

Fishery Management Plan

Teal and Lost Land Lakes Sawyer County, Wisconsin

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FOREWORD AND ACKNOWLEDGMENTS

This is a long-term strategic plan that will guide our fishery management efforts on Teal and Lost Land lakes for many years to come. We believe our fishery management plans should be based upon a shared vision that is developed by combining broad-based survey information from statewide anglers and interactive input from local stakeholders. From those sources we determine user preferences in light of ecosystem capability. We believe the goals of a good plan must reflect the shared vision between users and managers; and measurable objectives must be set so we know whether selected strategies are succeeding or failing. We believe in making good tries and learning from failure. Part of that process involves amending strategic plans (like this document) when failure dictates that we either develop more realistic objectives or change our strategies to achieve reasonable objectives. This plan should be updated as needed in the decades that follow.

We call this a “long-term strategic plan” because the goals and objectives are relatively timeless, and because we possess neither the wisdom nor the authority to commit DNR or partner resources to a specific operational schedule of funding and action. Each year will bring its own fiscal constraints and operational priorities, so we must remain flexible in our implementation of proposed actions. We will do our best to justify actions we believe necessary to realize our shared vision to DNR leaders and the general public as time and circumstances permit. We promise only to consult this plan at least once annually as we allocate our time and resources to the many important projects before us.

We want to thank the Quiet Lakes Association and Mr. Jack Wellauer (Fish Committee Chair) for hosting our local stakeholder visioning session at the Spider Lake Town Hall on June 3, 2006. Their continued support for this process and this plan has given us the energy and enthusiasm needed to aggressively pursue implementation and to expand this process to other lakes in Sawyer County and the Upper Chippewa Basin.

We also want to thank the 19 local stakeholders who gave up an entire Saturday evening in order to help us develop the vision that forms the backbone of this plan. We are very pleased to incorporate their input at this appropriate stage in the planning process; and we look forward to their continued support for the actions we believe will be necessary to achieve the shared vision. We can settle for nothing less in an area where the quality of fishing means so much to our livelihoods and our quality of life.

-- Max Wolter, Frank Pratt and Dave Neuswanger

BACKGROUND

Habitat Characteristics and Limnology

Teal Lake (1,024 acres) and Lost Land Lake (1,264 acres) are connected by a 1.2-mile channel (see map in Figure 1) and are often referred to as the “Quiet Lakes” (with Ghost Lake also included in that group, but not in this plan). The Teal River Flowage extends south from Teal Lake proper to the low head dam (near State Highway 77) which creates the flowage. South of the dam the waterbody is considered the Teal River. The Teal River Flowage will not be specifically discussed in this plan but can be considered part of Teal Lake for all intents and purposes. Teal Lake has a maximum depth of 31 feet and a mean depth of 15 feet. Lost Land Lake has a maximum depth of 21 feet and a mean depth of 12 feet. Substrates of both lakes are predominantly sand, gravel, and rock, with some muck bottom bays.

The lakes sit at the headwaters of the Teal River which is in the West Fork of the Chippewa River drainage. The total watershed of the Teal River is 29,198 acres lying mostly to the north of Teal and Lost Land Lakes. Tributary streams to these lakes include Lynch Creek and an unnamed creek (T42, R6W, Section 26) to Teal Lake and Wilson Creek, Ole Creek, and an unnamed creek (T42, R6W, Section 19) to Lost Land Lake.

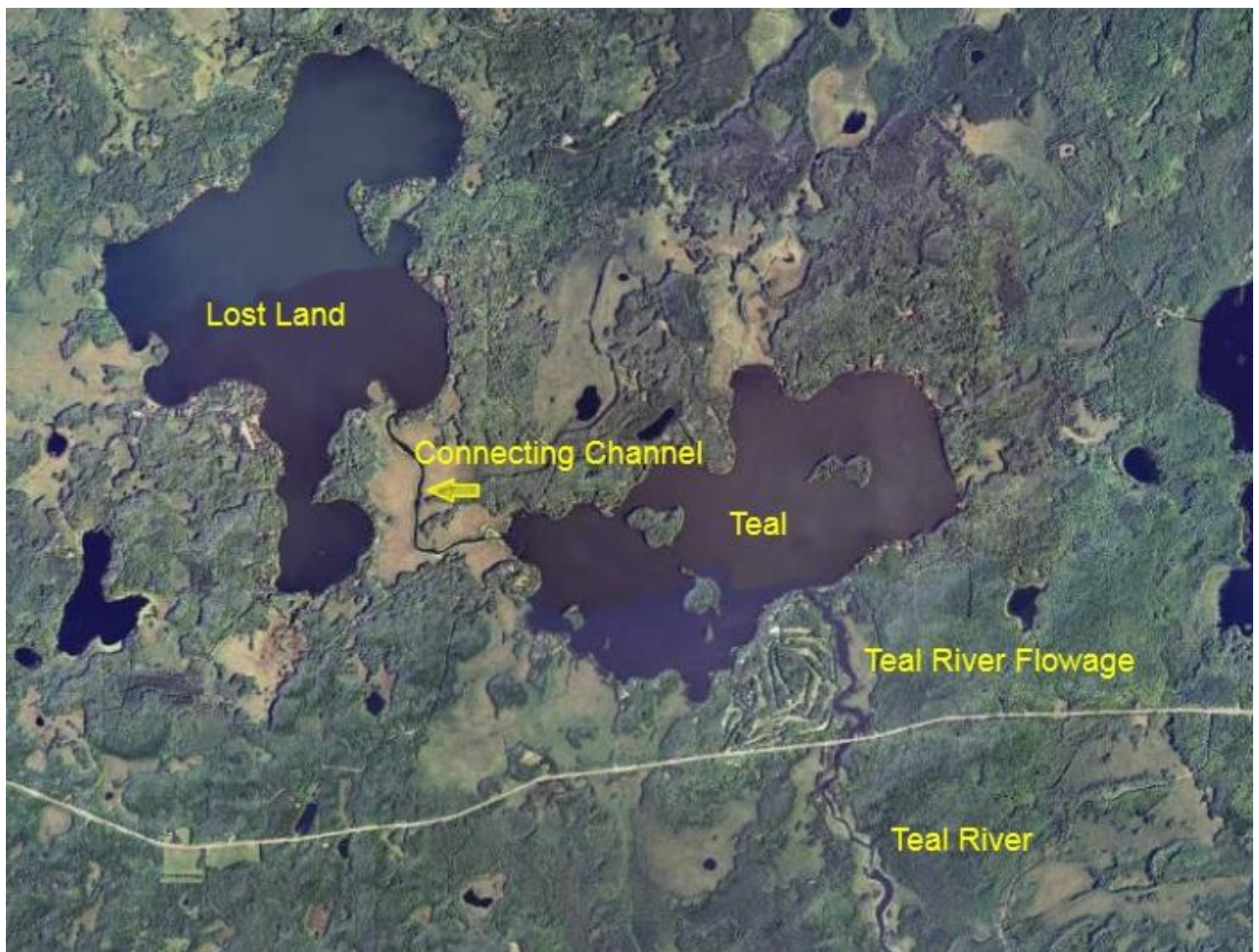


Figure 1. Map of Teal and Lost Land lakes, with connecting channel and outflowing river indicated.

Physical habitat for fish includes extensive beds of aquatic macrophytes, particularly in Lost Land Lake. Littoral wood is present but limited in both lakes. Estimates of near-shore large wood structure with at least some branching were 6.8 per mile for Teal Lake and 2.8 per mile in Lost Land Lake in 2013. Teal Lake has many rock bars and points which offer excellent fish habitat, particularly for walleye. Fish cribs have been added to both lakes at different points in time.

Both lakes are moderately productive (Table 1) and have moderate water clarity that is indicative of primary productivity and tannic stain from upstream bogs. These lakes do not have issues with excessive algal blooms and ranges of nutrients (Phosphorous, Nitrogen) are relatively normal for the area. Thermoclines are not always present in Lost Land Lake during summer months but thermoclines and oxyclines are often observed in Teal Lake.

Table 1. Most current limnological parameters for Teal Lake and Lost Land Lake.

Limnological Parameter	Absolute or Mean Value (range if known)	
	Teal Lake	Lost Land Lake
Physical Characteristics		
Surface Area	1,024 acres	1,264 acres
Volume	15,388 acre-feet	15,210 acre-feet
Maximum Depth	31 feet	21 feet
Mean Depth	15 feet	12 feet
Littoral Zone	91% of lake area <20 feet deep	99% of lake area <20 feet deep
Shoreline Distance	11.8 miles	11.3 miles
Watershed Area (direct drainage)	29,198 acres	29,198 acres
Chemistry and Primary Productivity		
Total Alkalinity	32 mg/l	37 mg/l
pH	7.7	7.7
Specific Conductance	72 micromhos/cm	80 micromhos/cm
Total Phosphorus	0.023 mg/l	0.017 mg/l
Chlorophyll <i>a</i> (July)	18.1 µg/l	6.53 µg/l
Total Nitrogen	0.68 mg/l	0.42 mg/l
Secchi Disk Visibility	6 feet (range 4-8 feet)	4 feet (range 3-6 feet)
Trophic State Index	Ranges from 45-60 (classed as Mesotrophic to slightly eutrophic)	Ranges from 45-55 (classed as Mesotrophic to slightly eutrophic)

Human Development and Public Access

Both lakes are residentially developed, with the exception of several marshy bays, the channel area, and the islands in Teal Lake. Teal Lake has 108 platted shoreline residences (not including outbuildings at residences or individual buildings at resorts) which translates to 9.2 residences per mile of shoreline. Lost Land Lake has 151 residences which translates to 13.4 residences per mile of shoreline. Public access to Teal Lake exists only through downstream passage of the channel from Lost Land Lake or upstream passage from the Teal River Flowage where there is an unimproved public ramp. There are six State-owned islands in Teal Lake that

make up 3.2 miles of total shoreline. Lost Land has public access through a State-owned boat landing on the west side of the lake which was renovated in 2018 and also through several platted access points that are a mix of State, U.S. Forest Service, and Board of Commissioners of Public Land owned shoreline totaling 0.8 miles. There are 0.8 miles of public shoreline in the channel that is owned by the U.S. Forest Service. In general, access to these lakes is limiting, and this is partially by design. The “Quiet Lakes” have a goal of maintaining a pristine wilderness experience. Local ordinances are in place to limit boat speed to 10 mph which essentially acts as a prohibition on most recreational boating activity.

