Management Priority: 8

NA-01570-01

LAKE MANAGEMENT PLAN

Ecological Lake Class: 22

Region	Area	D.O.W. Number	County	D.O.W. Lake Name	Acreage
II	Grand Rapids 216	31-0719	Itasca	Deer	4,097 surface 920 littoral

Long Range Goal: Increase the walleye gill-net catch to 11.0 fish/net. Maintain a spring electrofishing catch rate of 30 smallmouth bass/hr. Maintain the spring muskellunge trap net catch at 0.5/net with 45% ≥ 40 inches by natural reproduction.

Operational Plan: Stock walleye fingerlings (Mississippi River strain) annually at the rate of 1.0 lb/littoral acre (920 lbs).
- Conduct a population assessment late July 2012. The population assessment will include spring electrofishing for bass.
- Conduct a spring muskellunge assessment (large trap nets) in 2008 to monitor the population.
- The lake management plan will be revised after the 2012 population assessment.

Midrange Objective: Monitor changes in the diversity and catch rates of the fish community.

Potential Plan: If surplus Mississippi River strain walleye fingerlings are available, consider stocking up to an additional 20% or 184 lbs.

TOTAL $ 3,000.00

NARRATIVE: (Historical perspectives - various surveys; past management; social considerations; present limiting factors; survey needs; land acquisition; habitat development and protection; commercial fishery; stocking plans; other management tools; and evaluation plans)

Initial investigation – 1939 (no file record)
Initial Survey – June 1948
Re-survey- July 1975, July 1984, July 2005
Population Assessment-July 1980, July 1990, July 1995, July 2000
Spring Muskellunge Assessment – May 1981, 1988, 1993, Apr 2003
Whitefish/tullibee Checks – Various years
Stocking Evaluation (Fin clipping) – 1979 & 1980
Tissue Analysis (Contaminants) - 1984
Shoreline Seining- Various years
Water chemistry 1984, 1985
Lake Map-1948
Lake Management Plan-1986, 1996, 2001

Check the appropriate boxes below:

- ☐ Superior National Forest
- ☐ Chippewa National Forest
- ☐ Leech Lake Indian Reservation
- ☐ 1854 Ceded Territory

Primary Species Management:	Secondary Species Management:	
Muskellunge/Smallmouth bass/ Walleye	Northern pike	
Area Supervisor Signature: Christopher M. Konrad	**Date:** 3/28/2006	
Regional Manager Signature: Timothy J. Goeman	**Date:** 04-26-2006	

Narrative & Various Surveys:

Deer Lake is in ecological lake class 22 and is located in the Mississippi River Watershed (#9), five miles northeast of Deer River. The lake is 4,097 acres, has a littoral area of 920 acres (22%) and a maximum depth of 121 feet. Lakes in this class average 3,545 acres, 38% littoral, maximum depth of 102 feet, total alkalinity of 147 ppm and Secchi of 9.9 feet. Deer Lake has hard water (alkalinity=114 ppm), low fertility (phosphorus = 0.012 ppm), and a Secchi disk reading of 11.0 feet in 2005. There are no inlets and one outlet on the lake. A small channel connects Little Deer Lake to Deer Lake but both lakes are at the same elevation. The outlet flows into the Deer River, which ultimately flows into the Mississippi River.

Four lake surveys, four population assessments, five spring muskellunge assessments, various natural reproduction checks, and whitefish/tullibee checks have been completed since 1948. The summer assessment gear and catch rates for select species were summarized for this report (Table 1, Figure 1).

Table 1. Selected Deer Lake catch rates by gear from 1948 to 2005.

Date	No. of Nets (gill/trap)	Walleye (GN)	Northern pike (GN)	Bluegill (TN)	Rock bass (GN)	Yellow perch (GN)	Tullibee (GN)	Smallmouth bass (GN)(EF/h)
6/17/48	21/7	8.2	1.1	2.7	9.2	11.8	11.2	<.1 (-)
7/14/75	12/14	2.3	0.6	0.2	12.2	13.3	0	0.4 (-)
7/21/80	15/0	2.6	0.9	-	11.9	15.2	8.6	0.5 (-)
7/16/84	15/10	13.3	1.1	1.1	14.6	19.4	0.1	2.3 (-)
7/23/90	15/10	4.7	0.8	21.0	25.6	15.9	0.1	5.3 (-)
7/24/95	15/15	7.5	0.7	23.9	30.2	18.3	0.3	4.1 (17.3)
7/24/00	15/15	5.4	0.8	10.5	25.3	26.7	0.2	2.5 (25.2)
7/25/05	15/15	8.1	0.5	32.0	30.8	32.2	0	4.3 (55.9)
Lake Mean		**6.5**	**0.8**	**13.1**	**20.0**	**19.1**	**2.6**	**32.8**
Lake Median		**6.5**	**0.8**	**10.5**	**20.0**	**17.1**	**0.2**	**25.2**
				Lake Class 22				
1st quartile		4.0	3.0	3.7	1.0	7.1	0.5	0.2 (na)
Median		6.6	5.0	15.3	2.9	17.1	1.6	0.4 (na)
3rd quartile		9.6	7.9	42.9	6.6	33.9	5.2	0.9 (na)

Walleye – Walleye management has been a priority for Deer Lake since the initial stocking in 1913. Walleye fry were stocked several times between 1913 and 1946. Walleye stocking was limited between 1946 and 1965, with only three stockings (frylings) in 1958, 1961, and 1963. Since 1965, walleye of various sizes have been stocked on a more regular basis (Table 2). Different stocking regimes allowed evaluation of natural reproduction, and the size, number, and frequency of stockings necessary to produce a quality fishery. Although natural reproduction does occur, strong year-classes have generally corresponded to years of stocking, particularly fingerlings (Figure 2). In an attempt to better understand the contribution fingerling stocking had on the walleye population, fingerlings stocked in the fall of 1976 were given a fin clip. Although no official study was conducted, an interested resort owner monitored most of the walleye brought into his resort in the summers of 1979 and 1980. In 1979, 75% of the 93 walleye (13.5-17.0 inches) brought to the resort were fin clipped. The results were similar in 1980 when 86% of the 80 walleye (15.5-18.5) examined at the resort were fin clipped. The 2001 management plan indicated that more than 80% of the sampled walleye from the last seven assessments were from years of stocking.

