Fishery Management Plan

Chippewa Flowage, 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 Chippewa Flowage 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. Because there are so many complex and inter-related strategies, we have chosen to forego the lengthy process required to secure statewide DNR approval at this time. 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 annually as we allocate our time and resources to the many important projects before us.

We thank the Chippewa Flowage Area Property Owner's Association and the Lake Chippewa Flowage Resort Association for hosting our local stakeholder visioning session at the Hayward Veteran's Center on June 17, 2005, and also for inviting us to do a shorter follow-up session at the Property Owners' Annual Meeting on August 7, 2005. We also appreciate the thoughtful review, helpful comments, and general support for this plan from our colleagues at the LCO Conservation Department (representing Lac Courte Oreilles Band of Lake Superior Ojibwe).

We especially thank the 17 local stakeholders (June 17 visioning session) and at least 129 local property owners (August 7 annual meeting) who gave significant time 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.

BACKGROUND

Habitat Characteristics and Productivity

The Chippewa Flowage is a 15,300-acre drainage impoundment in the upper watershed of the Chippewa River in north central Sawyer County (Table 1). It began filling with completion of the Winter Dam at the confluence of the East and West forks of the Chippewa River in 1923. Other natural waters inundated by the Flowage include Crane, Crystal, Rice, Tyner, Chief, Scott, Two Boys, Moonshine, Pokegama, and Cranberry lakes, Crane Creek, and two forks of the Chief River.

Based upon a moderately high concentration of total phosphorus, the Chippewa Flowage is classified as meso-eutrophic, making it very productive for fish and fishing (Table 1). The Flowage can be divided into at least two distinct basins, each with its own unique character. The basin west of County Highway CC impounded many natural lakes and generally has greater water clarity and more submersed macrophytes than the eastern basin. The basin east of Highway CC generally has darker, tannin-stained water because the impounded rivers of the east basin drain a vast network of wetlands upstream.

Table 1. Limnological characteristics of the Chippewa Flowage.

Limnological Parameter	**Absolute or Mean Value**
Physical Characteristics:	
Surface Area	15,300 acres
Volume	225,000 acre-feet
Maximum Depth	92 feet
Mean Depth	14 feet
Littoral Zone	24% of lake area <12 feet deep
Shoreline Distance (including 200 islands)	233 miles
Watershed Area	681 square miles (70% public land)
Watershed Composition	92% forest, 5% water, 1% agricultural, 2% other
Normal Full Pool Elevation	1313.0 feet above mean sea level
Normal Outlet Flow	640 cubic feet per second
Minimum Outlet Flow (Required by Law)	250 cubic feet per second
Water Residence Time	0.6 year
Chemistry and Primary Productivity:	
Methyl Purple Alkalinity	32 parts per million (range 25-40 ppm)
pH	7.0 (range 6.7-7.4)
Specific Conductance	65 micromhos/cm (range 49-70 µmhos/cm)
Total Phosphorous (ppb)	30 parts per billion (range 10-40 ppb)
Secchi Disk Visibility	2-6 feet
Trophic Status	Meso-eutrophic

The littoral zone is comprised mostly of firm, well-oxygenated substrates – predominately sand but with many areas of gravel and cobble ideal as habitat for spawning walleyes. Sediments comprised of silt and detritus dominate some of the backwater bays, but even those substrates are consolidated and reasonably well-oxygenated due to annual over-winter drawdowns. Big woody cover is a key structural element in the littoral zone.

Bogs from pre-impoundment wetlands comprise a unique and substantial structural element in open-water areas of the Flowage where they occur in both submersed and floating form. Submersed bogs rich in organic debris have numerous stumps and root wads remnant of the black spruce and tamarack that once grew there. These submersed bogs comprise the base of a detrital food chain that probably is important to fish that feed upon leeches, midge larvae, burrowing mayfly nymphs, and other aquatic invertebrates. They also are a large source of dissolved organic carbon that can fuel the formation of methyl mercury, which is assimilated by phytoplankton, concentrated by zooplankton, and ultimately bio-magnified and stored in the muscle tissue of piscivorous (fish-eating) fish at levels that warrant moderation in human consumption. Well-vegetated bogs that have risen to the surface, sometimes in locations inconvenient for navigation, provide substrate for invertebrate production and overhead cover attractive to fish of most species.

DNR has worked with the LCO Band of Lake Superior Ojibwe, the Chippewa Flowage Area Property Owner's Association and the Lake Chippewa Flowage Resort Association to add additional deep-water cover in the form of fish cribs. More than 2000 such structures have been placed in the Flowage over the last 20 years. Approximately half those cribs were constructed of used wooden pallets; the rest were built of logs or modular plastic.

History of Water Level Management

Authorized by the Federal Power Act of 1920, the Chippewa Flowage was built as a storage reservoir to supply water to six hydroelectric generating facilities downstream, and secondarily to provide flood control on the lower Chippewa River. Water management decisions made at the Winter Dam influence river levels and hydroelectric power production operations for a distance of 180 miles downstream. The entire Chippewa River system of hydropower production facilities has a maximum generation capacity of 192 megawatts (1 megawatt supplies power to 500-1,000 households). In 1970, the original 50-year operating license expired. For the next 14 years, stakeholders and regulators, including the Federal Energy Regulatory Commission (FERC), discussed terms under which a FERC license or other operating authority might be granted.

In 1984, a settlement agreement was reached between Northern States Power Company - Wisconsin (NSPW – often referenced under its brand name, Xcel Energy), the Lac Courte Oreilles Band of Lake Superior Ojibwe (LCO), the U.S. Fish and Wildlife Service, and the Wisconsin DNR. FERC exercised its authority to grant NSPW and LCO a license exemption with the understanding that all the above parties would abide by terms of the settlement agreement. At that time, FERC approved construction of the LCO power plant, which was built in 1986 in conjunction with a major refurbishment of the dam. FERC still has authority for the Chippewa Flowage; and FERC is responsible for ensuring that NSPW complies with terms of the license exemption order. FERC also plays a significant role in regulating dam safety at this project.

In 2002, NSPW began operating under several new and amended FERC licenses at several projects on the lower Chippewa River system, downstream of the Chippewa Flowage. They now operate under modified flow and reservoir level conditions during the spring fish spawning season, including a "run-of-river" requirement at the Dells Project. Previous operational practices affected the suitability of aquatic habitat in 65 miles of free-flowing river downstream from the Dells Project – the last hydropower facility on the Chippewa River. Small winter drawdowns at Holcombe and Wissota were further moderated. Within the limits and allowances defined in the exemption and the settlement agreement, these and other minor changes now influence NSPW's discretionary management decisions regarding when and how much water is released from the main storage reservoir upstream – the Chippewa Flowage.

Under the negotiated terms of its FERC license exemption, NSPW must abide by specific seasonal operating requirements for the Chippewa Flowage. In summer, NSPW must strive to maintain a pool elevation of 1310.0 feet to 1313.0 feet (normal full level). However, they have the authority to allow pool elevation to rise as high as 1315.0 feet under unusual circumstances. (They have never done so, probably out of respect for the existence of an estimated 1,250 Indian graves between elevations 1313.0 and 1315.0.) During "abnormal stream and water conditions or other unusual and compelling circumstances," NSPW may allow the summer pool to fall below 1310.0 feet. Initially all parties agreed to a minimum downstream flow release of 90 cubic feet per second (cfs), but such flows soon were judged insufficient to sustain a healthy downstream ecosystem. The agreement was modified to require a minimum downstream flow release of 250 cfs, even if the volume of flow entering the Flowage is less at that time. In times of drought, the Flowage could experience a net loss in water volume due to this negotiated downstream flow requirement.

In winter NSPW may draw the pool down a maximum of 16 feet, to 1297.0. But the "normal" maximum winter drawdown is considered to be 13 feet, to an elevation of 1300.0 feet. Prior to 1998, winter drawdowns were substantial. But since 1998, maximum winter drawdowns have been minor (only 4-5 feet). NSPW uses average snowpack in the watershed to predict the amount of water storage capacity needed to accommodate runoff in the spring in order to maximize dam safety and minimize downstream flooding. Low snowfall in recent winters has made it unnecessary for NSPW to draw down the Flowage to the extent authorized.

In summer of 2006, the Flowage fell to 1309.5 feet in association with extraordinarily dry conditions. (It fell even lower in 1998 when the maximum summer drawdown was 3.8 feet.) The Hayward DNR Weather Station just outside the Chippewa Flowage watershed boundary indicated the area received 8 inches less rainfall than normal during June-September 2006 and 20 inches less rainfall than normal since 2003. NSPW's "low-flow contingency plan" was triggered in summer 2006 when discharge fell below 1000 cfs at Chippewa Falls. This caused them to increase flow releases to sustain aquatic life in the river, operate in "run-of-river" mode at the downstream hydro projects, and generally endure sub-optimal conditions for electrical power production.

Human Development and Public Access

In 1968 the Wisconsin DNR and NSPW co-signed a document entitled *Public Recreation on the Big Chip* that provided one of the first formal endorsements in Wisconsin of natural, undeveloped lakeshore as a public benefit. In that document, the parties asserted that "The greatest public benefits in the long run would be achieved by retaining the present undeveloped shoreline on as much of the Chippewa Flowage as possible. This would not necessarily result in the maximum number of users. However, recreation should not be a numbers game, with the sole objective being to serve the maximum number of people." This visionary philosophy has guided zoning laws, land acquisition efforts, and public access development ever since.

Residential shoreline development is very light (1.3 residences per shoreline mile, lake-wide); and the number of residences has not increased appreciably since 1967 considering the size of the Chippewa Flowage (Table 2). What little development exists is concentrated in the 22.7 miles of shoreline that are privately owned (14 residences per privately-owned shoreline mile).

Table 2. Residential shoreline development on the Chippewa Flowage (source: Sawyer County).

Year	Number of Residences	Resorts/Campgrounds
1967	135	38
2005	310	21

Since the 1960s, there has been a steady transition from small, seasonal residences to large, permanent residences; and the number of resorts has declined by 45% (Table 2). However, working resorts have declined at a slower rate than on other waters in this region; and resorts are still important in the socio-economic fabric of the Chippewa Flowage and surrounding area.

In recent years the trend has been for resorts to sub-divide into private, single-family residences or to manage former resort dwellings as condominiums (units not included in Table 2). Except for Two Boys Lake (Class 3), the Flowage has a Category 1 (least restrictive) shoreland zoning classification, requiring new residential developments to have a minimum lot width of 100 feet and a minimum structure setback of 75 feet. In most places on the Flowage, there are special deed restrictions that extend the setbacks to distances of 200 or 250 feet from the shoreline.

A high percentage of public shoreline ownership (90%) by the Wisconsin DNR (6,090 acres), the Lac Courte Oreilles Band of Lake Superior Ojibwe (4,500 acres), and the U.S. Forest Service (1,585 acres) gives the Chippewa Flowage a near-wilderness character that government agencies and area citizens are committed to preserving. Public access is provided by six developed boat ramps with parking areas – three provided by the Wisconsin DNR, two provided by the LCO Band, and one provided by the Town of Hayward. There are also several undeveloped, platted access sites and numerous private boat liveries. Most of the islands are in public ownership, and several have designated primitive camp sites.

Historical Perspective on the Fishery

The Chippewa Flowage impounded a large river system that contained native populations of walleye, muskellunge, and other riverine species. After the impoundment filled in the mid 1920s, walleye and muskellunge continued to reproduce naturally in the Flowage itself and in its tributary streams, maintaining populations that have supported a world-class fishery for decades. The first comprehensive fishery survey conducted in 1970 revealed one of the highest-density walleye populations ever observed in northern Wisconsin – approximately 20 adults per acre. At that extraordinarily high density, walleye growth rate and average size were far below average due to intense competition for prey. High density and good natural reproduction led WDNR to use the Chippewa Flowage as a source of fertilized eggs for hatchery production of walleye fry and 2-inch fingerlings for stocking throughout Wisconsin from 1948 (when hatchery records begin) until 1992. With a couple exceptions, walleye spawning operations have been conducted at nearby Lac Courte Oreilles since that time.

The Chippewa Flowage has a history of producing trophy muskellunge, including two world records. The National Freshwater Fishing Hall of Fame in Hayward currently recognizes a 69-pound, 11-ounce muskellunge caught by Louis Spray on October 20, 1949 as the all-tackle world record. We have no comment on recent challenges to the authenticity of that record because our responsibility is to create opportunity, not resolve disputes over who caught the biggest fish. But there is no question that Chippewa Flowage muskellunge are capable of achieving remarkable proportions in length and girth.

Originally there were no northern pike in the Chippewa Flowage or its tributary streams. In the mid to late 1970s, WDNR fishery surveys revealed the presence of pike in the lakes located on the East Fork Chippewa River system upstream of the Flowage. Pike fingerlings from an unauthorized DNR hatchery stocking near the Winter Dam in the late 1970s may have joined other pike migrating down the East Fork system. The population expanded rapidly from east to west. Regardless of origin, northern pike were firmly established throughout the Chippewa Flowage by the early 1980s.