Historical Perspective on the Fishery

The Quiet Lakes Chain has been regarded by local fisheries personnel as a “diverse, sustained fishery, with few obvious fishery related problems” (Paul Gottwald, 1979 report in DNR files). Fishing has increased importance in these lakes since power boating and other motorized forms of recreation are largely infeasible with the 10-mph speed limit.

Teal Lake has historically been a walleye dominated fish community. Early records indicate that in the 1930’s walleye growth was fast and the population was sustained almost completely through stocking. Over time walleye began to recruit naturally and eventually recruitment became so high that adult density was limiting growth. By 1979, 55% of the adult walleye in these lakes were less than 13 inches in length. Under those circumstances the population was exempted from size limits to allow harvest of the abundant small walleye. These conditions persisted into the early 2000’s when recruitment began to decline. That recruitment decline continued and has become the defining fishery issue for these lakes in the 21st century. There is significant movement of walleye between Lost Land and Teal lakes. A 1979 fisheries survey documented 50% of the walleye population captured in Lost Land Lake were originally tagged in Teal Lake, and about 20% vice versa. Walleye habitat, particularly for spawning, is more abundant in Teal Lake than in Lost Land.

Muskellunge populations in these lakes were historically relatively dense (close to 1 per acre in 1979) and were supported by a mix of stocking and natural recruitment. Stocking of muskellunge has been continual since the 1930’s. A 1979 report estimated that 40% of the muskellunge population at that time was stocked fish and the other 60% was naturally born. Like most northern Wisconsin lakes during the early to mid-1900’s, size structure was kept in check by high rates of exploitation. Harvest of muskellunge in the 1970’s was estimated to be in the range of 450-750 fish annually from the Quiet Lakes Chain (estimated 33% exploitation, example in Photo 1). Northern pike are a relatively new species to these lakes. Pike were most likely introduced illegally sometime in the 1990’s. Hybrid muskellunge x northern pike crosses (tiger muskellunge) have been observed.

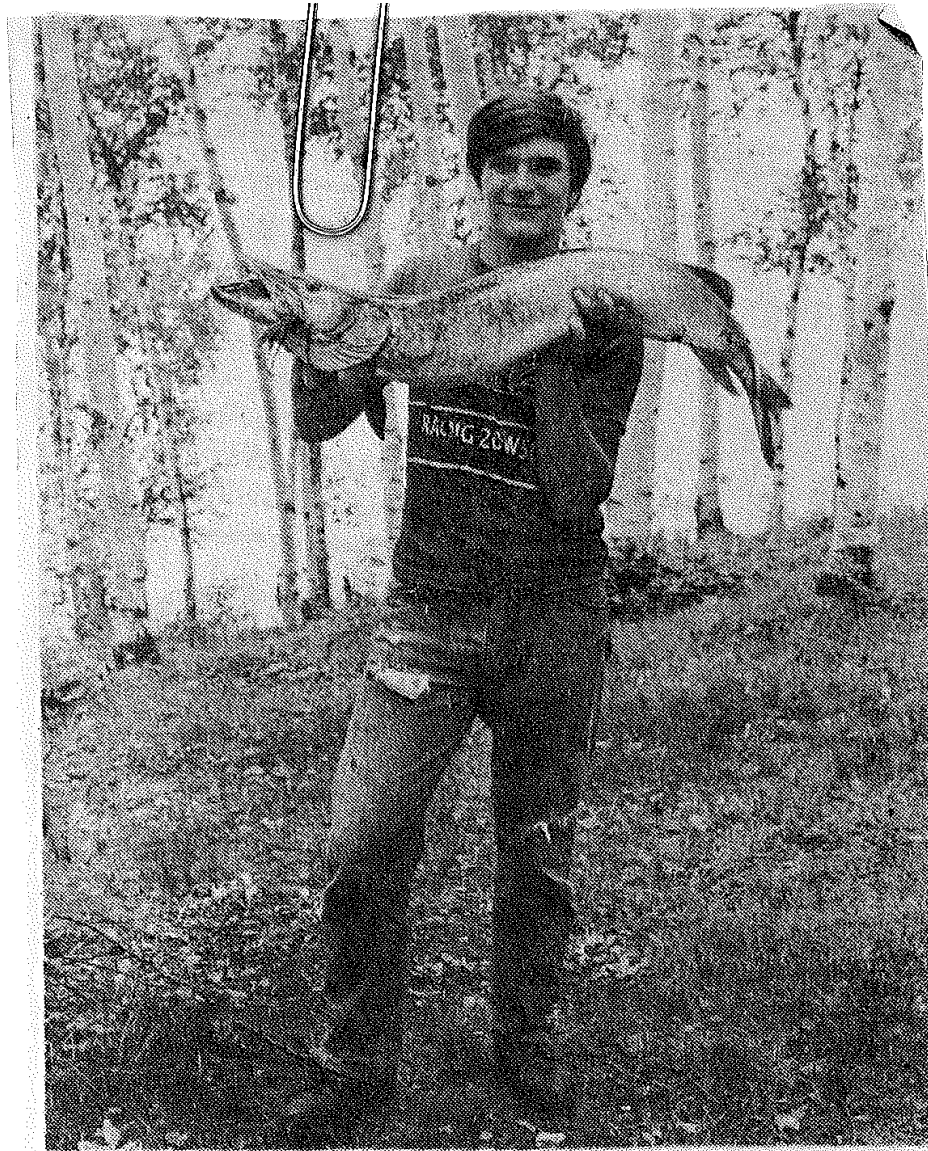


Photo 1. Like most lakes in northern Wisconsin muskellunge were harvested at high rates up until the 1980's when catch and release started to become popular and regulations became more restrictive. Today muskellunge harvest rate by sport anglers is close to 0%.

Largemouth bass have historically been more prevalent in Lost Land Lake while smallmouth bass are more abundant in Teal Lake. Habitat in Lost Land Lake is more favorable to largemouth bass than smallmouth bass, and arguably, is more favorable for largemouth bass than any other predator species. Both bass species were stocked up until 1950.

Early records from the 1930's indicate that there were perceived issues with overabundance of yellow perch and rock bass. Abundance and poor size of these species has been a recurring theme in fisheries investigations throughout the history of these lakes. Additionally, the Quiet Lakes Chain has never been known for consistent production of quality bluegill. Crappie however have been a very popular target species over the years, particularly through the ice. There is a very productive winter fishery for crappie in Lost Land Lake while angler success for crappie through the ice is remarkably low in Teal Lake. There is no established explanation for this phenomenon. It is possible that a mass migration of crappie into Lost Land occurs before winter. It is also possible that anglers have not yet discovered the winter holding areas for crappie in Teal, the deeper of the two lakes. Crappie formerly attained excellent size which was attributed to the historically dense

walleye population that kept crappie recruitment in check. Exploitation of crappie has been high. A combination of exploitation and higher recruitment are likely responsible for the decreased size of crappie present after 2000.

Common carp are present in these lakes but have always persisted in a low-density state with very little, and certainly not problematic, recruitment. There is no indication that common carp density will increase beyond a background level, assuming water quality, fish habitat and a sufficient density of predator species can be maintained.

Two endangered and threatened species have been documented in these lakes, Iowa darters and greater redhorse. Sturgeon are also native to these headwater lakes (Photo 2) but natural recruitment is assumed to be non-existent and new migrants cannot enter the lake. The few remaining sturgeon are likely very old and once they are gone it is unlikely that there will be sturgeon in these lakes again.



Photo 2. A large sturgeon caught on hook and line from Teal Lake. The fish died upon release and was turned over to the DNR- photograph from ~1987.

In the late 1930's muskellunge, walleye, panfish, and both bass species were stocked into Teal Lake (Summary of stocking activities can be found in Appendix B). Muskies were stocked along with suckers in the 1940's. From the 1940's to 1960's there were alternate stocking events of walleye and muskellunge. Muskellunge have been stocking continuously since the 1930's with a gradual shift from stocking high numbers of small fingerlings/fry to smaller numbers of larger fingerlings. In the 1970's it was recommended that walleye stocking be discontinued since the population was self-sustaining at that point. Walleye stocking resumed again in the 1990's with a shift in emphasis from small fingerlings and fry to large fingerlings which have better survival in lakes with abundant largemouth bass.

What anglers fish for and catch in these lakes

DNR conducts periodic on-water creel surveys of anglers. These surveys use roving creel clerks to *estimate* effort, catch, and harvest, during the gamefish season (first Saturday in May to end of first weekend in March). From these data we can learn a lot about how anglers spend their time, what success they have for different species, and how many they harvest. Unfortunately, the most *recent* creel data for Lost Land and Teal Lakes dates back to 2004. We present those data here, in the “Historical Perspective on the Fishery” section, with an understanding that their applicability to present day may be limited.

In 2004, muskellunge were the most popularly targeted species in both lakes, as measured by the total number of hours anglers spent pursuing them (Table 2). This is reflective of the unique and quality musky fishery, and to some extent the lesser quality of panfishing opportunities in the Quiet Lakes. In creels of most other area lakes, panfish species tend to be the top target. Black crappie were the second most targeted species in Lost Land Lake, followed by northern pike (surprisingly) and then walleye. Bass were targeted by a fair number of anglers in Lost Land Lake. In Teal Lake walleye were the number two species with crappie following and no other species particularly close to those top three of musky, walleye, and crappie.

