable Size $\geq 34"$
2014	2.8	51%	7%	0%
2019	0	0%	0%	0%



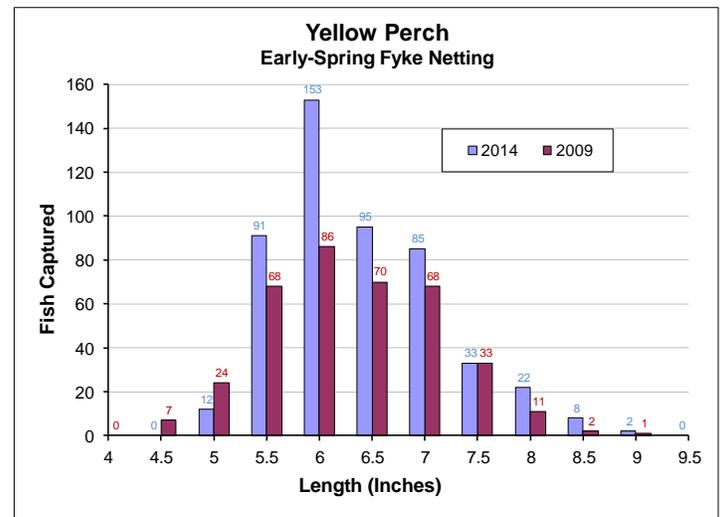
Northern pike, absent from our 2009 spring netting survey, showed a sharp increase in abundance. Yellow perch, the pike's preferred prey, were very abundant and may be a reason for the population increase over the five-year span. However, without large forage available, the size of many of the northern pike may be limited to less than memorable size (34 inches). Of the 118 largest pike that were measured in 14 tournaments from 2009-2014, the largest northern pike registered was 34¼ inches with the average pike registered being 25.9 inches. No management goals were set for northern pike in the 2005 Fisheries Management Plan.

Yellow Perch



Early-Spring Fyke Netting

	Number per net-night $\geq 5"$	Quality Size $\geq 8"$	Preferred Size $\geq 10"$
2014	160	6%	0%
2009	273	4%	0%



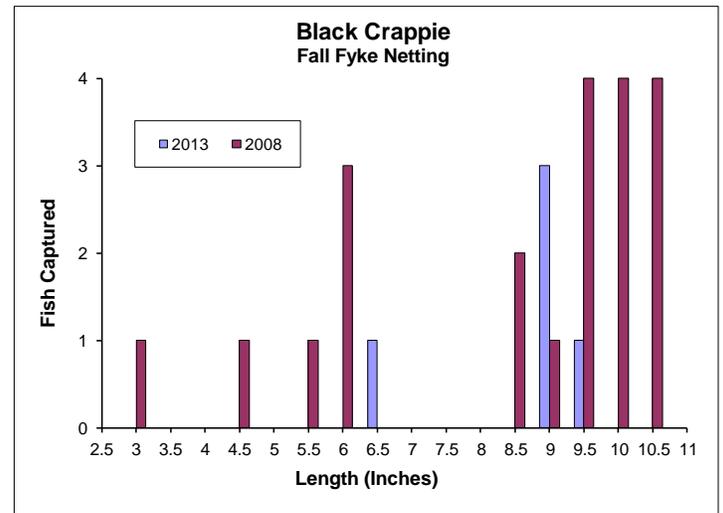
As a preferred food of walleyes, northern pike, and muskellunge, yellow perch play an important role in structuring fish community. We captured perch in our spring nets at a rate indicative of moderate to high abundance. We found very few perch of the sizes that anglers prefer to keep, and overall size structure fell well short of our goal (30-50% $\geq 8"$), an ambitious benchmark which may be unrealistic for Butternut Lake. The scarcity of perch longer than 9 inches may result from size-selective predation by muskellunge and northern pike, which typically eat more perch and larger perch in relation to their own increasing size. Perch of all sizes should continue to serve as the fundamental food of sport fish in Butternut Lake, so we may need to adjust our expectations accordingly.

