



## **Proposal for Muskellunge Management in the Gull Chain, Cass and Crow Wing County, Minnesota July 15, 2015**

**Proposal:** The DNR Section of Fisheries, with support from stakeholders, proposes to introduce muskellunge to the Gull Chain of Lakes to provide a muskellunge fishery for the increasing population of musky anglers in the Brainerd area, and beyond, by stocking 2,000 PIT tagged Leech Lake Strain muskellunge in alternate years for nine years (five stocking events, one fish per littoral acre), beginning in 2016. The goal is to provide a trophy fishery with approximately 0.3 adult fish per acre. Under this proposal, the Gull Chain would remain open to northern pike spearing, as allowed by state law.

**Justification Summary:** The Gull Chain meets the criteria for successful muskellunge management. It is a good fit biologically and there are a variety of social benefits to stocking this species. Reasons for proposing muskellunge management in the Gull Chain are as follows: 1) Gull Lake would provide excellent muskellunge fishing and would be a premier destination, 2) the new muskie fishery would fill a void or need in the area and statewide, and is consistent with the Long Range Plan for Muskellunge and Large Northern Pike, 3) muskie fishing is the fastest growing segment of the statewide angler population; the new fishery would be a viable angler retention and recruitment tool 4) The economy stands to benefit by adding another muskie fishing opportunity in a centralized location with the state, and 5) In an unbiased 2013 Gull Lake angler opinion survey (sample size of 1469), 41% supported, 30% opposed and 29% were undecided or indifferent to the proposal. 6) The Gull Chain has existing access and infrastructure sufficient to support the proposed diversification of the fishery.

**Lake Background and History:** Gull Lake is a 9,947 acre mesotrophic lake located 10 miles northwest of Brainerd. The shoreline is highly developed with residential and commercial interests. There are 19 resorts on Gull Lake, notably, Cragun's, Madden's and Grand View Lodge. Gull Lake was raised approximately five feet by the construction of Gull Lake Dam in 1912, one of six Federal Mississippi Headwaters reservoir dams controlled by the Army Corps of Engineers. At the outlet, the Gull River flows approximately 17 river miles to the Crow Wing River, only 4 river miles above its confluence with the Mississippi River.

There is an increasing interest by anglers for more muskellunge fishing opportunities near Brainerd. Other than the Mississippi River, the nearest muskellunge angling opportunities are Mille Lacs Lake (25 miles southeast), Cedar Lake (25 miles northeast), Shamineau Lake and Lake Alexander (25 miles southwest), Roosevelt Lake (35 miles northeast), and Woman Lake (45 miles north) of Brainerd. The Brainerd Lakes Chapter of Muskies, Inc. (MI) has 200+ members and has asserted pressure for and provided written support for additional muskellunge management in waters near Brainerd. Existing waters have high pressure directed at muskellunge, so demand often exceeds availability.



Credible anecdotal reports from anglers suggest a very low abundance of muskellunge already present in Gull Lake, though they have not been sampled during fisheries assessments. During a 2004 pike fishing tournament, a 47” musky was reportedly caught and harvested. Similarly, a Cass County Sheriff’s Deputy witnessed a 46” musky caught near Grand View (on Gull Lake) and released it after taking a picture. A 50” muskie was found dead on the shore of connected Round Lake in 2011. This specimen was recovered by Brainerd Area Fisheries staff. The origin of these fish is unknown.

Gull Lake is connected to several other lakes via navigable channel which share the same lake surface elevation controlled by the Federal dam, making up what is considered to be the Gull Chain of Lakes, totaling 13,039 acres. These basins include: Round Lake (1,706 ac.), Margaret Lake (230 ac.), Upper Gull Lake (345 ac.), Ray lake (183 ac), Spider Lake (21 ac.), Roy Lake (306 ac.), Nisswa Lake (213 ac.), and Love Lake (88 ac.). Gull Lake itself is 9,947 acres, of which, 2,825 acres is littoral area. We expect musky numbers in these connected lakes to remain relatively low as the primary musky habitat and forage base is in Gull Lake proper. There is also some connectivity between the Gull Chain of Lakes and other non-Gull Chain waters. Based on a statewide analysis of muskellunge movement into connected lakes via streams, we expect the number of muskies emigrating out of the Gull Chain of Lakes to be negligible.