Catch rates varied considerably between the two lakes for several species. Walleye catch rate (measured as hours fished per individual fish caught) was considerably better in Teal Lake than Lost Land. Smallmouth bass were also caught at a much faster rate in Teal. Largemouth bass and black crappie were caught at a faster rate in Lost Land Lake. Catch rates for other species were largely similar between the two lakes.

Popularly harvested fish in both lakes included walleye and black crappie. Muskellunge harvest was expectedly low, a function of restrictive minimum length limits and voluntary catch and release. Harvest rates for bass species were also low, though some harvest of each species was observed in 2004. In Lost Land, 12% of all pike caught were harvested and 10% were kept in Teal. Those rates are not uncommon for the area despite liberal pike regulations and encouragement for anglers to harvest more. Despite high catch rates, relatively few bluegill and yellow perch were harvested. This can be an indicator of poor panfish size, as anglers are not likely to keep smaller panfish if that is all they are catching.

Table 2. Estimates of effort, catch, and harvest of popular species in Lost Land (top) and Teal (bottom) lakes from a 2004 creel survey conducted on each lake.

Lost Land

Species	Hours fished (% of total)	Estimated Catch	Hours per catch	Estimated harvest (#/acre)
Walleye	9,901 (17.6%)	1,090	9.1	444 (0.4)
Muskellunge	26,202 (46.7%)	940	27.9	0 (0)
Black Crappie	15,709 (28.0%)	28,826	0.5	10,726 (8.5)
Smallmouth Bass	5,590 (10.0%)	450	12.4	29 (<0.1)
Largemouth Bass	7,054 (12.6%)	5,776	1.2	78 (0.1)
Northern Pike	11,074 (19.8%)	8,665	1.3	1,042 (0.8)
Bluegill	4,456 (7.9%)	17,161	0.3	1,522 (1.2)
Yellow Perch	1,167 (2.1%)	4,634	0.3	650 (0.5)

Teal

Species	Hours fished (% of total)	Estimated Catch	Hours per catch	Estimated harvest (#/acre)
Walleye	7,542 (27.7%)	6,596	1.1	818 (0.8)
Muskellunge	15,286 (56.2%)	663	23.1	17* (<0.1)
Black Crappie	4,757 (17.5%)	4,137	1.1	2,115 (2.1)
Smallmouth Bass	2,152 (7.9%)	445	4.8	11 (<0.1)
Largemouth Bass	1,916 (7.0%)	601	3.2	0 (0)
Northern Pike	1,460 (5.4%)	782	1.9	77 (0.1)
Bluegill	1,555 (5.7%)	4,913	0.3	1,079 (1.1)
Yellow Perch	905 (3.3)	1,178	0.8	84 (0.1)

*While the estimate for muskellunge harvested is 17 in Teal Lake, it is important to understand that these numbers are based on extrapolations. It is likely that only one or two muskellunge were actually observed to be harvested by creel clerks, but since creel clerks are not on the water continually, that one or two fish gets extrapolated to the estimate you see here. In general, accurately estimating harvest for a species like muskellunge, where fish are caught rarely and harvested even more rarely, is challenging.

Aquatic Community Overview

Lost Land and the Teal River Flowage are shallower and more heavily vegetated than Teal Lake. Common aquatic plant species in these lakes include white water lily, pickerel weed, common waterweed, slender naiad, cattails spp., coontail, Potamogeton spp., Myriophyllum spp., Vallisneria spp., Nuphar spp., Nymphaea sp., Elodea sp., Sagittaria sp., Scirpus sp., among others. Hybrid Eurasian water milfoil has been detected in Lost Land Lake, but has yet to be observed in Teal Lake. Management actions to control the spread of Eurasian water milfoil and hybrid Eurasian water milfoil are being investigated.

Both lakes support waterfowl and furbearer production, with the channel and marshy bays being particularly attractive for these animals. Various species of turtles and amphibians are present. Eagles and ospreys nest on the shores of these lakes and are popular for wildlife observers.

A Vision for the Fisheries of Teal and Lost Land Lakes

On June 3, 2006, DNR representatives Frank Pratt and Dave Neuswanger met with approximately 19 local stakeholders who were willing to volunteer their time to help develop a long-term vision for the fisheries of Teal and Lost Land lakes (a.k.a. “The Quiet Lakes”) in Sawyer County. Objectives of the meeting were to prioritize species of interest, and then to identify for those species the relative importance of numbers versus size and catch versus harvest. Attention was then focused on identifying the desired conditions (goals and objectives) that appear in this plan. Actual verbiage of goals and objectives for walleye, muskellunge, and black crappie was developed by consensus of local stakeholders in consultation with Frank Pratt, who served as technical advisor to the group on what was possible. However, little attention was given to methods for achieving goals and objectives (management strategies such as harvest regulations, fish stockings, and habitat preservation or enhancement). It was understood and generally agreed that professional fishery managers would select the most appropriate strategies once goals and objectives had been developed with help from local stakeholders and adjusted to incorporate what is known about statewide angler preference and the capacity of these lakes to produce what is desired.

Detailed results of the visioning session appear in Appendix A. Participants wanted to record their species preference responses separately in case there were substantial differences between Teal and Lost Land lakes. Therefore, in Table A1 the first number in each cell represents responses for Teal Lake, and the second number represents responses for Lost Land Lake. In both lakes, sport fishing interest was very high for walleye and muskellunge and very low for northern pike and yellow perch. Crappie and bass were viewed somewhat differently between the lakes. Participants believed their preferences for size versus number and catch-and-release versus harvest were not dependent upon which lake they were fishing, so responses to those questions were combined in Table A2.

Walleye were the species of greatest sport fishing interest among local stakeholders in the Quiet Lakes fisheries (Table A1). It was recognized that Teal Lake has greater potential for natural recruitment of walleye than Lost Land Lake. Those differences resulted in different walleye population goals for each lake, such that Teal Lake usually will have more but smaller walleye, on average, than Lost Land Lake. This will provide diversity of opportunity within the connected lake system and is consistent with the habitats and fish community structure of each lake. Local stakeholders preferred a balance between numbers and sizes (Table A2). Nobody wanted a “trophy fishery” for walleye, but nobody advocated maximum sustainable harvest either.

Muskellunge were almost as important as walleye to local stakeholders; though unlike walleye, a few participants had no interest whatsoever in muskellunge (Table A1). The vast majority of visioning session respondents preferred to release the muskies they catch; and there was almost unanimous preference for maintaining balance between numbers and size (Table A2), indicating that local stakeholders desire neither a strictly “numbers fishery” nor a strictly “trophy fishery” for muskellunge in Teal and Lost Land lakes. The two lakes have similar musky fishery potential, including the potential to produce an occasional fish over 50 inches long. Therefore, the same goal and objectives will apply to both lakes and will reflect local stakeholder interests in moderate numbers but above-average size structure of muskellunge.

As in most area waters, black crappies were important to local stakeholders in the Quiet Lakes fisheries, though it was obvious that interest in the crappie fishery was even higher in Lost Land Lake than in Teal Lake (Table A1), probably because Lost Land Lake has a history of

producing more crappie. Local stakeholders strongly favored balance between numbers and sizes, and they did not expect the lakes to be managed for maximum sustainable harvest (Table A2). It seemed that local stakeholders would be willing to support strategies, including reduced-harvest strategies if necessary, that would maintain low to moderate numbers of crappie in Teal Lake and moderate numbers of crappie in Lost Land Lake, with moderate proportions of 10-inch fish in both lakes.

Smallmouth bass were of moderate importance to local stakeholders in the Quiet Lakes fisheries (Table A1). All visioning session respondents were inclined to release most or all of the smallmouth bass they caught, and there was slightly more interest in size than in numbers (Table A2). The visioning session was beginning to run long (four hours) by the time we got around to developing goals and objectives for smallmouth bass. Participants were getting tired. They indicated general satisfaction with the existing fishery and a willingness to trust our judgment in characterizing and maintaining it. We developed goals and objectives that we believe reflect current uncertainties and the preferences of a majority of stakeholders.

Largemouth bass, northern pike, and yellow perch were of limited interest to local stakeholders in the Quiet Lakes fisheries, but there was insufficient time and interest to develop individual objectives for those species.

Overall, this was a very positive session in which everyone, including DNR representatives, learned a great deal. We are confident that we can develop strategies that reflect the preferences and desires of local stakeholders and other anglers who visit the area.

The results of this visioning session were consistent with results obtained in a mail survey of members of the Quiet Lakes Association by Fish Committee Chair, Jack Wellauer, in December of 2002. When the 60+ respondents to Mr. Wellauer's survey were asked which two species they targeted most often while fishing Teal and/or Lost Land lakes, the responses were evenly split among walleye, muskellunge, and crappie/panfish – all species that emerged from our visioning session as top priorities for management. Fewer than 10% of mail survey respondents targeted bass in either lake, and none targeted northern pike. We appreciate and acknowledge Mr. Wellauer's effort in providing data confirming that walleye, muskellunge, and black crappie should be our top priority species for management in Teal and Lost Land lakes. We also appreciate and acknowledge the receipt of several letters from visioning session attendees and some who could not attend, who expressed their support for preservation of the unique character of these Quiet Lakes, and of the fishing experiences that have and will continue to make these waters so special.

Two criticisms of the later drafts of these Fishery Management Plans in Sawyer County is the amount of time that elapsed between Visioning Sessions (2006, in this case) and plan implementation (2018), and whether the number of stakeholders at the Visioning Session was adequate. To address these concerns, we conducted a follow-up survey of anglers on the Quiet Lakes and other area lakes to gauge whether preferences were consistent over time and under a larger sample size. We found overwhelming similarities in the feedback we received between the online format and in-person sessions. We believe this gives support for management goals and species preferences included in this plan. A summary of the results from the online survey can be found in Appendix C.