Table 2. Stocking records for Deer Lake from 1965 to 2005

Species	Year	Number	Pounds	Size	Species	Year	Number	Pounds	Size
MUE (Shoepack)	1965	10,000	-	Fry	MUE (Wisc)	1985	535	107	Yrl
MUE (Shoepack)	1966	18,500	-	Fry	WAE	1985	11,890	287	Fgl
WAE	1966	43,692	37	Fryling	WAE	1985	806	129	Yrl
WAE	1968	50,692	71	Fryling	WAE	1987	3,993	846	Fgl
MUE (Shoepack)	1968	710	142	Fgl	WAE	1989	1,074	159	Fgl
WAE	1971	13,002	69	Fryling	WAE	1989	3,693	510	Yrl
MUE (Shoepack)	1971	1,158	173	Fgl	WAE	1991	1,271	677	Yrl
WAE	1973	2,000,000	-	Fry	WAE	1993	6,229	585	Fgl
WAE	1973	140	14	Fgl	WAE	1997	11,981	632	Fgl
MUE (Shoepack)	1973	1,043	176	Fgl	WAE	2000	50	2	Fgl
MUE (Shoepack)	1974	520	104	Yrl	WAE	2000	766	383	Yrl
WAE	1975	46	1	Fgl	WAE	2000	2,490	1,556	Adl
WAE	1976	1,120	28	Fgl	WAE	2001	35,263	1,220	Fgl
WAE	1976	4,507	482	Yrl	WAE	2003	94	66	Yrl
WAE	1977	6,006	144	Fgl	WAE	2003	24	12	Adl
WAE	1979	13,701	195	Fgl	WAE	2003	25,237	1,097	Fgl
WAE	1981	7,184	146	Fgl	WAE	2005	6,616	290	Fgl
WAE	1981	10,448	438	Yrl	WAE	2005	1,982	629	Yrl
MUE (Shoepack)	1981	286	65	Yrl					
WAE	1983	14,276	332	Fgl					
MUE (Shoepack)	1983	495	37	Fgl					

* MUE = Muskellunge, WAE=Walleye

Walleye spawning habitat is available in many areas around Deer Lake. However, natural reproduction is typically poor. The lack of natural reproduction in conjunction with poor results of fry/fryling stocking suggests the bottleneck may be the result of some early life stage requirement. One theory suggests that because the lake is large and deep, spring water temperatures increase slowly. The cooler water temperatures causes zooplankton production to be delayed compared to shallow, darker lakes. As a result, it appears small walleye do not have sufficient food to survive after hatching. Therefore, fingerling walleye stocking would be required to provide a fishable population.

Walleye gill-net catch rates have fluctuated considerably since the first assessment in 1948 (Table 1, Figure 1). The lowest catch rate was 2.3 fish/net in 1975 and the highest catch of 13.3 fish/net occurred in 1984. In 2005, the gill-net catch was 8.1 fish/net, which exceeded the lake class median of 6.6 fish/net. The catch did not attain the aggressive management goal of 11 walleye/gill net. However, the catch rate was good considering that regular stocking in an effort to meet the goal began in 2001. Prior to 2000, the goal of the stocking regime was to allow for evaluation of natural reproduction.

In 2005, the walleye population appeared to be in good condition based on the size and age structures sampled. Walleye from 9.8 to 28.2 inches were sampled and they had a mean length of 15.2 inches. Size structure values for PSD, RSD-P, and RSD-M were 45, 11 and 4, respectively (Table 3). Eight year-classes were identified by scale and opercle analysis. The 2003 (54%) and 2001 (30%) year classes represented the majority of the sample and both corresponded to stocked years. Walleye growth was good with age-4 fish averaging 16.3 inches. Mean back-calculated length-at-ages were similar to statewide averages for all ages.

Table 3. Deer Lake Proportional Stock Density (PSD), Relative Stock Density (RSD) indices for preferred-length and memorable-length **walleye** sampled in gill nets from 1975 to 2005. Standardized lengths were used to calculate structural indices (Stock length = 10 in., Quality length = 15 in., Preferred length = 20 in., Memorable length = 25 in.)

Year	Sample size	PSD	RSD-P	RSD-M
7/14/75	27	59	11	0
7/21/80	38	47	18	3
7/16/84	92	37	15	1
7/23/90	65	78	14	6
7/24/95	112	53	8	4
7/24/00	76	36	8	3
7/25/05	121	45	11	4

Muskellunge – Deer Lake has a native muskellunge population and has been managed as a designated muskellunge lake since the early 1960s. Limited information was available on the population before spring special assessments began in 1981. Since standard summer assessments do not sample muskellunge effectively, early spring (ice-out) trap netting has been used as the primary tool for evaluating this species in the Grand Rapids management area. These assessments sample predominantly sexually mature muskellunge. Spring assessments from 1981 to 1998 used 3' x 6' framed trap nets with 40' leads, 1" mesh, and modified string trap openings. In 2003, large muskellunge trap nets (5' x 6' frames, 100' leads, ¾" mesh) were used and has become the statewide standard gear for sampling muskellunge. The change was made after a period of evaluation found large nets caught more and larger fish, and the fish were in better condition because they had more room in the net.

