SHANNON LAKE: DAVID JUDE FRESHWATER PHYSICIANS, INC.

OUTLINE

- OBJECTIVES OF STUDY
- METHODS
- RESULTS
- DISCUSSION
- RECOMMENDATIONS


INTRODUCTION

OBJECTIVES

STUDY THE PHYSICAL, CHEMICAL, AND BIOLOGICAL CHARACTERISTICS OF SHANNON LAKE ECOSYSTEM WITH EMPHASIS ON FISH

METHODS

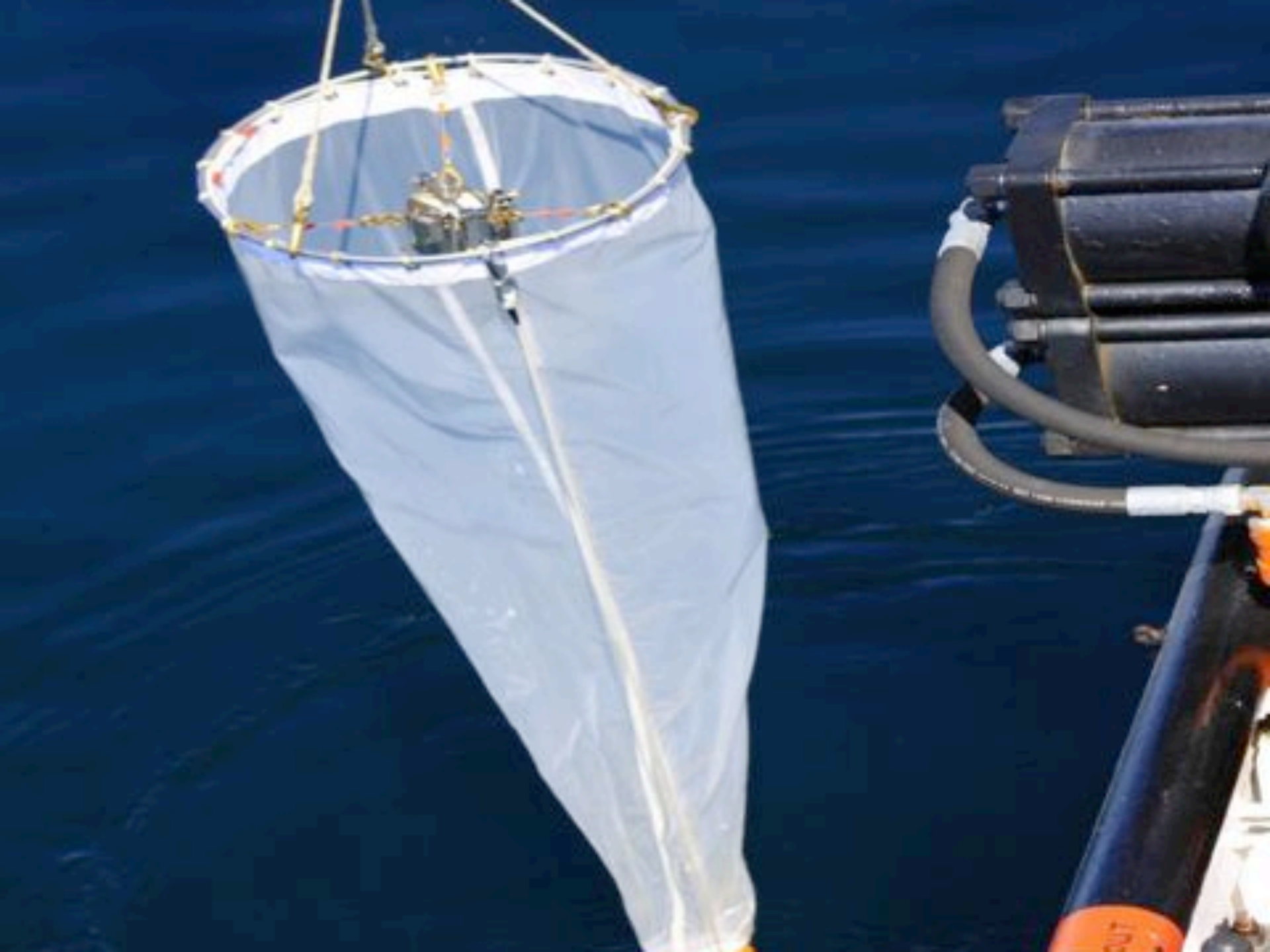
PHYSICAL: MEASURE WATER CLARITY AND MEASURE TEMPERATURE PROFILE

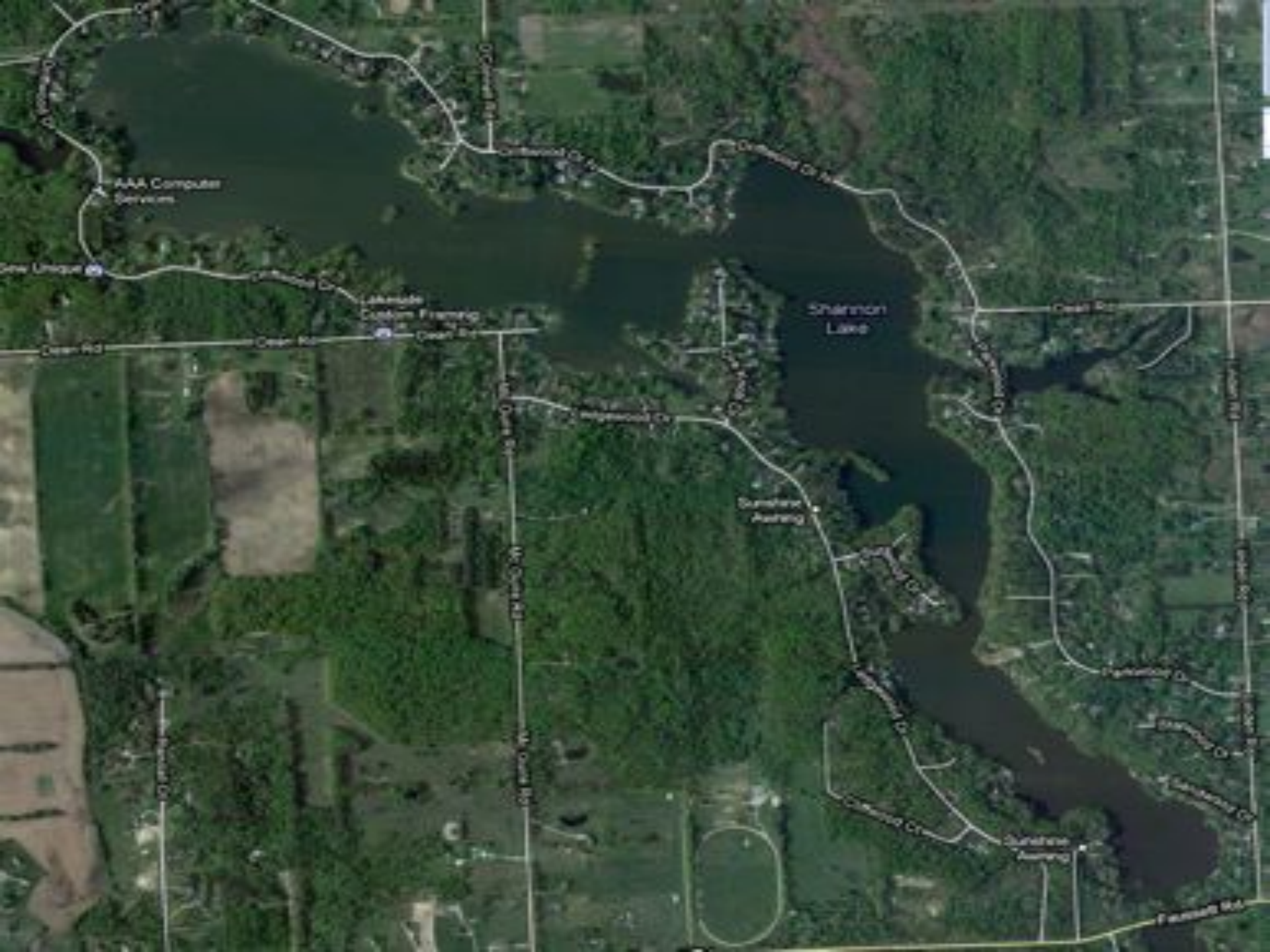
METHODS

CHEMICAL: MEASURE OXYGEN, NUTRIENTS, PH, CONDUCTIVITY, CHLORIDES

METHODS

BIOLOGICAL: ZOOPLANKTON AND FISH SURVEY




AAA Computer Services
Lakeside Custom Framing
Ocean Rd
Shannon Lake
Sunshine Awning
Sunshine Awning

LAKE SHANNON

(A reservoir)
Section 24, Deerfield Township
& Sections 19, 30 & 31, Tyrone Township
(T4N R5,6E)
Livingston County, Michigan

Area = 262 acres
Mean depth = 9.7 feet
Volume = 2,528 acre feet
Elevation = 891 feet