Smallmouth bass were native to the river system, and largemouth bass probably were native to several of the lakes (Crane, Scott, etc.) that formerly were isolated but became connected when the Flowage was impounded. Smallmouth bass still spawn in the east-side tributary streams, and both black bass species spawn in the lake, though in different habitats. Smallmouth have always been more numerous on the river-influenced east side with its darker-stained water and firmer, rockier substrates; and largemouth have always been more numerous on the west side where clearer water and softer substrates promote greater growth of the aquatic plants conducive to reproductive survival of young largemouth bass.

Panfish have always been important in the Chippewa Flowage fishery. Yellow perch and probably bluegill are native to the Upper Chippewa Basin. Perch are particularly important as the primary prey for walleye and young muskellunge, in addition to their sporting value and eating quality. Bluegill have been present in the Flowage for as long as anyone can remember, but only recently have they become an important element of the fishery. Black crappie are not native to the Upper Chippewa Basin. But widespread introductions of crappie from Mississippi River sources beginning in the mid 1920s have resulted in naturalized populations of these extremely popular panfish throughout northern Wisconsin, including the Chippewa Flowage.

Much of the Chippewa Flowage (mostly the southern half) lies within the Lac Courte Oreilles Ojibwe Indian Reservation, which has always been open to spearing by members of the LCO Band. Since the Voigt decision in 1985, both on-reservation and off-reservation portions of the Flowage have been popular locations for Indian spearing. In order to set safe harvest levels for this shared fishery, game fish population estimates and creel surveys were conducted in 1990/91 and 1998/99. A list of all fishery-related survey work conducted since the first comprehensive survey in 1970 appears in the Appendix (Table A4).

In the 22-year period from 1986 through 2007, off-reservation spearing harvest of walleye by the LCO Band has ranged from 17 to 2,673 fish per year, averaging only 1,312 fish (fewer than 0.1 per acre) annually. Even this low level of tribal harvest typically requires that DNR reduce the sport fishing bag limit from 5 to 3 daily according to a conservative formula that minimizes the risk of exceeding the calculated safe harvest level for the shared fishery. This is a common adjustment in walleye waters of the Ceded Territory. Off-reservation spring spearing harvest of muskellunge has ranged from 0 to 22 fish per year, averaging only 7 fish annually (only 2 in spring of 2007). In summary, low off-reservation spring spearing harvest of walleye and muskellunge has had no significant impact on the sport fishery of the Chippewa Flowage. However, the Voigt decision did not require tribes to track or report on-reservation harvest during the spring, nor did it require reporting of winter harvest on or off reservations, so the significance of those sources of mortality is unknown. Considerable winter spearing effort for muskellunge occurs on the Chippewa Flowage. The unknown extent and size distribution of that harvest poses a challenge to scientific management for trophy muskellunge.

During 1998-2000 representatives from the Wisconsin DNR, The LCO Band of Ojibwe, the U.S. Forest Service, and the private sector met to coordinate a vision for overall management of the Chippewa Flowage. The resulting *Chippewa Flowage Joint Agency Management Plan* (CFJAMP) was signed in 2000. The CFJAMP is primarily an administrative land management agreement, but there are a few elements pertaining to the fishery. Most importantly, "Fisheries management activities will recognize the existence of a mixed and shared fishery in the Flowage, serving both sport recreational and Tribal subsistence, religious, ceremonial, and economic fishing needs. As such, management will emphasize maintenance and protection of native species, genetic strains, and their spawning habitat, plus fairly balanced harvest opportunities for both fisheries."

Aquatic Community and Fishery Overview

Many species of aquatic macrophytes (large, rooted plants) create valuable habitat for fish in the Chippewa Flowage. Macrophytes are particularly dense and widespread in the western basin, where sunlight penetration in the relatively clear water allows plant growth to depths of approximately 12 feet, compared with only 8 feet in the tannin-stained waters of the eastern basin in normal years. Some of the most common native macrophytes include Canada waterweed (*Elodea canadensis*), fern pondweed (*Potamogeton robbinsonsii*), large-leaf pondweed (*Potamogeton amplifolius*, also known as "cabbage weed" and "musky weed"), coontail (*Ceratophyllum demersum*), northern watermilfoil (*Myriophyllum sp.*), muskgrass (*Chara sp.*), water celery (*Vallisneria americana*), water buttercup (*Ranunculus sp.*), and bulrush (*Juncus sp.*). It seems that many former bulrush beds have been replaced by cattails (*Typha sp.*) that prefer mud over sand as substrate.

Currently there are two non-native, invasive plant species in the Flowage -- Eurasian watermilfoil (a submergent relative of native northern watermilfoil) and purple loosestrife (an emergent shoreline plant). On several popular musky fishing bars, Eurasian watermilfoil sometimes displaces large-leaf pondweed, forcing anglers to change methods of lure presentation.

The Chippewa Flowage harbors five species classified as "game fish" in Wisconsin (walleye, muskellunge, smallmouth bass, largemouth bass, and northern pike) and three species usually managed in the aggregate as "panfish" (black crappie, bluegill, and yellow perch). Our most recent insight into overall fish community composition was provided by a comprehensive survey conducted during 1999/2000. Results indicate a general trend in the direction of greater balance between percids (walleye and perch) and centrarchids (bass, bluegill, and crappie) in this once percid-dominated fish community (Table 3).

Table 3. Fish community characteristics in the Chippewa Flowage based upon a comprehensive survey conducted during spring of 1999.

Species	Density or Relative Abundance	Average Length (Inches)	Comments on Status and Changes Since 1990/91 Survey
Walleye	5.2 per acre	13.5	Density high and stable. Good natural reproduction.
Black Crappie	Common	10.1	Recovering from likely over-harvest in the early 90s.
Muskellunge	0.2 per acre	40.0	Density moderate and stable. Size increasing.
Bluegill	Abundant	7.1	Numbers increasing greatly.
Yellow Perch	Present	9.0	Numbers decreasing.
Smallmouth Bass	Common	15.0	Numbers moderate and increasing, especially east.
Largemouth Bass	Common	14.0	Numbers moderate and increasing, especially west.
Northern Pike	4.5 per acre	20.0	Density high and increasing slightly.

Black crappies are not native to the Upper Chippewa River basin, but they have been naturalized throughout Wisconsin and are not considered an invasive species. Besides northern pike, the only other non-native fish in the Chippewa Flowage are common carp (*Cyprinus carpio*), which were imported from Europe as a food fish before 1900 and have existed in low number in the Flowage since impoundment. Native predators like largemouth bass eat young carp. Esocids (pike and muskellunge) prey upon young and adult carp. In the presence of so many effective predators, carp remain a minor component of the Chippewa Flowage fish community.

Other species known to occur in the Chippewa Flowage fish community include white sucker, greater redhorse, golden redhorse, shorthead redhorse, silver redhorse, bluntnose minnows, golden shiner, blacknose shiner, common shiner, various other small cyprinid species, trout perch, log perch, johnny darter, rainbow darter, various other small darter species, pumpkinseed, rock bass, warmouth, hybrid sunfishes, tadpole madtom, bullheads (black, yellow, and brown), burbot, channel catfish, and lake sturgeon. Many of these species are important as prey for sport fish, particularly bullheads and white sucker which are eaten by walleye and muskellunge.

The comprehensive fish community survey (fyke netting and electrofishing) in spring of 1999 was followed by an angler creel survey, wherein anglers who had completed their fishing trips were interviewed by WDNR creel clerks throughout the year and into winter of 2000 at several points of access. At that time, walleye were the most sought-after game fish, followed by muskellunge and black crappie (Table 4). Bluegill and bass fishing were just beginning to increase in popularity. If conducted today, a similar creel survey probably would confirm walleye as the most sought-after sport fish, followed by panfish of all species, then muskellunge and bass. Bass fishing has increased in popularity among club anglers due to undocumented but likely increases in largemouth and smallmouth bass populations since the 1999 creel survey. In 1999, many pike were caught (often by anglers pursuing them because nothing else was biting); and a small proportion of those (<15%) were harvested (Table 4). But northern pike are not a highly regarded or sought-after species in the Chippewa Flowage (Tables A1 and A3).

Table 4. Fishery characteristics of the Chippewa Flowage based upon on-site interviews of anglers who had just completed their fishing trips during a WDNR creel survey in 1999/2000. Species are listed in order of preference identified in public meetings conducted in 2005 (Tables A1 and A3).

Species	Relative Angler Effort (% of all Interviewees Targeting this Species)	Average Number of Hours to Catch a Targeted Fish	Estimated Total Angler Catch*	Estimated Total Angler Harvest*
Walleye	37	2.3	109,000	36,000
Black Crappie	15	0.8	85,000	46,000
Muskellunge	23	50.0	3,000	38
Bluegill	7	0.8	71,000	20,000
Yellow Perch	4	1.6	31,000	10,000
Smallmouth Bass	4	0.8	2,500	725
Largemouth Bass	2	6.0	4,700	0
Northern Pike	7	3.0	52,000	7,400

* These numbers are expanded estimates of the total number of fish of each species caught or harvested, regardless of whether the species was actually being targeted by anglers interviewed.

The Chippewa Flowage has been home to numerous special fishing events annually. Most notable among them is the annual outing (since 1988) of a non-profit organization known as "Fishing Has No Boundaries, Inc." FHNB is a national organization with 23 chapters in 11 states whose goal is to "open up the great outdoors for people with disabilities through the world of fishing." Every year in late May the Hayward community hosts disabled anglers from throughout the Midwest for this popular three-day event that has served approximately 1,500 anglers during the last 20 years. Volunteers provide participants with experienced guide service, boats, bait, fish cleaning service, meals, emergency medical care, awards, and prizes. This event is indicative of the kind of volunteer service effort the small community of Hayward is capable of generating when all are committed to the goals.

A Vision for the Chippewa Flowage Fishery

On June 18, 2005, DNR representatives Frank Pratt and Dave Neuswanger met with 17 local stakeholders who were willing to volunteer their time to help develop a long-term vision for the fishery of the Chippewa Flowage 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 for species of greatest concern. Time constraints prevented us from developing goals and measurable objectives for all species of interest; but we completed that task for the three species most important to local stakeholders -- walleye, black crappie, and muskellunge. Frank Pratt served as technical advisor to the group on what was possible. 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 the Chippewa Flowage to produce what is desired.

Because of the size and importance of the Chippewa Flowage, we were concerned that the relatively small number of visioning session participants (only 17) might not accurately represent the interests of a majority of even local anglers. Therefore, everyone agreed at the onset of the session that we would pose the most important questions to a larger audience at the Annual Meeting of the Chippewa Flowage Area Property Owner's Association on August 7, 2005. At that meeting, 129 attendees also indicated whether they had high (3 points), moderate (2 points), low (1 point) or no (0 points) interest in each of the eight species discussed at the June 18 session. Based upon those point values and the number of respondents at each session, we calculated Relative Importance Values for each species, by stakeholder group. Surprisingly, the species were ranked in identical order of importance by both groups. In descending order of interest, walleye, black crappie, muskellunge, and bluegill were very important to local stakeholders (Table A3). Of less but still noteworthy concern to local stakeholders were yellow perch, smallmouth bass, largemouth bass, and northern pike, in that descending order of sport fishing interest. Concurrence on species preference between the two groups bolstered our confidence in the accuracy of our assessment of local angler priorities, even at the lightly attended June 18 visioning session.

Walleye are clearly the species of greatest sport fishing interest among local stakeholders in the Chippewa Flowage fishery (Tables A1, A3). This local preference for walleye is consistent with statewide angler priorities. Local stakeholders desire and expect to catch and harvest good numbers of walleye, indicating little interest in a catch-and-release or trophy fishery for walleye in the Chippewa Flowage (Table 2). Because the Flowage has a history of consistent walleye recruitment, a realistic goal of moderate to high density was chosen in order to meet angler expectations. The specific objective of 4-8 adult walleye per acre developed by 17 stakeholders at the June 18 visioning session was put to a vote of 129 stakeholders at the August 7 annual meeting of property owners, where 74 of 80 respondents approved the objective developed during the smaller group session. The only reason a higher density was not chosen is that many stakeholders desire some balance between numbers and size of walleye, and that balance cannot be sustained at a density higher than 8 adults per acre. Stakeholders also did not want to keep walleye at such a high density that crappie recruitment would be seriously compromised. The LCO Band of Lake Superior Ojibwe encouraged us to aim for the midpoint of the 4-8/acre range of adult density.

Black crappies are almost as important as walleyes to local stakeholders in the Chippewa Flowage fishery (Tables A1, A3). Crappies also are extremely important to anglers statewide, so a high priority on managing crappie clearly is appropriate. Local stakeholders (and most anglers in the Upper Chippewa Basin) prefer a balance between numbers and sizes of crappie, and most are willing to forego maximum sustainable harvest in order to achieve that balance (Table A2). By consensus, local stakeholders further defined their size-related preferences by agreeing that we should strive to maintain a population in which approximately one in three crappies over 5 inches long in DNR fyke-net samples is also over 10 inches long.