Black Crappie



Fall Fyke Netting

	Number per net-night $\geq 5"$	Quality Size $\geq 8"$	Preferred Size $\geq 10"$	Memorable Size $\geq 12"$
2013	0.3	80%	0%	0%
2008	2.4	79%	42%	0%



Black crappie abundance is low in Butternut Lake, despite desires expressed and actions taken by local stakeholders for better crappie fishing opportunity. Fall netting efforts yielded very low numbers of black crappies in both the 2008 and 2013 surveys. We suspect that fall netting does not accurately represent the crappie population in Butternut Lake, possibly because crappies occupied deeper water where they were not vulnerable to capture in our nets. While tending our 2013 nets we watched anglers fishing from a boat catch preferred-size crappies in water 18 – 20 feet deep about 50 yards from one of our net sites. Consequently, we may need to adjust our survey methods to better represent crappie population status.

Based on the low sample sizes, it is difficult to assess the size structure of the population, but we suspect that it meets the goals in the *2005 Fisheries Management Plan* (30-50% $\geq 8"$ and 5-15% $\geq 10"$). Age analysis using scales taken in the fall 2008 showed crappies grow to an average of 10.0 inches in 4 years (range 9.0-10.6, n=6) and 10.3 inches in 5 years (range 9.9-10.7, n=6). Butternut Lake crappies exceeded the regional average lengths at those ages by 1.7 and 1.0 inches. Low density is allowing these fish to grow faster because of less competition. In 2012 the Butternut & Schnur Lake Association stocked 1,400 adult black crappies (averaging 6 inches) in hopes of increasing recruitment. Excessive predation by overabundant small walleye on young (age-0) crappie may be repressing crappie recruitment, not allowing the population to attain the desirable level of abundance.

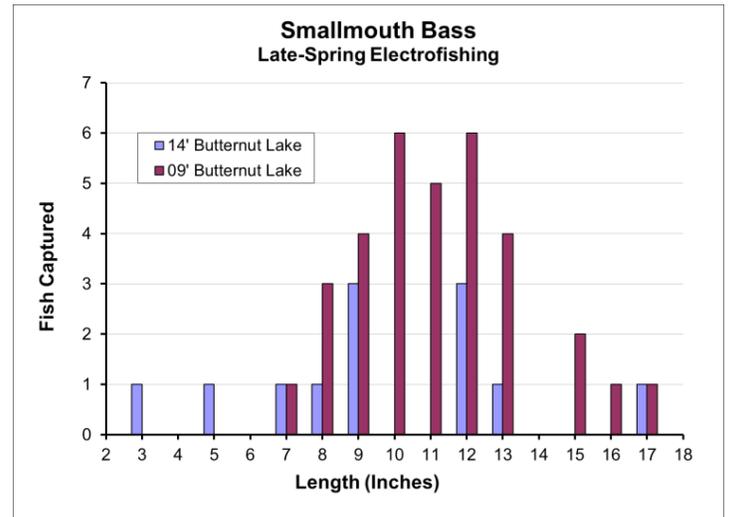
A pending proposal to limit angler harvest to 10 crappies, 10 sunfish, and 10 yellow perch in a daily bag limit of 25 panfish combined, should serve to improve crappie size structure, moderate the extremes of fluctuating crappie abundance, and distribute the harvest more equitably among Butternut Lake anglers. If approved, the new fishing regulation would take effect in April 2016.

