Proposal to introduce Muskellunge in Tetonka Lake (40-0031)
September 30, 2009

Objective:

To provide a trophy muskellunge fishing experience for southern Minnesota area anglers. Fisheries Long Range Plan for Muskellunge indicates Minnesota may add up to eight new muskellunge waters over the next twelve years; this is part of a strategy to increase trophy muskellunge angling opportunities by adding new waters (MN DNR, 2008). Our goal is to produce a stocking-sustained population that will offer trophy muskellunge angling.

The specific goal for muskellunge in Tetonka is to produce an adult (larger than 27 inches) population density of approximately 0.50 fish per acre. This population density is similar to other pure strain muskellunge class 24 lakes in the metropolitan area (M. Habrat, personal communication, September 25, 2009) and Waterville Area Fisheries' other muskellunge lake, French Lake. French Lake has an estimated population density of 0.5 to 1.5 adult fish per acre (Baird 2004). Additional information on goals for other species is in the Tetonka Fisheries Lake Management Plan.

Justification:

Southern Minnesota anglers have few opportunities for muskellunge fishing. French Lake (876 acres) in Rice county, Fox Lake (949 acres) in Martin county, and Zumbro Lake (714 acres) in Olmsted county represent the only muskellunge angling opportunities for Minnesota residents living in the southern third of the state and outside of the seven county metropolitan area.

Prior to 2003, fingerling muskellunge raised at the Waterville fish hatchery were grown in one acre ponds, drained in the fall, and stocked out. Anecdotally, small numbers of fingerling muskellunge escaped, and the water drained to Tetonka Lake. Today, there are still observations of muskellunge catches in the lake and on other lakes connected through the Cannon River system (Figures 2-6). This small, accidentally released population of muskellunge shows Tetonka Lake's trophy fishery potential. Tetonka Lake is a relatively large southern Minnesota lake with 10 miles of shoreline length and many diverse underwater structural elements (Figure 1). The lake size, depth, physical habitat, water quality and prey base is very similar to French Lake where trophy potential has been realized.

There are twenty-three lakes statewide in Lake Class 24 managed for muskellunge and all but four are in the metropolitan area. Twelve of the twenty-three lakes currently host populations of hybrid tiger muskellunge. All twenty-three lakes are maintained through stocking (Younk and Pereira 2003).

Five Ideal Lake Criteria for Muskellunge Management

These criteria, or characteristics, were developed from the Lake Management Planning Guide (1983) and the Long Range Plan for Muskellunge and Large Northern Pike Management Through 2020 (2008). See Table 4 which summarizes these criteria for Lake Tetonka.

1) Lake size: >500 acres - Tetonka Lake (40-0031, class 24) is 1,336 acres, 548 littoral acres, and has a maximum depth of 35 ft (Table 1).

Table 1. Comparison of Tetonka Lake physical attributes to other (n=23) existing Class 24 muskellunge lakes.

Attribute	Lake Class Mean	Range	Tetonka Lake
Acreage	562	152-2,251	1336
Maximum depth (ft)	48	20-91	35
Water clarity (ft)	5.0	1.0-12.5	5.7

Tetonka Lake has varied morphological structural elements including several distinct points, manmade lagoons, vegetated flats, sharp breaklines, and bars. Local favorite angling locations include Preuss' bar, Willow point, Best point, Rocky point, Antl bay, McPeete's point, Cram's/Warner's point, Preuss' point, and Dickinson flats. The lake has 548 littoral acres, primarily located in Antl Bay, Dickinson flats, and on the east and west ends of the lake. Littoral acres are areas where water depth is less than fifteen feet of water. Tetonka's substrates are variable between mud, sand, silt, rubble, and boulder. Tetonka's aquatic vegetation community varies during the growing season. Curly-leaf pondweed dominates during the early season and native plants are found in low abundance later in the summer. Sago pondweed, water stargrass, Canada waterweed, and coontail are all found sparingly during the late season (MN DNR Lake Survey 2009). With a maximum fetch of four miles, the lake receives good wind mixing and summer dissolved oxygen extends to at least fifteen feet of depth (dissolved oxygen > 5.0 mg/l in 1999, 2004, 2009 lake surveys). Lake Tetonka has no history of winterkill.

