



Summary of Fishery Surveys Boot Lake, Rusk County, 2012

WDNR's Fisheries Management Team from Park Falls completed fyke netting and electrofishing surveys in 2012 to assess the status of important fish populations in Boot Lake. Fyke nets set shortly after the spring thaw targeted walleye, muskellunge, northern pike, and yellow perch. An electrofishing survey in mid-May documented the abundance and size structure of largemouth bass and bluegill populations, and fyke netting in early October yielded useful information on black crappie. 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

We set 3 fyke nets at locations chosen to intercept early spring spawners and fished them overnight for two nights (6 net-nights of effort) during April 18-20 when water temperature was 50 – 51°F. Comparing measured water temperature with the optimal spawning temperature range of the target species, we believe our spring fyke netting occurred before the peak spawning activity of muskellunge and after that of pike, perch, and walleye. With water temperature at 68°F, our May 14 electrofishing survey was well-timed to represent the relative abundance and size structure of largemouth bass and bluegill populations during their spawning seasons. We sampled 1.98 miles of shoreline in 1.37 hours, including 1 mile sub-sampled for panfish in 0.82 hour. In our fall fyke netting survey we replicated the netting effort and net locations of our spring netting survey.

Habitat Characteristics

Boot Lake is an 87-acre seepage lake located about 8 miles south of Bruce, WI. It has 2.1 miles of shoreline, an average depth of 17 feet, and an intermittent outlet to WDNR's Washington Creek Wildlife Management Area. The lake includes a small island (0.3 acre) and three distinct basins with maximum depths of 24, 39, and 44 feet that are connected by shallow flats. About 14% of the surface area is less than 3 feet deep, and 37% is deeper than 20 feet. August Secchi disk depth measurements averaging about 8 feet show that water clarity remains very good through mid-summer. Judging from symbols on the 1965 lake map, bottom substrate appears to be equally distributed between sand and muck. Dense floating vegetation near the public boat landing and along the southeast shore provides spawning habitat for muskellunge and cover for young fish to evade predation. Tamarack-spruce bogs predominate the riparian zone, limiting residential development to the shorelands with pines and mixed hardwood near the boat landing and along the south and east shores of the largest basin. In 1999 nineteen fish cribs were installed 10 – 15 feet deep.

Summary of Results

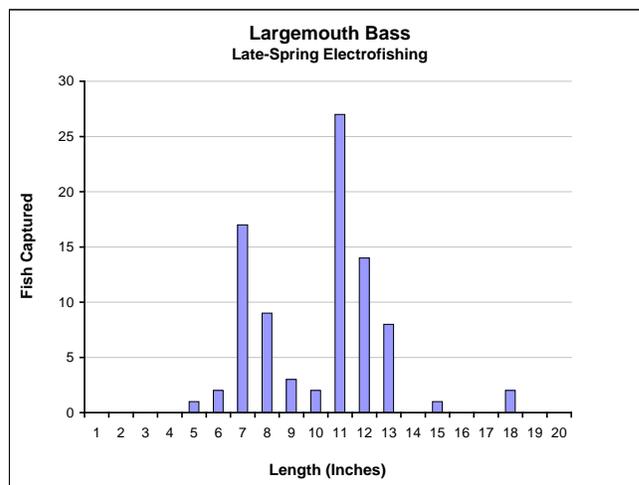
Our surveys validated the fish community that could be predicted from Boot Lake's habitat and water quality characteristics—one in which largemouth bass and bluegill fill the roles of primary predator and prey. Interactions involving muskellunge, walleye, yellow perch, and black crappies appear to have secondary importance in structuring the fish community. Fyke nets and electrofishing captured 11 species. Unlike nearby lakes that have a perennial, unobstructed connection to the Flambeau or Chippewa rivers, riverine fishes (e.g., redhorses, suckers, sturgeon, catfish, northern pike, and smallmouth bass) were absent from our samples.