Smallmouth Bass



Late-Spring Electrofishing

	Number per mile $\geq 7''$	Number per hour $\geq 7''$	Quality Size $\geq 11''$	Preferred Size $\geq 14''$	Memorable Size $\geq 17''$
2014	1.9	4.7	50%	10%	10%
2009	6.6	11	58%	12%	3%



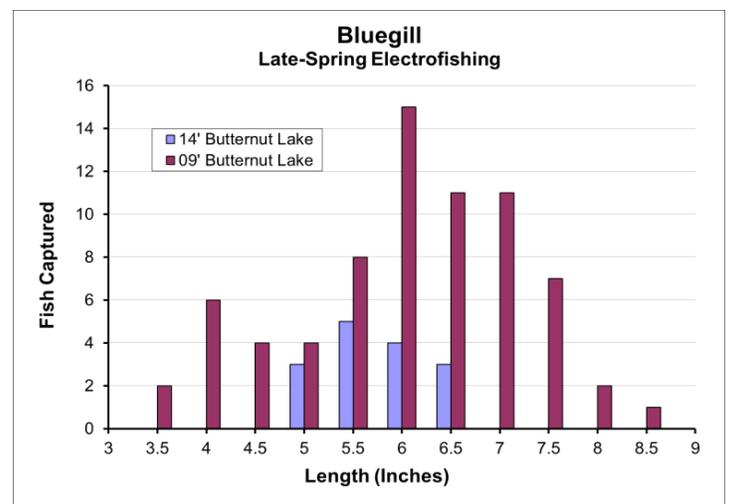
Capture rates of smallmouth bass decreased by 71% from 2009 to 2014, similar to the recent trends we noted in nearby Solberg Lake and the Phillips Chain of Lakes. This apparent decline may be due to temperature variation between surveys or to an actual decrease in population abundance. Either way, smallmouth bass were captured at rates that indicated low population abundance. Smallmouth bass typically thrive in lakes with rocky substrates that produce many crayfish and with woody structure in the near shore zone that offers cover for smallmouth bass of all ages. Butternut Lake does not offer much of this preferred habitat, but it does have some rock and crayfish, and habitat is probably not a limiting factor that affects smallmouth bass abundance. Our samples included a wide range of sizes, suggesting that Butternut Lake consistently produces smallmouth bass year classes. Because a very high percentage of smallmouth bass die shortly after hatching, year class strength is governed by subtle changes in survival rates at two early phases of development: the swim-up fry stage (influenced by environmental conditions—mainly water temperature and wind) and the late fingerling stage (influenced by the size attained in the first growing season and the energy reserves available for overwinter survival). Though we cannot predict a resulting increase in bass abundance, replacing the submerged woody habitat that landowners commonly remove along developed shorelands by installing half-logs (logs sawn longitudinally, weighted, and elevated about 1 – 1½ feet above the lakebed) and whole trees from an upland source (placed individually as “tree-drops” or in clusters as “fish sticks”) may increase available cover and angling success for smallmouth bass without compromising our objectives, provided that Butternut Lake anglers continue to practice catch-and-release as most anglers do statewide.

Bluegill



Late-Spring Electrofishing

	Number per mile $\geq 3''$	Number per hour $\geq 3''$	Quality Size $\geq 6''$	Keeper Size $\geq 7''$	Preferred Size $\geq 8''$
2014	7.4	17	47%	0%	0%
2009	18	29	66%	30%	4%



Bluegills were measured in low abundance in Butternut Lake. Population size structure was also unsatisfactory, falling short of the goal to have 10-30% \geq 8 inches long. We exerted extra electrofishing effort for bluegills to try to increase our sample size in both years. Butternut Lake seems to be better suited as walleye/perch lake rather than a bass/bluegill lake. With high walleye density and predation we predict that bluegill population abundance and size structure will remain below our objectives.