2) Good Water clarity:

Although not critical to the ability of a lake to produce a quality muskellunge population, Tetonka has better clarity than many surrounding waters. Historical secchi disk readings from 1947 to present have ranged between two and twelve feet, with a yearly average of 5.7 feet (n=22). Water clarity is highly dependent upon precipitation and nutrient runoff fueling algal blooms.

3) Closed system:

Tetonka Lake is an open system, connected to other lakes by the Cannon River. The Cannon River begins in Shields Lake and maintains intermittent connections with downstream lakes. They are, in order, Rice, Dora, Mabel, Volney, Gorman, Sabre, Tetonka, Upper Sakatah, Lower Sakatah, Cannon, and Wells. The Cannon River beyond Wells Lake widens and runs to the Mississippi River. Dams below Wells Lake include the King Mill Dam in the city of Faribault, Northfield Dam, and the Cannon Falls Dam. Dams in the upstream reaches include a dam in the city of Morristown between Lower Sakatah and Cannon Lakes and the Schmidtke dam at the outlet of Lower Sakatah

Lake. No barriers exist above Tetonka Lake. Barriers prevent upstream movement of fish, so fish can go over the dam but not back upstream. Upstream movement of muskellunge has already been observed. In the 1999 survey, one muskellunge was caught in a gill net on Sabre Lake. It had presumably moved upstream from Tetonka Lake. Overall, Tetonka Lake offers the best habitat for muskellunge of the lakes in the Cannon River system; in terms of maintaining a population, emigration concerns are low and no evidence of natural reproduction has been found. It is the opinion of Minnesota DNR Fisheries, given the past observations of angler catches and incidental captures and observances, that some muskellunge movement out of Tetonka Lake may occur into three downstream lakes (Figure 1a). However, muskellunge downstream of Tetonka Lake will likely be present at low densities and are unlikely to establish a population from natural reproduction or from stocked emigrants.

4) Low northern pike abundance:

Northern pike gill net catch rates on Tetonka Lake have generally been within the median and 1st quartile for class 24 lakes (Table 2); mean catch is 1.2 northern pike per gill net lift. Size structure indices (Gablehouse 1984) for pike have been stable through the past half century during the modern period of fisheries management and regularly scheduled lake surveys (Table 3).

Coexistence of muskellunge and northern pike has been a concern to anglers and fish managers. Inverse trends in relative abundance of muskellunge and northern pike have been reported by numerous studies in various lakes where muskellunge decreased while northern pike increased in abundance (Oehmcke 1951; Johnson 1981; Inskip and Magnuson 1986). Other studies have shown the two species to coexist, for example; Strand (1986) showed ecological separation of spawning habitat and early life history stages in Leech Lake. Separation of the two species with respect to time of spawning, spawning habitat, and location of juvenile fish was documented in the St. Lawrence River (Osterberg 1985).

5) Adequate Prey:

Species sampled in gill nets and trap nets over the years include bigmouth buffalo, black bullhead, black crappie, bluegill, bowfin, channel catfish, common carp, freshwater drum, longnose gar, largemouth bass, northern pike, pumpkinseed sunfish, quillback sucker, smallmouth bass, walleye, white bass, white crappie, white sucker, yellow bullhead, and yellow perch. Tetonka Lake has a diverse fish community for southern Minnesota waters, with many species that could be potential muskellunge prey. Abundant populations of freshwater drum, black bullhead, common carp, white sucker, and yellow perch will likely be the primary forage base. This is similar to the forage base of French Lake, Rice County, where growth rates and condition factor are above average for Class 24 lakes, producing angler reports and Fisheries surveyed muskellunge up to 53 inches. Shoalwater seine history for Tetonka is incomplete outside of gamefish, but a comparable lake exists in Fox Lake, Martin County (46-0109-00). Fox has similar size, littoral acres, maximum depth, and is classified the same as Tetonka Lake (class 24). Seine hauls in Fox Lake have returned spottail shiners, common shiners, fathead minnows, golden shiners, young-of-the-year sunfish, young-of-the-year drum, and young-of-the-year perch.