Muskellunge are of very high interest to local stakeholders in the Chippewa Flowage fishery (Tables A1, A3). And musky fishing is the bread and butter of several local business operators at certain times of the year. Local stakeholders share the tendency of trophy musky hunters everywhere, strongly preferring size over number and exhibiting little interest in ever harvesting a fish (Table A2). Because the Chippewa Flowage has the demonstrated potential to produce record-class fish, participants in the June 18 visioning session were unanimous in their support of developing and maintaining a musky population of moderate density but extraordinary size structure. Their desire for a trophy fishery is reflected in the ambitious objective to develop and maintain a muskellunge population in which 3-5% of the adult fish are 50 inches or longer.

Bluegill fishing is a relatively recent phenomenon on the Chippewa Flowage, but bluegills are now among the top four species of interest to local stakeholders (Tables A1, A3). Bluegills are extremely important to statewide anglers as well, and we suspect that many family fishing trips originating from Flowage resorts are saved by the availability of numerous, quality-size bluegills. As with crappie, most respondents in our June 18 visioning session preferred a balance between numbers and size, even if that means forgoing maximum sustainable harvest. Visioning session participants did not have time to develop desired outcomes for bluegill, so we have developed a goal and specific objectives that we believe reflect the priorities and stated preferences of local and non-local anglers alike, including our intent to maintain a population in which approximately one in ten bluegills over 3 inches long in DNR electrofishing samples is also over 8 inches long.

The other four species of interest to local stakeholders – yellow perch, smallmouth bass, largemouth bass, and northern pike – are of substantially less interest than the top four species (Tables A1, A3). In fact, there is some negative sentiment toward largemouth bass based upon legitimate concerns that predation by largemouth bass could reduce the survival of young walleyes, especially on the west side of the Flowage. And there are strong negative feelings toward northern pike, which stakeholders fear could eat enough young muskies to adversely affect recruitment and adult density of muskellunge. There was insufficient time to develop individual goals and objectives for perch, bass, and pike at the June 18 visioning session; so we have chosen parameters for those species that we believe are consistent with preferences of local stakeholders, with different east-west habitat characteristics, and with achieving objectives for higher-priority species. We understand that local stakeholders would prefer a higher proportion of large yellow perch, if possible. We understand that some local stakeholders and many non-local anglers enjoy the bass fishery and are more inclined to release bass than to harvest them. We will try to meet the demand for bass fishing with smallmouth bass to the greatest extent possible, because we do not believe they pose the threat to walleye recruitment that largemouth bass do. And we recognize that stakeholders prefer a northern pike population that is low in density but large in average size. Our proposed goal and objectives for northern pike reflect that understanding and our desire to maximize conditions that favor the survival of young walleye and muskellunge.

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 1: **WALLEYE:** A walleye population of moderate to high density with a moderate proportion of quality-size fish.

Objective 1.1: 4-8 adult walleye per acre in spring population estimates, or early spring fyke-netting capture rates that we someday determine to be statistically associated with the desired density. (Adult walleye are defined by DNR as all fish over 15 inches long and all smaller fish for which gender can be determined in early spring.) We seek to maintain adult density near the midpoint of this 4-8/acre range.

Objective 1.2: 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%).

Walleye Status and Management Strategies (Local DNR Recommendations):

We do not have recent, relevant data on the adult walleye population, but angler reports from late spring and early summer of 2007 suggest that walleye fishing has never been better on the Chippewa Flowage. The most recent comprehensive survey conducted in spring of 1999 revealed an estimated density of 5.8 adult walleye per acre--centered within the range of desirability identified in Objective 1.1. Average length of adult walleye captured in spring of 1999 was 13.4 inches, and walleye PSD was 22%--also within the range of desirability identified in Objective 1.2, but on the low end of that range (Figure 1).

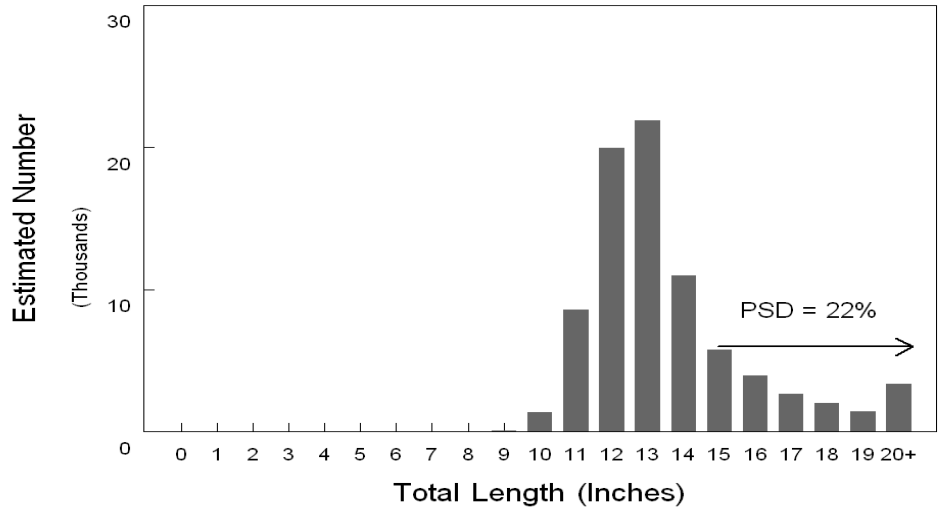

Figure 1. Length-frequency distribution of the estimated number of adult walleyes, by inch group, in the Chippewa Flowage in early spring of 1999. Fish were fyke-netted, marked with a temporary fin clip, and recaptured shortly thereafter by electrofishing in order to estimate adult density.

Throughout the documented history of the Flowage, moderate to high walleye density has been sustained by relatively consistent natural reproduction (survival to first birthday) and recruitment (survival to catchable size). From 1990 through 2006, our capture rate of age-0 (young-of-year) walleye has averaged 82 per mile during fall electrofishing surveys conducted annually at index stations used since the Chippewa Flowage Investigations of 1970-71 (WDNR 1971). We are confident this relatively high capture rate of age-0 walleye is a result of natural reproduction, because walleye were stocked only four times during that 17-year time period (1991, 1992, 1995, and 2000) – all as newly hatched fry that probably experienced little or no survival. (See Appendix Table A5 for all documented fish stockings in the Chippewa Flowage since 1990.)

Despite consistently high natural reproduction in the Flowage compared with other waters, there is some cause for concern about walleye recruitment in recent years. Four of the five lowest fall electrofishing capture rates of age-0 walleye since 1990 have occurred since the year 2000, including the lowest capture rate on record (14/mile) in 2004 (Figure 2). We are uncertain whether this recent period of lower average reproduction is due to less favorable weather, changes in fish community composition (e.g., more largemouth bass in the western basin that feed upon young walleye), or some other factors yet to be identified. We are reasonably certain that walleye spawning habitat (clean gravel and cobble substrate) remains excellent in the lake and in many tributary streams. In general, walleye should not be stocked in the Chippewa Flowage as long as natural recruitment remains sufficient to maintain the desired density (Objective 1.1).

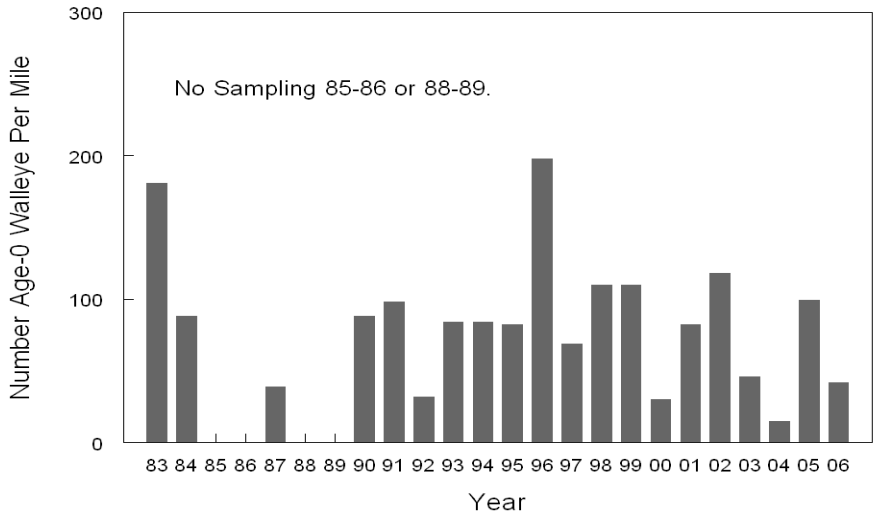

Figure 2. Fall electrofishing capture rate of age-0 (young-of-year) walleye in the Chippewa Flowage, 1983-2006.

Over-winter draw-downs in the Chippewa Flowage have facilitated natural reproduction of walleye by exposing near-shore cobble and gravel substrates to the air for several months prior to refilling in early spring. As algae and bacteria are killed by desiccation, rocky substrates become ideal habitat for the hatching of walleye eggs. Moderate over-winter draw-downs followed by complete refilling of the pool within a week of ice-out would ensure good spawning habitat (clean cobble and gravel) because walleye spawn in very shallow water, very close to shore. Dramatic over-winter draw-downs, on the other hand, pose a serious risk of depleting dissolved oxygen and killing fish in isolated, nutrient-enriched basins, especially if such draw-downs occur late in winter when the withdrawal of surface water high in dissolved oxygen through shallow, connecting waterways leaves only anoxic water caused by bacterial decomposition of organic matter in the deeper portions of vulnerable basins. Major fish kills have been observed in the Chippewa Flowage in association with these high-magnitude (>10 feet), late-winter draw-downs (91/92 and 95/96). In the future, such conditions should be avoided if at all possible. A comprehensive water level management plan should be developed that balances power production, flood control, and recreational interests.

Maintaining high-quality walleye spawning habitat also demands that we maintain shoreline stability. Wind-induced wave erosion on some islands and other exposed shorelines has, in some cases, converted stabile cobble or gravel substrates in the littoral zone to areas comprised primarily of eroded, shifting sand separated by high banks from overhanging riparian vegetation. Such areas are not conducive to walleye reproduction or to the production of invertebrates important to fish as prey. Besides degrading fish habitat in some areas, shoreline erosion decreases aesthetic values and threatens sacred Ojibwe burial grounds. For these reasons, the Lac Courte Oreilles Conservation Department has completed several shoreline erosion control projects on the Chippewa Flowage. We believe the Department of Natural Resources should join the LCO Conservation Department in more aggressively combating shoreline erosion on the Chippewa Flowage, especially in areas where walleye spawning habitat is threatened. We also believe that one of the best uses of volunteer time and money would be to join the agencies in this common cause of preserving fish habitat, aesthetic quality, and cultural heritage. And finally, any comprehensive water level management plan should limit maximum pool elevation in a way that minimizes shoreline erosion.

We have no current data on walleye growth rate in the Chippewa Flowage, but growth rates estimated in 1990 and 1999 were so similar that we have little reason to believe they have changed since that time. The length-at-age analysis conducted on a sample of male walleye collected in spring of 1999 revealed the relatively slow growth rate typical of male walleye in waters with moderate to high natural recruitment and adult density (Figure 3). DNR policy has been to exempt walleye populations from the statewide minimum length limit wherever the average male walleye fails to attain a length of at least 13 inches by the end of the fourth growing season. The rationale for this policy is to avoid protecting harvestable-size fish for so long that a high percentage of them die of natural causes before anglers have the opportunity to harvest them, which would be wasteful. Slot length limits (e.g., 14- to 18-inch fish protected from harvest) can be useful where harvest of numerous, slow-growing, small fish is desirable and anglers place a high priority on catching significant numbers of larger (e.g., 18-inch) fish. However, Chippewa Flowage stakeholders and Upper Chippewa Basin walleye anglers in general are more interested in harvesting sustainable numbers of acceptable, quality-size walleye than they are in catching and releasing such fish until they attain significantly larger (memorable or trophy) sizes (Table A2).

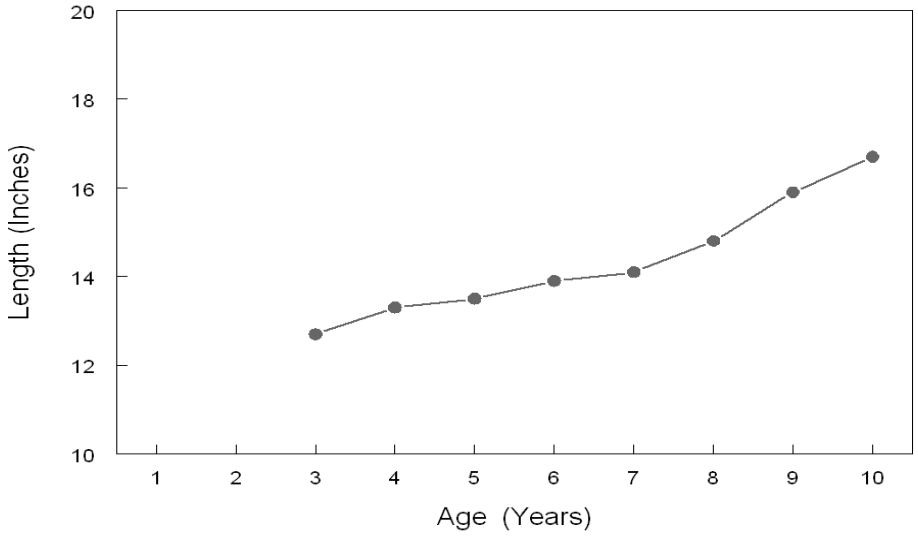

Figure 3. Average length at various ages of male walleye in the Chippewa Flowage based upon analysis of dorsal spines collected in spring of 1999.

