SCP-27-03
report

Fisheries Assessment Results From Medicine Lake NWR

Medicine Lake

2003

Wade L. King
U.S. Fish and Wildlife Service
Missouri River Fish and Wildlife Assistance Office
Bismarck, ND

Introduction

Medicine Lake is predominantly a large, shallow lake that is managed predominantly for waterfowl production and also is a waterfowl rest area. Although the lake is a shallow basin, it has a rather substantial northern pike fishery than can be utilized from marked fishing areas in the summer, and also through the ice when waterfowl have migrated and disturbance isn't an issue.

Methods

Annual summer population surveys were conducted on Medicine Lake from June 18 through June 20, 2003. Standard protocol for gears used on the lake include a compliment of nine, 6-feet high by 250-foot monofilament gill nets comprised of five different mesh changes, including ¾", 1", 1½", 1¾" and 2" which change in increments every 50 feet. Three additional nets were included in the sample protocol to survey larger fish; they are 6-feet high by 300-feet long and contain three different mesh sizes, which are 3", 4" and 5" at 100-foot intervals. An additional net was set on the west side of the highway just out of curiosity.

Analysis

All fish are weighed and measured at each net location and are entered into a statistical database which calculates Catch and Weight per unit effort, percentages of Proportional Stock Densities (PSD), Relative Stock Density (RSD), percent composition, Relative Weights (Wr), and length frequencies. The program also lists weight and length values including ranges, mean and median size fish.

A brief explanation of PSD, RSD, and Wr is warranted for non-fish squeezing biologists. Wr is calculated by taking the actual weight of the fish and dividing it into a standard weight for that length of species and multiplying by 100. Wr can be used as a quick reference to classify the health or condition of the fish. In most cases, fish with Wr's of 85 below usually signify the fish are not getting the appropriate amount of forage and/or it may signify a stunting problem.

Fish falling in the range of 90 to 100 usually indicate they are somewhat in a balance and have adequate forage to maintain growth. Once Wr's climb above 105, it is a good indication that the forage base is overly abundant and could possibly withstand higher stocking rates within reason.

Taking the number of quality size fish, dividing by the number of stock size fish, and multiplying by 100 derives proportional stock density. PSD's are another indicator of balance that are derived from length frequency data that, cumulatively with Wr's, CPUE, and RSD values, can help evaluate fish communities through trends.

Ranges of PSD's values suggested as indicative of balance when the population supports a substantial fishery, were derived from Anderson and Weithman 1978. Some more common species listed were Walleye 30-60, Yellow Perch 30-50, Northern Pike 30-60 and Bluegill 20-40.

Relative Stock Density is another index focusing on the proportion of any size fish within the sample. RSD for the purpose of this report was calculated to reflect fish in the preferred and memorable length categories and lists the number of fish that fit in that category.

Length frequency data or histograms can also be a valuable tool to help assess fisheries by observing the different length classes and the overall numbers in these classes. Anderson and Gutreuter (1983) developed an index linked to the quality of fish preferred by the angling community that are in relation to the world record length. They were classified into five different categories including stock (20-26%), quality (36-41%), preferred (45-55%), memorable (59-64) and trophy (74-80%). Rarely in North Dakota refuge lakes does the trophy classification come into play, although fish in the memorable category often do.

Results and Discussion

Northern Pike

The surveys produced a fairly low number of northern pike (72) compared to the trend data collected since 2000. The large year classes from 1999 and 2000 are starting to reduce in numbers and may be falling out of the population due to mortality or possibly, their size is not conducive to the gears we are using and are not showing up in the samples.

There were representatives sampled from three year-classes, although the larger and older of three is extremely weak. The two stronger year classes were represented fairly well and, of which, 85% fell into the quality-preferred and preferred-to-memorable categories. Wr's were also outstanding, coming in at 112 that indicate these fish are extremely healthy and finding plenty of forage.

Due to extremely good production of northern pike fingerlings produced at the hatchery, there were plenty of excess fish. Therefore, an additional 150,000 plus northern pike were stocked above and beyond the original rate, which raised numbers to over 300,000. Although the number seems high, it only equates to approximately 33 to 35 fish per surface acre, which will hopefully produce a strong yearclass of fish if they recruit into the population.