Popular opinion and public perception have characterized the muskellunge as a relentless eating machine and a fish that may decimate walleye populations. Recent research confirms that muskellunge and walleye populations have limited interactions. Bozek et al. (1999) investigated muskellunge diets in 34 northern Wisconsin lakes and found yellow perch and white sucker were the most important prey throughout spring, summer and fall. All other species that might be a concern for anglers (bass, bluegill, crappie, northern pike, walleye) were very low in importance in muskellunge diets. Despite walleye being abundant in many lakes, muskellunge consumed more small muskellunge than they consumed walleye. Fayram et al. (2005) evaluated evidence of competition and predation between walleye and northern pike, muskellunge, smallmouth bass, and largemouth bass in northern Wisconsin. In the study lakes, the only significant relationships observed were largemouth bass electrofishing CPE was negatively correlated to adult walleye abundance and muskellunge electrofishing CPE was positively correlated to adult walleye abundance. Muskellunge were not considered any further because direct competition or predation was unlikely between these two species.

The diverse fish community of Tetonka Lake should provide appropriate sized prey for all sizes of muskellunge, especially when each species growth stages are considered. Common, golden, and spottail shiners and yellow perch should provide the basis for quality prey base for small to medium size muskellunge. Large muskellunge should have more than adequate prey as a result of the white sucker, freshwater drum, and yellow perch populations.

Public Acceptance:

No formal information has been collected (solicited comments, surveys, or creels) regarding public acceptance for muskellunge introductory stocking in Tetonka lake. Representatives from the Southern Lakes chapter of the Minnesota Darkhouse and Angling Association, a longtime conservation partner with the Waterville DNR fisheries office, have pledged support for muskellunge stocking. Tetonka Lake, while not as popular as some other local lakes, does receive some wintertime darkhouse spearing pressure, but with no plans to impose spearing bans or institute northern pike slot length limits, there would be no limitation on continued darkhouse northern pike spearing. Chapter 54 of Muskies Inc., also a longtime conservation partner with the Waterville DNR fisheries office, has long supported introducing muskies to Tetonka. Resorts on Tetonka Lake and the city of Waterville could potentially profit from a muskellunge fishery if the lake becomes a musky destination and an economic benefit follows.

Potential for Opposition:

Potential public perception of muskellunge "eating everything in the lake", particularly walleye, exists. Educational efforts would be necessary for species identification and to explain the role of muskellunge as a top-level predator within the fish community. A recently completed Minnesota evaluation of impacts of muskellunge stocking on the fish community (Knapp et. al. 2008) shows no statewide or lake class trends for catch per unit effort for northern pike, walleye, yellow perch, bluegill, white sucker, or black crappie. These fish species have coexisted well with muskellunge at densities that have resulted from stocking. The Upper Midwest and Ontario have numerous lakes where some of the best walleye populations exist with the best muskellunge

fisheries (Lake of the Woods, Leech, Vermillion, Mille Lacs).

There will likely be some opposition from some darkhouse spearers since northern pike spearing has been popular for many years. However, since there is no intention for banning spearing or instituting a northern pike slot length limit, those concerns should be limited.