Largemouth Bass



Late-Spring Electrofishing

Captured 33 per mile or 48 per hour $\geq 8''$	
Quality Size $\geq 12''$	38%
Preferred Size $\geq 15''$	5%



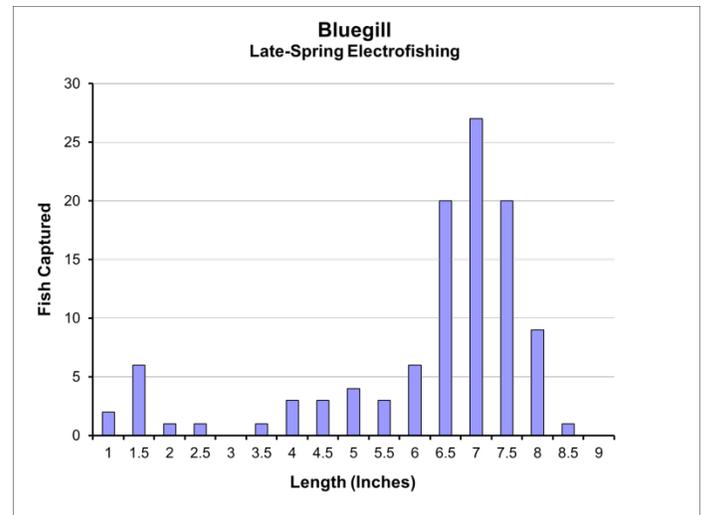
Boot Lake anglers should enjoy fast fishing action for largemouth bass, as long as size is not important. Consistent with the findings of past investigations, our 2012 electrofishing survey revealed a largemouth bass population of moderately high abundance with few individuals exceeding the legal and preferred sizes (14 and 15 inches long). Though we cannot infer population status from netting surveys, unusually high capture rates (8 and 6 fish $\geq 8''$ per net-night) and similar length distribution of largemouth bass in spring and fall fyke nets reinforced Boot Lake's reputation for producing lots of small bass. Analysis of scales showed that young bass grew slightly faster than average, but the mean length of bass ages 4 – 9 progressively declined, falling 0.9 – 4.8 inches below the regional average length at those ages. Juvenile bass appear to have sufficient food (perhaps young bluegill) to maintain satisfactory growth through age 3, but at intermediate sizes growth slowed so severely that bass still did not attain the minimum harvestable length after completing nine growing seasons (mean = 13.7 inches; n = 3). Back-calculation showed that largemouth bass starting the year at 8 – 11.9 inches long grew on average only 1.4 inches (range = 0.6 – 2.3; n = 22) by the end of the growing season. With such a modest annual gain, few bass are likely to attain legal size before the oldest bass succumb to natural causes of mortality. Despite their underperformance, slow-growing largemouth bass at high population density appear to be effectively controlling bluegill abundance to maintain satisfactory bluegill size structure in a fish community with few other capable predators. Promoting selective harvest and responsible use of largemouth bass 9 – 12 inches long under liberalized regulations could serve to reduce bass abundance and improve their size structure, but any decrease in predatory pressure on young bluegill would likely result in lower proportions of keeper- and preferred-size bluegill.

Bluegill



Late-Spring Electrofishing

Captured 121 per mile or 148 per hour ≥ 3 "	
Quality Size ≥ 6 "	86%
Keeper Size ≥ 7 "	59%
Preferred Size ≥ 8 "	10%



Electrofishing capture rates of bluegill ≥ 3 inches indicated moderate population abundance, a condition essential for maintaining satisfactory growth and size structure. Despite past difficulties in maintaining predator-prey balance in Boot Lake, the high-density population of slow-growing largemouth bass has risen to a level of abundance that is capable of preventing excessive survival of young bluegills. As a result, Boot Lake bluegills are probably growing at a rate faster than average (not actually measured), resulting in a relatively high proportion of preferred-size fish ≥ 8 inches. Anglers selectively harvesting up to 25 of the largest bluegill per day may be largely responsible for preventing any fish from achieving memorable lengths of 10 inches and longer. More restrictive panfish harvest regulations could serve to increase the percentage of bluegill ≥ 8 inches and distribute the annual harvest more equitably among anglers.