Muskellunge were stocked nine times from 1965 to 1985; eight of the stockings were with Shoepack strain fish (Table 2). The success of these stockings and ultimately the effects on the native population are unknown. Stocking was discontinued because it appeared natural reproduction was adequate to maintain the population. Not only has the population been maintained by natural reproduction but the quality has increased since the first muskellunge assessment in 1981 (Table 4). Changes in regulations and angler behavior have likely helped size structure improve. The minimum length limit increased from 30 inches to 36 inches in 1983 and then again to 40 inches in 1993. In addition, voluntary catch and release has increased substantially since the early 1980s.

Table 4. Deer Lake Proportional Stock Density (PSD), Relative Stock Density (RSD) indices for preferred-length, memorable-length, and trophy length **muskellunge** sampled in spring trap nets from 1981 to 2003. Standardized lengths were used to calculate structural indices (Stock length = 20 in., Quality length = 30 in., Preferred length = 38 in., Memorable length = 42 in., Trophy length = 50 in.)

Year	Sample size	PSD	RSD-P	RSD-M	RSD-T
4/27/81	52	88	13	6	2
4/28/88	119	66	39	18	0
4/27/93	156	90	44	22	0
4/13/98	130	92	40	15	0
4/27/03	267	98	45	21	<1

Although spring trap net assessments sample muskellunge more effectively than summer netting, weather can have dramatic influences on catches. As a result, spring catch rates should be compared with caution. For example, muskellunge catch rates ranged from 0.35 to 0.49 fish/net in the four assessments prior to 2003 when 1.7 fish/net were captured (Table 5). The extremely high catch in 2003 (highest on record for all our

spring muskellunge assessments) was primarily the result of calm, sunny weather with increasing water temperatures during the assessment. In contrast, the Schnabel and Peterson estimates only ranged from 431 to 761 fish during the same time frame (Table 5). Despite variable catch rates, spring muskellunge assessments provide good information on age and size structure, condition, and population estimates when sample sizes are large.

The most recent assessment in 2003 captured 339 muskellunge of which 72 were recaptured fish. The catch rate was the highest ever for Deer Lake at 1.7 fish/net. The modified Schnabel and Peterson population estimates were 600 (0.15/acre) and 651 (0.16/acre) fish (Table 5). Muskellunge captured in this assessment ranged from 26.0 to 50.2 inches and had a mean length of 38.0 inches. Despite improvements in size structure in the last 20 years, relatively few fish exceeding 42 inches have been sampled (Table 4). Twelve age-classes were identified by scales from age 4 to age 15, indicating consistent recruitment. Growth rates and relative weights have been good in the last three assessments. Mean relative weights for male and female muskellunge were 89.1 and 96.1, respectively. Mean relative weights for Deer Lake muskellunge have consistently exceeded those for fish from Moose Lake and North Star Lake (Figure 3). The population appeared to be in good condition based on population estimates, recruitment, growth and condition; only size structure appears to be an area that could use improvement.

Table 5. Summary of Deer Lake spring muskellunge assessments conducted from 1981 to 2003. Numbers in parentheses represent 95% confidence intervals.

Year	Date	Trap net Lifts	Muskies Caught	Population Estimate	Muskies/ Acre	Muskies/ Trap net
1981	4/27 - 5/8	153	54	---	---	0.35
1988	4/28 - 5/11	326	135	482 (311-917) Schnabel	0.13	0.41
1993	4/27 - 5/10	359	176	761 (503-1383) Schnabel	0.21	0.49
1998	4/13 - 4/26	331	140	431 (279-701) Schnabel 744 (401-1452) Peterson	0.12 0.20	0.42
2003	4/27 - 5/7	199	339	600 (484-766) Schnabel 651 (391-1153) Peterson	0.15 0.16	1.70

Northern pike - Northern pike gill-net catch rates have always been below the lake class 1st quartile value of 3.0 fish/net (Table 1). The highest catch rate of 1.1 fish/net occurred in 1948 and 1984. In 2005, the gill-net CPUE was 0.5 fish/net. Low northern pike numbers frequently results in good size structure. Northern pike ranged from 23.8 to 34.6 inches and had a mean length of 27.4 inches. Size structural indices had PSD, RSD-P, and RSD-M values of 100, 29 and 14. Five year-classes were identified by age analysis ranging from age 3 to age 8. Growth exceeded statewide averages for all ages (>15%). Northern pike averaged 26.3 inches by age 4.

Smallmouth bass – Gill-net catch rates have increased substantially for smallmouth bass since the initial survey in 1948 (Table 1). Catch rates were less than 0.6 fish/gill net from 1948 to 1980 but have ranged from 2.3 to 5.3/gill net since 1984. Smallmouth bass were sampled with spring night electrofishing in 1995, 2000, and 2005 (Table 1). From 1995 to 2005, smallmouth bass electrofishing catch rates increased from 17.3 fish/hr to 55.9 fish/hr. In 2005, the fish ranged from 3.9 to 18.6 inches and had a mean length of 8.9 inches. Based on the electrofishing data, size structure appears to have declined in the last three assessments (Table 6) but it may be due to a few strong year-classes. Eight year-classes were sampled from two to nine years old with age-2 through age-4 fish representing nearly 81% of the sample. Growth was slower than statewide averages for all ages. It is not clear why the population appears to have expanded.

Table 6. Deer Lake Proportional Stock Density (PSD), Relative Stock Density (RSD) indices for preferred-length, and memorable-length **smallmouth bass** sampled in spring electrofishing from 1995 to 2005. Standardized lengths were used to calculate structural indices (Stock length = 7 in., Quality length = 11 in., Preferred length = 14 in., Memorable length = 17 in.)