Walleye production may be enhanced marginally by ensuring that over-winter draw-downs are of sufficient magnitude (perhaps 6-8 feet) and advantageous timing (late fall/early winter) to force young bass and sunfish away from shallow cover to open water where walleye can prey upon them efficiently. This might also help to maintain the desired walleye-dominated fish community.

A statewide minimum length limit of 13 inches did not work for the Flowage in the 1970s, and it was rescinded in 1978. As long as density and size structure objectives continue to be met in most years, we will continue to manage the Chippewa Flowage walleye fishery with no harvest length restrictions. However, if recruitment and density should decline to unacceptable levels (trending downward and threatening to drop below 4 adults per acre) and growth rate increases significantly, other strategies (e.g., the statewide 15-inch minimum length limit) may become appropriate. If density remains high and growth rate remains slow, but PSD falls and stays below 20% (Objective 1.2), the most appropriate harvest regulation may include the usual daily bag limit of 3, but only one of which could be over 14 inches long (known popularly as the 1-over-14 regulation). We will adjust strategies as needed to achieve stakeholder-influenced objectives, depending upon the cumulative results of annual baseline monitoring surveys.

Walleye populations can change dramatically over time due primarily to variations in recruitment and harvest. Increased frequency of monitoring is necessary in order to determine whether our walleye population objectives are being met. Because of the size and importance of the Chippewa Flowage, we propose to begin gathering catch-rate and size-structure data by early spring fyke netting every year (east side in even years, west side in odd years) in order to closely track the walleye population. We will continue to monitor walleye reproductive survival by conducting fall electrofishing surveys at established index stations. With our assistance, WDNR's Treaty Assessment unit plans to conduct a comprehensive survey (actual mark-recapture walleye population estimate) in spring of 2011.

GOAL 2: **BLACK CRAPPIE:** A population of moderate density with a moderate proportion of preferred-size fish.

Objective 2.1: Currently we lack an agency-accepted standard method to assess the relative abundance of black crappie. Until such a method is developed, we will consider a mid-fall fyke netting capture rate of 10-20 black crappie 5 inches and longer per net-night to be indicative of the desired moderate density.

Objective 2.2: Of all black crappie 5 inches and longer captured by fyke netting in mid fall, 20-40% should be 10 inches or longer (RSD-10 = 20-40%).

Black Crappie Status and Management Strategies (Local DNR Recommendations):

We have no mid-fall fyke netting data for black crappie that would allow us to assess population status exactly as specified in Objectives 2.1 and 2.2. However, the crappie population was sampled by fyke netting in early spring of 2006 incidental to efforts to capture broodstock muskellunge. We captured black crappie 5 inches and longer at a rate of 17 per net in 19 overnight fyke net sets in the eastern basin. Of the 325 black crappie ≥ 5 inches captured during that survey, the proportion ≥ 10 inches (RSD-10) was 18% – slightly below the desirable range for RSD-10 identified in Objective 2.2 had this actually been a fall fyke net sample. Mean length of crappie captured in these early-warming embayments of the eastern basin was 9.1 inches.

In a 1990 WDNR creel survey, we estimated that anglers harvested almost 200,000 black crappie – a high harvest rate of 13/acre/year. In the mid 1990s, many anglers expressed concerns that both numbers and sizes of crappie had declined. Those concerns prompted a 1998 reduction to the current daily bag limit of 15 crappie (among the aggregate daily bag limit of 25 panfish) and a prohibition of crappie harvest during the ice fishing season (December 1 through the first Sunday in March). At the time, computer modeling suggested that even the 15-daily bag limit might not be low enough to prevent over-harvest during the open-water season, especially in the absence of any harvest length restrictions. But a daily bag limit of 15 with winter closure seemed to be the only restrictive crappie harvest regulations anglers would support at that time.

In a 1999 WDNR creel survey, we estimated that anglers harvested almost 46,000 black crappie – a moderate harvest rate of 3/acre/year. We do not know if the smaller harvest in 1999 compared with 1990 reflects lower crappie population density, added harvest restrictions, or both. The 1999 creel survey revealed that Flowage anglers were willing to harvest significant numbers of crappie less than 10 inches long (54% of all fish measured), many as small as 8.0-8.4 inches long. Such data suggest that potential length restrictions could influence total harvest.

We cannot evaluate black crappie population status or changes associated with special regulations until we develop a meaningful method of population assessment. Therefore, starting in 2007, we propose to sample black crappie in mid-fall fyke nets every year (east side in even years, west side in odd years) until we learn if this method will allow us to confidently assess trends in crappie abundance and size structure in the Chippewa Flowage. We also cannot render sound judgment about the potential use of length limits to manage crappie in the Flowage without knowing more about age-specific mortality rates. We encourage WDNR's Integrated Science Services (ISS) Division to conduct research into black crappie population dynamics in northern Wisconsin, particularly to identify an age-dependent length to which crappie may be protected in most populations without incurring unacceptably high losses to natural mortality.

We will estimate age structure, growth rate, and total mortality rate of black crappie in the Chippewa Flowage in order to augment such research and to develop a basis for improved harvest regulation. It is important that we identify a combination of bag and length limit restrictions that would allow attainment of Objectives 2.1 and 2.2 without continuing to restrict winter harvest altogether.

Installation of "fish cribs" to attract crappie and other species has been a popular activity among civic-minded volunteers who live and fish on the Chippewa Flowage. Over the past 20 years, more than 2,000 such structures have been deployed in the Flowage, usually on 10- to 20-foot depth contours. Those structures have been built using wooden pallets (approximately 50%), traditional logs (~25%) and modular plastic (~25%). Before northern pike and bluegill became prevalent in the Flowage, fish cribs were viewed by resort owners and fishing guides as the only places where many novice anglers could catch fish – mostly crappie for the frying pan. But the fish community has changed. Northern pike now are abundant and relatively easy to catch in weed beds; and high harvest of pike is desirable. (See muskellunge section.) Bluegills also are abundant and easy to catch in many different habitats, and they can sustain a relatively high harvest. Similar to crappie, northern pike and bluegill are excellent food fish. It is no longer necessary to concentrate crappie around fish-attracting structures so that novice anglers can easily find and harvest some fish for consumption. In order to best utilize the time and generosity of volunteers who wish to help us manage the Chippewa Flowage fishery, we recommend that conservation of shoreland habitat and other educational efforts take priority over enhancement of off-shore habitat.

GOAL 3: **MUSKELLUNGE:** A population of moderate to high density with a moderate proportion of memorable-size fish and a low proportion of trophy-size fish.

Objective 3.1: 0.3 to 0.4 adult muskellunge per acre in spring population estimates, or early spring fyke-netting capture rates that we someday determine to be statistically associated with the desired density.

Objective 3.2: Of all muskellunge 20 inches and longer captured by fyke netting in early spring, 30-40% should be 42 inches or longer (RSD-42 = 30-40%) and 3-5% should be 50 inches or longer (RSD-50 = 3-5%).

Muskellunge Status and Management Strategies (Local DNR Recommendations):

Valid estimates of muskellunge density (number per acre) are almost impossible to obtain on the Chippewa Flowage because of its large area (15,300 acres) and high habitat diversity. Within a large margin of error, mark/recapture studies by WDNR during 1970/71 and 1990/91 estimated density at approximately 0.15 to 0.25 adult muskellunge per acre – somewhat lower than today's objective range of 0.3 to 0.4 per acre. Analysis of tag return data from 1,634 fish caught by 27 guides between 1979 and 1986 generally supports the supposition that muskellunge density has been approximately 0.2 per acre (1 adult fish every 4 to 6 acres) for much of recent history.

We do not have a recent estimate of muskellunge density, but in late April of 2006 we captured muskellunge over 20 inches long in 98 fyke-net nights of effort in northern areas of the Chippewa Flowage at an average rate of 1.6 per net-night. Of the 151 individuals ≥20 inches captured at least once during the week-long spawning period, 21% exceeded 42 inches (objective range for RSD-42 = 30-40%), and 1.3% (two fish) exceeded 50 inches (objective range for RSD-50 = 3-5%) (Table 5).

Despite the fact that this population does not yet meet our unusually high expectations, indexes of size structure have increased substantially over the past 16 years due primarily to an excellent, voluntary catch-and-release ethic among Flowage anglers. RSD-40 increased from 12% in 1990 to 34% in 2006 even though the minimum length limit was only 34 inches from 1995 through 2002. And RSD-45 (relevant to the 45-inch minimum length limit in effect since 2003) increased from <2% in 1990 to almost 9% in 2006.

Table 5. Muskellunge captured in 98 fyke-net nights of effort in northern areas of the Chippewa Flowage during the musky spawning season, April 18-22, 2006. East Side and West Side net locations were separated by County Highway CC.

Parameter	East Side	West Side	Combined
Number of Fyke-Net Nights	49	49	98
Total Number of Muskies Captured	118	42	160
Total Number of Muskies Caught ≥ 20 Inches	115	42	157[A]
Number of Muskies ≥ 20" per Fyke-Net Night	2.35	0.86	1.60
Number of Female Muskies Mated for Production	20	10	30[B]
Number of Fin Tissue Samples for DNA Analysis	104	41	145[C]
Number of Muskies ≥ 20" Caught Only Once	110	41	151
Sex Ratio (Sexually Mature Males/Females)	67/43	26/14	93/57
Number of Muskellunge ≥ 40 Inches	36	16	52
Muskellunge RSD-40 (# ≥ 40" / # ≥ 20" x 100)	33%	39%	34%
Number of Muskellunge ≥ 42 Inches	22	9	31
Muskellunge RSD-42 (# ≥ 42" / # ≥ 20" x 100)	20%	22%	21%
Number of Muskellunge ≥ 45 Inches	9	4	13
Muskellunge RSD-45 (# ≥ 45" / # ≥ 20" x 100)	8.2%	9.7%	8.6%
Number of Muskellunge ≥ 50 Inches	1	1	2
Muskellunge RSD-50 (# ≥ 50" / # ≥ 20" x 100)	0.9%	2.4%	1.3%

A These numbers include fish that were marked and recaptured. They were used to calculate fyke-net capture rate, but not sex ratio or size structure indexes.
B Ripe adults (30 females combined with 1-4 unique males each) were used to procure fertilized eggs for 2006 production of muskellunge fingerlings at WDNR's Thompson Hatchery in Spooner.
C A total of 145 fin tissue samples were collected in order to characterize the genetic stock by analyzing DNA at several microsatellite loci in the Conservation Genetics Laboratory of Dr. Brian Sloss at the University of Wisconsin – Stevens Point.

Typical of most musky waters, female muskellunge in the Chippewa Flowage were larger than males in our spring 2006 fyke netting survey. But unlike many waters, even males demonstrated the capacity to achieve large size (Figure 4) and robust condition. The largest male captured in 2006 weighed 31.5 pounds at a length of only 45.2 inches. The largest female weighed 40.9 pounds at only 51.0 inches, and that was after delivering 1.5 quarts of eggs for hatchery production. In summary, muskellunge appeared healthy (no external signs of disease) and exceptionally robust in spring of 2006.

These and other data suggest that a high minimum length limit continues to be the best strategy for achieving muskellunge population objectives in the Chippewa Flowage. But those objectives (especially an RSD-50 of 3-5%) are not likely to be achieved as long as anglers are allowed and a few decide to harvest muskellunge between 45 and 50 inches long. Therefore, to maximize the odds of achieving the stakeholder-influenced trophy musky fishery objectives in this plan, the minimum length limit for muskellunge must be increased from 45 to 50 inches in the Chippewa Flowage.

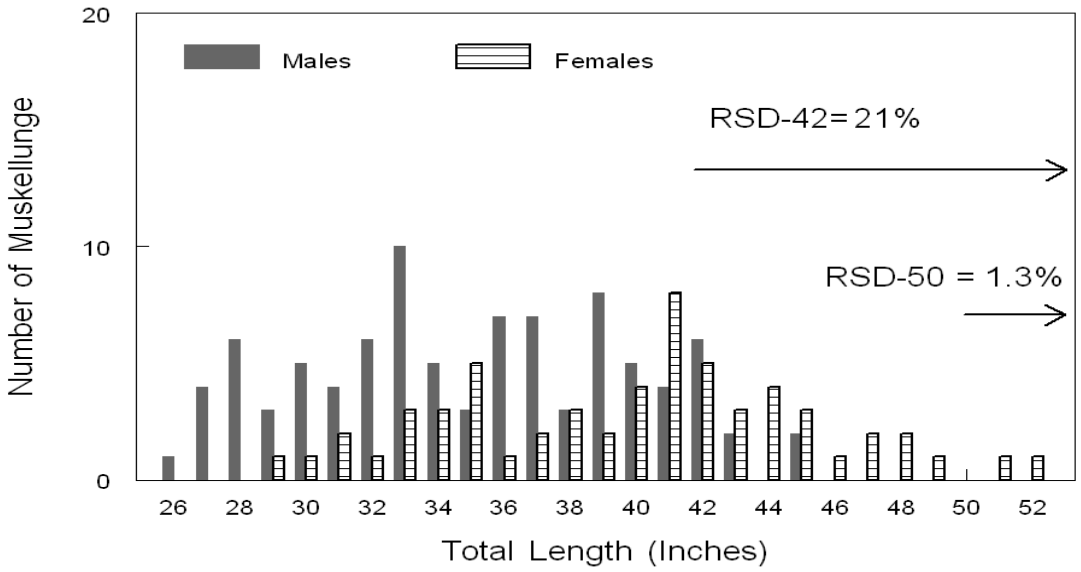

Figure 4. Length-frequency distribution of 151 muskellunge captured during 98 fyke-net nights of effort during April 18-22, 2006 in the northern half of the Chippewa Flowage.

