

PHASING OF IMPROVEMENTS
TEAL LAKE PARK

* Phase 1	1. Boat Launch with Pier	\$39,000	1997 - 1998
	2. Fishing Dock	\$28,000	
	3. Parking Improvements	<u>\$33,000</u>	
		\$100,000	
* Phase 2	4. Shoreline Improvements	\$27,000	1998 - 1999
	5. Picnic Area Development (South Sector)	\$4,000	
	6. Beach Nourishment	\$10,000	
	7. Clean Up/Beautification	<u>\$15,000</u>	
		\$56,000	
Phase 3	8/9. Landscaping / Signage	\$20,000	1999 - 2001
	10. Picnic Area (North Sector)	\$20,000	
	11. Shoreline Protection Improvements	\$36,000	
	12. Shoreline Walking (South Sector)	<u>\$15,000</u>	
		\$91,000	
Phase 4	13. Shoreline Walking (North Sector)	\$30,000	2001 - 2003
	14. Period Style Lighting	\$30,000	
	15. Beachhouse / Restrooms	<u>\$150,000</u>	
		\$210,000	
Phase 5	16. Landscaping / Pedestrian Furniture	\$15,000	2003 - 2005
	17. Pavilion	<u>\$80,000</u>	
		\$95,000	
Phase 6	18. Waterworks Building Rehabilitation	\$300,000	1997 - 2006
	19. Gazebo	<u>\$ 60,000</u>	
		\$360,000	
Phase 7	20. Roadway Relocation	\$200,000	1997 - 2006
	21. Utilities	<u>\$80,000</u>	
		\$280,000	
	TOTAL	\$1,192,000	

APPENDIX

Site Visit Summary (10-11-95)

Fisheries Management Plan for Teal Lake, Marquette County
(Bill Bullen, MDNR District Fisheries Biologist)

Analysis of Negaunee Attitude Survey
(David E. Allen, NMU)

Teal Lake Study Committee Final Report

*CITY OF NEGAUNEE
TEAL LAKE MASTER PLAN
Field Notes
SCA #95-115
Wednesday, October 11, 1995
Present: LVR, LAH, MDL*

Site Visit Summary (10-11-95) Sunny, warm.

I. Existing Conditions:

A. Field verified buildings, trees, etc. at south end of site.

1. Several large maple trees in vicinity of former water works building. (Memorial trees?). Caliper - approximately 18" - 24".
2. Verified existing pavement boundaries at former waterworks building (FWWB).
3. FWWB:
 - a. brick in fair to poor condition in selected areas. (some deterioration).
 - b. Majority of exterior facade composed of stone (painted).
 - c. See field drawing for building measurements.
 - d. Relatively new roof.
 - e. Apparent additions - brick facade on S.E. elevation, single-story addition on N.E. elevation.
 - f. Interior not investigated.
4. Broken concrete slabs strewn along shoreline at (FWWB).

B. Retail outlet (currently Pier Delights ice cream).

1. Building recently remodeled.
2. New-paved parking.
3. Several anchored benches and small tables on site.

C. Restaurant/take out (currently Paisano's Pizza).

1. New paved parking.
2. Fenced grounds on north side of building.

D. Green area (between wire fence and unimproved gravel road access).

1. Approximate width from retaining wall to curb (Croix Street) is 36'-0".

2. Relatively flat, treeless, mowed lawn.
 3. Wood retaining wall at lakeshore = 2'-0" high.
 4. Existing electrical power stubout (Senior Center Christmas Tree).
- E. Green Area from unimproved gravel road access to outfall location.
1. Dirt/gravel road, approximately 10'-0" wide.
 2. Width of green area is 28'-0".
 3. Painted crosswalk on Croix Street near clump of Birch trees.
- F. Outfall location to edge of retaining wall.
1. Width at outfall location: 55'-0" from retaining wall to edge of curb at Croix Street.
 2. Cross section at outfall location:



East-West Section - Looking North

3. Outfall pipe protected by iron bars.
 4. Upper outfall at grassy berm.
 - a. concrete apron
 - b. protected by rail fence
 5. End of retaining wall - some erosion at back of wall.
- G. Swimming Beach Area:
- 1 Sand/gravel mix

2. Water erosion evident in parts of this area.
3. Sand/gravel beach area - approximately 50'x150'.
4. Outfall - corrugated metal pipe at water line.
5. Sand at water's edge.
6. Beach front approximately 64' (measured between maple trees).
7. Distance from southern most maple tree to wire fence = 110'.
8. Swimming area bottom - sandy/sporadic plant growth.
9. Southern most maple tree in this area - severely damaged by disease.
10. Grassy berm height at Croix Street is approximately 12'-0" above beach elevation.