Year	Sample size	PSD	RSD-P	RSD-M
6/06/95	40	68	20	8
6/01/00	25	84	28	0
6/16/05	75	41	9	1

Black crappie - Black crappie catch rates have always been low and will likely remain low due to the lack of suitable habitat. Black crappie were only sampled by trap nets once from 1948 to 1990 and were first sampled by gill nets in the 2000 assessment. In 2005, black crappie gill-net and trap-net catch rates were both 0.7 fish/net. Both gear type catches were near their respective lake class median. Black crappie ranged from 7.2 to 11.8 inches for the combined gears. Three year-classes were identified from age 3 to age 6, with age-3 fish representing 90% of the sample. Mean back-calculated length-at-ages were similar to those reported for statewide averages.

Bluegill – Bluegill were seldom sampled prior to the 1990 population assessment (0.2 to 2.7 fish/trap net). Bluegill catch rates have increased substantially beginning in 1990 with a catch of 21.0/net, followed by 23.9/net in 1995, 10.5/net in 2000, and 32.0/net in 2005 (Figure 1). Bluegill catch rates have been near or above the lake class median of 15.3 fish/net in the last four assessments. Bluegill lengths ranged from 3.2 to 8.0 inches, with a mean of 5.4 inches. Six year-classes were sampled from two to seven years old. Age-4 and age-6 fish each represented 35% of the sample. Growth was slow compared to lake class 22 means, with most back-calculated lengths near 85% of the class means. The distinct increase in catch rates between 1984 and 1990 is not well understood; however, bluegills were not the only centrarchid to experience this trend.

Burbot – Burbot have never been captured in any summer assessments; however, they have been captured in spring muskellunge assessments. A state record fish was caught in Deer Lake in 1980 that was 14 lbs, 1 oz and 33.3 inches long. The current record was caught in 2001 from Lake of the Woods and was 14 lbs, 3 oz and 36.25 inches long.

Largemouth bass – Largemouth bass were seldom sampled in previous summer assessments. Summer gill nets and trap nets typically do not sample bass well. Largemouth bass were sampled with spring night electrofishing in 1995, 2000, and 2005. Catch rates followed a similar trend to smallmouth bass catch rates. Catch rates increased substantially from 2.2 fish/hr in 1995 to 45.0 fish/hr in 2005. In 2005, the sampled fish ranged from 5.1 to 13.9 inches and had a mean length of 9.8 inches. Six year-classes were sampled from two to seven years old. Age-3 and -4 fish represented 82% of the sample. Growth was poor compared to statewide averages. However, most mean back-calculated lengths remained within 15% of the statewide average. Similar to other centrarchid species in the lake, it is unknown why the population has expanded.

Rock bass – Deer Lake has always had excellent habitat for rock bass. Catch rates have exceeded the lake class 3rd quartile of 6.6 fish/gill net in all assessments (Table 1). The population appears to have increased substantially since 1948. Catch rates from 1948 to 1984 averaged nearly 12 fish/gill net compared to almost 28 fish/gill net from 1990 to 2005 (Figure 1). It is unclear what has led to the increased catch rates in recent assessments but it appears to be more than just random variation in catch rates or variable recruitment. During this same time frame, Deer Lake has also seen a substantial increase in other centrarchids: bluegill, largemouth bass, and smallmouth bass.

Whitefish & Tullibee – *Trianophorus* sp. has been observed in both species in past assessments. Tullibee are difficult to sample with our standardized summer assessments due to their pelagic nature. As a result, tullibee catch rates are generally low but can be highly variable (Table 1). In 1948, the gill-net catch rate was 11.2 fish/net but in the next assessment in 1975 none were captured. In 1980, 8.6 tullibee/net were sampled but in the next five assessments the highest catch was 0.3 fish/net. None were sampled in gill nets in 2005. Anecdotal information indicates tullibee have been abundant in the lake and that standard sampling has not accurately reflected the population.

Whitefish also pose a challenge to sample because of the areas they inhabit during the summer. Consequently, whitefish catch rates have never exceeded 0.9 fish/gill net. However, Deer Lake is open to fall sport netting for whitefish and tullibee under schedule I (48 hour notice), and many whitefish are harvested each year. The season typically opens the last Friday in October and runs through the first Sunday in December.

Fall whitefish netting activity was monitored in 2004 and 2005. The purpose of the surveys was to gather information on participation, whitefish harvest, and incidental catch of game fish, particularly walleye and muskellunge. During the first week of the 2004 and 2005 seasons, there were 120 and 115 nets checked, respectively. In 2005, the estimated whitefish harvest was 312 fish compared to 593 fish for the same time period in 2004. Incidental catch of game fish included 11 muskellunge, 8 northern pike, 7 smallmouth bass, and 54 walleye in 2005. In 2004, 13 muskellunge, 14 northern pike, 2 smallmouth bass, and 32 walleye were caught. The survey crews estimated the muskellunge ranged from 24 to 48 inches and walleye ranged from 20 to 25 inches long.

Yellow perch – The yellow perch population has been relatively stable, remaining between the 1st and 4th quartiles for all assessments. In 1948, the catch was 11.8 fish/gill net (lowest on record), and catches have gradually increased to 32.2 fish/gill net (highest on record) in 2005 (Table 1, Figure 1). Yellow perch lengths ranged from 5.5 to 11.4 inches and had a mean length of 7.9 inches. Seven year-classes were sampled in 2005 indicating consistent recruitment. Growth was slow compared to the statewide averages but was still within 15% of the mean. Yellow perch are probably more important within the fish community as a prey than as a species desired by anglers.

Other species observed during previous assessments included bluntnose minnow, common shiner, emerald shiner, golden shiner, Iowa darter, Johnny darter, mimic shiner, spottail shiner, black bullhead, brown bullhead, yellow bullhead, bowfin, hybrid sunfish, pumpkinseed sunfish, shorthead redhorse, and white sucker.