Simply restricting angler harvest to fish over 50 inches long may not be sufficient to meet our objectives. Recent WDNR research suggests that 83% of muskellunge caught and released on single-hook (swallow) sucker rigs die within a year after release as a result of internal injuries sustained by that method of capture. It will do little good to release 45- to 50-inch muskellunge caught on swallowed, live-bait rigs if 80% will die within the year. Because regulating the manner in which live bait is fished would be virtually unenforceable, we will recommend a statewide regulation requiring that anglers fishing for muskellunge use only one rod at a time, as in Minnesota. This will force musky anglers to fish with artificial lures or to fish attentively with harnassed suckers, theoretically reducing the time fish would have to swallow a deadly hook. Concurrently, the proper use of "quick-strike" rigs and methods will be strongly promoted in signs, brochures, and newsletters. In order to compensate Flowage musky anglers for what some will perceive as loss of opportunity, we will propose to legalize motor trolling (one rod per angler) on the Chippewa Flowage, thus providing another effective method to catch fish (particularly in the fall) that is much more consistent with the goals of a catch-and-release trophy fishery than the use of live bait. Legalizing motor trolling also would allow more anglers in our aging population an opportunity to continue participating in what has always been a physically demanding sport when restricted to casting.

In conjunction with reducing angler-induced sources of mortality, representatives of the WDNR and the Lac Courte Oreilles Band of Lake Superior Ojibwe should investigate how we might work together to improve our understanding of the currently undocumented angler harvest, on-reservation spring spearing harvest, and winter spearing harvest of muskellunge – particularly rare fish approaching 50 inches long, so that management strategies can be altered further, if needed, in order to achieve shared objectives. Total registration of all muskellunge harvested by anglers and tribal spearers should be among the options discussed.

Muskellunge density is difficult to track, mostly because adult fish are rare even in good populations. Increased frequency of monitoring is necessary in order to determine whether trends in density can be indexed by capture rate. Because of the size and importance of the Chippewa Flowage, we propose to begin gathering catch-rate and size-structure data by early spring fyke netting every year (east side in even years, west side in odd years) in order to closely track the muskellunge population. With our assistance, WDNR's Treaty Assessment unit plans to conduct a comprehensive survey (actual mark-recapture musky population estimate) in spring of 2011 (year of marking) and 2012 (year of recapture and calculation of estimate).

We do not know the extent to which natural reproduction has contributed to the current adult population of muskellunge in the Chippewa Flowage. But we know that the 9- to 11-inch fingerlings stocked and marked with ventral fin clips by WDNR in fall of 1987, 1988, and 1989 comprised 22% of the 90 muskellunge <20 inches long captured in two electrofishing circuits of the entire Flowage shoreline in May of 1990. Applying a small correction factor to account for unmarked fish stocked by the LCO Conservation Department during those years, we estimate that stocked fingerlings accounted for approximately 25% of all recruitment of young muskellunge in the Chippewa Flowage in the late 1980s. But in fall of 1990, 12 of 18 (67%) of all young-of-year muskellunge captured by electrofishing along 32 miles of shoreline had a right ventral fin clip, indicating they had been stocked that fall prior to the survey. This raises a question as to whether the presumed 75% rate of natural reproduction of the late 1980s is still characteristic of the Flowage muskellunge population. We have done no intensive mark/recapture evaluations for stocked fingerlings since 1990. Uncertainty is compounded by the fact that WDNR, the Lac Courte Oreilles Band of Lake Superior Ojibwe, and the Hayward Lakes Chapter of Muskies, Inc. have stocked 9- to 13-inch muskellunge fingerlings into the Flowage in 17 of the last 20 fall seasons (Table A5). Fall electrofishing surveys in two of the three non-stocked years produced few young-of-year muskellunge (one age-0+ fish along 5 miles of shoreline in 1994 and three age-0+ fish along 30 miles of shoreline in 1999); but two years of sampling in non-stocked years is insufficient to draw any conclusions about the significance of natural reproduction.

We propose to continue sampling juvenile muskellunge (<20 inches) by electrofishing at established lake-wide index stations every fall (preferably at least one week after fish have been stocked in alternate years of stocking) until we determine whether there is a statistically significant difference in capture rate between stocked and non-stocked years. (Stocked fingerling distribution points should be standardized also.) This monitoring strategy will reduce uncertainty about the role of natural reproduction in the Chippewa Flowage only if all contributing entities (including LCO Conservation and Muskies, Inc.) refrain from stocking in designated non-stocked (even) years. If we learn that more muskellunge must be stocked in order to achieve Objective 3.1, then we will ask our partners (including the Chippewa Flowage Area Property Owners' Association and the Lake Chippewa Flowage Resort Association) to contribute to the purchase of 10- to 12-inch muskellunge fingerlings for stocking in addition to the typical maximum of 2,500 that WDNR may dedicate to any single body of water in any given year of stocking. However, we hope that natural reproduction will prevail as the primary source of recruitment of muskellunge to this fishery. If natural reproduction provides all the fish needed to achieve Objective 3.1, we shall discontinue stocking altogether. That would be the only way to ensure that the Chippewa Flowage remains the highest-quality source of broodstock for hatchery production if we decide to keep it on a five-year rotation for such purposes in northwestern Wisconsin.

Natural reproduction of muskellunge in the Chippewa Flowage can be enhanced in three ways. First and most importantly, we can continue to protect wild shorelines and the corridors of tributary streams in which muskellunge are known to spawn. (The relatively recent acquisitions into public ownership of Big Timber Island and more than a mile of Chief River corridor are excellent examples.) Research demonstrates clearly that the success of natural reproduction of muskellunge is related to the extent to which shoreline vegetation and littoral zones exist in a natural state. Efforts to combat shoreline erosion in wind- and wave-exposed areas will help. Second, we can continue to support a water level management regime that exposes littoral zone sediments to the air during moderate winter draw-downs, ensuring high levels of dissolved oxygen at the sediment-water interface and thus facilitating survival of muskellunge eggs broadcast in the shallows after the Flowage fills each spring. And lastly, we can encourage anglers to harvest northern pike and largemouth bass – both of whom prey upon young muskellunge significantly – by informing anglers of the need for harvest (in signs, brochures, and newsletters), the methods of preparation, and the good eating qualities of both northern pike and largemouth bass.

GOAL 4: **BLUEGILL:** A population of moderate density with a moderate proportion of preferred-size fish.

Objective 4.1: Currently we lack an agency-accepted standard method to assess the relative abundance of bluegill. We will initiate a new baseline monitoring protocol in 2008 by establishing late-spring electrofishing index stations in and around spawning areas in order to begin tracking the relative abundance of bluegill. Until we have reliable data upon which to base an objective, we will consider a late spring electrofishing capture rate of 50-100 bluegill 3 inches and longer per hour to be somewhat indicative of the desired moderate density.

Objective 4.2: Of all bluegill 3 inches and longer (stock size) captured by electrofishing in late spring, 5-15% should be 8 inches or longer (RSD-8 = 5-15%).

Bluegill Status and Management Strategies (Local DNR Recommendations):

We have no late spring electrofishing data for bluegill that would allow us to assess population status as specified in Objectives 4.1 and 4.2. But reports from anglers and our own fishing experience suggest that bluegill have become a new and major contributor to the Chippewa Flowage fishery in just the past decade. Anglers target and routinely catch 7- and 8-inch bluegills near their nesting colonies in early spring and similar-size fish at the edge of floating bogs and over submersed bogs in mid summer. Harvestable-size fish can be caught again in mid winter until the special ice-fishing season closes on the first Sunday in March. But little effort is directed toward bluegill at that time, probably because winter harvest restrictions on crappie and all other game fish discourage anglers from even venturing out onto the Flowage to fish through the ice.

Local stakeholders at recent meetings clearly considered bluegill to be among the top four species of interest in the Chippewa Flowage fishery (Tables A2 and A3). Though we did not have time to develop desired outcomes for bluegill at those meetings, we have developed a goal and objectives that we believe reflect the priorities and stated preferences of local and non-local anglers alike. Bluegills are important to anglers statewide, and presumably they fill a niche for tourists who seek to enjoy the occasional (and fairly reliable) fish fry while vacationing in the Hayward area.

We will seek to provide a bluegill fishery that meets angler expectations by considering an appropriate combination of strategies to regulate reproductive survival (influenced by timing and degree of winter draw-downs), natural recruitment (influenced significantly by walleye density), and angler harvest (influenced by seasons and limits). We suspect but cannot yet demonstrate that current winter harvest regulations for bluegill are unnecessarily restrictive. After obtaining some usable data under our new baseline monitoring protocol (late spring electrofishing in and around spawning areas on the east side in even years and on the west side in odd years), we will conduct a thorough review of those restrictions and recommend changes if appropriate.

GOAL 5: **YELLOW PERCH:** A population of low to moderate density with a moderate proportion of preferred-size fish.

Objective 5.1: Currently we lack an agency-accepted standard method to assess the relative abundance of yellow perch. We will initiate a new baseline monitoring protocol in 2008 by including yellow perch among the species for which data are collected during annual, early-spring fyke-netting surveys. As our understanding of perch improves, we will update this objective with appropriate parameter values.

Objective 5.2: Of all yellow perch 5 inches and longer captured in early spring fyke nets, 10-20% should be 10 inches or longer (RSD-10 = 10-20%).

Yellow Perch Status and Management Strategies (Local DNR Recommendations):

Yellow perch were the fifth most desired species by local stakeholders in the Chippewa Flowage fishery (Table A1); but their importance as prey for walleye and muskellunge may overshadow their importance as sport fish. Throughout North America, fishery researchers have documented that years with good hatches of yellow perch correspond well with strong year classes of walleye – the latter feeding heavily upon larval and fingerling perch during times of plenty. On a more limited basis, researchers have found that juvenile and adult yellow perch are among the most prevalent items in the diets of juvenile and small adult muskellunge and northern pike. There is no denying the importance of yellow perch to the Chippewa Flowage fishery.

Though we did not have time to develop desired outcomes for perch at our stakeholder meetings, we have developed a goal and objectives that we believe reflect the likely preferences of anglers and also indicate a healthy ecosystem with perch as an important link in the food chain for the sport fish of primary interest – walleye and muskellunge. Without more information on current status, it is difficult to know what strategies may be necessary in order to achieve our partially developed objectives. However, we can make some generalities to guide volunteer efforts.

The Chippewa Flowage has more wild shoreline than most lakes, but the amount of littoral zone structure (emergent plants or densely branched woody material) specifically well-suited for yellow perch to drape their long strings of gelatinous eggs in early spring may be limited. Fishery scientists have not tested whether increasing the amount of perch spawning habitat leads to higher egg survival and hatching, but if we were doing everything possible to maximize walleye reproductive survival, we might suggest placing “reefs” of fresh conifer trees every year into shallow areas where yellow perch are likely to spawn. (We would need help from local fishing guides to locate such areas.)

If Flowage volunteers wish to try this technique, we suggest securing structures in water that is 2-4 feet deep and using fully needled evergreens that would provide intra-structure shade. Yellow perch eggs are very sensitive to ultraviolet light and would be killed if laid in shallow, clear water or even stained water too close to the surface in unshaded areas. We suggest targeting areas where walleye/perch dominance is being challenged by the perceived upsurge in abundance of northern pike, largemouth bass and bluegill, so west-side locations like Crane Lake and Chief Lake would be good candidates for initial efforts.

If we accept the basic premise that all waters cannot be all things to all anglers, then we must act upon our highest priorities on a water-specific basis. Every yellow perch eaten by a northern pike is a perch no longer available for consumption by a muskellunge or walleye. And relatively few young yellow perch recruit to adulthood in lakes where largemouth bass and bluegill are abundant. In order to minimize potentially adverse competitive interactions with highly desired species, we encourage anglers to harvest northern pike, largemouth bass, and bluegill. This can be facilitated by informing anglers of the need for harvest (in signs, brochures, and newsletters), and possibly also by opening up the Flowage to ice fishing throughout the year. Northern pike and bluegill are easy to catch through the ice compared with most species.