Scale 1" = 767 feet

Water Quality Investigators
Dexter, Michigan 48130
1990

RESULTS

PHYSICAL:
SHALLOW LAKE – 15 FT MAX
THICK SEDIMENTS
WATER CLARITY - POOR

RESULTS

CHEMICAL
-NUTRIENTS
-pH, CONDUCTIVITY

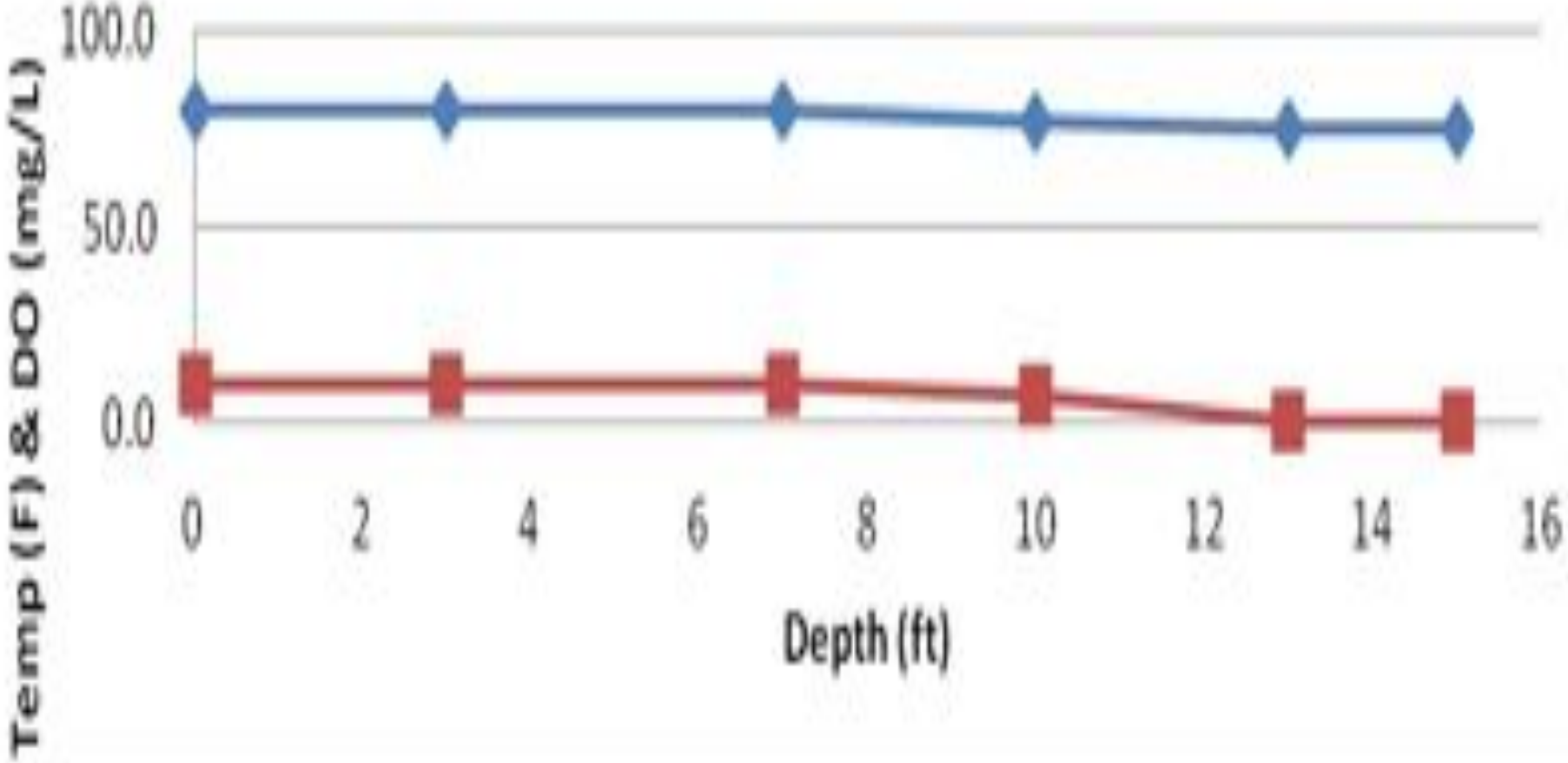
Depth (ft.)	Cl mg/L	NO_3 mg/L	NH_3 mg/L	SRP mg/L
SURFACE	60	<0.01	<0.01	<0.005
8	63	<0.01	<0.01	<0.005
15	62	<0.01	<0.01	<0.005

WATER CHEMISTRY

- Water samples collected 1 Sep 2011
- Station A in mid lake – 15-ft station
- pH was same from top to bottom
- Conductivity was similar from top to bottom
- Due to mixing by boat traffic

DEPTH (FEET)	TEMP . C	TEMP F	DISSOLVED OXYGEN (MG/L)
0	26.6	79.9	10.3
3	26.4	79.5	10.2
7	26.3	79.3	10.2
10	24.8	76.6	6.8
13	23.9	75.0	0.4
15	23.8	74.8	0.3