THE PLAN

The following goals and objectives were developed with significant input from stakeholders in the fishery. We agree they are desirable and achievable. Stakeholders were not consulted about management strategies. Recommended strategies represent a local consensus agreement between Plan authors regarding actions necessary to achieve the goals and objectives.

GOAL 1A: A walleye population in **Teal Lake** of moderate to high density with a low to moderate proportion of quality-size fish.

Objective 1A.1: 4-8 adult walleye per acre in spring population estimates in Teal Lake

Objective 1A.2: Of all walleye 10 inches and longer captured by fyke netting in early spring, 10-20% should be 15 inches or longer (PSD = 10-20%) in Teal Lake.

GOAL 1B: A walleye population in **Lost Land Lake** of moderate density with a moderate to high proportion of quality-size fish.

Objective 1B.1: 2-4 adult walleye per acre in spring population estimates in Lost Land

Objective 1B.2: Of all walleye 10 inches and longer captured by fyke netting in early spring, 20-40% should be 15 inches or longer (PSD = 20-40%) in Lost Land Lake.

Walleye Status and Management Strategies:

Managing for walleye abundance objectives (1A.1 and 1B.1) will be challenging in light of recent declines in natural recruitment of walleye both regionally and locally. The objective for abundance in Lost Land Lake (2-4 adult walleye per acre) will be particularly challenging considering that the population has never been observed to meet that mark (Table 3). Walleye abundance in Teal frequently met objective levels in this plan historically.

Table 3. Estimates of adult walleye abundance in Lost Land and Teal lakes since 1990 from mark recapture population estimates.

Year	Lost Land	Teal
1990	792 (0.60/acre)	4,645 (4.42/acre)
1991	528 (0.40/acre)	5,143 (4.90/acre)
2000	563 (0.43/acre)	7,722 (7.26/acre)
2004	688 (0.50/acre)	4,897 (5.30/acre)

Walleye recruitment (# of young walleye surviving their first summer in the lake) in Lost Land and Teal lakes has never been highly consistent, but the lakes had a history of occasionally producing large year classes that would sustain the population (Figure 2) in combination with occasional stocking. However, walleye recruitment in both lakes has declined to extremely low levels, with no large year classes observed since the early 2000s. A recent population estimate is not available for either lake, but we expect lower walleye abundance has resulted from prolonged poor recruitment. Extended growth walleye have been stocked into both lakes repeatedly in recent years (Appendix B), but stocking success typically does not match the abundance delivered by naturally produced year classes (Nate et al. 2000). The lack of natural recruitment is a region-wide phenomenon that appears to be linked to climate change (Hansen et al. 2017), offering no easy solutions for individual lakes that are struggling. Stocking is a viable short-term strategy,

particularly in Teal Lake where stocking success is high compared to other Sawyer County lakes (unpublished data, DNR files). Managing predators more effectively (particularly largemouth bass and possibly northern pike) may lead to increased stocking survival and slightly better odds of natural reproduction success. There is no indication that habitat improvements would increase the odds of successful walleye reproduction, as habitat in both lakes remains excellent and largely unchanged from when natural reproduction was occurring.

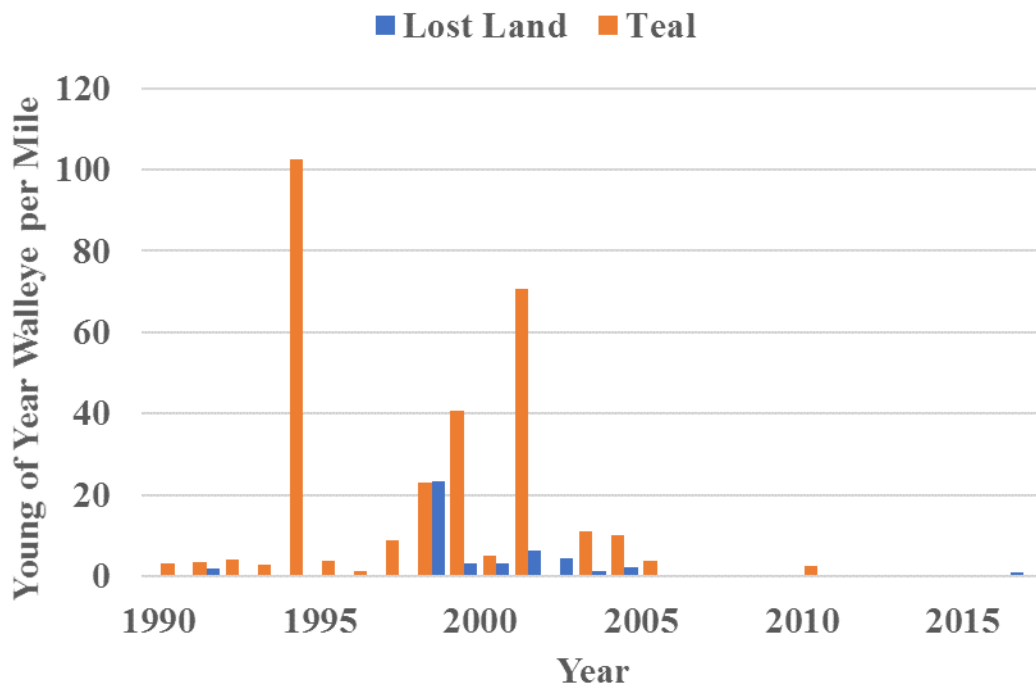


Figure 2. Walleye recruitment history in Lost Land and Teal lakes. Walleye recruitment is indexed during fall electrofishing surveys.

Size structure objectives for walleye (1A.2 and 1B.2) represent populations with good balance between the numbers of young/small and old/large fish, characteristic of a naturally reproducing population. Under a low density, stocked status, these objectives may be very difficult to meet, particularly in Lost Land Lake. Since the early 2000s when natural reproduction diminished, size of walleye increased to the point that both lakes had an average size of walleye that exceeded 20 inches around 2010-2014 (Table 4). While this might sound appealing to anglers, it is symptomatic of the recruitment issue in these lakes. The average length was high because there were very few young fish coming into the system to balance out the population. Under this status, size of walleye far exceeds the target range established in this plan (particularly for Lost Land Lake). There are indications that stocking has increased the abundance of walleye in Teal and some amount of balance is returning to the size structure (note the declining average size between 2014-2018 and size histogram in Figure 3). But more work will need to be done in both lakes to promote recruitment of new walleye. If the walleye fishery continues to be a “stocked only” population, new goals and objectives for walleye may need to be approached.

Table 4. Size structure metrics for walleye in Lost Land and Teal lakes from available survey data (1978-2018).

Year	Lost Land		Teal	
	Avg. Length (in.)	PSD* (% >15 inches)	Avg. Length (in.)	PSD* (% >15 inches)
1978	NA	NA	13.1	18
1990	17.1	60	14.8	35
2004	17.4	68	15.1	42
2010	20.9	98	18.8	74
2014	NA	NA	21.1	91
2018	20.5	96	15.0	39

*PSD stands for “Proportional Stock Density”, which is a fisheries term that identifies the percentage over a given length that also meet a minimum length cutoff. In this instance, PSD is the percentage of walleye over 15 inches, with only fish over 10 inches included in the calculation.

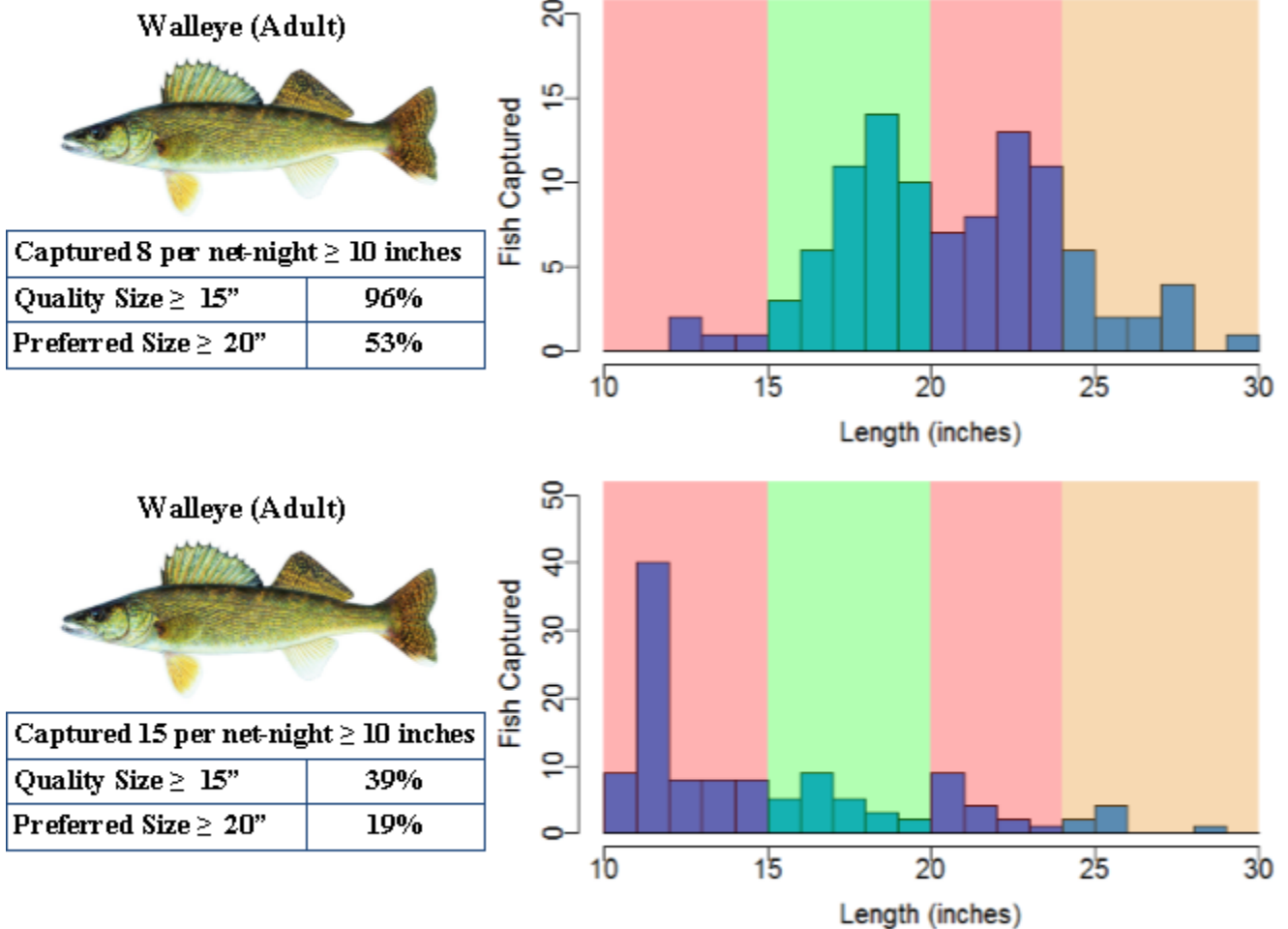


Figure 3. Statistics on walleye catch rate and size from a spring 2018 netting survey in Lost Land (top) and Teal (bottom) lakes. Shaded portions indicate fishing regulations (green = harvest up to 3, yellow = harvest no more than 1, red = no harvest).