Walleye



Early Spring Fyke Nets

Captured 0.3 per net-night ≥ 10 "	
Quality Size ≥ 15 "	100%
Preferred Size ≥ 20 "	100%
Memorable Size ≥ 25 "	100%

While our survey may have followed the peak of walleye spawning activity, we are confident that the two large adults captured in early spring fyke nets accurately represent a walleye population at very low abundance with no evidence of recent recruitment—a status not unexpected in a clear water lake with a fish community in which largemouth bass are dominant and abundant. The few individuals we encountered may have originated from unauthorized and unlawful introductions; walleyes were not noted in Boot Lake until a 1995 survey. Boot Lake's sandy shorelines are not ideal as spawning substrate to support successful fertilization and incubation of walleye eggs. Predation of young walleye by abundant largemouth bass in clear water will curtail any additions to the adult walleye population.

Muskellunge



Early Spring Fyke Nets

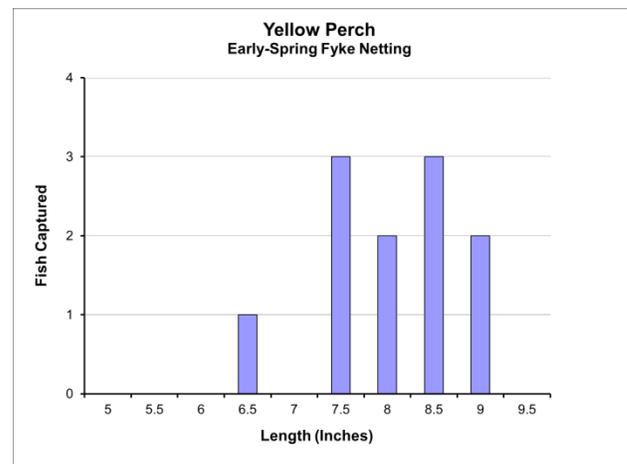
Captured 0.5 per net-night $\geq 20''$	
Quality Size $\geq 30''$	100%
Preferred Size $\geq 38''$	0%

Early spring fyke nets captured only three muskellunge 31 – 37 inches long, indicating a population of relatively low abundance. Observed water temperature led us to believe that the timing of our survey would overlap with early spawning activities, but all muskellunge captured in spring fyke nets had already released their gametes—perhaps because abnormally high and sustained air temperatures in late March raised water temperature sufficiently to trigger spawning. Since all authorized fish stocking in Boot Lake was suspended 40 years ago, the individuals encountered in our 2012 survey are the natural descendants of large muskellunge fingerlings introduced between 1966 and 1972. Habitat characteristics seem ideal for muskellunge spawning, but predation of musky eggs by bluegills and of young musky by abundant largemouth bass probably limits reproductive success and recruitment of new adults to the muskellunge population. The scarcity of yellow perch, a preferred food of all musky age classes, may prevent most muskellunge from attaining preferred size in Boot Lake.

Yellow Perch



Captured 1.8 per net-night $\geq 5''$	
Quality Size $\geq 8''$	64%
Preferred Size $\geq 10''$	0%



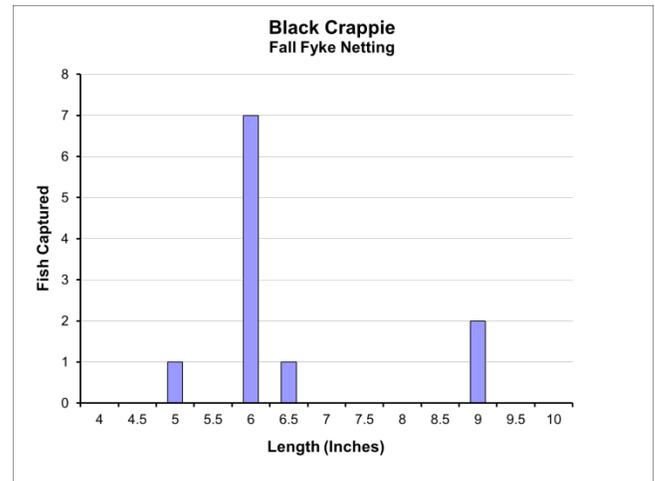
Low capture rates and mediocre length distribution of yellow perch in early spring fyke nets point towards a low-density population that does not offer the range of sizes that both anglers and muskellunge prefer. Several causes may be responsible for the scarcity of perch and the absence of perch longer than 9.5 inches. Abundant largemouth bass prefer perch as prey, and muskellunge feed selectively on the largest perch available.