Past Management

Deer Lake has been stocked with a variety of species that include black crappie, lake trout, largemouth and smallmouth bass, muskellunge, northern pike, rainbow trout, and walleye. Deer Lake has been managed as a walleye lake since it was first stocked in 1913. In addition, the lake has been designated a muskellunge lake since the 1960's. Four surveys, four population assessments, five muskellunge special assessments, various whitefish/tullibee netting checks, and natural reproduction checks have been conducted since 1939.

In 1941, legislation granted authority to the "Commissioner of Conservation" to close up to 50% of the state's waters to spearing. The main reason was "to control stunted panfish populations". Deer Lake was closed to spearing from 1944 through 1949. Dark house spearers were resistant to losing their favorite lakes, whereas resorters and summer anglers were passionate supporters of closing lakes. Biologist at the time felt the closings tended to concentrate spearing effort on some lakes. Regulations for 1951-52 opened all waters to spearing. In 1961, the Commissioner was given the authority to close spearing on up to 10 lakes designated for special muskellunge management. The purpose was to eliminate the accidental and illegal kill of muskellunge by spearers. The authority was eventually extended up to 40 lakes by 1971, although only 11 lakes were closed in 1970. Deer Lake has been closed since 1963.

Social Considerations

Deer Lake is located five miles northeast of Deer River, MN and about 12 miles northwest of Grand Rapids, MN. There is a public access located in a small bay on the southwest shore of the lake. It has a concrete ramp and parking for 15 rigs.

Lakeshore development has increased substantially over the years. A typical trend observed on many area lakes has been lakeshore development by a few resorts followed by more resorts and a few private parcels, and as we get closer to the present time period, fewer resorts with more private development. A 1940 investigation mentioned that development on the lake included two resorts and 25 cottages. The 1948 fisheries survey recorded three resorts, 52 cabins and two youth camps. In 1975, six resorts with 51 cabins, and 254 cabins/homes were counted. The count increased to seven resorts with 55 cabins and 306 homes/cabins in 1984. The most recent lake survey conducted in 2005 documented three resorts with 23 cabins, and 373 homes/cabins.

An old logging dam existed at the outlet at the turn of the century. The remains can still be seen today. In 1938, WPA crews constructed the dam where the outlet crosses County Road #142, approximately 2000 ft downstream of the old dam. In 1983, the dam was modified from a stop log "type C" dam to the present solid concrete weir dam. Water levels have fluctuated from the high in 1941 (1309.20) to the lowest recorded of 1307.00 in 1976 (D.O.W. file records).

Deer Lake was one of 90 lakes included in an aerial creel survey during the summer of 2001 and winter of 2001-02. Pressure counts were made randomly on 30 separate days for the summer and approximately 15 days during the winter. Deer Lake had the fifth highest summer recreational pressure (on a per acre basis) of the 11 class 22 lakes sampled; fishing represented 77% of the total recreational pressure. Deer Lake received 9.1angler hours/acre of fishing pressure, which was below the lake class 1st quartile value of previously sampled class 22 lakes. During the winter of 2001-02, the fishing pressure estimate (0.08 angler-hours/acre) was the lowest of the 11 class 22 lakes sampled.

Limiting Factors

Water quality data indicates Deer Lake has low fertility (total phosphorus = 0.012 ppm). Itasca SWCD calculated the Trophic Status Index value at 33, one of the lowest in the county. The index includes water transparency, chlorophyll *a*, and total phosphorus readings. The value also classifies the lake as oligotrophic.

The walleye population is limited by poor natural reproduction and or early life stages survival. In the Grand Rapids area, deep, clear, infertile lakes are generally poor natural walleye lakes even if good spawning substrate is present. Extended incubation periods due to cooler temperatures may result in poor hatch rates for eggs because the eggs are more vulnerable to mortality from predation and other environmental conditions. Adequate food (zooplankton) is also limited during the early life stages of walleye in this type of lake. Deer Lake and other similar lakes in the area, appear to respond best to walleye fingerling stocking.

Rusty crayfish have been documented in Deer Lake for a number of years but the year they were first observed is unknown. The exotic crayfish may reduce submerged aquatic vegetation that was naturally limited in Deer Lake. In addition, rusty crayfish may limit native crayfish populations in the lake.

The Deer Lake muskellunge population has been characterized by size structures dominated by fish less than 42 inches (Table 4). Large muskellunge may be limited by angler harvest and/or poor catch & release methods by inexperienced anglers. In addition, Shoepack strain fish were stocked eight times from 1965 to 1983. It has been documented that Shoepack strain muskellunge do not grow as fast or as large as Leech Lake strain fish. The potential for genetic intermingling does exist for this population.

Northern pike spawning habitat appears to be limited since there are no inlets and few shallow bays with extensive vegetation. The northern pike population has been sampled with low catches in all assessments but they have had good size structure. Bluegill and largemouth bass habitat appears to be limited to the relatively few shallow protected bays. Despite limited areas for these species, in the last 15 years, their populations have expanded substantially. It is not clear what changes in the lake may have occurred to allow the increase in the centrarchid populations. Although rock bass have been common, catch rates have followed a similar pattern to that of the bluegill and largemouth bass.

Survey Needs and Evaluation Plans

Conduct a population assessment in late July 2012 setting 15 gill nets and 15 trap nets in the same location as in the 2005 survey. Conduct spring night electrofishing for largemouth and smallmouth bass. Collect age structures (opercle, otolith, and scales) from largemouth and smallmouth bass and walleye. Conduct a spring muskellunge assessment using large trap nets in 2008 to monitor the population. Measure and mark (clip a small portion of the caudal fin) all northern pike during the muskellunge assessment to help evaluate the population size structure. Based on the results of all the assessment work, the lake management plan will be revised after the 2012 population assessment.