Strategies for attaining walleye abundance and size objectives are limited, considering the scope of the recruitment problem may be beyond local control. More restrictive length limits are now in place to protect walleye until they have had a chance to spawn at least once. This is

common practice in stocked populations. Continuing to promote policies that limit the abundance of competitors may improve conditions for walleye. In 2016, the minimum length limit was removed for largemouth bass in response to the high abundance and poor size of that species. Anglers have been encouraged to harvest smaller largemouth bass to control the abundance of that species. While direct benefits of that policy to walleye recruitment have not been proven, there is reason to believe that lower largemouth bass abundance will have a range of benefits to the fishery, including better largemouth bass size structure. Actions that promote preferred walleye prey such as yellow perch should also be explored. Enhancing shoreline woody habitat may benefit perch reproduction, which could have positive impacts on walleye. Lastly, continuing to maintain high-quality walleye spawning habitat (cobble and gravel shorelines and bars) will ensure that natural reproduction of walleye will continue to be possible in the future should environmental conditions allow it.

GOAL 2: A muskellunge population in **both lakes** of moderate density with a moderate proportion of memorable-size fish and a low proportion of trophy-size fish.

Objective 2.1: 0.3 to 0.4 adult muskellunge per acre in spring population estimates

Objective 2.2: Of all muskellunge 20 inches and longer captured by fyke netting in early spring, 15-25% should be 42 inches or longer ($RSD_{42} = 15\text{-}25\%$).

Muskellunge Status and Management Strategies:

Muskellunge are native to the Quiet Lakes and have always been a popular species. Both lakes are considered “A2” muskellunge waters, which indicates high quality fishing and a tendency for more action with just average size in comparison to other lakes. Both lakes are supported by a mix of natural reproduction and stocking. The lakes have been used as a source of muskellunge eggs for the DNR’s Governor Thompson Fish Hatchery in Spooner every third year (most recently in 2018). In some years when eggs are taken for hatchery production, a portion of the resulting fingerlings have been stocked back into the system.

Abundance Objective 2.1 for muskellunge in both lakes calls for a moderate density population and is based on a desire for above average angler catch rates. Visioning session participants supported such management, with 90% indicating they wanted a balance between size and catch rate as opposed to managing solely for trophy size (Appendix A). Historically, these lakes have been around the 0.3 fish per acre mark with the most recent estimate on Lost Land somewhat higher (Table 5). Managing these populations at this level seems very attainable and in line with how the populations have naturally structured themselves. A moderate amount of natural reproduction continues to occur in both lakes. Stocking will remain a viable option to increase population abundance as needed, provided that appropriate brood source fish are available.

Table 5. Estimates of adult muskellunge abundance in Lost Land and Teal lakes from mark recapture population estimates.

Survey Year	Lost Land	Teal
2004	397 (0.31/acre)	349 (0.34/acre)
2013	652 (0.52/acre)	333 (0.33/acre)

Muskellunge size objective 2.2 aligns with the densities prescribed by the abundance objective (2.1) for these lakes. It would be unrealistic to expect a population with a moderate to high density of muskellunge to also produce large numbers of trophy-sized fish. Instead, our

objectives match with what is commonly observed in action fisheries and aim for a population where 15-25% of all adult muskellunge exceed 42 inches. That does not preclude the production of 50-inch fish, but it should set angler expectations that those fish will be exceptional. Size of muskellunge in both lakes in the 2018 survey fell short of Objective 2.2 (10% over 42 in Lost Land and 9% in Teal, Figure 4). Size of muskellunge statewide and locally has been steadily increasing, likely as a result of wide-spread catch and release ethic (Simonson and Hewitt 1999). As such, no specific action may be needed to achieve this objective, the population may just need time to respond.

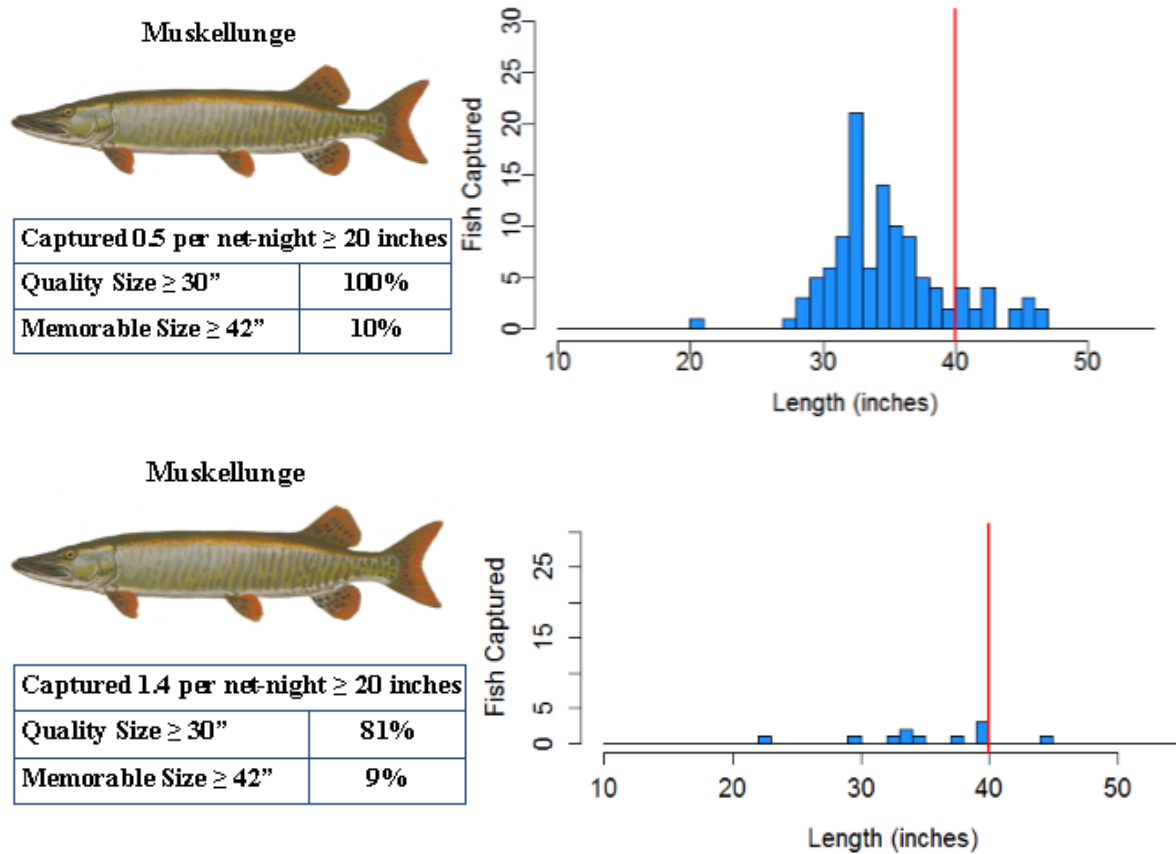


Figure 4. Statistics on muskellunge catch rate and size from a spring 2018 netting survey in Lost Land (top) and Teal (bottom) lakes. Red lines indicate the minimum length limit of 40 inches. Differences in the numbers of fish displayed for each lake are the result of considerably less netting effort in Teal Lake, not lower abundance.

PIT (Passive Integrated Transponder) tags have been used to track individual muskellunge in Lost Land and Teal lakes since 2008. There have been 576 adults implanted with PIT tags (409 in Lost Land and 167 in Teal), and in 2012 an entire stocked year class of 1,304 fingerlings was tagged. To date, 195 tagged fish have been recaptured. Data from these tags provides invaluable information on growth, movement, survival, and contribution of stocked fish. All adult muskellunge handled by DNR crews on these lakes are now implanted with a tag if not already carrying one. Stocked fingerlings should also continue to be tagged, if possible, to aid in determining the relative contribution of stocked and natural fish, among other reasons.

Muskellunge are known to move back and forth between Lost Land and Teal. From PIT tag returns, we estimate that around 10% of all muskellunge move from one lake to the other in a

given year. This movement illustrates that the population must be managed as a whole and cannot be treated as two completely distinct units.

Tag data also gives us a glimpse of how fish may leave the system. A muskellunge that was tagged in Teal Lake several years ago was recently captured in the Chippewa Flowage, over 10 miles downstream. It is not clear how common those kinds of movements are, but further tagging and recaptures of tags may at some point provide such data.