GOAL 6: **SMALLMOUTH BASS:** A population east of Highway CC of moderate density with a high proportion of memorable-size fish. (We lack confidence in our ability to establish a significant smallmouth bass population west of Highway CC.)

> **Objective 6.1:** Electrofishing capture rates for 7-inch and longer smallmouth bass of 30-50 per hour in bass spawning grounds (including Chippewa River tributaries upstream to the first barrier) during the bass spawning season.
>
> **Objective 6.2:** Of all smallmouth bass 7 inches and longer captured by electrofishing during the bass spawning season, 5-15% should be 17 inches or longer (RSD-17 = 5-15%).

Smallmouth Bass Status and Management Strategies (Local DNR Recommendations):

We did not have time to actually set smallmouth bass goals and objectives at the Visioning Session on June 18, 2005. Our recommendations incorporate habitat-based realities (east basin vs. west basin) and what we know about the desirability of smallmouth bass and the preferences of local stakeholders and statewide anglers for "numbers vs. size" and "catch vs. harvest."

We have no late spring electrofishing data for smallmouth bass that would allow us to assess population status as specified in Objectives 6.1 and 6.2. But reports from anglers suggest that smallmouth bass fishing can be excellent on the east side of the Flowage, particularly where a combination of rock substrate and adjacent macrophytes provides the cover and feeding areas that smallmouths prefer. After obtaining some usable data under our new baseline monitoring protocol (late spring electrofishing in and around spawning areas on the east side in even years and on the west side in odd years), we will conduct a thorough review of bass regulations and recommend changes if needed to achieve our objectives.

Unlike largemouth bass, we believe that a good fishery for smallmouth bass is consistent with higher-priority goals for walleye and muskellunge on the Chippewa Flowage. Smallmouth bass populations coexist well with walleye and muskellunge throughout the Upper Midwest and Canada. Because we view smallmouth bass positively and largemouth bass somewhat negatively with respect to their influences on the Chippewa Flowage fishery, we may need to regulate the harvest of these species separately – protecting smallmouth bass with minimum length limits and allowing or even promoting harvest of largemouth bass of all sizes. In order for the regulatory separation of black basses to be considered by WDNR's Fisheries Management Board, we must obtain at least two seasons of data in order to document status and justify any proposed changes. In the interim, a voluntary catch-and-release approach toward legal-size smallmouth bass (fish ≥ 14 inches) seems warranted and should be promoted by tourism officials and area businesses.

GOAL 7: **LARGEMOUTH BASS:** A population west of Highway CC of low density that minimizes predation upon young walleye but provides some angling diversity, with a moderate proportion of memorable-size fish. (We do not wish to maintain a significant largemouth bass population east of Highway CC.)

Objective 7.1: Electrofishing capture rates for 8-inch and longer largemouth bass of 10-20 per hour in bass spawning grounds during the bass spawning season.

Objective 7.2: Of all largemouth bass 8 inches and longer captured by electrofishing during the bass spawning season, 5-15% should be 18 inches or longer (RSD-18 = 5-15%).

Largemouth Bass Status and Management Strategies (Local DNR Recommendations):

We did not have time to set largemouth bass goals and objectives at the Visioning Session on June 18, 2005. Our recommendations incorporate habitat-based realities (east basin vs. west basin) and what we know about the desirability (or lack thereof) of largemouth bass among interviewed anglers and local stakeholders who prefer a fishery dominated by walleye, panfish, and muskellunge (Tables 4 and A1).

We have no late spring electrofishing data for largemouth bass that would allow us to assess population status as specified in Objectives 7.1 and 7.2. But angler reports suggest that largemouth bass fishing can be very good on the west side of the Flowage, particularly in some of the clearer lake basins with dense aquatic plants. After obtaining some usable data under our new baseline monitoring protocol (late spring electrofishing in and around spawning areas on the east side in even years and on the west side in odd years), we will conduct a thorough review of bass regulations and recommend changes if needed to achieve our objectives. In the interim, a harvest-oriented approach toward legal-size largemouth bass (fish ≥ 14 inches) seems warranted and should be promoted by tourism officials and area businesses.

It is our intuitive impression at this time that largemouth bass density may be high enough to adversely affect recruitment of both walleye and muskellunge in the western basin of the Chippewa Flowage. Significant movement of walleye between eastern and western basins could be masking the extent to which walleye reproduction and recruitment have been impacted by largemouth bass in the western basin. But until we actually begin sampling both walleye and bass in a frequent, systematic manner that accurately characterizes relative abundance and size structure of both species, our suspicions will not suffice to justify dramatic regulatory action.

As mentioned in the section on smallmouth bass, we believe we must obtain at least two seasons of data to document status and justify any liberalization of largemouth bass harvest. If largemouth bass electrofishing capture rates far exceed those outlined in Objective 7.1, and if fall electrofishing capture rates of young walleye and muskellunge are substantially lower on the west side than the east side of the Flowage, then we may have the information needed to initiate change.

Though largemouth bass fishing currently may be good enough in the western basin to tempt local tourism officials to promote that aspect of the fishery by inviting largemouth bass tournament activity to the Flowage, we advise strongly against it. First, deliberate attempts to routinely bring large crowds of competitive anglers to the Chippewa Flowage would conflict with the near wilderness experience philosophy and limited public access plans first articulated in the 1968 publication *Public Recreation on the Big Chip* that was co-signed by WDNR and NSPW. Second, doing so could create a long-term expectation that largemouth bass fishing would always be as good or better than it is today. We do not wish to create such an expectation, because it is inconsistent with higher-priority goals prompted by the use patterns of visitors from throughout the Midwest and the convictions of local stakeholders who helped us to develop this Plan.

When considering the future of water level management on the Flowage, we should keep in mind that a moderate fall drawdown (perhaps 6-8 feet) would give some advantage to walleye over largemouth bass by allowing an effective cool-water predator (walleye) to feed upon warm-water prey (young largemouth bass) that will be sluggish in the cold water prior to ice-up and vulnerable to predation as water level recedes from the protective, densely vegetated shallows.

GOAL 8: **NORTHERN PIKE:** A population of very low density that minimizes predation upon young muskellunge but allows angling diversity and sustains a winter fishery, with a moderate proportion of preferred-size fish.

> **Objective 8.1:** Less than 1 adult northern pike per acre in spring population estimates, or early spring fyke-netting capture rates that we someday determine to be statistically associated with the desired density.
>
> **Objective 8.2:** Of all northern pike 14 inches and longer captured by fyke netting in early spring, 15-25% should be 28 inches or longer (RSD-28 = 15-25%).

Northern Pike Status and Management Strategies (Local DNR Recommendations):

Valid estimates of northern pike density (number per acre) are almost impossible to obtain on the Chippewa Flowage because of its large area (15,300 acres) and high habitat diversity. We have no recent estimates of density, but near the end of the pike spawning season in late April of 2006 we captured northern pike over 14 inches long in 98 fyke-net nights of effort in northern areas of the Chippewa Flowage at an average rate of 3.1 per fyke-net night (Table 6) – twice the mean capture rate of stock-size muskellunge at that time. Of the 307 pike ≥14 inches captured during the week-long survey, only 6% exceeded 28 inches (objective range for RSD-28 = 15-25%). Though size structure was similar on both sides of the Flowage, we captured northern pike at a rate 3.1 times higher on the clear-water, more densely-vegetated west side than on the stained-water, more sparsely-vegetated east side (Table 6). This observation corresponds to angler reports of better pike fishing on the west side of the Flowage than on the east side – particularly in the Scott, Tyner, Chief, and Crane lake basins.

Table 6. Northern pike captured in 98 overnight fyke nets in the northern half of the Chippewa Flowage after the peak of the pike spawning season, April 18-22, 2006.

Parameter	East Side	West Side	Combined
Number of Fyke-Net Nights	49	49	98
Total Number of Northern Pike Captured	83	242	325
Number of Pike with Esocid Lymphosarcoma	2	6	8
Proportion of all Pike with Lymphosarcoma	2.4%	2.5%	2.5%
Number of Northern Pike ≥ 14 Inches	75	232	307
Northern Pike ≥ 14 Inches per Fyke-Net Night	1.5	4.7	3.1
Number of Northern Pike ≥ 28 Inches	5	14	19
Northern Pike RSD-28 (# ≥ 28" / # ≥ 14" x 100)	6.6%	6.0%	6.1%

In the spring 2006 fyke-netting survey, we observed that 2.5% of all pike captured had lesions and tumors that later were verified as symptoms of esocid lymphosarcoma (Table 6) – a disease of northern pike and muskellunge that presumably is caused by a virus found throughout North America and Europe. This was only the second discovery of esocid lymphosarcoma in Sawyer County waters – the first being confirmed in Nelson Lake pike a year earlier. The disease poses no health risk to humans or other mammals, but northern pike can experience significant mortality during cool-water periods; and muskellunge can experience high mortality if infected. Fortunately, we observed no infected muskellunge in 2006. Esocid lymphosarcoma is spread by direct bodily contact, presumably during the spawning season. The fewer the pike, the lower the chances are that they will spread esocid lymphosarcoma among themselves and to muskellunge.

We are unable to conclude with great confidence that the Chippewa Flowage has "too many" northern pike at this time. But we can conclude that size structure is not what local stakeholders desire, and it is unlikely to change unless more small pike (<28 inches) are harvested in relation to the fewer preferred-size pike (≥28 inches) that are available. Also, we captured far fewer muskellunge in 2006 on the west side of the Flowage where pike were most numerous; and some evidence exists to suggest the mechanism for that relationship in many waters may be predation by adult pike upon young muskellunge. Also, we know that northern pike prey heavily upon yellow perch when available, potentially putting pike into direct competition for prey with the most preferred species of sport fish on the Flowage – walleye and muskellunge. All things considered, including the actual anti-pike sentiment evident among local stakeholders, liberal harvest of northern pike seems to be a prudent approach to achieving many objectives of this Plan.

When considering whether enough pike could be harvested by anglers to make a difference, we referred to results of the 1998 creel survey in which anglers *caught* an estimated 52,000 northern pike (3.4 per acre) but *harvested* only 7,400 of them (0.5 per acre) – 14% of all pike caught (Table 4). Currently there is no length limit, and most pike are harvested on completed-trip stringers that contain only one or two fish; so liberalizing limits is not a practical option to increase harvest. But promoting a higher rate of harvest in the angler catch with special events and informational materials (signs, brochures, etc.), combined with opening up the Chippewa Flowage to ice fishing throughout the winter season, might generate enough additional harvest to improve pike population size structure (Objective 8.2) and make a positive difference in the fishery overall. Recently WDNR and the LCO Conservation Department experimented with removal of northern pike by spring fyke netting in Musky Bay of Lac Courte Oreilles. LCO Conservation may continue that experiment by hiring and supervising interns to do the field work. If those efforts succeed and the method is thought to have application for the Chippewa Flowage, we will encourage our partners to expand their pike removal program to the Flowage.

GOAL 9: BIODIVERSITY: 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 9.1: No net loss of native fish or other native aquatic species either in the lake or in its tributary streams; and no catastrophic losses to disease or poor water quality that could lead to fish community imbalance and failure to achieve important sport fishing objectives.

Objective 9.2: Identification and maintenance of genetic stocks that may be uniquely adapted and well-suited for life in the Chippewa Flowage and possess the genotypic diversity to adapt to changing environmental conditions and challenges from diseases and other biological invaders.

General Ecosystem Status and Management Strategies (Local DNR Recommendations):

Adequate year-round water quality is vital to maintaining sport fish populations with acceptable densities and size structures. The Chippewa Flowage, while productive, generally has very good water quality. However, extreme late-winter draw-downs (>10 feet) within currently authorized limits occurred during 1991/1992 and 1995/1996, causing depletion of dissolved oxygen in large areas of the Flowage and killing enough fish to delay progress in meeting trophy fishery objectives for long-lived species like muskellunge. We recommend that an ad hoc committee of agency and organizational representatives (including Xcel Energy officials) convene in the near future with the specific and sole purpose of reviewing current water level operating guidelines and practices, and determining how those may be amended and communicated in the future in order to benefit the fishery and other legitimate uses of the Chippewa Flowage.

During most of the past several winters WDNR has operated a compressed-air diffusion aeration system in Crane Lake in order to minimize the probability of fish kills associated with low dissolved oxygen levels. The cost of electricity and maintenance to operate that system has been funded primarily by generous donations from the Chippewa Flowage Area Property Owner's Association, the Lake Chippewa Flowage Resort Association, and the Hayward-based group – Walleyes for Northwest Wisconsin. During winter of 2006/2007, we did not operate the system because the over-winter drawdown did not exceed 5 feet, winter weather was relatively mild, and dissolved oxygen levels remained naturally high throughout Crane Lake. If water level operating guidelines and practices should change such that extreme late-winter drawdowns are no longer likely, then it may be possible to discontinue winter aeration altogether, replacing that expensive strategy with routine, low-level monitoring of dissolved oxygen levels in order to confirm that water quality conditions remain acceptable without human intervention. Our experience suggests that winter dissolved oxygen levels of 5 parts per million or greater in open water at the Highway CC bridge indicate reasonably good water quality conditions throughout the Flowage. Monitoring could be expanded to include a few other critical areas under the ice.