Habitat development and protection

Concern over land and habitat protection around Deer Lake has become more prevalent in recent years. In 1999, the Minnesota DNR and the Deer Lake Association purchased Bear Island. Funding from the state came from the Critical Habitat Matching component (License Plate Funds) of the Reinvest in Minnesota program. The Section of Wildlife manages the 25 acre island as a Wildlife Management Area.

A lakeshore landowner deeded a conservation easement to the Minnesota Land Trust to protect over ½ mile of lakeshore and about 80 acres of upland from development in Kocemba's Bay. The bay is relatively unique to Deer Lake and development would have negatively impacted the integrity of the aquatic resource. In 2002, two lots adjacent to the conservation easement were purchased by the MNDNR with financial assistance from Muskies Inc. and the Deer Lake Association. These lots will be protected in their natural state in perpetuity and managed by the Section of Fisheries as an Aquatic Management Area. These important projects have led to the Deer Lake Association establishing an endowment fund to provide the necessary funding to protect additional critical habitat.

The long-term maintenance or improvements in fish and wildlife populations will directly depend on the protection of water quality and the habitat in which they live. People often associate water quality problems with large-scale agricultural, forestry, urban development or industrial practices in the watershed. In reality, the impact of land use decisions on one lake lot may be relatively small, yet, the cumulative impact of those decisions on many lake lots can result in a significant decline in water quality and habitat. For example, removing shoreline and aquatic vegetation, fertilizing lawns, mowing to the waters edge, installing beach sand blankets, failing septic systems and uncontrolled run-off, all contribute excess nutrients and sediment which degrade water quality and habitat. Understanding these cumulative impacts and taking steps to avoid or minimize them will help to insure our quality fisheries can be enjoyed by future generations.

Commercial Fishery

A resort owner on Deer Lake seined and harvested white suckers during the 1980's. Annual harvest ranged from 600 to 4,000 pounds. No commercial fishery opportunities exist.

Stocking Plans

Stock walleye fingerlings (Mississippi River strain) annually at the rate of 1.0 pound/littoral acre (920 lbs). If surplus Mississippi River strain walleye fingerlings are available, consider stocking up to an additional 20% or 184 lbs.

Public Input

The public had an opportunity to comment on our plans to manage the lake during February of 2006. One person (whitefish netter) called and was interested in seeing if we planned to close whitefish netting.

Steve Mero rewrote the 2001 plan written by Richard Thompson.

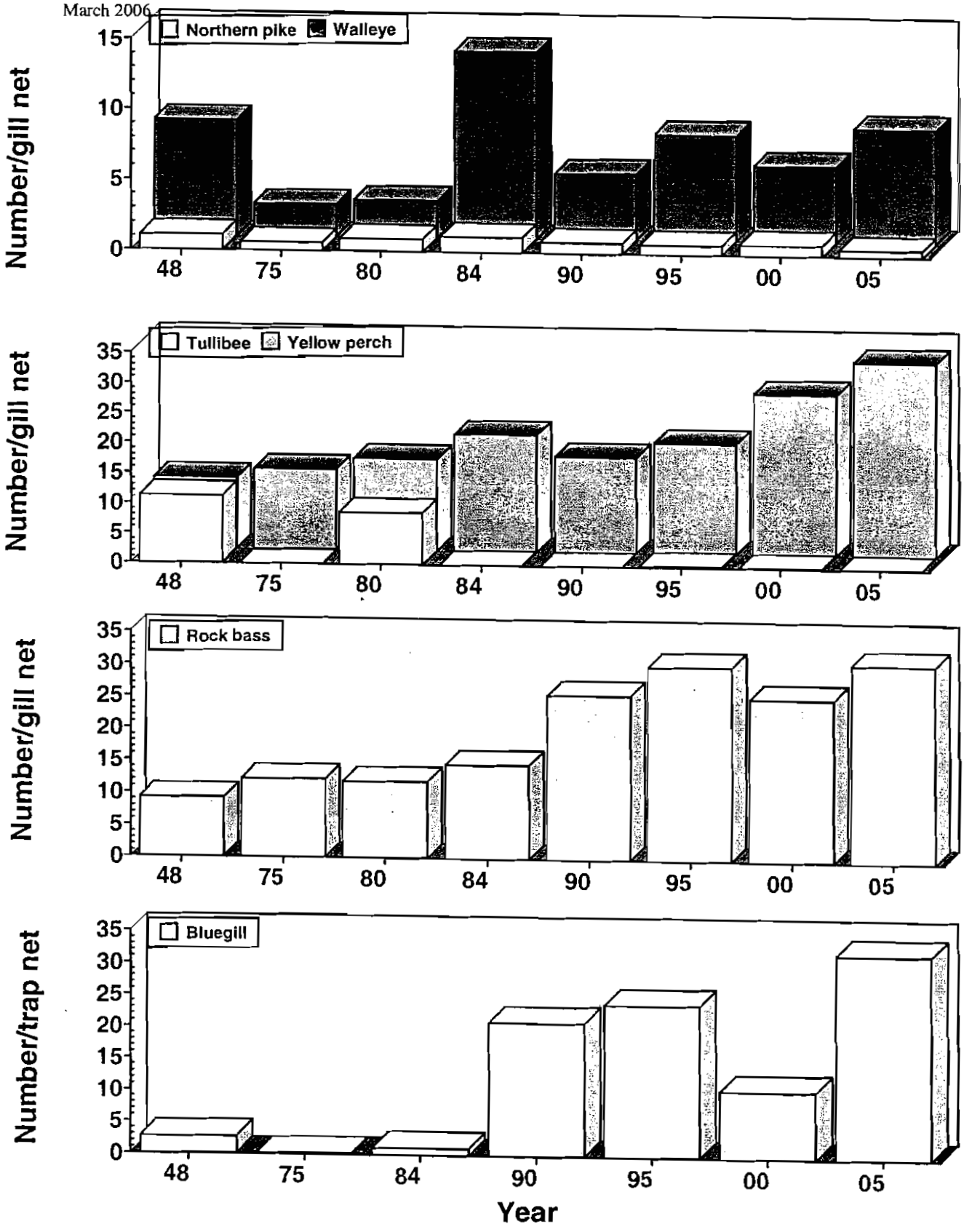


Figure 1. Catch rates for bluegill, northern pike, rock bass, tullibee, walleye, and yellow perch for Deer Lake from 1948 to 2005.