Dissolved oxygen/temperature profiles with depth for Shannon Lake



LAKE STRATIFICATION

- LAYERS OF DIFFERENT TEMPERATURE FORM
- IMPORTANT DETERMINANT OF FISH DISTRIBUTION, SURVIVAL, AND GROWTH

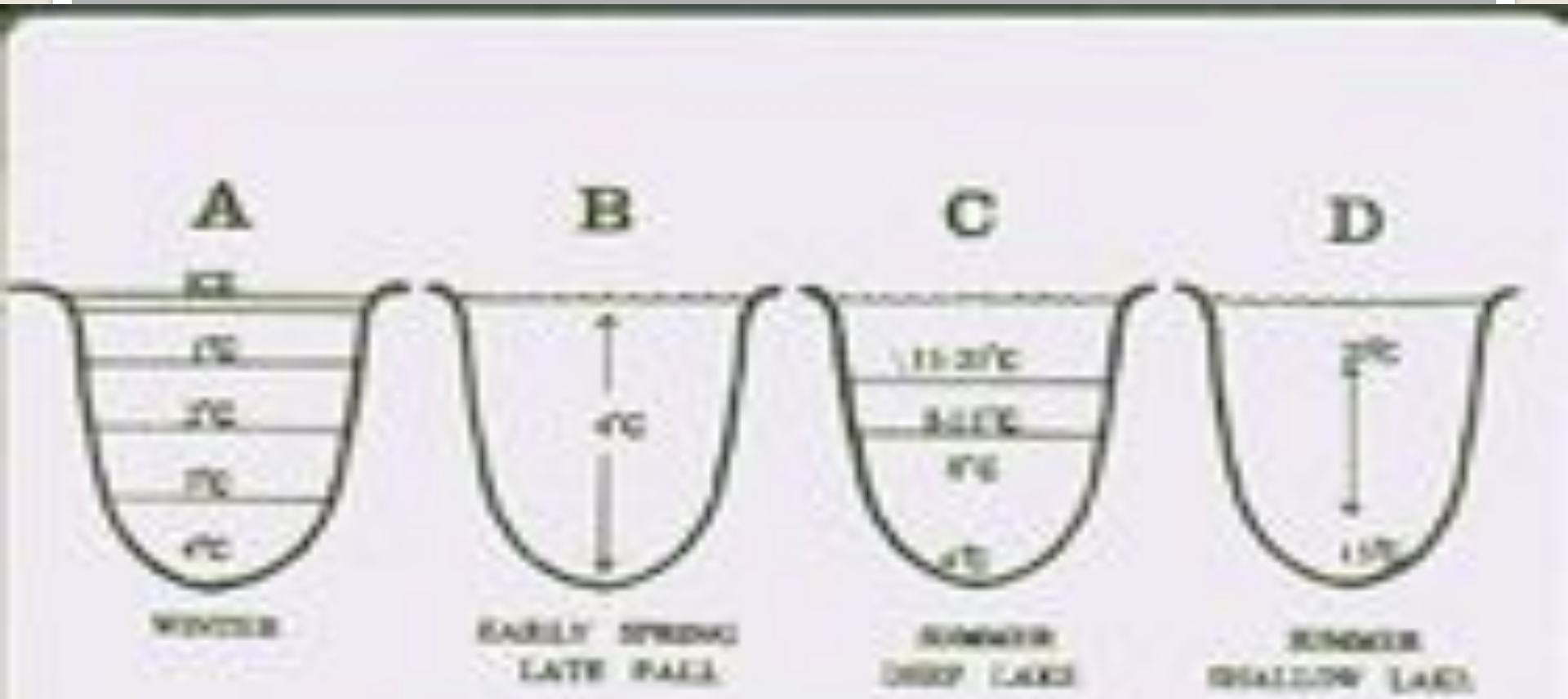