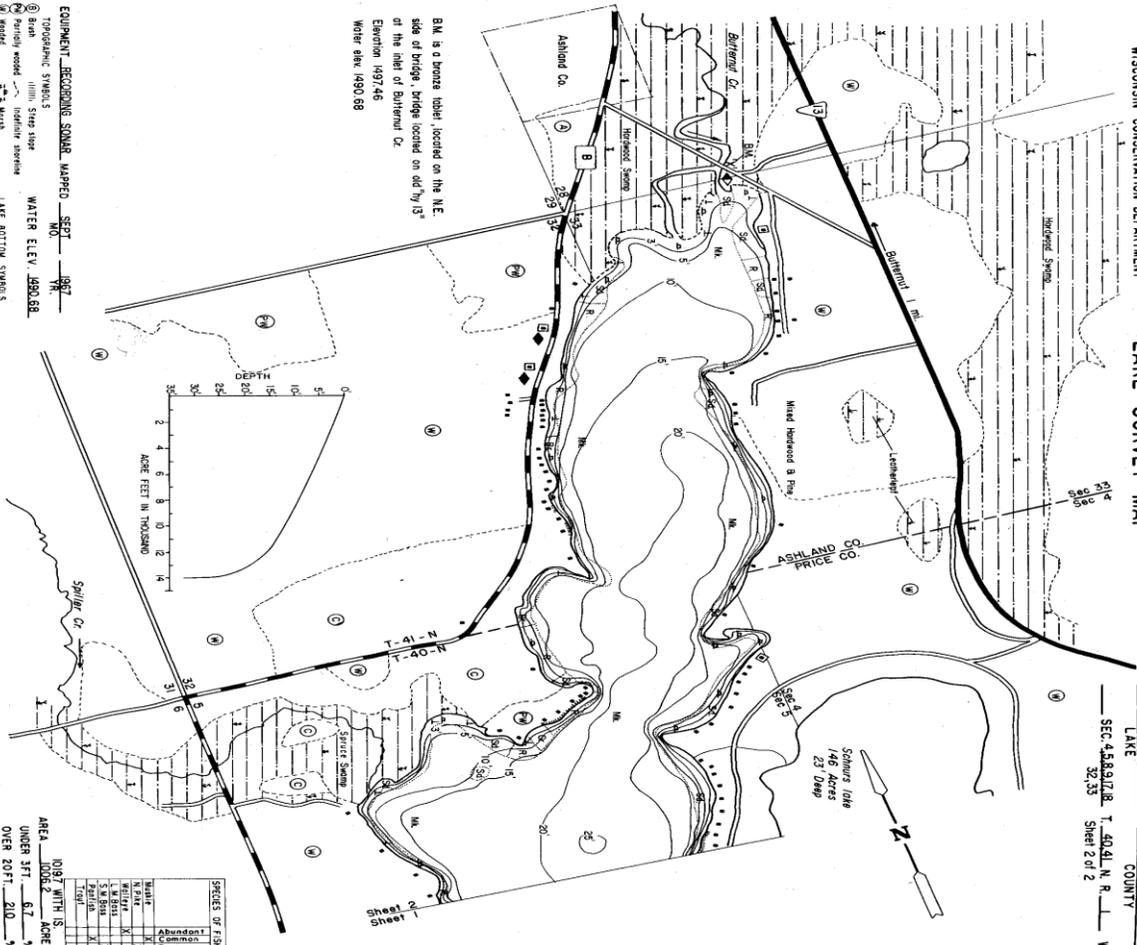
Survey data collected and analyzed by: Kendal Patrie, Greg Rublee, Jeff Scheirer, Evan Sniadajewski, Jeanette Wendler, and Jess Zakovec—WDNR Fishery Team, Park Falls.

Written by: Chad Leanna— Fishery Technician, January 2015.

Reviewed and edited by: Jeff Scheirer—Fishery Biologist, January 2015.

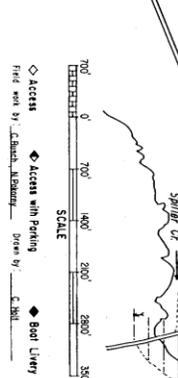
Approved for web posting by: Mike Vogelsang—acting Hayward Field Unit Supervisor, January 2015.