Tetonka Lake is a popular lake for bass, panfish, and walleye anglers. The Waterville Lakes Association has expressed some concerns and opposition to increased boat traffic on the lake. It is not known how much more boat traffic muskellunge angling would add in a given year. Currently, one public access exists on the south side of the lake off county road 12; it has vehicle with trailer parking capacity of 25 rigs and 3 handicap accessible spots. The Cannon River city launch in the city of Waterville, about one quarter of a mile downstream from Tetonka, has parking lot capacity for approximately 23 vehicles with trailers; overflow parking could be accommodated on city streets. Public input should include key stakeholders including local residents and businesses, the Waterville Lakes Association, Muskies Inc. Chapter 54, and the southern lakes chapter of the Minnesota Darkhouse and Angling Association.

Proposed stocking (number, size, frequency):

The initial stocking would consist of 548 fall fingerlings (one per littoral acre, mean length 10-12 inches or 3-5/lb) every other year over a period of seven years. Fingerlings from Waterville Fisheries' Hatchery muskellunge pond (Hebl's Pond) could be used to cover the stocking quota. Other potential muskellunge fingerling rearing pond opportunities exist such as Gray's Pond or hatchery drainable rearing ponds. With muskellunge in Tetonka, past escapement issues become less critical.

Evaluation:

Tetonka Lake is monitored every five years with lake surveys or population assessments. This will continue as scheduled and special attention will be directed at any changes in the fish community once muskellunge are stocked.

To evaluate the muskellunge population directly, spring netting with large trap nets would begin seven years after the initial stocking to allow the first year of stocked fish to become sexually mature. Future assessments would be conducted every four or five years to fit within our spring assessments on other local muskellunge lakes. Trap net catch rates, lengths, weights, sex and scales will be collected to determine relative abundance, size and age structure, condition and growth. Captured fish would also receive a hole-punch in a fin or fin clip for purposes of making a population estimate.

The population characteristics and goals were established by considering the potential of Tetonka Lake to produce trophy fish and also based on previous spring muskellunge assessments on our other local muskellunge lake, French Lake. A healthy trophy population would be defined by a spring trap net catch rate of at least 0.3 fish/net, a population density of at least 0.50 adults/acre

based on a Schnabel estimate (with adults defined as fish >27 inches), multiple year classes represented and at least 5% of the sample 50 inches or longer once the population becomes established.

Table 2. Selected gill net catch rates from 1955 to 2009 on Tetonka Lake compared to other (n=23) class 24 muskellunge waters and lake class quartiles.

Date	No. of Nets	Northern Pike	Walleye	Yellow Perch	White Sucker
7/20/1955	12	0.3	0.8	1.3	1.7
8/25/1969	11	0.3	0.3	0.1	0.5
8/26/1981	14	0.5	0.6	7.1	1.1
8/26/1986	6	0.2	1.0	6.5	2.8
8/7/1989	14	1.4	2.6	7.3	0.8
7/20/1994	12	0.4	1.2	13.1	3.1
7/12/1999	6	3.5	3.7	11.5	4.8
7/12/2004	10	1.4	1.4	6.5	1.5
7/20/2009	15	2.9	2.3	4.0	0.7
Lake Mean		1.2	1.5	6.4	1.9
Lake Median		0.5	1.2	6.5	1.5
		Class 24 MUE Waters			
Mean		4.5	2.7	23.0	0.7
		Lake Class 24			
1st Quartile		1.5	1.2	2.0	0.4
Median		3.8	2.8	10.5	1.0
3rd Quartile		7.3	6.3	27.9	2.2

Table 3. Average weight and population size structure indices for northern pike sampled in Tetonka Lake, 1955-2009.

Year	Sample size	Mean Weight	PSD	RSD-P	RSD-M
1955	4	2.64	75	25	0
1969	3	2.63	66	33	0
1981	7	4.54	92	50	0
1986	1	12.5	100	100	100
1989	19	2.55	68	37	0
1994	5	2.98	60	20	0
1999	21	2.76	71	14	0
2004	14	4.46	93	43	0
2009	48	4.42	94	25	4

Table 4. Physical and Biological Characteristics of Tetonka Lake, as a potential lake for muskellunge management.