Gull was previously proposed for muskellunge stocking in 2006, prior to adoption of the “Long Range Plan for Muskellunge and Large Northern Pike Management Through 2020” (LRP) [http://files.dnr.state.mn.us/fish\\_wildlife/fisheries/plans/muskiepike\\_2020.pdf](http://files.dnr.state.mn.us/fish_wildlife/fisheries/plans/muskiepike_2020.pdf) which provides for up to eight new muskellunge waters by 2020. Gull ranks near the top of local lakes when considering physical and biological criteria necessary for successful muskellunge management. Further, it has the infrastructure in place to accommodate local muskellunge anglers, as well as those from afar, to the benefit of the local tourism economy.

If muskellunge stocking is approved, the Brainerd Area Fisheries staff is committed to monitoring the Gull Chain for muskellunge during the appropriate assessment period following stocking, as outlined in the LRP guidelines.

**Physical and Biological Considerations:**

Physical and biological considerations for muskellunge management, as listed in the LRP include the following:

1. Lake size
2. Littoral Area
3. Lake Basin Depth
4. Shoreline Development Factor (SDF)
5. Water clarity
6. Northern Pike Density
7. Adequate Forage Base

See Table 2 for a summary of how Gull Lake rates in terms of these 7 criteria, with a more detailed narrative below.



#### Lake Size:

At 9,947 acres Gull Lake is nearly twice the size of the average native muskellunge waters (5,473 acres, median = 705 acres) and 50% larger than the average basin that is stocked with muskellunge (6,492 acres, median = 1,359 acres).

#### Littoral Area:

Gull is a relatively productive lake though the littoral area comprises only 28.4% of the surface area. The lake's 2,815 littoral acres are greater than all but four currently stocked muskellunge waters, two of which are Vermilion and Mille Lacs.

#### Basin Depth:

With a maximum depth of 80 feet, there is plenty of thermal habitat available in most years for northern cisco. In general, deeper lakes rank higher for muskellunge management. There is no potential for winterkill, though partial summerkill of cisco can occur during extremely warm summers.

Shoreline Development Factor (SDF): With an SDF value of 3.41, Gull ranks highest of the lakes in the Brainerd management area considered for muskellunge management. The highly irregular shoreline provides a variety of diverse angling locations and habitat types within the lake. The high SDF also serves to offset the moderate percentage of littoral area within the lake resulting in a relatively productive lake with significant pelagic areas.

Water Clarity: Esocids are sight feeders and are thought to benefit from good water clarity. With a mean Secchi reading of 10.9 feet, Gull is comparable to native muskellunge waters which have a mean of 11 feet. Measurements range from 7 feet to 16.8 feet with the lake trending clearer in recent years.

Northern Pike CPUE: The mean northern pike gill net CPUE for Gull Lake is 4.4 fish/net. The range of NOP CPUE has been 0.4 (1954) to 6.4 (2004). This is desirable and lower than native muskellunge waters which have a mean northern pike CPUE of 4.7/gill net. According to a 2013 population estimate generated by ice-out trap netting, 22,172 pike ( $\geq 400$  mm total length) exist in Gull Lake or 2.3 per acre. Mean length in 2013 was 24.7" and 47% of the fish were 24" or larger. There is a trophy northern pike component to the fishery with a reputation for having fish well over 20 lbs present. It is unlikely that muskellunge will compete with the trophy northern pike to the detriment of either species because of adequate forage. See Tables 1, 3 and 4.

Forage Base: The forage base in Gull Lake consists of northern cisco (TLC), white sucker, and secondarily yellow perch and shorthead redhorse. The CPUE for northern cisco has ranged from 0.5/gill net (2007) to 17.7/gill net (1996, excludes fall netting) with a mean of 7.6/gill net. This mean is in the upper quartile for the lake class. Roughly 2.3 million TLC exist in Gull Lake (main basin N of Gull Point and S of Grassy Point) according to hydroacoustic derived estimates, (CV=0.7) in late-August 2013 (Table 1). With the exception of Ten Mile Lake, densities of TLC in Gull Lake are fairly high compared to other hydroacoustics surveyed lakes, including Elk Lake, a well-studied,



muskellunge broodstock lake (Figure 1). The white sucker CPUE has ranged from 0.2 (1981) to 4.1 (1991) with a mean of 2.2/gill net. There is a significant spring sucker spawning run up Stoney Brook, Home Brook, and Mayo Brook. The shorthead redhorse population is very low and has only been detected in one assessment netting (1986). Yellow perch, as an alternate prey species, are relatively numerous and with the exception of the most recent 2013 netting, has been relatively stable in Gull Lake. The CPUE has ranged from 2.7 (2013) to 95.4 (1986). See Tables 3 and 4.