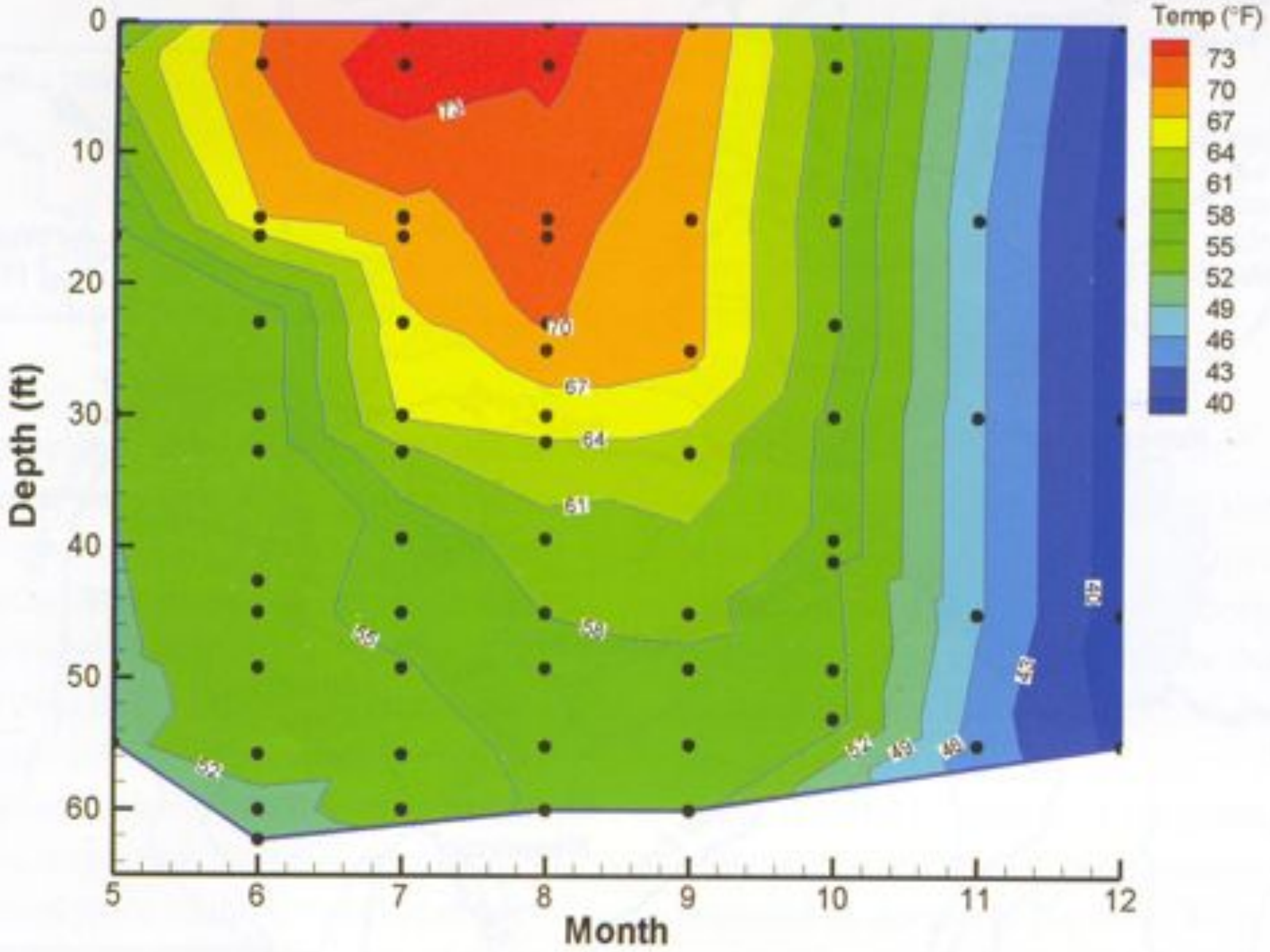
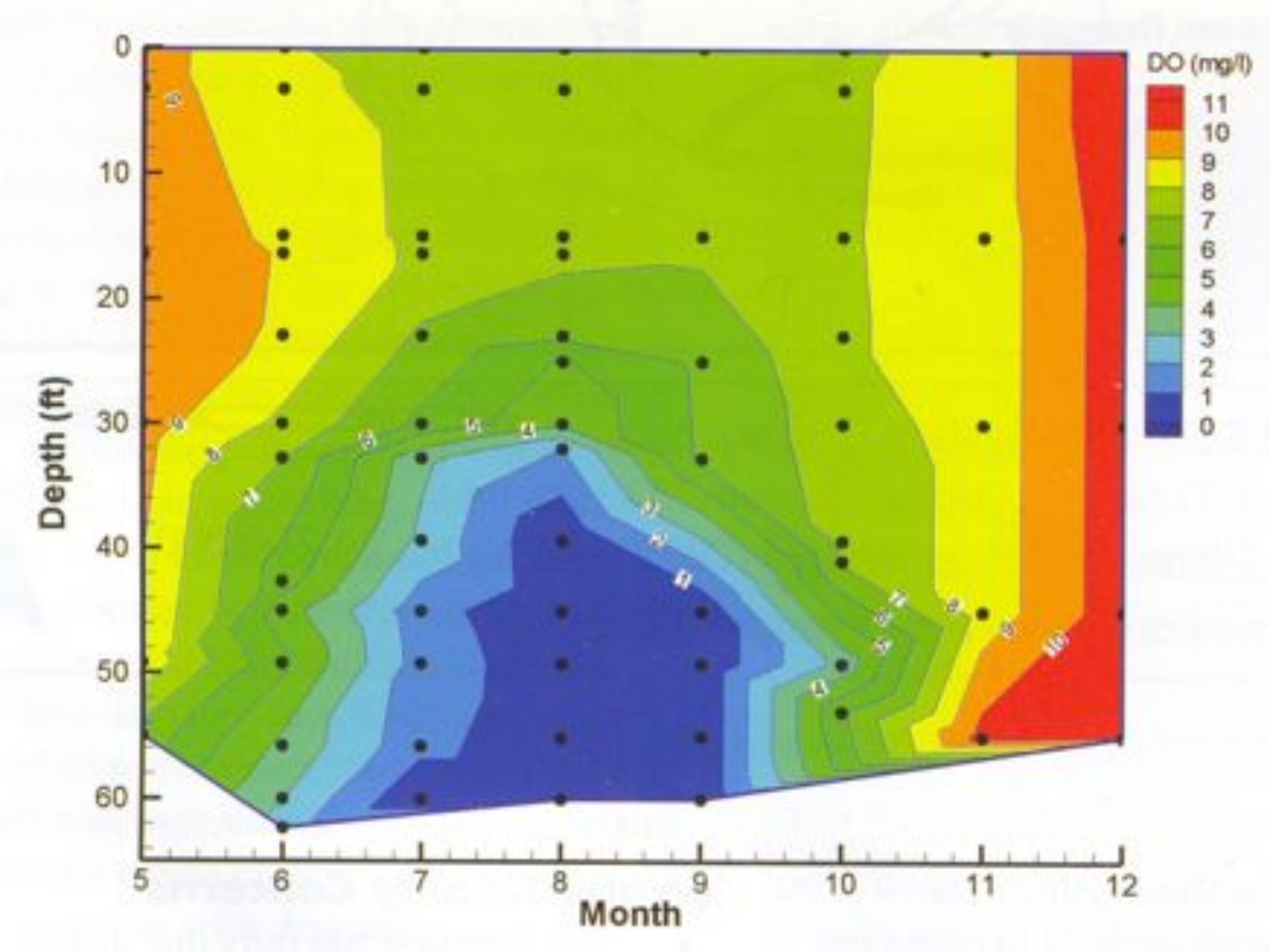
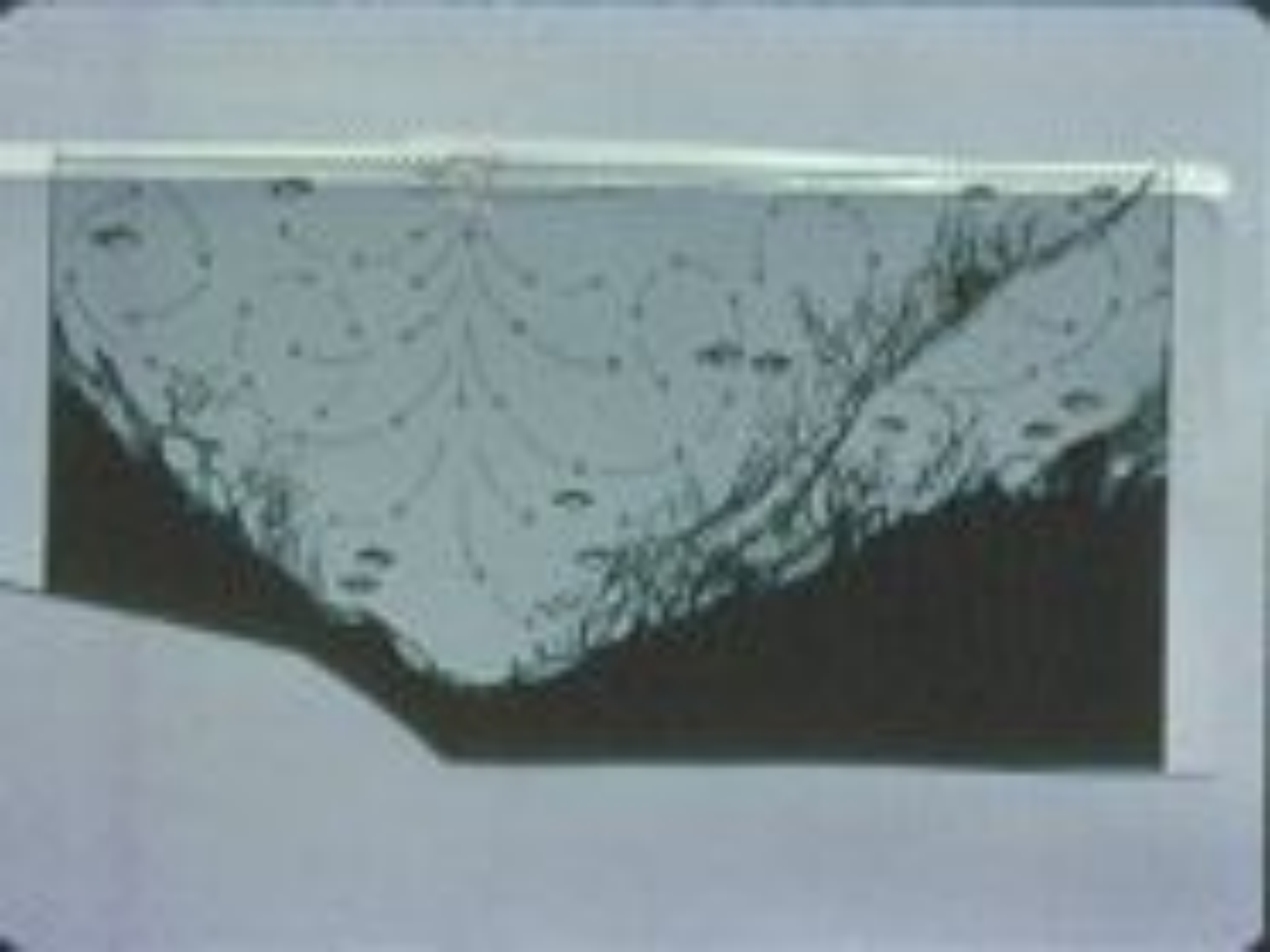