The Chippewa Flowage Joint Agency Management Plan (2000) recommends installation of an emergency cascade aeration system at Tyner Lake. WDNR developed engineering plans for that system and budgeted $38,000 for its construction in 1996, but funding was canceled due to budget shortfalls with the understanding that it would be revisited when financial conditions improved. WDNR and LCO Conservation may be able to secure the funding for this project now. These plans should be reactivated if needed, but we may be able to avoid emergency aeration costs altogether if Xcel Energy decides that extreme late-winter drawdowns (>10 feet) can be avoided on the Chippewa Flowage in all but the most unusual circumstances.

Introduction of non-native species or genetic strains of aquatic plants, animals, and microorganisms should be discouraged by all stakeholders in the fishery, including the Chippewa Flowage Area Property Owner's Association and the Lake Chippewa Flowage Resort Association via newsletter communications and meetings with their membership. Numerous efforts are underway to understand the current status of invasive species (e.g., aquatic plant surveys by the LCO Conservation Department and the Lac Courte Oreilles Ojibwe Community College) and to raise awareness about the impacts of invasive species on aquatic ecosystems (e.g., signs, brochures, and news releases coordinated by WDNR with funding from the Corps of Engineers and participation by several other agencies). We will not address this overall lake management issue in detail here. But from a fishery standpoint, we will state clearly and unequivocally that WDNR will *not* permit the stocking of additional non-native species or non-native strains of fish (e.g., muskellunge from Leech Lake, Minnesota) into the Chippewa Flowage. Flawed claims by well-meaning amateurs about the superiority of such strains, and pressure to stock such fish based upon popular misunderstandings, will have no influence on the permitting decisions of professional fishery managers. We are beginning an era in which we will identify and characterize our genetic stocks (starting with muskellunge and walleye) and then do everything within our authority to conserve their inherent character and diversity. Any fish approved for stocking into the Chippewa Flowage in the future will have to undergo thorough testing for disease and also be viewed as compatible with native genetic stocks.

Support for good shoreland management along publicly- and privately-owned shorelines will help to prevent excessive input of sediment and nutrients. Controlling shoreline erosion and maintaining wild shorelines with 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.

GOAL 10: **ECONOMIC SUSTAINABILITY:** A thriving year-round economy for the Hayward area that is enhanced by a less restricted, year-round fishery in the Chippewa Flowage.

Objective 10.1: Ice-fishing regulations consistent with other waters in Sawyer County and the Upper Chippewa Basin, resulting in wise use and increased tourism-based income associated with the Chippewa Flowage fishery during winter.

Status and Management Strategies (Local DNR Recommendations):

Most original reasons for closing the Chippewa Flowage to ice fishing are no longer valid. Dramatic over-winter draw-downs that raised safety concerns in past decades have not occurred recently and are not likely to occur routinely in the future. Other major flowages in the Upper Chippewa Basin (e.g., Turtle-Flambeau and Gile flowages in Iron County) experience over-winter draw-downs without loss of ice fishing opportunity. Concerns in the business community about over-harvest of walleye and crappie by local ice anglers (reducing availability of fish for summer tourists) were never well supported by scientific data, but such concerns seem less relevant now that northern pike and bluegill have become such significant members of the fish community and would likely support most of the future winter harvest. The Turtle-Flambeau Flowage maintains excellent populations of walleye and black crappie without closing the lake to ice fishing.

In light of recent changes in winter water levels and fish community composition, we believe that winter ice fishing is an ecologically and economically sustainable activity on the Chippewa Flowage – that the expansion of fishing opportunity into the winter months probably can be done in a way that complements, rather than contradicts, other goals of this Plan. Benefits of eventually opening the Flowage to statewide ice fishing seasons would include:

1) Northern pike are particularly vulnerable to ice-fishing methods and could be harvested in significant numbers. Maintaining northern pike at a low density will become an increasingly important objective as we seek to manage a world-class trophy musky fishery with little or no artificial stocking. A healthy winter pike harvest would increase the likelihood of survival of young, naturally spawned muskellunge.

2) Bluegills are particularly vulnerable to ice fishing methods and could be harvested in significant numbers also. Because they have become so numerous in recent years, we believe bluegill would support most of the winter panfish harvest. We may even need greater bluegill harvest if walleye and crappie are to remain the predominant sport fish in the Chippewa Flowage. We may be able to manage a sustainable harvest of all the important panfish species (black crappie, bluegill, and yellow perch) by implementing conservative harvest regulations throughout the year rather than prohibiting winter harvest of crappie and overly restricting the ice fishing season in general.

3) Complicated special regulations for winter fishing on the Chippewa Flowage would be replaced by simpler, more angler-friendly statewide regulations.

4) Business owners currently losing customers to other areas in the winter should benefit from greater year-round demand for ice-fishing gear, bait, lodging and food. Special events could be organized that would not only target species like pike for harvest, but also would add to the diversity of interesting year-round events that bring tourists to the Hayward area.

5) Smaller, less fertile lakes in Sawyer County that cannot sustain as much winter harvest as the Chippewa Flowage should experience a slight reduction in fishing pressure as more anglers opt to do at least some of their ice fishing on the Flowage.

Given this long list of potential benefits, we will conduct upcoming surveys (baseline monitoring annually and comprehensive Treaty assessment in 2011) in a manner that provides the information needed to decide if, when, and under what conditions we should liberalize the ice fishing season. Data will have to show that walleye and crappie populations are within the range of this plan's management objectives before we consider allowing a proportion (typically 10-15%) of the annual harvest of those species to occur during winter. We will also need some assurance that winter draw-downs in lake level will continue to be moderate in nature and not as extreme as currently authorized under the negotiated terms of the FERC license exemption agreement. And finally, we will also want to know that we have support from the LCO Band of Lake Superior Ojibwe and from a majority of members of the Chippewa Flowage Area Property Owners Association and Lake Chippewa Flowage Resort Association before recommending such action.

Objective 10.2: A combination of length and bag limits and other strategies that allow the objectives of this plan to be achieved without restricting trolling – a common and legitimate method of fishing that would expand open-water fishing opportunity for all anglers without endangering the fishery.

Status and Management Strategies (Local DNR Recommendations):

Restricting trolling on the Chippewa Flowage may have been questionable from the outset, but there is virtually no justification for this restriction currently. To us, it is wrong to allow financially comfortable, physically fit anglers who prefer casting to equip their boats with modern sonar, GPS devices, underwater cameras and other high-technology equipment that provides fish-finding and fish-catching advantages, while concurrently prohibiting anglers of modest financial means and/or reduced physical capacity (due to age or disability) from engaging in the simple but less physically demanding act of trolling to locate active fish. It is, in fact, discriminatory. And it is not necessary to prohibit trolling in order to achieve the objectives of this Plan. A progressive combination of length limits, bag limits, other method restrictions, stockings, habitat conservation, and public awareness will get us where we want to go.

The advantages of legalizing trolling on the Chippewa Flowage include:

1) Anglers of all incomes, ages, and physical abilities will have more equitable opportunities to find and catch fish.

2) Confusion and debate over the definition of "position fishing" would become moot.

3) Many anglers who currently travel out-of-state to fish for muskellunge in the fall would fish the Chippewa Flowage in autumn if they could troll, even if they were restricted to fishing with just one rod for muskellunge in order to discourage the use of single-hook (swallow) sucker rigs.

4) Anglers who enjoy trolling could do so on a near-wilderness water where their activity is not as likely to conflict with water skiers and jet skiers as on a more highly developed lake with fewer navigation hazards.

5) Trolling will provide all anglers with one more tool for locating and catching fish. It is up to the fishery managers and game wardens to ensure that those fish are not over-harvested.

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Chippewa Flowage Fishery Management Plan
August 2007
Summary of Local DNR Strategies & Recommendations
(Proposed roles for partners are underlined.)

FISH HARVEST REGULATION AND EDUCATION

Walleye: As long as density and size structure objectives continue to be met in most years, we will continue to manage the walleye fishery with no harvest length restrictions. However, if recruitment and density should decline to unacceptable levels (trending downward and threatening to drop below 4 adults per acre) and growth rate increases significantly, other strategies (e.g., the statewide 15-inch minimum length limit) may become appropriate. If density remains high and growth rate remains slow, but the proportion of 15-inch and larger walleye falls and stays below 20%, the most appropriate harvest regulation may include the usual daily bag limit of 3, but only one of which could be over 14 inches long (known popularly as the 1-over-14 regulation). We will adjust strategies as needed to achieve stakeholder-influenced objectives, depending upon the cumulative results of annual baseline monitoring surveys.

Muskellunge: To maximize the odds of achieving our stakeholder-influenced trophy musky fishery objectives (0.3 to 0.4 adult fish per acre with 3-5% ≥ 50 inches), the minimum length limit for muskellunge must be increased from 45 to 50 inches. This proposal probably will appear on the Spring Hearing Questionnaire of the Wisconsin Conservation Congress in March of 2008. If this proposal passes, we will subsequently recommend a statewide regulation requiring that anglers fishing for muskellunge use only one rod at a time, as in Minnesota. This will force musky anglers to fish with artificial lures or to fish attentively with harnassed suckers, theoretically reducing the time fish would have to swallow a deadly hook. Concurrently, the proper use of "quick-strike" rigs and methods should be strongly promoted in signs, brochures, and newsletters. In order to compensate Flowage musky anglers for what some will perceive as loss of opportunity, we will propose to legalize motor trolling (one rod per angler) on the Chippewa Flowage, thus providing another effective method to catch fish (particularly in the fall) that is much more consistent with the goals of a catch-and-release trophy fishery than the use of live bait. Legalizing motor trolling also would allow more anglers in our aging population an opportunity to continue participating in what has always been a physically demanding sport when restricted to casting. Our partners (particularly the lake associations and the Hayward Lakes Chapter of Muskies, Inc.) can play a valuable role by publicly supporting and privately voting for these initiatives.

Tribal Harvest: In conjunction with reducing angler-induced sources of mortality, representatives of the WDNR and the Lac Courte Oreilles Band of Lake Superior Ojibwe should investigate how we might work together to improve our understanding of the currently undocumented angler harvest, on-reservation spring spearing harvest, and winter spearing harvest of muskellunge – particularly rare fish approaching 50 inches long, so that management strategies can be altered further, if needed, in order to achieve shared objectives. Total registration of all muskellunge harvested by anglers and tribal spearers should be among the options discussed.

Panfish (Black Crappie, Bluegill, and Yellow Perch): We will estimate age structure, growth rate, and total mortality rate of black crappie in order to develop a basis for improved harvest regulation. It is important that we identify a combination of bag and length limit restrictions that would allow attainment of crappie fishery objectives without continuing to restrict winter harvest altogether. We suspect but cannot yet demonstrate that current winter harvest regulations for bluegill are unnecessarily restrictive also. After obtaining some usable data under our new baseline monitoring protocols, we will conduct a thorough review of those restrictions and recommend changes if appropriate.

Black Bass (Smallmouth and Largemouth): After obtaining some usable data under our new baseline monitoring protocol (late spring electrofishing in and around spawning areas on the east side in even years and on the west side in odd years), we will conduct a thorough review of bass regulations and recommend changes if needed to achieve our objectives. Because we view smallmouth bass positively and largemouth bass somewhat negatively with respect to their influences on the Chippewa Flowage fishery, we may need to regulate the harvest of these species separately – protecting smallmouth bass with minimum length limits and allowing or even promoting harvest of largemouth bass of all sizes. In order for the regulatory separation of black basses to be considered by WDNR's Fisheries Management Board, we must obtain at least two seasons of data in order to document status and justify any proposed changes. In the interim, a voluntary *catch-and-release approach* toward legal-size smallmouth bass (fish ≥ 14 inches) and a *harvest-oriented approach* toward legal-size largemouth bass seems warranted and should be promoted by tourism officials and area businesses.

Northern Pike: Liberal harvest of northern pike seems to be a prudent approach to achieving many objectives of this Plan. Promoting a higher rate of harvest in the angler catch with special events and informational materials (signs, brochures, etc.), combined with opening up the Chippewa Flowage to ice fishing throughout the winter season, might generate enough additional harvest to improve pike population size structure and make a positive difference in the fishery overall.

FISH STOCKING

Walleye: In general, walleye should not be stocked in the Chippewa Flowage as long as natural recruitment remains sufficient to maintain approximately 6 (range 4-8) adult walleye per acre.

Muskellunge: Our proposed fall monitoring strategy for young muskellunge (later in this section) will reduce uncertainty about the role of natural reproduction in the Chippewa Flowage only if all contributing entities (including LCO Conservation and Muskies, Inc.) refrain from stocking in designated non-stocked (even) years. If we learn that more muskellunge must be stocked in order to achieve the desired adult density, then we will ask our partners (including the Chippewa Flowage Area Property Owners' Association and the Lake Chippewa Flowage Resort Association) to contribute to the purchase of 10- to 12-inch muskellunge fingerlings for stocking in addition to the typical maximum of 2,500 that WDNR may dedicate to any single body of water in any given year of stocking. However, we hope that natural reproduction will prevail as the primary source of recruitment of muskellunge to this fishery. If natural reproduction provides all the fish needed to achieve our objective, we shall discontinue stocking altogether.