**Social Considerations:** A significant amount of both support and opposition is expected to this proposal. Written comments in response to the 2006 proposal showed the following: 375 were in support, 97 opposed, and 2 were undecided. Much of the support came from Muskies, Inc. members via a well-organized campaign and standard template letters. The local chapter of the Minnesota Darkhouse and Angling Association did not oppose the previous proposal because spearing opportunities were unaffected. Lake association opinion was mixed, but generally in favor.

A creel survey in 2013 provided an opportunity to gauge interest in muskellunge management from anglers fishing on Gull Lake. In general, there appeared to be support though there was a substantial contingent that were undecided or simply did not have a preference (MN DNR, Staff report). Angler support for stocking muskies decreased with increasing angler age with anglers under age 45 being in favor while those 65 and older tended to be opposed. The highest demographic in favor was the 16-24 year old group (58%) while the 65 and older group had the highest percentage opposed at 40%. Guides and their clients who indicated they would support muskie stocking were twice as numerous as those in opposition, though over half of all guides and clients (51%) were undecided or indifferent. Local anglers residing within 10 miles of Gull Lake were evenly split in their support and had the lowest percentage (17%) of anglers being undecided. Anglers living more than 10 miles away were generally in support of muskie stocking. Walleye anglers were 41% in support and 34% in opposition representing 60% of the lake's anglers. Northern pike and largemouth bass anglers showed the highest levels of support (59% and 52%, respectively) while panfish anglers were the only group that had more anglers opposed (40%) than supportive (33%), but this difference was not significant.

Local muskie anglers will actively seek to promote and obtain support for this proposal. This stakeholder group has worked cooperatively with DNR on a variety of projects. They will likely spend many hours talking with local politicians, businesses, resort owners/managers, and other interested parties. Many of these interests could potentially benefit economically from a muskie fishery if additional tourism dollars are brought to the local economy by those in search of muskie angling opportunities.

Angling pressure will likely increase after a fishable population of muskies becomes established. However, conflicts over access space should be alleviated in most cases by the three large public accesses and numerous resorts/marinas located around the lake. A Nisswa Lake Public Water Access installation is in the planning stages, which would serve the Gull Chain of Lakes.



**Workload Considerations:** Monitoring would consist of spring trap netting beginning seven years following the introduction and continuing biennially. Population estimates are the preferred method for gauging population density and will be used if/when adequate numbers of adult fish are captured. PIT tagging all stocked fish will allow for determination of growth, mortality, and contribution of any natural reproduction. Future assessments would include a creel survey, reports from cooperative muskie anglers and the general angling public. An index catch rate would have to be established from repeated sampling and comparisons with similar lakes in adjacent areas. The relative success would be based on some goal established after some reasonable number of nettings. Gull Lake is sampled with gill nets biennially to monitor the walleye, yellow perch, northern pike, northern cisco, burbot and largemouth bass populations.

Table 1. 2013 Gull Lake TLC population estimate and density.

	Age-0 TLC	Age-1 and Older TLC	Total TLC
Population (#)	2,100,000	196,000	2,296,000
Biomass (lbs)	48,500	123,500	172,000
#/surface acre	361	34	395
Lbs/surface acre	8.3	21.2	29.5

Figure 1. TLC densities of hydroacoustics surveyed lakes in MN.