BUTTERNUT LAKE
 SEC. 4, S. 8, T. 40, R. 1, W.
 32.33 Sheet 2 of 2



B.M. is a bronze tower located on the NE side of bridge, bridge located on old '13' of the inlet of Butternut Cr. Elevation 1497.46. Winter elev. 1490.68

- EQUIPMENT RECORDING SOUND MAPPED
- ① Bark
 - ② Brush
 - ③ Gravel
 - ④ Sand
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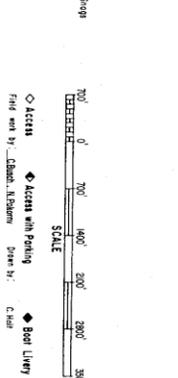


10,977 WITH IS

AREA UNDER 2 FT	ACRES
6.7	110
OVER 2 FT	210
TOTAL	320

VOLUME 14,077 ACRE FT.
 TOTAL A.K. 69 P.M.
 SHOULDER 112 FEET
 MAX DEPTH 32 FEET

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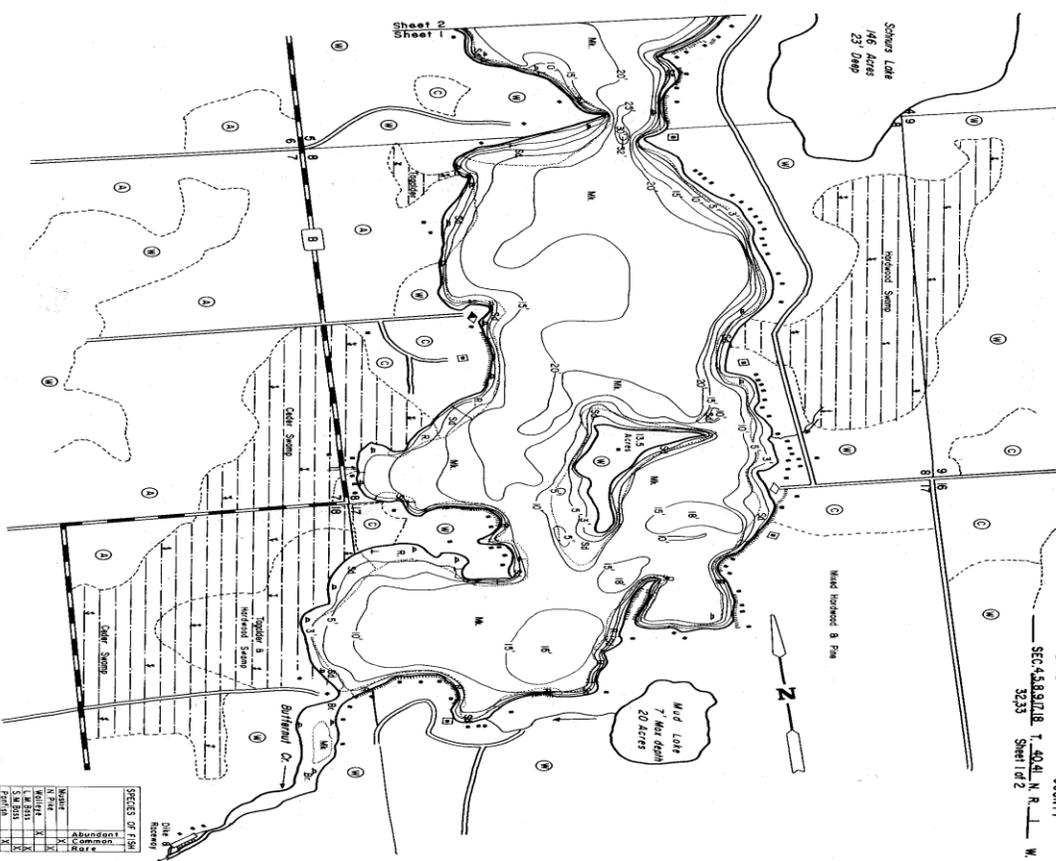


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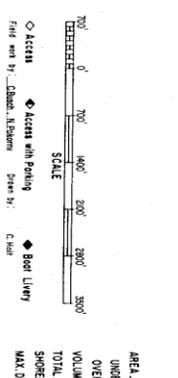
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BUTTERNUT LAKE
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 32.33 Sheet 1 of 2



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