Black Crappie



Fall Fyke Netting

Captured	1.8 per net-night	$\geq 5"$
Quality Size	$\geq 8"$	18%
Preferred Size	$\geq 10"$	0%

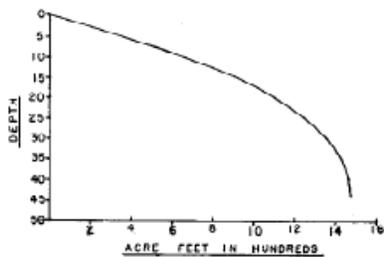


Black crappie were absent from both spring surveys, but their capture rate in fall fyke nets points toward a low-density population predominated by the 2011 year class at about 6 inches in length. Age analysis from scales revealed that crappies grew to 9.2 inches in 4 years ($n = 2$). Black crappies captured at 5.3 – 6.4 inches long had gained on average 3.6 inches in their second full season of growth ($n = 6$)—a relatively large annual increment consistent with an assessment of low density and therefore low competition for food. In small, clear lakes like Boot Lake, largemouth bass are capable of eating enough juvenile crappies to minimize crappie recruitment but maximize growth rate of the few remaining survivors.

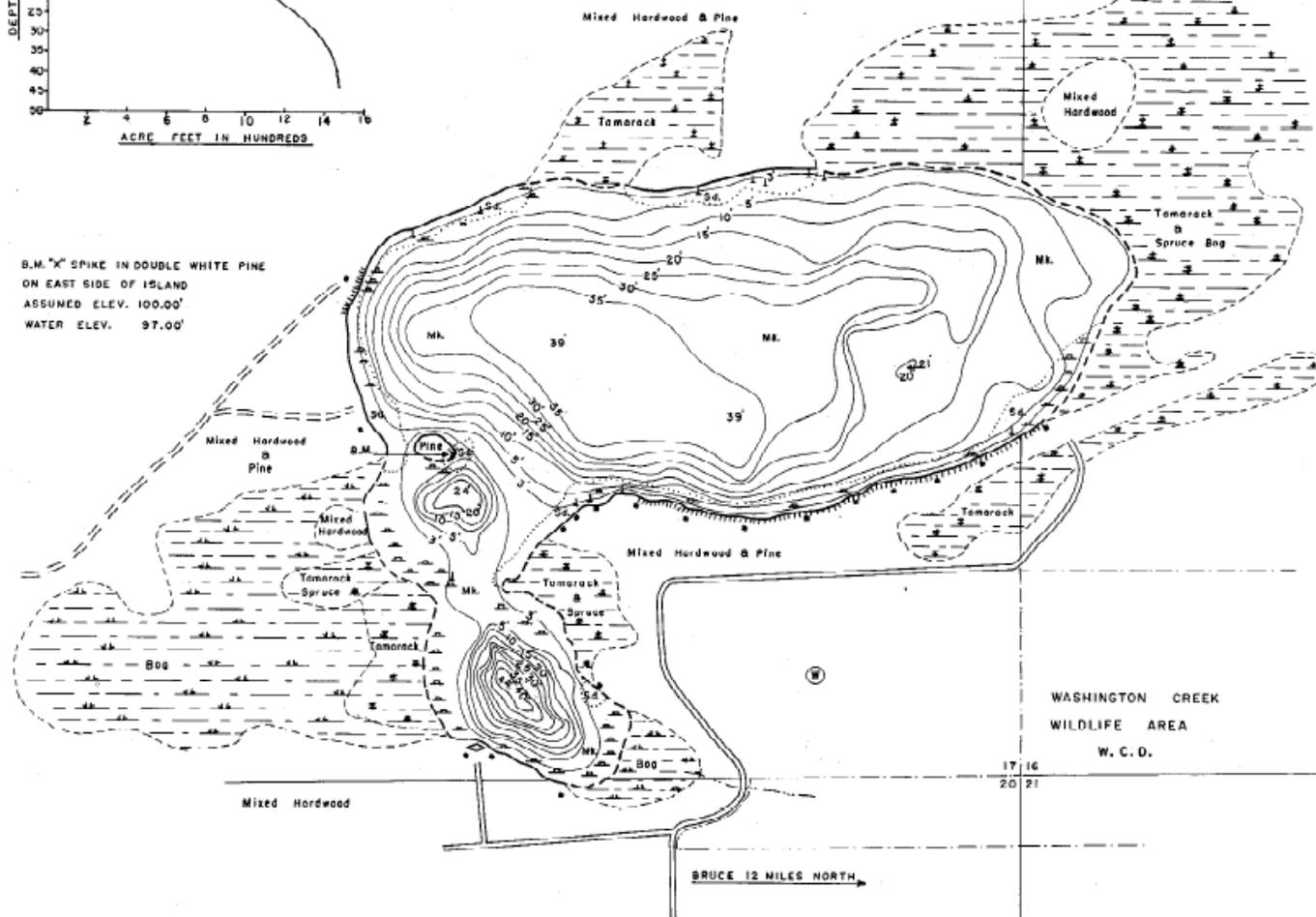
Report By: Rebecca Pawlak, Jeff Scheirer, Kendal Patrie, and Greg Rublee, 12/17/12