Characteristic	Attribute	Priority	Criteria of attribute	Tetonka Lake
Physical	Lake size (acres)	Best	> 3,000	
		Better	300 to 3,000	1,336
		Acceptable	< 300, but ≥ 100	
	Maximum depth (ft)	Best	> 80	
		Better	40 to 80	
		Acceptable	< 40, but ≥ 15	35
	Secchi (ft)	Best	> 10	
		Better	5 to 10	$\bar{x}$=5.7
		Acceptable	< 5, but ≥ 3	
	Littoral area (%)	Best	0.33 to 0.55	0.41
		Better	NA	
		Acceptable	< 0.33, but ≥ 0.55	
	SDF	Best	> 1.40	
		Better	1.40 to 2.40	1.95
		Acceptable	< 1.40, but ≥ 1.05	
Biological	Northern pike CPUE	Best	< 2.4	$\bar{x}$=1.2
		Better	2.4-6.3	
		Acceptable	≤ 15.1	
	Forage (size quality abundance diversity)	Best	Primary and secondary species present, abundance inter-quartile ranges or above	
		Better	Secondary species present, abundance inter-quartile ranges or above	*WTS (YEP,FRD)
		Acceptable	At least one secondary species present, with some mix of alternate species at moderate to high abundance	

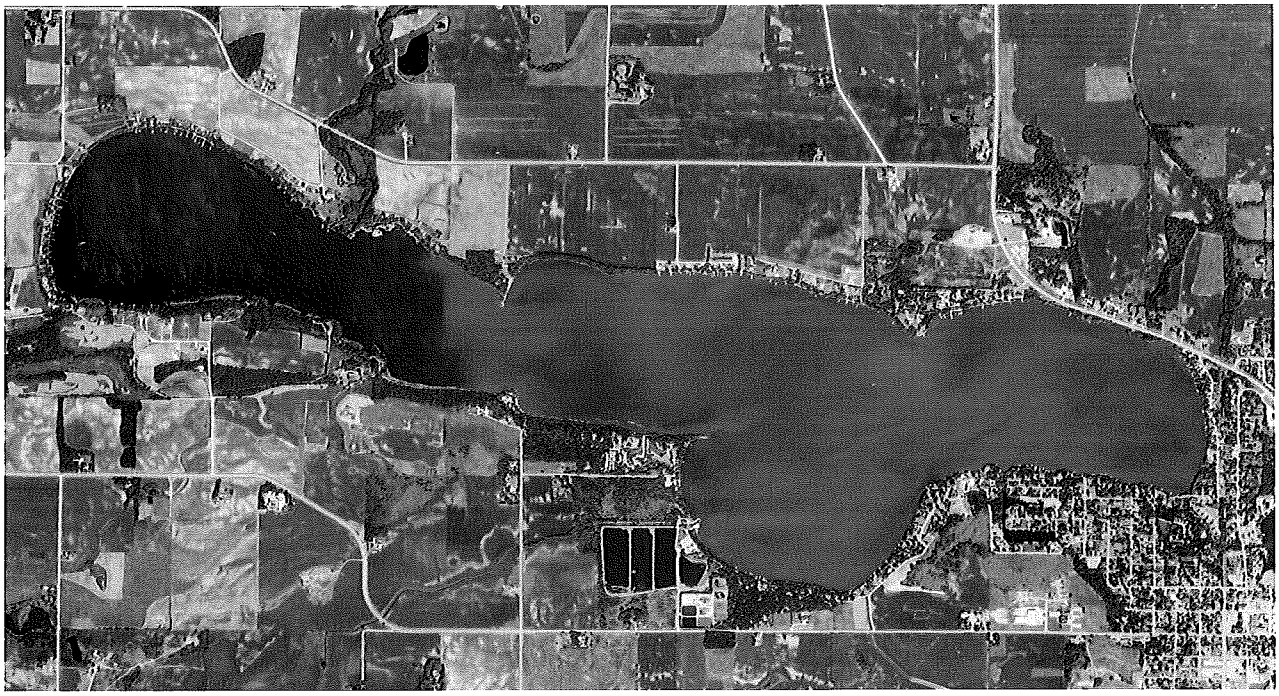

Figure 1. Tetonka Lake

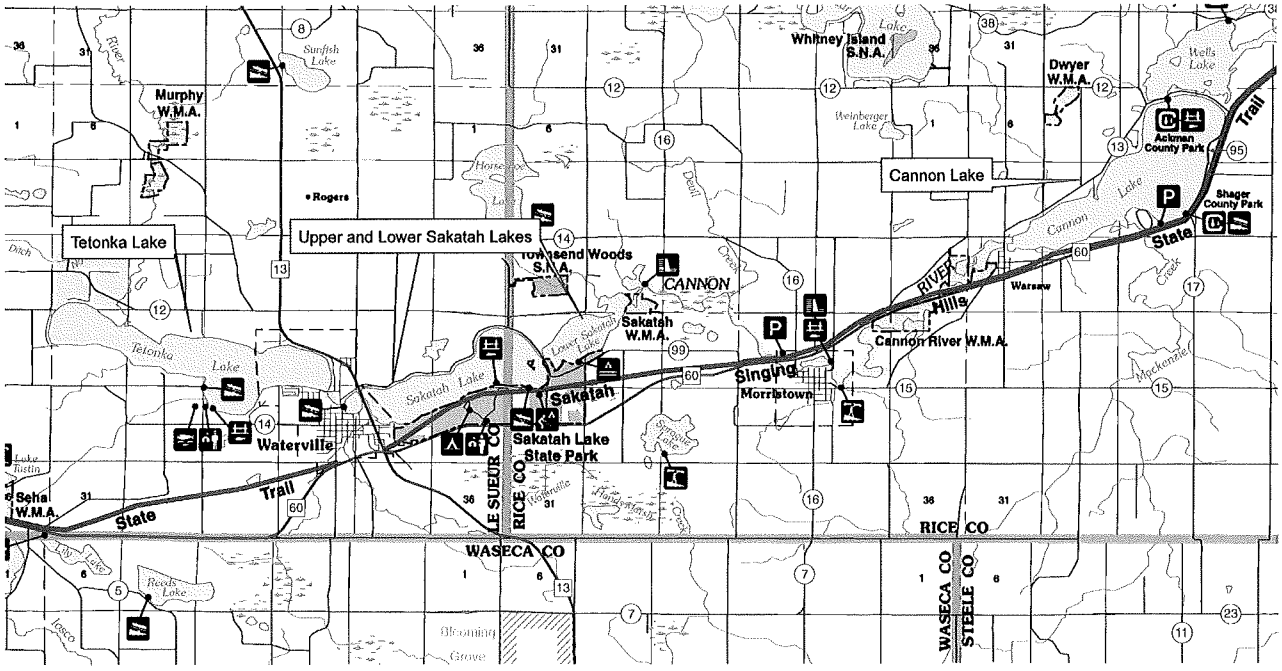

Figure 1a. Tetonka Lake and three downstream Lakes along the Cannon River

Figure 2. Muskellunge seined in January of 2009

Elwood family of Blooming Prairie, Jake, Theresa, Stan and Benjamin, with their 53 inch muskie, caught on Lake Tetonka.

Figure 3. Muskellunge caught November 6, 2004.

Figure 4. A 51" muskellunge caught in summer 2009.

Submitted Photo
Doc Brockman of Waterville reeled in this 54 inch, 38 pound muskie while fishing on Lake Tetonka Friday morning. Brockman

Figure 5. Muskellunge captured in August 2007.

Figure 6. 53" muskellunge found washed ashore dead in Tetonka Lake, summer 2007.

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