H. General Site Observations:

1. Site adjacencies (North to South) East side of Croix Street.
 - a. Lakeview Elementary School
 - b. Birch Street intersection at Croix Street
 - c. Large paved parking area (Negaunee Public Schools)
 - d. Green space with landscaping (Negaunee Public Schools)
 - e. Lakeview Street intersection at Croix Street.
 - f. Private professional practice (Dentist)
 - g. Senior housing
 - h. Privately owned apartment buildings
 - i. Commercial drive (Holiday Gas Station).
2. Croix Street:
 - a. 66 foot r.o.w.
 - b. Moderately busy residential north south arterial (25mph speed limit)
 - c. Intersects U.S. highway 41 (traffic light controlled intersection)

DNR - 1981

FISHERIES MANAGEMENT PLAN
FOR
TEAL LAKE, MARQUETTE COUNTY

- need comm.
- with survey
- remove teal as
- Quett. Dis?

FISHERIES MANAGEMENT PLAN

FOR

TEAL LAKE, MARQUETTE COUNTY

(T48N R27W Sec. 35 and 36)

Introduction:

Teal Lake has provided a very popular and productive sport fishery for many years. Its species complex is simple and includes one of the few naturally reproducing populations of walleyes found in the central Upper Peninsula. The fish population is not without problems, however, and intensive management is needed to satisfy increasing demands by anglers. This plan describes physical and chemical characteristics of Teal Lake, the existing fish population and sport fishery and, finally, lists recommendations for maintaining good angling success in the future.

Environment:

Teal Lake is located adjacent to US-41 within the City of Negaunee. According to a 1946 contour map, it covers an area of 466 acres and has a maximum depth of 32 feet. Annual water surface fluctuations of at least three to four feet have been recorded in the past 40 years. Shallow shoreline areas are quite limited with most of the lake being greater than 15 feet deep. Its general shape is long and narrow with the bottom being almost flat. Shallow water bottom soils consists of sand, gravel and rock cobble, usually mixed but sometimes found separately. Decayed organic material covers the original sand and rock bottom in deeper water.

US-41 follows the entire south side of the lake, and for much of the distance the highway grade has become the shoreline. Residences are found only on the east end of Teal Lake along with undeveloped city-owned frontage. The north and west shores are still in the wild state, characterized by large granite outcroppings and mixed hardwood and pine timber.

Two small, unnamed inlets enter the lake about midway along the north shore. No natural outlets presently exist since water is pumped from Teal Lake by the City of Negaunee for its public water supply.

The lake water is colorless but usually appears greenish because of an almost always present algae growth. It is relatively hard water by U.P. standards, having a pH of about 7.9 and a total alkalinity near 35 ppm. Both factors vary somewhat depending on depth and season.

Aquatic vegetation is quite common to abundant along the south shore in water depths of three to eight feet. Scattered patches of Potamogeton Sp. also occur throughout the lake. Fish cover consists almost entirely of this vegetation and rocks; very few logs are found around the shoreline.

Public access to the lake is available across the city-owned property on the east end. Swimming and the use of gasoline engines (outboard motors) are prohibited, however, because of the use of lake water as the city water supply.

Fish population and Sport Fishery:

The first fish population survey was conducted in 1948. It was quite limited in nature and only involved use of experimental mesh gill nets. At that time, walleye, yellow perch, smallmouth bass, pumpkinseed sunfish and white suckers were found to be present.

Largemouth and smallmouth bass, bluegills and walleye were stocked during the period 1937-1942. Records do not indicate whether these species were present prior to these years or not.

The only other study of the fish population was completed in September, 1981. And in considerable contrast to most other central U.P. waters, the species complex has not changed in the past 30 years. The 1981 survey found the same fish species present as in 1948, plus blunt-nose minnows which could easily have been missed in the earlier gill-net-only survey. This continued simplicity of species is undoubtedly one of the major reasons why fishing success has remained good in spite of rather

intensive fishing pressure. Most of the productivity in Teal Lake goes into four kinds of desirable fish instead of the eight to 12+ species, including rough fish, commonly found in many other waters.

In 1981, yellow perch were the most numerous of the desirable species, followed by walleye, sunfish and smallmouth bass. Growth rates of these fishes were all close to or greater than state-wide averages. Condition of the fish was excellent and all contained liberal amounts of body fat. Fifty percent of the 353 perch samples with three types of nets exceeded eight inches in length. Another 50 percent of the 146 walleyes sampled exceeded the legal size limit of 15 inches, yet all age groups from I-VII were represented. A relatively low number of older-age smallmouth bass were captured. As a result, it was difficult to assess whether the population actually consisted of few individuals or if the nets used were ineffective.