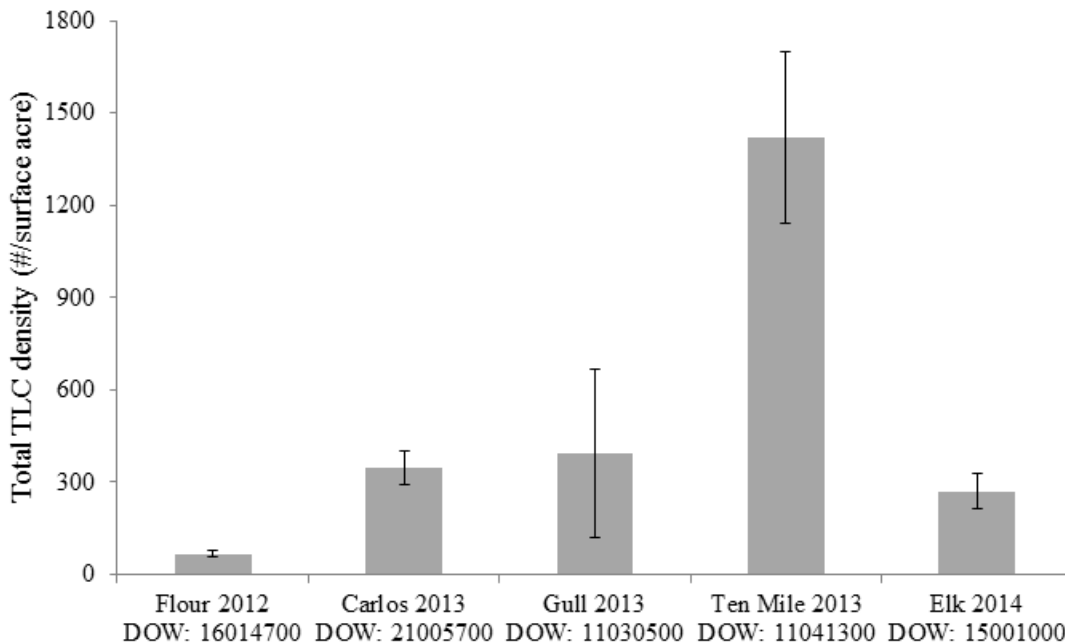




Table 2: Gull Lake’s consistency with criteria for new muskellunge waters according to the LRP.

Characteristic	Attribute	Priority	Criteria of attribute	Gull Lake
Physical	Lake size (acres)	Best	> 3,000	9,947
		Better	300 to 3,000	
		Acceptable	< 300, but ≥ 100	
	Maximum depth (ft)	Best	> 80	
		Better	40 to 80	80
		Acceptable	< 40, but ≥ 15	
	Secchi (ft)	Best	> 10	$\bar{x} = 10.9$
		Better	5 to 10	
		Acceptable	< 5, but ≥ 3	
	Littoral area (%)	Best	0.33 to 0.55	
		Better	NA	
		Acceptable	< 0.33, but ≥ 0.55	0.28
SDF	Best	> 1.40	3.41	
	Better	1.40 to 2.40		
	Acceptable	< 1.40, but ≥ 1.05		
Biological	Northern pike CPUE	Best	< 2.4	
		Better	2.4-6.3	$\bar{x} = 4.38$
		Acceptable	≤ 15.1	
	Forage (size quality abundance diversity)	Best	Primary and secondary species present, abundance inter-quartile ranges or above	TLC, WTS, YEP
		Better	Secondary species present, abundance inter-quartile ranges or above	
		Acceptable	At least one secondary species present, with some mix of alternate species at moderate to high abundance	



**Table 3.**  
**Gull Lake (11-305) Historical gillnet CPUE**

	<b>GN</b>	<b>WAE</b>	<b>NOP</b>	<b>YEP</b>	<b>TLC</b>	<b>WTS</b>	<b>BLC</b>
<b>1954</b>	3.1	0.4	8.8	4.6	3.9	1.7	
<b>1972</b>	2.8	3.2	41.8	3.0	2.2	0.3	
<b>1981*</b>	7.4	3.5	15.5	21.9	0.2	0.7	
<b>1986</b>	8.2	3.2	95.4	5.1	2.0	0.1	
<b>1991</b>	5.7	2.3	41.9	11.4	4.1	0.1	
<b>1996</b>	6.1	4.7	27.3	17.7	1.3	0	
<b>2001</b>	6.9	5.8	33.5	14.3	1.4	0	
<b>2004</b>	6.4	6.4	28.2	1.3	1.7	0	
<b>2007</b>	8.5	4.1	18.3	0.5	3.1	0.3	
<b>2010</b>	7.3	4.2	18.4	3.2	1.9	0.4	
<b>2013</b>	3.6	4.5	2.7	2.1	1.1	0.3	
<b>Mean</b>	7.0	4.4	37.6	7.6	2.2	0.1	
<b>Median</b>	6.9	4.2	28.2	5.1	1.93	0.1	
<b>Lake class 22 quartiles</b>							
<b>25%</b>	4.0	3.0	7.1	0.5	1.0	0.2	
<b>Median</b>	6.6	5.0	17.1	1.6	2.0	0.4	
<b>75%</b>	9.6	7.9	33.9	5.2	3.5	1.1	

\* note: 1981 netting done 10/13-16 and used GN only. Only data from 1986-present is included in summary statistics.

**Table 4. Comparison of Gull Lake to other Existing Lake Class 22 MUE Waters**

	<b>Lake Class Mean (Range)</b>	<b>Gull Lake</b>
Acreage	<u>4,515 (652-15,596)</u>	9,947
Max depth (ft)	93 (54-135)	80
Water Clarity (ft)	10.4 (5.5-14.9)	10.9
No. of lakes	16 (over half are native MUE waters)	
<b>GN CPUE</b>		
NOP	5.0	4.4 (0.4-6.4)
WAE	8.3	7.0 (2.8-8.5)
TLC	4.9	7.6 (0.5-17.7)
WTS	3.2	2.2 (0.2-4.1)
YEP	37.1	37.6 (2.7-95.4)