Edited By: Dave Neuswanger, Fisheries Supervisor, Hayward Field Unit, 5/1/13

Approved for Posting By: Steve Avelallemant, Fisheries Supervisor, Northern District, 11/07/13



B.M. "X" SPIKE IN DOUBLE WHITE PINE
ON EAST SIDE OF ISLAND
ASSUMED ELEV. 100.00'
WATER ELEV. 97.00'



EQUIPMENT RECORDING SONAR MAPPED AUGUST 1965
MO. VR.

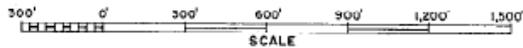
TOPOGRAPHIC SYMBOLS

- ⊙ Brush
- ⊙ Partly wooded
- ⊙ Wooded
- ⊙ Cleared
- ⊙ Pastured
- ⊙ Agricultural
- B.M. Bench Mark
- Dwelling
- ⊙ Resort
- ⊙ Steep slope
- ⊙ Indefinite shoreline
- ⊙ Marsh
- ⊙ Spring
- ⊙ Intermittent stream
- ⊙ Permanent inlet
- ⊙ Permanent outlet
- ⊙ Dam

WATER ELEV. 97.00'

LAKE BOTTOM SYMBOLS

- P. Peat
- Mk, Muck
- C. Clay
- M. Marl
- Sd. Sand
- St. Silt
- Gr. Gravel
- M. Muds
- Br. Bedrock
- T. Submergent vegetation
- ⊙ Emergent vegetation
- ⊙ Floating vegetation



◇ Access ◀ Access with Parking ▶ Boat Livery

Field work by J. Miller, M. Perkins, L. Sather Drawn by E. Eaton

WASHINGTON CREEK
WILDLIFE AREA
W. C. D.

SPECIES OF FISH

Species	Abundant	Common	Rare
Muskie			
N. Pike			
Walleye			
S. M. Bass		X	
Perch			
Trout			

86.9 WITH ISLAND
AREA 86.6 ACRES
UNDER 3 FT. 14 %
OVER 20 FT. 37 %
VOLUME 1,463.8 ACRE FT.
TOTAL ALK. 1.4 P.P.M.
SHORELINE 2.1 MILES
MAX. DEPTH 44 FEET