One last item to note in regards to the pike population would be absence of substock size fish and the low percentage of stock-to-quality fish. This is perfectly normal to see these types of numbers due to the smaller pike's ability to avoid being caught in the standardized netting.

It usually takes a couple of years until the pike get to a larger size and are more vulnerable to gears we are using to get an accurate handle on whether a certain year class recruited into the population.

White Sucker and Common Carp

White sucker numbers seemed to jump from 2000 to 2001, but have been decreasing slightly since. This is a direct relationship to the large year-class of pike that recruited into the population and the biomass they are consuming; simply put, the larger they are the more they consume. I imagine we will see sucker numbers rebound again after 2004 for a coupe of years and then start to decline if the large, 2003-year class recruits into the population.

Since 2000, only five carp have been surveyed and 2003 surveys only yielded one. Although there are probably more carp present than indicated in the surveys, their numbers are extremely low and hopefully will remain way in the future as a result of the large predator base.

FISHERIES DIVISION
STANDARD ADULT POPULATION REPORTING SUMMARY
POPULATION STATISTICS
Montana Fish, Wildlife & Parks, OUT-OF-STATE COUNTY

TYPE OF GEAR: MONO 6x250 3/4"-2" NUMBER FISHED: 10 NET(S), FOR A TOTAL OF 192.0 HOURS
SAMPLING PERIOD: 6/19/2003 TO 6/19/2003

	NUMBER		20 HR.	AVG.	SUBSTOCK			PSD			S-Q			Q-P			P-M			RSD	
SPC	CAUGHT	CPUE	* CPUE	Wr	%	CPUE	Wr	%	CPUE	Wr	%	CPUE	Wr	%	CPUE	Wr	%	CPUE	Wr	-P	-M
NOP	71	0.370	7.4	112				85	0.31	111	15	0.06	118	72	0.27	112	13	0.05	100	13	
WHS	68	0.354	7.1																		
CAR	1	0.005	0.1																		
TOT:	140	0.729	14.6																		

TYPE OF GEAR: MONO 6x300 3"-5" NUMBER FISHED: 3 NET(S), FOR A TOTAL OF 57.0 HOURS
SAMPLING PERIOD: 6/18/2003 TO 6/18/2003

	NUMBER		20 HR.	AVG.	SUBSTOCK			PSD			S-Q			Q-P			P-M			RSD	
SPC	CAUGHT	CPUE	CPUE	Wr	%	CPUE	Wr	%	CPUE	Wr	%	CPUE	Wr	%	CPUE	Wr	%	CPUE	Wr	-P	-M
NOP	1	0.018	0.4	108							100	0.02	108								
TOT:	1	0.018	0.4																		

Table 1. Population statistics for Medicine Lake 2002.

FISHERIES DIVISION
STANDARD ADULT POPULATION REPORTING SUMMARY
LENGTH & WEIGHT STATISTICS
Montana Fish, Wildlife & Parks, OUT-OF-STATE COUNTY

TYPE OF GEAR: MONO 6x250 3/4"-2" NUMBER FISHED: 10 NET(S), FOR A TOTAL OF 192.0 HOURS
SAMPLING PERIOD: 6/19/2003 TO 6/19/2003

SPC	NUMBER CAUGHT	CPUE	% COMP. BY NUMBER	LENGTH (mm) MEAN	LENGTH (mm) MEDIAN	LENGTH (mm) RANGE	WEIGHT (Grams) MEAN	WEIGHT (Grams) MEDIAN	WEIGHT (Grams) RANGE	WEIGHT (Grams) TOTAL	WPUE	% COMP. BY WEIGHT	WPUE-Q	AVG. Wr
NOP	71	0.370	50.7	613	630	400 - 810	1683	1803	460 - 3680	119,524	622.5	70.39	586.4	112
WHS	68	0.354	48.6	379	400	175 - 475	737	780	46 - 1380	50,146	261.2	29.53		
CAR	1	0.005	0.7	200	200	200 - 200	140	140	140 - 140	140	0.7	0.08		
TOT:	140	0.729								169,810	884.4		586.4	