Northern pike have been implicated in the decline of muskellunge abundance in some instances, including several lakes in the vicinity of Lost Land and Teal. Northern pike are not considered to be native to Lost Land and Teal and have the potential to disrupt the natural reproduction of muskellunge either through direct predation and/or competition for food at juvenile stages. However, to date northern pike do not appear to be causing major issues. Pike density remains at a relatively low level in both lakes (Figure 5) and natural muskellunge reproduction continues to be observed. The darker water in these lakes may allow muskellunge to maintain an advantage over pike, which prefer more clear water. If northern pike density becomes problematic (say >10 per net night in DNR surveys) in the future, strategies will need to be developed to manage their abundance. In the meantime, anglers are encouraged to eat northern pike. Pike are excellent table fare.

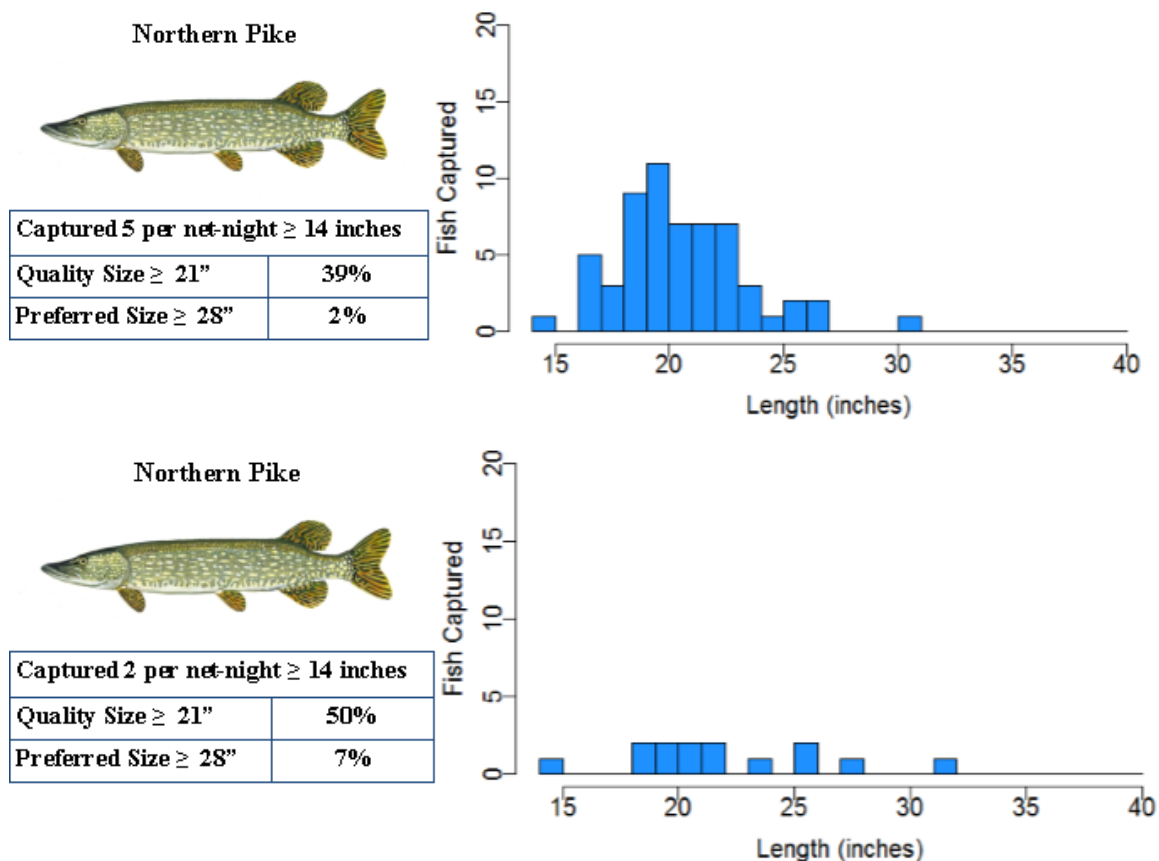


Figure 5. Statistics on northern pike catch rate and size from a DNR netting survey in the spring of 2018 in Lost Land (top) and Teal (bottom) lakes.

GOAL 3: Black crappie populations of low to moderate density in Teal Lake and moderate density in Lost Land Lake, with moderate proportions of preferred-size fish in both lakes.

Objective 3.1: A late spring fyke net capture rate of 5-10 black crappie 5 inches and longer per net-night in Teal Lake, and 10-20 black crappie 5 inches and longer per net-night in Lost Land Lake.

Objective 3.2: Of all black crappie 5 inches and longer captured by fyke netting in late spring, 20-40% should be 10 inches or longer (RSD₁₀= 20-40%) in both lakes.

Black Crappie Status and Management Strategies:

Panfish (crappie, bluegill, perch, sunfish species) in the Quiet Lakes have generally exhibited poor size structure and have not been the main attraction in the fishery (Figure 6, as an example). The specific reason why panfish size is poor is not specifically known. The area of focus for panfish in this plan will be black crappie, which anglers ranked as the third highest species of preference. Strategies listed here to improve crappie may also benefit other panfish species.

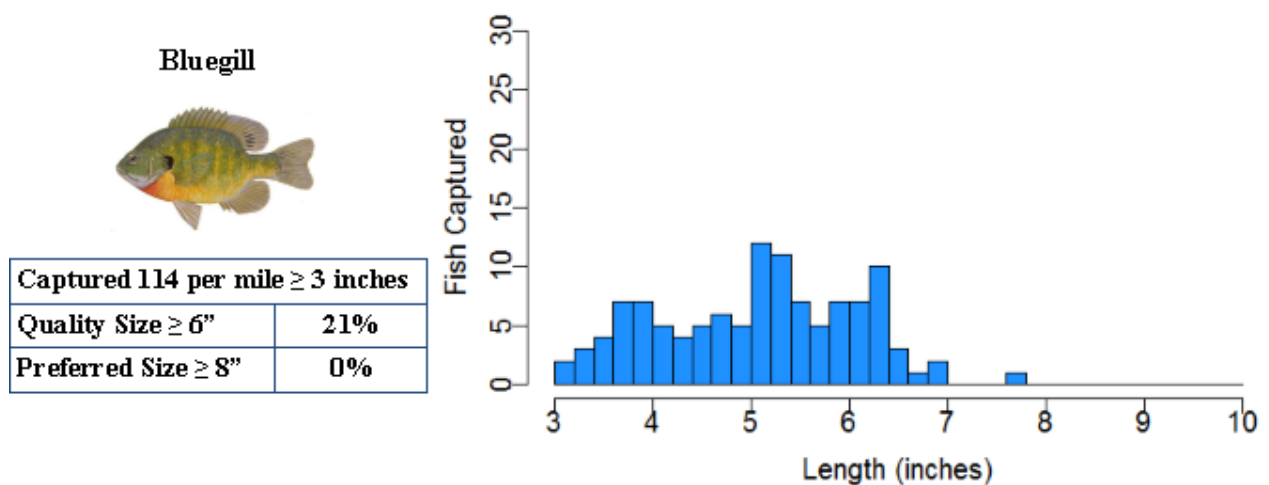


Figure 6. Statistics on bluegill catch rate and size from a DNR electrofishing survey in the spring of 2018 in Lost Land Lake.

Crappie abundance in Lost Land and Teal lakes has been satisfactory in recent years with both DNR surveys and anglers reporting good catch rates in both lakes. In 2018, catch rates in a DNR fyke net survey were 8 per net night in Teal, and 11 per net night in Lost Land, both within the target range of this plan. There is little reason to believe that crappie abundance will be problematically low going forward, unless there is a dramatic and unexpected change in the predator community. Managing for crappie size will almost surely be the greater challenge.

Long-time anglers of Lost Land and Teal Lakes have vivid and not-necessarily inaccurate memories of years with good crappie size. Available survey data does not indicate when that period of time was or provide clues about what issues arose that led to the undeniably poor size observed recently (in both lakes, only 2% were over 10 inches during a 2018 survey). Figure 7 shows the size histograms of crappie observed in surveys over the years in both lakes, and the average size has consistently hovered around just 8 inches. Crappie over 10 inches have historically been rare in surveys, while those over 12 inches have been almost non-existent.