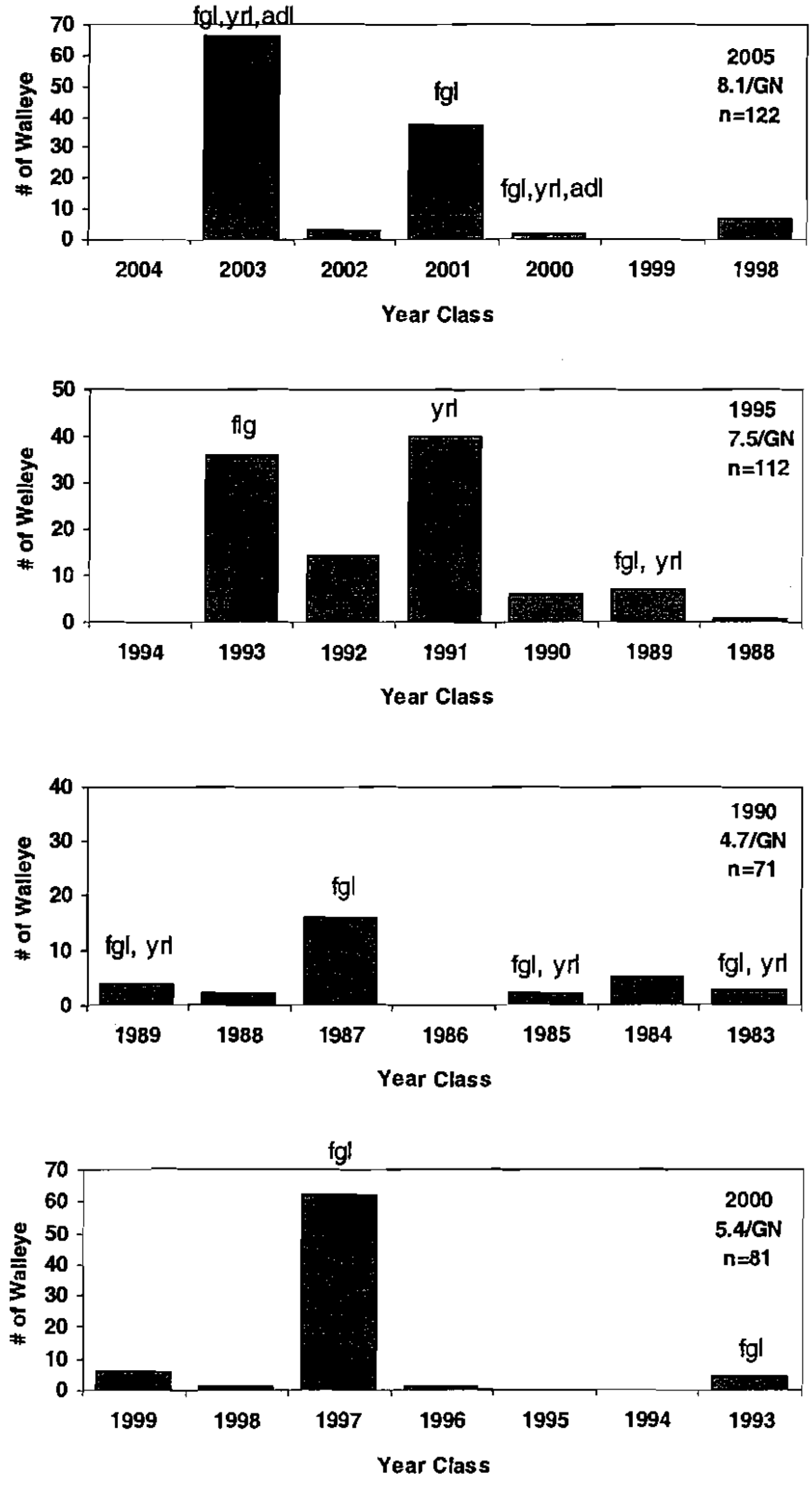
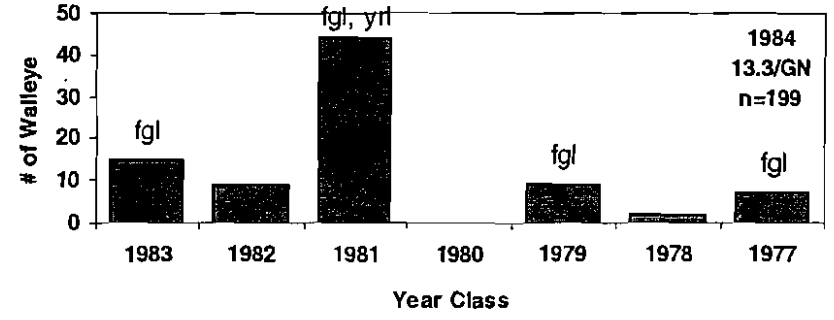
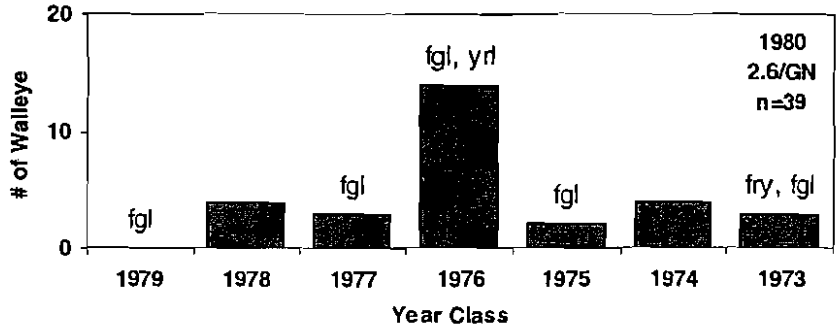