TYPE OF GEAR: MONO 6x300 3"-5" NUMBER FISHED: 3 NET(S), FOR A TOTAL OF 57.0 HOURS
SAMPLING PERIOD: 6/18/2003 TO 6/18/2003

SPC	NUMBER CAUGHT	CPUE	% COMP. BY NUMBER	LENGTH (mm) MEAN	LENGTH (mm) MEDIAN	LENGTH (mm) RANGE	WEIGHT (Grams) MEAN	WEIGHT (Grams) MEDIAN	WEIGHT (Grams) RANGE	WEIGHT (Grams) TOTAL	WPUE	% COMP. BY WEIGHT	WPUE-Q	AVG. Wr
NOP	1	0.018	100.0	400	400	400 - 400	420	420	420 - 420	420	7.4	100.00		108
TOT:	1	0.018								420	7.4			

Table 2. Length and weight statistics for Medicine Lake 2003.

Year	CPUE	Wr	Total Caught	Number Stocked
2000	1.321	104	111	
2001	0.615	113	119	174056
2002	0.994	97	159	181480
2003	0.370	112	72	304150

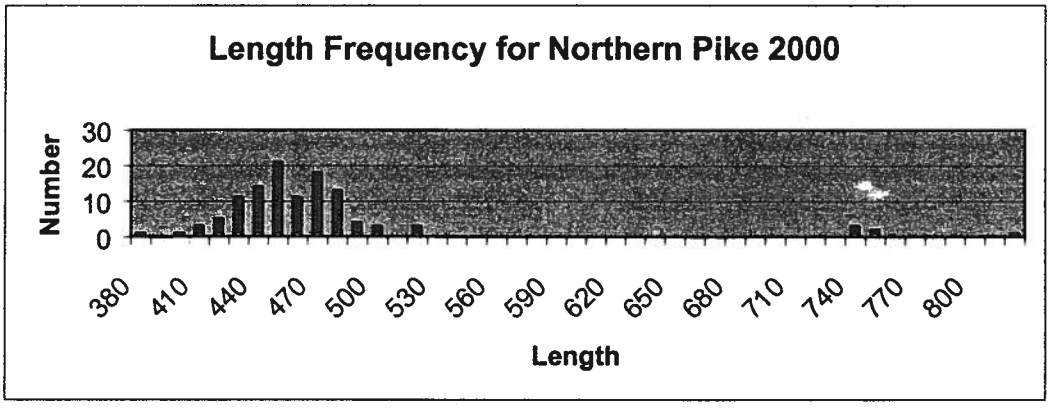
Table 3. Trend data for Northern Pike on Medicine Lake 2003.

Year	CPUE	WPUE	Total Caught
2000	0.5	217.7	44
2001	0.901	738.3	151
2002	0.81	640	128
2003	0.354	261.2	68

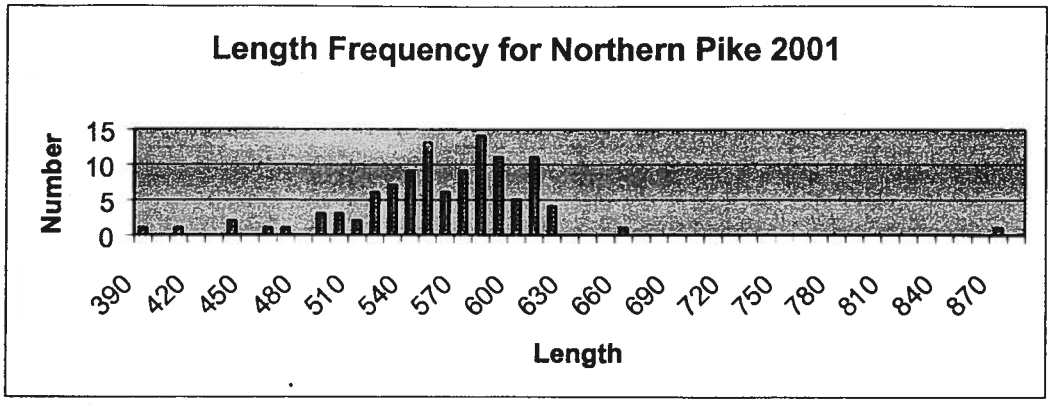
Table 4. Trend data for White Sucker on Medicine Lake 2003.