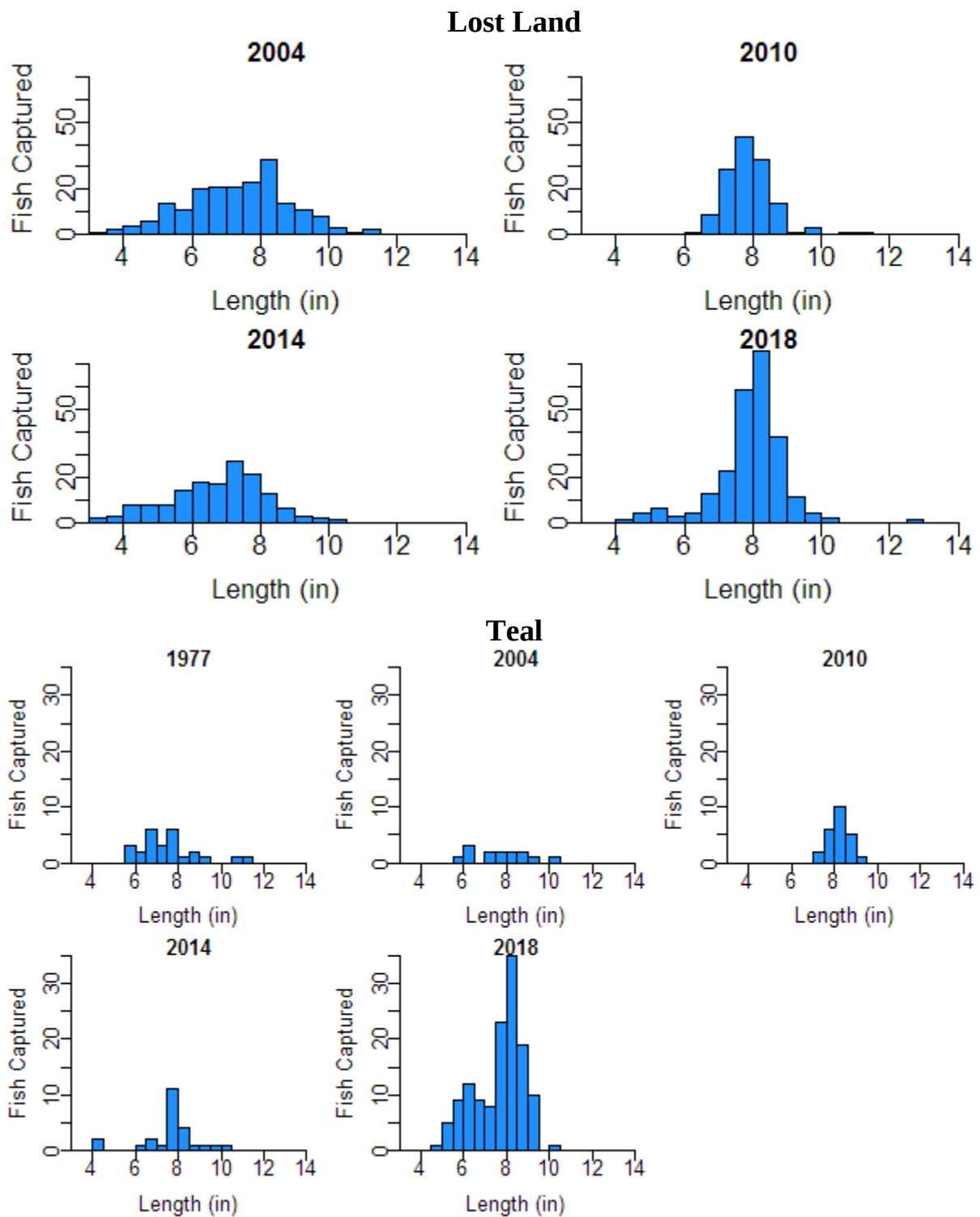


Figure 7. Size histograms of crappie captured in fyke nets during surveys in Lost Land and Teal lakes between 1977 and 2018 (data not available for both lakes in all years).

In 2016, new panfish regulations were implemented on both Lost Land and Teal lakes on an experimental basis. The new regulations limit anglers to no more than 10 per day of any single panfish species, while retaining the total panfish bag limit at 25 (this effectively functions as a 10 bag for crappie). Evaluations of that regulation on Lost Land and Teal, as well on other lakes across the State, will determine if limiting angler harvest is a viable tool to increase panfish size. If it is determined that crappie and other panfish are too abundant in Lost Land and Teal to allow for adequate growth, the most effective means to improve growth, and in turn size, may be to increase predator abundance. That strategy fits with objectives 1A.1 and 1B.1 in the walleye section of this plan and illustrates how effective management of a keystone species like walleye could benefit other species as well.

GOAL 4: A smallmouth bass population of low to moderate density with a moderate proportion of memorable-size fish.

Objective 4.1: Electrofishing capture rates for 7-inch and longer smallmouth bass of 10-20 per mile in both lakes during the bass spawning season.

Objective 4.2: Of all smallmouth bass 7 inches and longer captured by electrofishing during the bass spawning season, 5-10% should be 17 inches or longer.

Smallmouth Bass Status and Management Strategies:

Smallmouth bass were of moderate importance to anglers of the Quiet Lakes. Smallmouth are valued primarily as a catch and release opportunity. Habitat for smallmouth bass is not equal between Lost Land and Teal. Teal, having more rock and deeper water, holds the higher quality habitat for smallmouth. As such, catch rates for smallmouth bass are consistently higher in Teal than in Lost Land (Table 2). Regardless of differences between the lakes, we will set objectives for abundance and size for both, knowing that achievement of those goals will be more likely on Teal.

Abundance of smallmouth bass in Teal Lake, as measured by spring electrofishing catch rate, has typically been just below the range established in Objective 4.1 of this plan (Figure 8). That makes this objective somewhat aspirational, but well within the realm of possibility. Minor habitat improvements such as increased littoral woody habitat might improve smallmouth reproductive success (Brown and Bozek 2010) and/or carrying capacity and should be considered. The State-owned islands in Teal would be an obvious place to carry out such habitat additions as it would not require landowner buy-in. Woody habitat additions along private shorelines would certainly be welcome as well.

Size objectives for smallmouth bass may be more challenging to meet. Creel data does not suggest that harvest of smallmouth bass is common in either lake. Still, when bass regulations were changed in 2016 the decision was made to maintain the 14-inch length limit for smallmouth while dropping the length limit for largemouth. That decision was made partly in response to angler desires, captured in this plan, to have a smallmouth population with better size. Added harvest of smallmouth was not seen to be beneficial. In light of minimal harvest, it is unclear what factors might be limiting the ability of smallmouth in these lakes to reach bigger sizes. While preferred-size fish (>17 inches) are observed occasionally in DNR surveys, they remain rare.

An assessment of smallmouth bass growth rates in these lakes may provide useful insights on new management directions to improve the fishery. If growth rates are found to be slow, strategies to improve growth may need to be explored. If growth is adequate, further limiting

smallmouth bass mortality may be important. A growth rate analysis should be completed in the near future to inform the next steps.

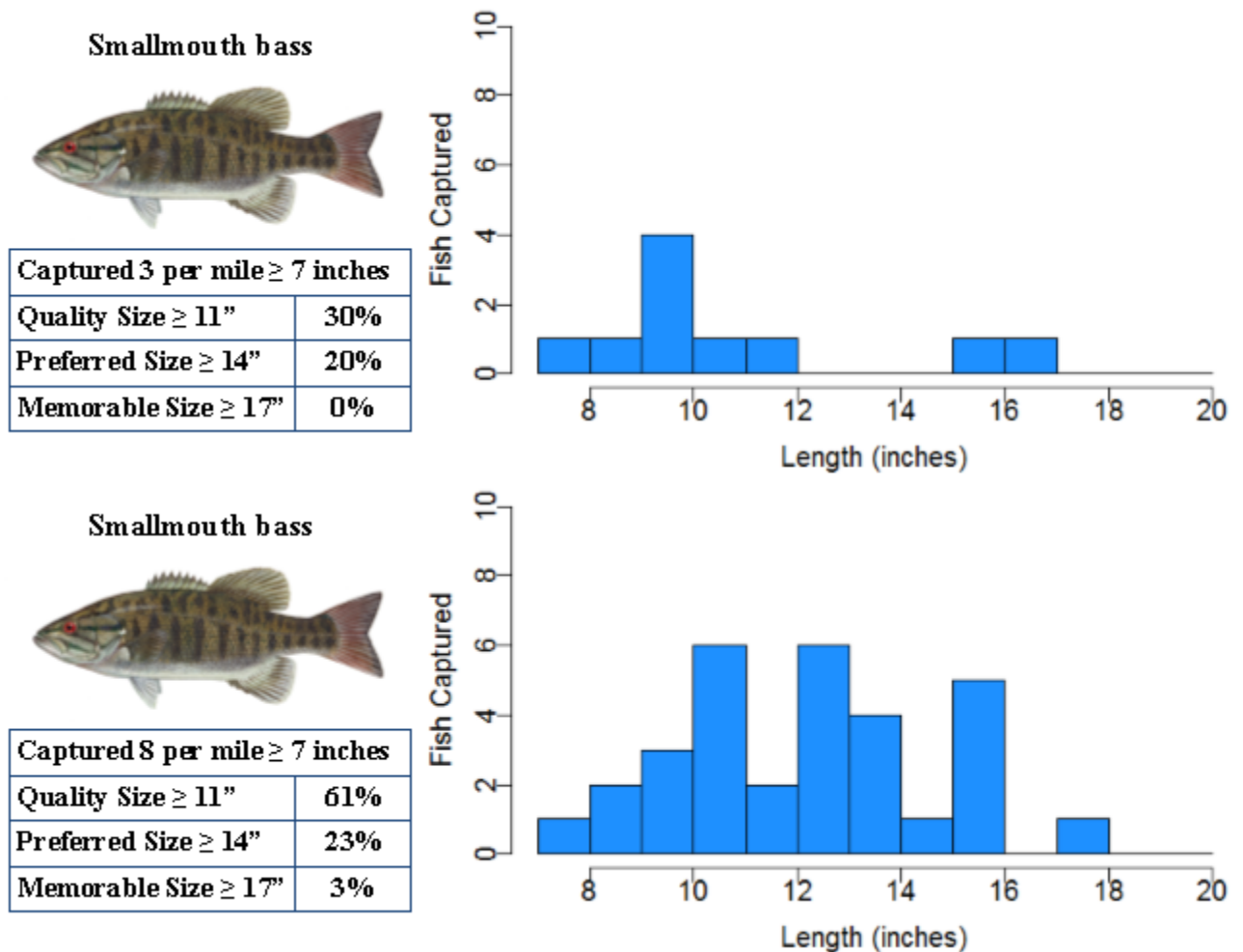


Figure 8. Statistics on smallmouth bass catch rate and size from a DNR electrofishing survey in the spring of 2018 in Lost Land (top) and Teal (bottom) lakes.

GOAL 5: A diverse native fish community that fluctuates in species composition but generally experiences no net loss of native fish species and provides adequate forage for sport fish populations.

Objective 5.1: No net loss of native fish or other aquatic species in either lake, as documented by periodic baseline monitoring surveys.

Objective 5.2: Adequate forage, as reflected by satisfactory growth rates and condition factors of sport fish populations managed under Goals 1-4.