White suckers were very abundant in 1981, as they were in 1948. These fish are large (average size = 17.5 inches) and represent a very significant amount of biomass that could be at least partially converted into more desirable species. There are few Teal Lake predators capable of feeding on suckers over seven to eight inches long (one-year old), and thus most of the sucker population is not utilized. Bald eagles, which nest some miles north of the lake, feed on dead fish, including suckers, but few Teal Lake fish become available to these birds because of the limited shoal areas. The presence of suckers provides little advantage to the sport fishery.

Natural reproduction of all species appears optimal. Adequate aquatic vegetation exists for yellow perch spawning; clean, wave-swept rock cobble provides an excellent substrate for walleye egg deposition and the shallow sand and gravel areas are suitable for sunfish, bass and suckers. Very few lakes in the central U.P. have such suitable spawning habitat for walleyes. This capability of maintaining a high density of the predatory walleye is another reason why the population has remained balanced for so many years. Reproduction of walleye has been remarkably consistent, too, as seen in the eight successive year classes found in the 1981 survey. Walleye populations are seldom this uniform in age distribution. There is no need for supple-

mental stocking as long as this condition continues to exist.

Information on the sport fishery, both past and present, comes solely from angler comments. No studies have been made to measure angling pressure or catch.

As a beginning, it is probably safe to state that angling pressure on a per-acre-basis has been lower on Teal Lake than on other similar waters because of the ban on the use of gasoline engines. In my opinion, this long-term restriction, which has limited angling pressure and thus prevented the overharvest of fish, is the other major reason why the Teal Lake fish population has remained so well balanced over the years.

Most comments received recently indicated fishing was very good for both perch and walleye until about 1977-1979 when a significant decline in catch rates began. Other reports stated angling success is about the same as ever but that people aren't fishing as much because of rumors describing a deteriorating situation. Since periodic surveys have not been completed between 1948 and 1981, there is no factual basis upon which to make a judgment concerning recent changes in the fish population, but it is hard to believe the 1981 population structure is the cause of poor fishing. Certainly there is room for improvement, but the Teal Lake situation is currently as good as or better than any other found in the central U.P..

The problem of abundant suckers is viewed as somewhat minor because of the ease with which it can be solved. If a majority of suckers were removed, additional numbers of all other species should result. These rough fish consume large quantities of food organisms which would become available to more desirable species. Increased growth rates of at least perch and sunfish could also occur although current rates would be difficult to improve upon.

Fyke or hoop nets identical to those used in the 1981 survey could effectively catch over 90 percent of the suckers if set in shoal water areas after spring ice melt and walleye spawning. This technique has been successfully used on other land-locked inland lakes where an excessive sucker population existed.

Sucker Removal 1982 - 34,000 lbs
" " 1992 - 20,000 lbs

Recommendations:

The following actions should be taken to improve and then maintain the sport fishery of Teal Lake.

1. A maximum number of white suckers should be removed in the spring prior to spawning whenever the population becomes large.
2. Fish population surveys should be completed not less than once every 10 years to monitor changes and detect the need for further management.
3. Extreme care should be exercised in permitting any development or changes to critical shoreline spawning and rearing areas. Continued preservation of the walleye spawning habitat is vital to maintaining a balanced population and the traditionally good fishery.
4. Other fish species should not be introduced into Teal Lake unless very drastic changes occur in the future. The existing simple species complex is ideal for maximizing production of desired fish. Anglers should be made aware of the high risk involved with stocking any other species, whether intentional or not, under the current circumstances.
5. Continued communications between Teal Lake anglers and this office must be encouraged. The more information available on the lake, the better the fishing and the management decisions will be.
6. The ban on the use of gasoline engines on Teal Lake should be maintained regardless of its future use as a public water supply. This traditional restriction should continue to subtly limit angling pressure and fish harvest. This may well be the most important factor in sustaining the fishery for large perch and walleye.

Comments or questions concerning this plan or Teal Lake are most welcome and should be addressed to the Department of Natural Resources, P.O. Box 495, Escanaba, Michigan 49829 (Phone: 907-786-2351).