Year	CPUE	WPUE	Total Caught
2000	0.105	220.1	6
2001	0	0	0
2002	0.560	150.0	2
2003	0.005	0.7	1

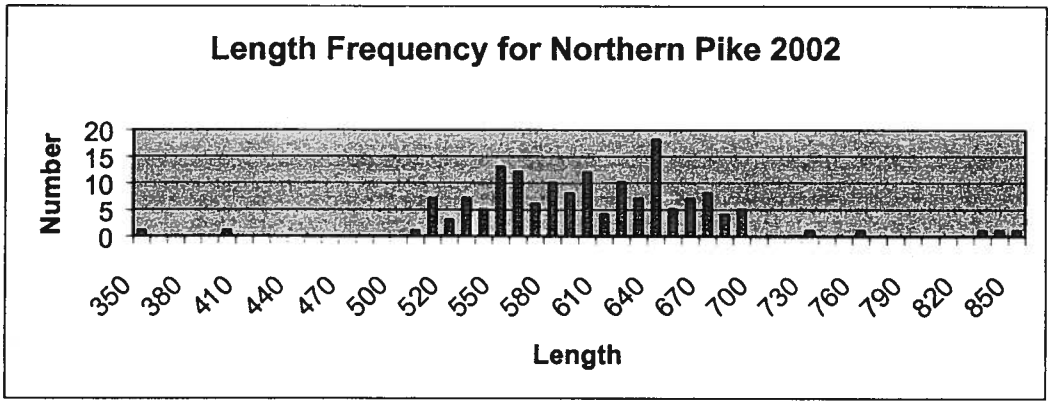
Table 5. Trend data for Carp on Medicine Lake 2003.



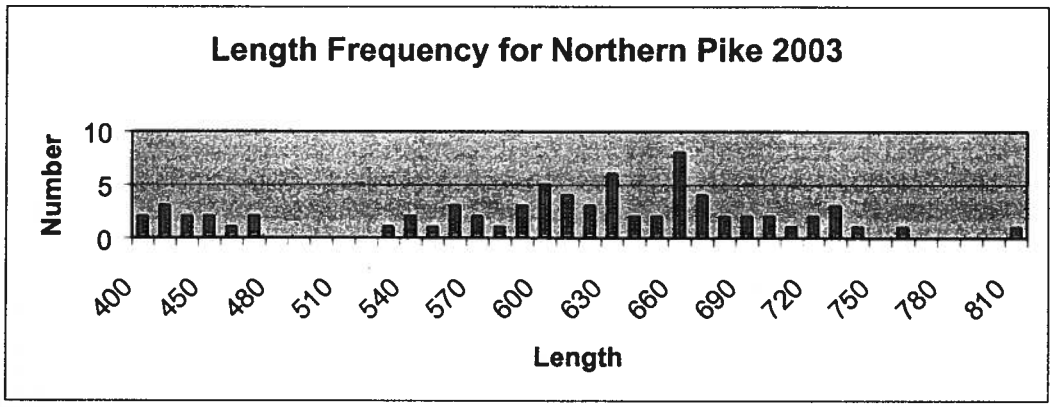
Stock-Quality (35-53) *Quality-Preferred (54-71)* *Preferred-Memorable (72-86)*



Stock-Quality (35-53) *Quality-Preferred (54-71)* *Preferred-Memorable (72-86)*



Stock-Quality (35-53) *Quality-Preferred (54-71)* *Preferred-Memorable (72-86)*



Stock-Quality (35-53) *Quality-Preferred (54-71)* *Preferred-Memorable (72-86)*

Bibliography

Anderson, R.O., and S.J. Gutreuter. 1983. Length, weight, and associated structural indices. Pages 283-300 in L.A. Nielsen and D. L. Johnson, editors. Fisheries techniques. American Fisheries Society, Bethesda, Maryland.