FIGURE 3: Seasonal Temperature Profiles

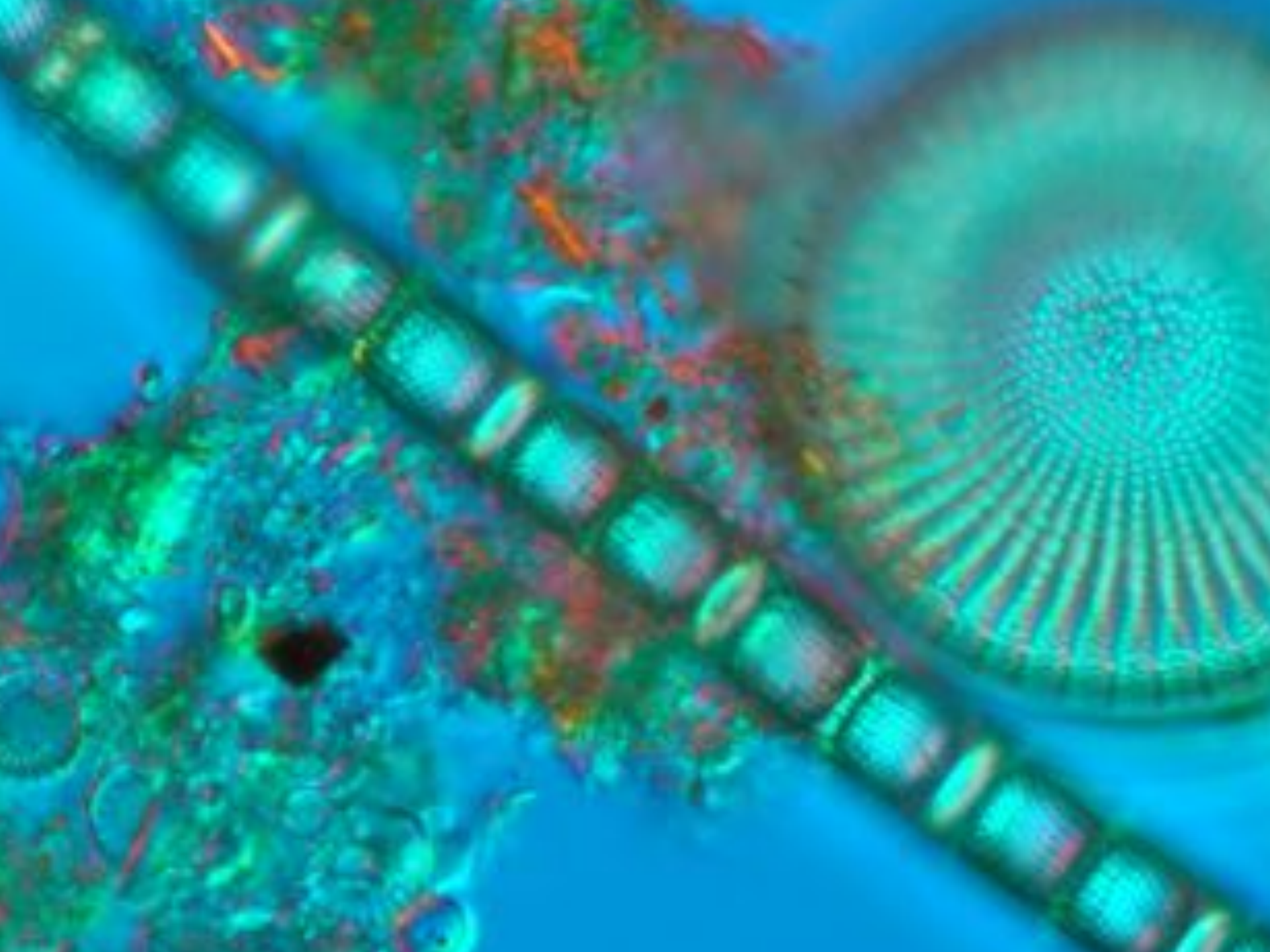

Temp (°F)
73
70
67
64
61
58
55
52
49
46
43
40
Depth (ft)
0
10
20
30
40
50
60
Month
5
6
7
8
9
10
11
12


DO (mg/l)
11
10
9
8
7
6
5
4
3
2
1
0
Depth (ft)
0
10
20
30
40
50
60
5
6
7
8
9
10
11
12
Month



RESULTS

ALGAE



ALGAE

- BLUE-GREEN ALGAE BLOOM *Anabeana*
- Green algae *Cladophora*
- Diatoms – spring bloom
- *Chara* –on bottom; looks like aquatic plant
- STARRY STONEWORT AN EXOTIC ALGAE (DISCUSSED LATER)

RESULTS

AQUATIC PLANTS OR MACROPHYTES

AQUATIC PLANTS

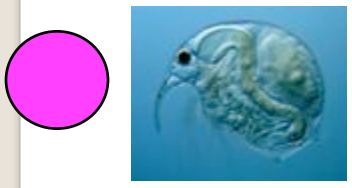
- EURASIAN MILFOIL – EXOTIC
- PREVALENT IN LAKE
- BEING TREATED BY LAKE ASSOCIATION
- SUPPORT CONTINUED TREATMENT
- NO TREATMENTS IN FALL