Figure 2. Walleye age structures from the last seven assessments on Deer Lake. Stocked years are designated by the size of fish stocked (fry, fgl for fingerlings, or yrl for yearlings).





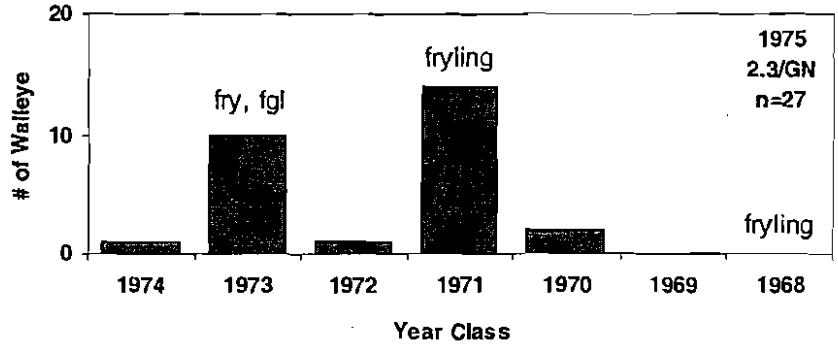


Figure 2. Continued.

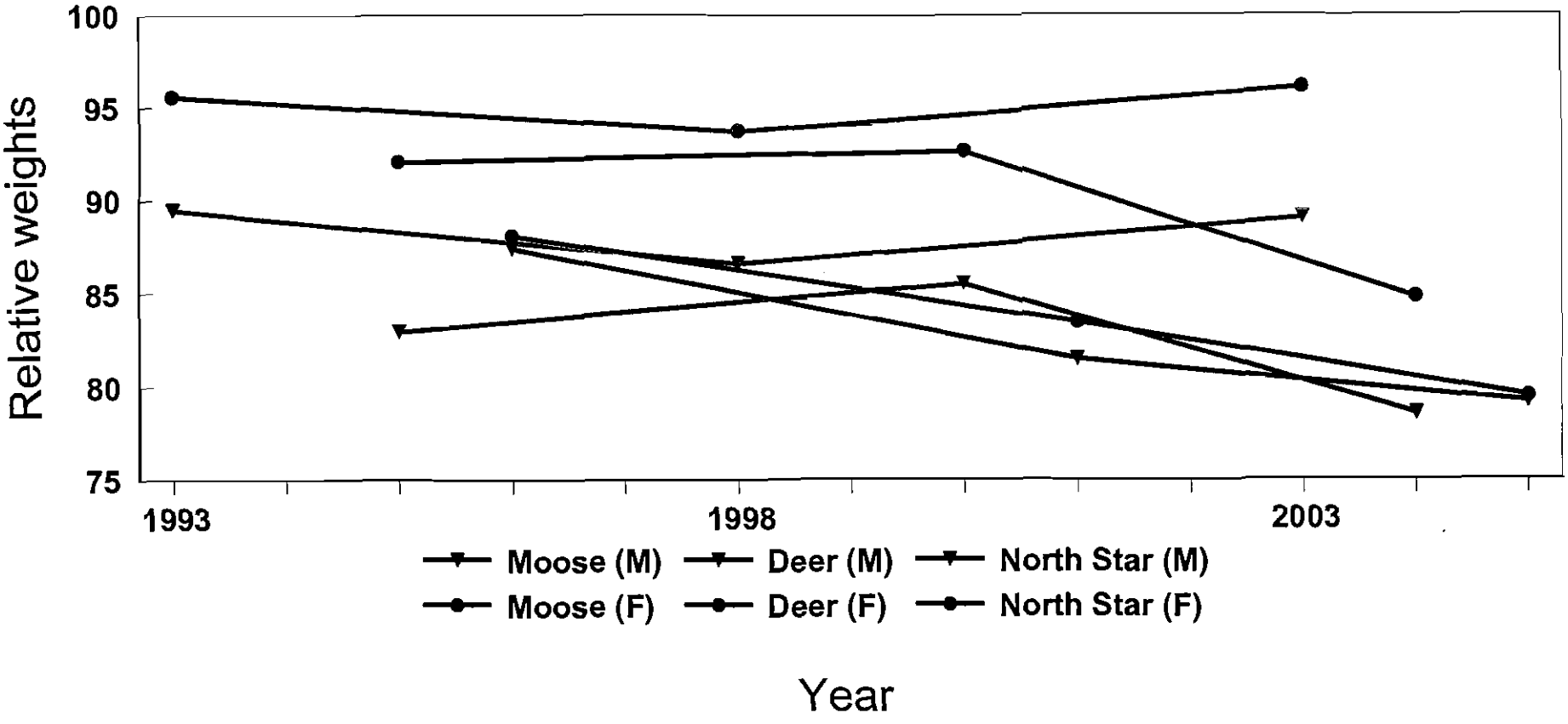


Figure 3. Relative weights for muskellunge captured during spring assessments from Deer Lake, Moose Lake, and North Star Lake. Male and females are indicated by M or F.