General Fish Stocking: Introduction of non-native species or genetic strains of aquatic plants, animals, and microorganisms should be discouraged by all stakeholders in the fishery, including the Chippewa Flowage Area Property Owner's Association and the Lake Chippewa Flowage Resort Association via newsletter communications and meetings with their membership. To lay a recent issue to rest, we will state here, unequivocally, that WDNR will *not* permit the stocking of additional non-native species or non-native strains of fish (e.g., muskellunge from Leech Lake, Minnesota) into the Chippewa Flowage. Any fish approved for stocking into the Chippewa Flowage in the future will have to undergo thorough testing for disease and also be viewed as compatible with native genetic stocks.

AQUATIC HABITAT MANAGEMENT

Water Level Management: Moderate over-winter draw-downs followed by complete refilling of the pool within a week of ice-out would ensure good spawning habitat for walleye (clean cobble and gravel) and muskellunge (high levels of dissolved oxygen at the sediment-water interface). Walleye production may be enhanced marginally by ensuring that over-winter draw-downs are of sufficient magnitude (perhaps 6-8 feet) and advantageous timing (late fall/early winter) to force young bass and sunfish away from shallow cover to open water where walleye can prey upon them efficiently. This might also help to maintain the desired walleye-dominated fish community. Major fish kills have been observed in the Chippewa Flowage in association with high-magnitude (>10 feet), late-winter draw-downs (91/92 and 95/96). In the future, such conditions should be avoided if at all possible. A comprehensive water level management plan should be developed that balances power production, flood control, cultural heritage, and recreational interests. We will need all stakeholders at the table in order to ensure a fair and balanced process and outcome.

Shoreland Management: We should continue to seek public ownership of wild shorelines and the corridors of tributary streams in which walleye and muskellunge are known to spawn. (The relatively recent acquisitions into public ownership of Big Timber Island, Moonshine Island, and more than a mile of Chief River corridor are excellent examples.) We also believe that one of the best uses of volunteer time and money would be to join the LCO Conservation Department in more aggressively combating shoreline erosion on the Chippewa Flowage, especially in areas where walleye or muskellunge spawning habitat is threatened. Conservation of shoreland habitat should take priority over enhancement of off-shore habitat, which already is abundant and of high quality in the form of submersed and floating bogs. The Chippewa Flowage has more wild shoreline than most lakes, but the amount of littoral zone structure (emergent plants or densely branched woody material) specifically well-suited for yellow perch to drape their long strings of gelatinous eggs in early spring may be limited. Fishery scientists have not tested whether increasing the amount of perch spawning habitat leads to higher egg survival and hatching, but if we were doing everything possible to maximize walleye reproductive survival, we might suggest placing "reefs" of fresh conifer trees every year into shallow areas where yellow perch (important prey of walleye) are likely to spawn. We would need help from local fishing guides and other knowledgeable anglers in order to locate such areas.

Winter Aeration: If water level operating guidelines and practices should change such that extreme late-winter drawdowns are no longer likely, then it may be possible to discontinue winter aeration altogether, replacing that expensive strategy with routine, low-level monitoring of dissolved oxygen levels in order to confirm that water quality conditions remain acceptable without human intervention. If this should happen, we will ask our aeration gift account contributors how they would like us to use their funds in the future.

Water Quality Management: Support for good shoreland management along publicly- and privately-owned shorelines will help to prevent excessive input of sediment and nutrients. Controlling shoreline erosion and maintaining wild shorelines with 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.

FISH POPULATION MONITORING

Coolwater Gamefish: We propose to begin gathering catch-rate and size-structure data for walleye, muskellunge, and northern pike by early spring fyke netting every year (east side in even years, west side in odd years) in order to closely track these populations. We will continue to monitor walleye and muskellunge reproductive survival by conducting fall electrofishing surveys at established index stations. With our assistance, WDNR's Treaty Assessment unit plans to conduct a comprehensive survey (actual mark-recapture walleye population estimate) in spring of 2011.

Panfish: Starting in 2007, we propose to sample black crappie in mid-fall fyke nets every year (east side in even years, west side in odd years) until we learn if this method will allow us to confidently assess trends in crappie abundance and size structure in the Chippewa Flowage. We also cannot render sound judgment about the potential use of length limits to manage crappie in the Flowage without knowing more about age-specific mortality rates. We encourage WDNR's Integrated Science Services (ISS) Division to conduct research into black crappie population dynamics in northern Wisconsin, particularly to identify an age-dependent length to which crappie may be protected in most populations without incurring unacceptably high losses to natural mortality. Starting in spring of 2008, we propose to sample bluegill by late spring electrofishing in and around spawning areas on the east side in even years and on the west side in odd years. Also, we will initiate a new baseline monitoring protocol in 2008 by including yellow perch among the species for which data are collected during annual, early-spring fyke-netting surveys.

Warmwater Gamefish: Starting in 2008, we propose to sample smallmouth and largemouth bass under a new baseline monitoring protocol (late spring electrofishing in and around spawning areas on the east side in even years and on the west side in odd years).

APPENDIX

Results of Visioning Session for Stakeholders in the Fishery of the Chippewa Flowage in Sawyer County, Wisconsin

Date: June 18, 2005
Time: 1:00 p.m. to 5:00 p.m.
Place: Veteran's Center in Hayward, WI
Facilitator: Dave Neuswanger, Fisheries Supervisor, Upper Chippewa Basin, WDNR
Technical Advisor: Frank Pratt, Senior Fisheries Biologist, Hayward, WDNR
Profile of 17 Participants:

Lakeside Landowners – 11
Area Anglers – 5
Fishing Guides – 1
Business Owners – 0
Others – Some of those counted above represented the Lac Courte Oreilles Tribe (2) and the Chippewa Flowage Area Property Owner's Association (1).

Table A1. Levels of sport fishing interest among visioning session participants in fish species nominated for consideration at the Chippewa Flowage.

Fish Species Nominated	Level of Participant Fishing Interest			
	High	Medium	Low	None
Walleye	15	0	1	0
Black Crappie	13	2	0	1
Muskellunge	11	3	2	0
Bluegill	12	2	0	1
Yellow Perch	0	12	1	2
Smallmouth Bass	1	8	5	1
Largemouth Bass	3	1	11	1
Northern Pike	0	2	9	5
Bullheads	0	0	2	14

Table A2. Preferences for numbers versus size and catch versus harvest among visioning session participants for fish species perceived to be most important at the Chippewa Flowage.

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	9	6	0	0	8	7
Black Crappie	0	14	1	0	11	3
Muskellunge	0	3	11	13	1	0
Bluegill	0	14	0	0	12	2
Smallmouth Bass	0	5	6	9	3	0
Largemouth Bass	0	3	6	8	4	2
Northern Pike	0	2	8	4	7	0

Table A3. Comparison of sport fishing interest between 17 visioning session participants on June 18 and 129 attendees of the Annual Meeting of the Chippewa Flowage Area Property Owner's Association on August 7, 2005.

$$\text{Relative Importance Index (\%)} = \frac{\text{Mean Rank Value x Weight Factor x 100}}{3.00}$$

where the maximum Mean Rank Value is 3.0 (all responses highly important)
and Weight Factor = N (number of voters for each species) ÷ Total N (all possible voters)

Fish Species	Relative Importance Index (%)	
	June 18, 2005 N = 17	August 7, 2005 N = 129
Walleye	97	96
Black Crappie	87	90
Muskellunge	67	85
Bluegill	62	83
Yellow Perch	41	52
Smallmouth Bass	35	50
Largemouth Bass	29	46
Northern Pike	23	27

Table A4. History of fishery-related surveys on the Chippewa Flowage, 1970-2006.

HLCMI = Hayward Lakes Chapter of Muskies, Inc.
LCFRA = Lake Chippewa Flowage Resort Association.
WDNR = Wisconsin Department of Natural Resources.
GLIFWC = Great Lakes Indian Fish and Wildlife Commission.
LCO = Lac Courte Oreilles Conservation Department.
UWSP = University of Wisconsin – Stevens Point.

Year(s)	Agency	Type	Objectives	Gear	Effort
70-06	HLCMI LCFRA	Musky Charts	Size Distribution of Angler Catch	Voluntary Angler Reports	Most Resorts
70-06	WDNR GLIFWC	Walleye/Musky Fall Index	Capture Age 0/1 to Monitor Reproduction	Electrofishing	3-34 sites in 21 of 36 years
06	WDNR LCO UWSP	Spring Musky/Pike Population Survey & Musky Broodstock	Obtain Broodstock for Spooner Hatchery & Sample Genetics	Netting Hatchery Work & Laboratory	98 net sets 160 musky (116 tested)
86-06	GLIFWC	Walleye/Musky Off-Reservation	Document Indian Spearing Harvest	Creel Census	Total Registration
04	WDNR EPA	Carp Tissue Analysis	Monitor Contaminants (Mercury, PCBs, etc.)	Electrofishing & Laboratory	10 carp
90-04	WDNR GLIFWC	Walleye/Musky Tissue Analysis	Monitor Contaminants (Primarily Mercury)	Electrofishing & Laboratory	Periodically
98-00	Multiple	Musky Radio Telemetry	Document Movement and Survival	Angling	29 fish
99-00 90-91 70-71	WDNR	Comprehensive Treaty Assessment & FERC Evaluation	Walleye/Musky Population Estimates & Harvest of All Fish	Netting Electrofishing Creel Survey	Intensive
98	WDNR	Baseline Monitoring for Small Fish	Develop Complete List of Species Present	Mini-Fykenets	33 Sites
88-89	WDNR HLCMI	Musky/Pike Radio Telemetry	Movement and Habitat Use	Angling	13 fish
87	WDNR	Walleye Tagging	Estimate Harvest Rate	Netting	??
79-86	HLCMI	Musky Tagging	Estimate Harvest Rate	27 Guides	1,634 fish

Table A5. Documented Fish Stockings in the Chippewa Flowage, 1987 – 2006.
WDNR = Wisconsin DNR Fish Hatchery. LCO = Lac Courte Oreilles Band of Ojibwe.

Year	Species	Number	Source and Length	Notes
1987	Muskellunge	8,400	WDNR 7,500 @ 10” LCO 900 @ 10”	Left Pelvic Fin Clip on WDNR Fish
1987	Walleye	7,500,000	WDNR Fry @ 1”	--
1988	Muskellunge	6,000	WDNR 5,000 @ 11” LCO 1,000 @ 10”	Right Pelvic Fin Clip on WDNR Fish
1988	Walleye	911,264	WDNR Fry @ 1”	--
1989	Muskellunge	3,400	WDNR 2,500 @ 9” LCO 900 @ 10”	Left Pelvic Fin Clip on WDNR Fish
1989	Walleye	2,700,000	WDNR @ <1”	--
1990	Muskellunge	3,400	WDNR 2,500 @ 10” LCO 900 @ 10”	Right Pelvic Fin Clip on WDNR Fish
1990	Walleye	1,000,000	WDNR Fry @ <1”	--
1991	Muskellunge	5,474	WDNR 4,574 @ 12” LCO 900 @ 10”	Left Pelvic Fin Clip on most WDNR Fish
1991	Walleye	1,500,000	WDNR Fry @ <1”	--
1992	Muskellunge	3,670	WDNR 2,500 @ 11” LCO 1,170 @ 10”	Right Pelvic Fin Clip on WDNR Fish
1992	Muskellunge	275,000	WDNR Fry @ <1”	Stocked in Chief Lake
1992	Walleye	5,070,000	WDNR Fry @ <1”	--
1993	Muskellunge	7,170	WDNR 6,000 @ 12” LCO 1,170 @ 10”	--
1994	No Stocking	--	--	--
1995	Walleye	300,000	WDNR Fry @ <1”	--
1996	Muskellunge	5,470	WDNR 4,300 @ 11” LCO 1,170 @ 10”	--
1997	Muskellunge	2,691	WDNR 1,250 @ 12” LCO 811 @ 10” Muskies, Inc. 630 @ 12”	--
1998	Muskellunge	500	Hayward Lakes Chapter Muskies, Inc. @ 12”	--
1998	Muskellunge	25,000	WDNR Fry @ <1”	--
1999	No Stocking	--	--	--
2000	Muskellunge	3,624	WDNR 2,500 @ 12” LCO 1,124 @ 10”	--
2000	Walleye	75,000	WDNR Fry @ <1”	--
2001	Muskellunge	7,650	WDNR @ 10”	--
2002	Muskellunge	1,134	LCO @ 13”	--
2003	Muskellunge	2,675	WDNR 2,500 @ 11” Muskies, Inc. 175 @ 12”	--
2004	Muskellunge	840	LCO @ 13”	--
2005	Muskellunge	2,135	WDNR 1,885 @ 12” Muskies, Inc. 250 @ 12”	--
2006	Muskellunge	72	LCO @ 13”	--
2006	Yellow Perch	21,906	LCO @ 1-2”	--