Written by:
Bill Bullen
District Fisheries Biologist
December, 1981

TEAL LAKE SURVEY COMPARISON

<u>SPECIES</u>	<u>YEAR</u>	<u>GEAR</u>	<u>AVG. LEN.</u>	<u>% CATCHABLE</u>	<u>% TOTAL WT</u>
Walleye	9-81	E.G.N.	15.6"	52%	18%
	5-84	"	13.1"	15%	9%
	5-88	"	13.5"	33%	
Walleye	9-81	S.M. Fykes	14.6"	44%	3%
	5-84	"	11.7"	0%	1.5%
	5-88	"	13.9"	27%	
Yellow Perch	9-81	E.G.N.	9.4"	77%	36%
	5-84	"	10.1"	84.8%	57.7%
	5-88	"	5.2"	43.2%	
Yellow Perch	9-81	S.M. Fykes	6.5"	30%	4%
	5-84	"	6.6"	31%	3%
	5-88	"	7.8"	52%	
W. Suckers	9-81	E.G.N.	17.1"	--	42%
	5-84	"	15.2"	--	33%
	5-88	"	?		
W. Suckers	9-81	S.M. Fykes	16.5"	--	91%
	5-84	"	17.0"	--	94%
	5-88	"	15.2"		

<u>C.P.E. (E.G.N.)</u>	<u>WALLEYE</u>	<u>Y. PERCH</u>	<u>W. SUCKERS</u>
1981	6	21	5.9
1984	4.1	31.3	6.5
1988	2.4	47.0	22.8

<u>C.P.E. (S.M.F.)</u>	<u>WALLEYE</u>	<u>Y. PERCH</u>	<u>W. SUCKERS</u>
1981	0.67	7.25	8.6
1984	1.7	7.0	28.2
1988	1.5	5.0	70.0

*RE-SAMPLING: 1.) Taste of Fish Suckers - Winter 1989-1990
2.) Remove W. Suckers - Spring 1990*

RECORD OF ACCOMPLISHMENTS
TEAL LAKE, MARQUETTE COUNTY

May, 1982 - 322 net-nights of effort with fyke nets removed 13,783 white suckers weighing 37,122 lbs. (79.6 lbs./acre). Av. wt. = 2.7 lbs. per sucker.

May, 1984 - Evaluation survey w/exp. gill net found yp ave.=10.1", most w.e. in 11"-13" range ('82 year class) and suckers more abundant than anticipated.

July, 1984 - Public meeting held in Negaunee to discuss results of survey and determine future management.

May, 1985 - Seventeen fyke and trap nets set over 21 day period, removed 2,893 suckers weighing 6,273 lbs. 1985 catch = 17% of '82 catch by weight. 1,585 walleyes incidentally caught and released. Vast majority was 1982 year class. Av = 14.4". 23% over 15".

MANUAL REMOVALS

Manual Removal of Suckers, Teal Lake, Marquette County. In May of 1992, we again went in for the third time to Teal Lake to remove suckers. This time we set the record for sucker removals in this lake. The nets were set on the 4th of May and fished through the 21st of May when they were all removed. The total catch of suckers was 38,189 lbs. That was approximately 10,600 fish. The average size of the suckers in terms of length was 17.8 inches. This total poundage works out to 82 lbs. per acre which slightly beats our first manual removal in 1982 of 79.7 lbs. per acre. The 1985 manual removal was quite small at only 13.5 lbs. per acre. Nearly all these fish were given away to the public. The removal of this large amount of suckers should make a significant showing in improved growth and survival of game fish. Perch will probably be the most obvious beneficiary of this removal, however, we would expect walleyes also to show some improved growth and survival. The walleye population that was evident during the sucker removal netting did not look very strong. As a result of this, we made the first ever (in recent history) walleye plants in Teal Lake. On the 26th of May, 600,000 walleye fry were planted in Teal Lake and probably even more significantly on the 14th of July, 19,400 2-inch walleye fingerlings were planted in Teal Lake. We hope that this will give the walleye population a boost and help to bring the fishery back up to where it has been in past years. We would like to acknowledge the help of the Central Upper Peninsula Sport Fishing Association. They provided many hours of volunteer help to our crews in lifting nets and loading and giving away of suckers from Teal Lake. Without their help, I don't know how we would have done it.

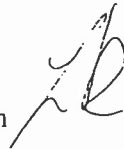
PLANNING COMMISSION
CITY OF NEGAUNEE

100 Silver Street • P.O. Box 70
Negaunee, Michigan 49866
(906) 475-7400

— MEMORANDUM —

TO: Negaunee City Planning Commission
Negaunee City Council
City Manager

FROM: Les Ross, Chairman
Negaunee Planning Commission



RE: Negaunee Attitude Survey

DATE: April 18, 1995

Attached is the completed statistical analysis of the Attitude Survey developed by the Negaunee City Planning Commission. It was compiled by David E. Allen of NMU who apologized for the delay in completing the report (he was much busier than usual this semester). He indicated the analysis was fun to perform and that it should prove very informative.

The high level of the results are pretty obvious. I will send Mr. Allen a big thank you. Please let me know if you have any questions.