General Ecosystem Status and Management Strategies:

Adequate year-round water quality is vital to maintain sport fish populations with acceptable growth rates and size structures. All measures should be taken to preserve the excellent water quality that exists in the Quiet Lakes. Visit <http://www.quietlakes.org/> for additional information on lake association activities and efforts to improve water quality.

Introduction of invasive exotic species should be discouraged by the Quiet Lakes Association via direct communications to their membership and appropriate signing at local businesses and public access areas. Several DNR grants are available through the Clean Boats Clean Waters program that lake associations can take advantage of if desired.

Support for good shoreland management along privately-owned shorelines would help to prevent excessive input of nutrients. Maintaining wild shorelines and wide buffer strips between managed lawns and the lake will be helpful in achieving the goals and objectives of this plan. Minimizing the input of phosphorus and nitrogen from lawns or faulty septic systems will minimize nuisance plant growth and the ultimate decay of those plants that depletes oxygen and kills fish. Wild shorelines can exist on well-managed private properties as well as public lands. Both active (placing new trees) and passive (allowing trees to remain in the water) support for littoral woody habitat can be beneficial to fish and wildlife.

APPENDIX A

Results of Visioning Session for Local Stakeholders in the Fisheries of Teal and Lost Land Lakes in Sawyer County

Date: June 3, 2006

Time: 4:00 p.m. to 8:00 p.m.

Place: Spider Lake Town Hall

Facilitator: Dave Neuswanger, Fisheries Supervisor, Upper Chippewa Basin, WDNR

Technical Advisor: Frank Pratt, Senior Fisheries Biologist, Sawyer County, WDNR

Profile of 19 Participants (more than one affiliation possible per person):

Lakeside Landowners – 14 (6 from Teal and 8 from Lost Land)

Area Anglers – 3 (people who fish on these lakes but do not own property on them)

Fishing Guides – 1

Business Owners – 4 (representing the major resorts)

Others – 1 (Walleyes for Northwest Wisconsin)

Table A1. Levels of sport fishing interest among visioning session participants for fish species nominated for consideration in Teal (first number) and Lost Land lakes.

Fish Species Nominated	Level of Participant Fishing Interest			
	High	Medium	Low	None
Walleye	12 / 12	3 / 5	3 / 2	0 / 0
Muskellunge	11 / 11	5 / 2	0 / 2	2 / 3
Black Crappie	5 / 8	2 / 4	5 / 1	3 / 2
Smallmouth Bass	5 / 4	7 / 9	4 / 6	2 / 0
Largemouth Bass	0 / 3	0 / 4	12 / 7	5 / 5
Northern Pike	0 / 0	0 / 1	4 / 4	12 / 13
Yellow Perch	1 / 1	2 / 0	3 / 4	9 / 13

Table A2. Preferences for numbers versus size and catch versus harvest among visioning session participants for fish species perceived to be most important in the Quiet Lakes.

Important Fish Species	Preference for Numbers versus Size			Preference for Catch-and-Release versus Harvest		
	Emphasis on Number over Size	Prefer Balance	Emphasis on Size over Number	Emphasis on Catch and Release	Prefer Balance	Emphasis on Maximum Sustainable Harvest
Walleye	2	10	0	2	10	0
Muskellunge	1	9	0	9	1	0
Black Crappie	0	11	1	1	11	0
Smallmouth Bass	2	4	6	12	0	0

APPENDIX B

Table B1. Available stocking data for Lost Land and Teal Lakes in Sawyer County, going back to the earliest records that were kept. The stocking numbers here reflect a mix of State, Tribal, and private funded stocking events.

TEAL	<u>Walleye</u>			<u>Muskellunge</u>		<u>Largemouth bass</u>		<u>Smallmouth bass</u>	<u>Bluegill</u>		<u>Black Crappie</u>	
	Fry	small fingerling	large fingerling	Fry	Fingerling	Fry	Fingerling	Fingerling	Fry	Adult	Fry	Adult
Year(s)												
1933-1939	27,000,000	-	22	1,000,000	3	-	1,500	200	400,000	1,700	100,000	600
1940-1949	10,000,000	-	-	500,000	375	3,000	8,000	-	1,500	-	-	-
1950-1959	-	8,000	-	-	5,000	-	-	-	-	-	-	-
1960-1969	-	8,000	-	15,000	20,000	-	-	-	-	-	-	-
1970-1979	-	5,000	-	-	8,500	-	-	-	-	-	-	-
1980-1989	-	-	-	-	9,835	-	-	-	-	-	-	-
1990-1999	2,000,000	24,000	1,500	-	7,319	-	-	-	-	-	-	-
2000-2009	-	-	-	-	4,911	-	-	-	-	-	-	-
2010-2017	-	-	30,455	-	-	-	-	-	-	-	-	-

LOST LAND	<u>Walleye</u>			<u>Muskellunge</u>		<u>Largemouth bass</u>		<u>Smallmouth bass</u>	<u>Bluegill</u>	<u>Black Crappie</u>
	Fry	small fingerling	large fingerling	Fry	Fingerling	Fry	Fingerling	Fingerling	Fry	Fry
Year(s)										
1933-1939	35,000,000	-	-	580,000	-	104,000	1,700	200	563,000	396,000
1940-1949	13,000,000	25,000	-	297,000	12,000	3,000	19,000	1,500	-	-
1950-1959	-	59,000	-	-	26,000	-	5,000	-	-	-
1960-1969	-	25,000	-	268,000	17,000	-	-	-	-	-
1970-1979	-	82,162	-	-	7,264	-	-	-	-	-
1980-1989	-	-	-	-	-	-	-	-	-	-
1990-1999	-	192,809	326	-	3,338	-	-	-	-	-
2000-2009	1,450,000	64,985	6,883	-	5,717	-	-	-	-	-
2010-2017	-	-	35,833	-	1,304	-	-	-	-	-

APPENDIX C

An online survey that mirrored the questions asked to elicit the feedback shown in Appendix A was crafted in response to criticism that the stakeholder feedback used to develop this plan was outdated or had insufficient sample size. The survey was administered online through Survey Monkey and was distributed through various email lists that would capture a range of stakeholders, including property owners, guides, resorts, and both local and nonlocal anglers. The survey was specifically targeted at stakeholders interested in at least one of seven lakes where visioning sessions had been completed between 2004-2006 and where management plans were complete or were in draft form. Those lakes included the Chippewa Flowage, Lac Courte Oreilles, Nelson Lake, Grindstone Lake, Round Lake, Moose Lake, and the **Quiet Lakes (Lost Land and Teal)**.

A total of 497 responses were received. Results from the online survey are shown below with comparisons to the results from in-person visioning sessions. Species preferences (Table C1) were nearly identical in rank with only black crappie-muskellunge and smallmouth bass-bluegill swapping adjacent spots. Both bass species scored higher in the online format than the in-person sessions. This may be the result of the online surveys capturing a relatively high proportion of “casual anglers” (self-identified through the survey). The higher response rate of casual anglers to an online survey with an average response time of 4 minutes in comparison to the visioning sessions which often took several hours is not surprising. Preference for how each species should be managed (Table C2) was also largely similar, with the only major difference being more interest in trophy management for northern pike among in-person respondents. The online survey actually filled in a few gaps in the results from the in-person sessions where there was not enough time to get specific feedback for all species.

Table C1. Species preferences based on a weighted score of angling interest for both in-person visioning sessions (2004-2006) and a similar online survey (2018). Score determined for each species using: $((N=\text{high interest} \times 3) + (N=\text{medium interest} \times 2) + (N=\text{low interest} \times 1)) / \text{total respondents}$.

Visioning Session	Score	Online Survey	Score
Walleye	2.67	Walleye	2.45
Muskellunge*	2.22	Black crappie	2.07
Black crappie	2.07	Muskellunge*	1.93
Bluegill	2.00	Smallmouth bass*	1.83
Smallmouth bass*	1.42	Bluegill	1.75
Yellow perch	1.37	Yellow Perch	1.44
Northern pike*	1.25	Northern pike*	1.43
Largemouth bass	1.00	Largemouth bass	1.36
Average	1.75	Average	1.78
Total respondents	166		497

*indicates species not present in all lakes where survey was administered.

Table C2. Summary of responses to two questions about preferred management style (size vs. numbers and harvest vs. catch and release) for the most popular species in several Sawyer County lakes between in-person visioning sessions (2004-2006) and a similar online survey (2018). Most common result in each category is shown in bold.

	<u>Visioning Session</u>			<u>Online Survey</u>		
	Trophy	Balance	Action	Trophy	Balance	Action
Walleye	3.36%	76.51%	20.13%	5.87%	69.60%	24.53%
Black crappie	16.41%	82.81%	0.78%	7.49%	74.52%	17.99%
Muskellunge	48.54%	50.49%	0.97%	49.47%	43.35%	7.18%
Bluegill	18.45%	74.76%	6.80%	10.31%	66.23%	23.46%
Yellow perch	NA	NA	NA	11.29%	58.29%	30.41%
Smallmouth bass	40.54%	48.65%	10.81%	32.08%	55.27%	12.65%
Largemouth bass	NA	NA	NA	30.25%	53.81%	15.94%
Northern pike	71.43%	28.57%	0.00%	39.86%	50.12%	10.02%
	C+R	Balance	Harvest	C+R	Balance	Harvest
Walleye	6.67%	72.00%	21.33%	8.96%	59.28%	31.77%
Black crappie	0.80%	92.00%	7.20%	8.92%	53.72%	37.37%
Muskellunge	92.04%	6.19%	1.77%	83.93%	10.71%	5.36%
Bluegill	3.88%	76.70%	19.42%	8.47%	46.19%	45.34%
Yellow perch	NA	NA	NA	8.91%	45.21%	45.88%
Smallmouth bass	78.07%	20.18%	1.75%	46.33%	41.87%	11.80%
Largemouth bass	NA	NA	NA	30.32%	36.20%	33.48%
Northern pike	31.82%	54.55%	13.64%	19.41%	47.63%	32.96%

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