RESULTS

ZOOPLANKTON
INVERTEBRATES IN THE WATER COLUMN
IMPORTANT FISH FOOD

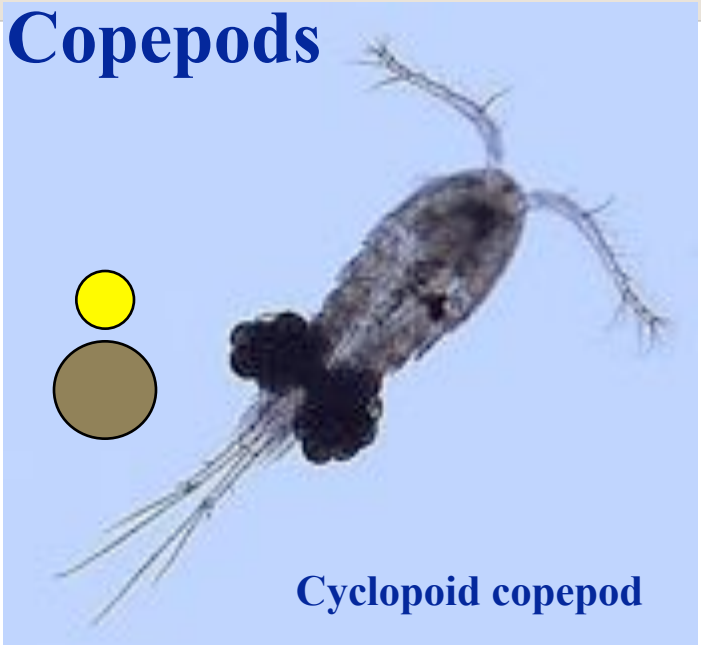
Cladocerans

Daphnia

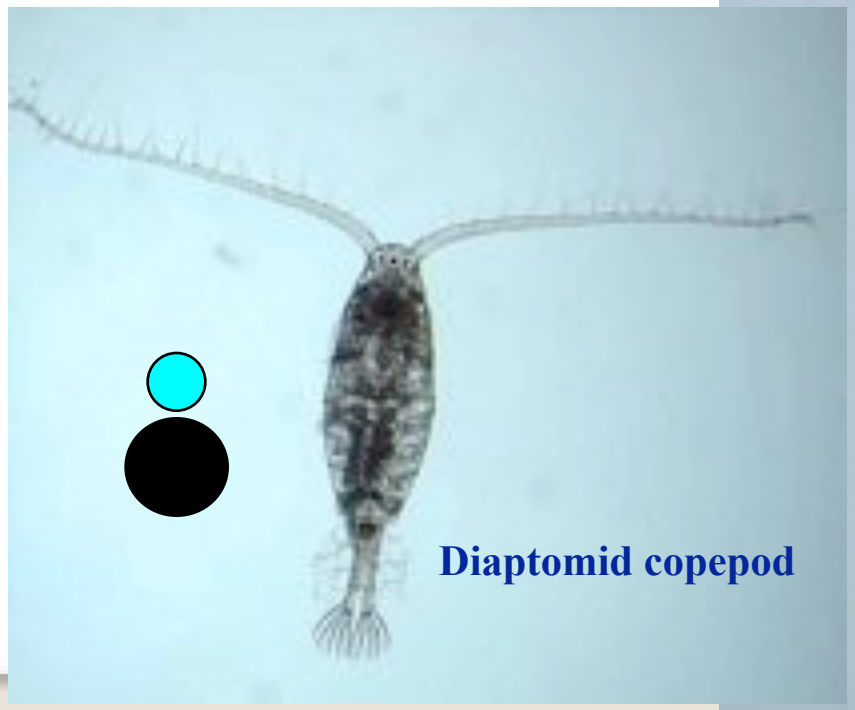


Bosmina

Copepods



Cyclopoid copepod



Diaptomid copepod

Limnocalanus

ZOOPLANKTON

- SMALL FORMS DOMINANT (DIAPTOMUS)
- EXPECTED DUE TO INTENSE FISH PREDATION BY PLANKTIVORES (BG)
- SOME DAPHNIA PRESENT: THEY ARE LARGEST AND PREFERRED FISH FOOD

RESULTS

FISH:

-DIVERSITY

-DIET

-GROWTH

RESULTS

FISH COMMUNITY SURVEY -SPECIES DIVERSITY

FISHES COLLECTED:

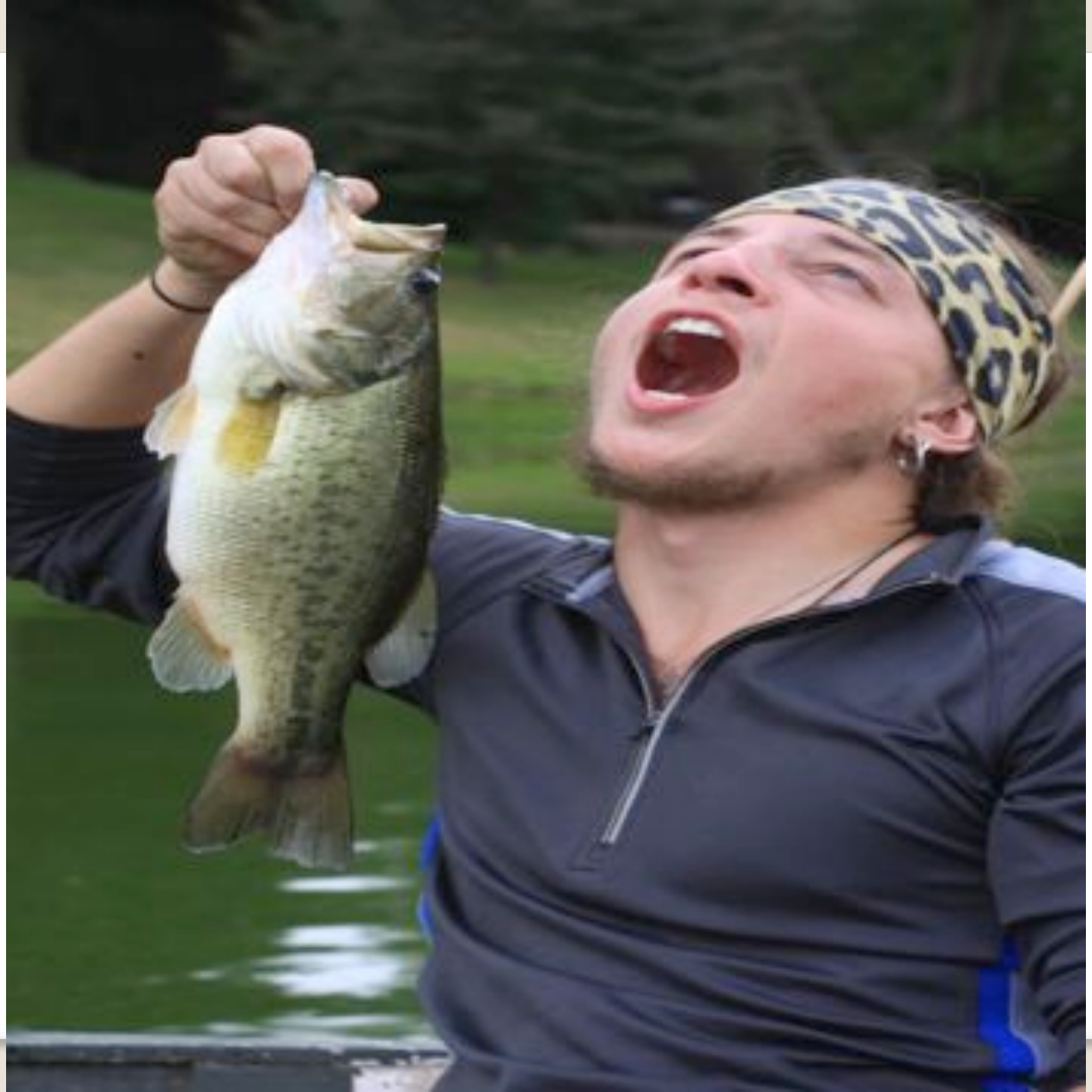
- 19 SPECIES COLLECTED IN LAKE SHANNON
- LARGE & SMALLMOUTH BASS, BLACK CRAPPIE, BOWFIN, COMMON SHINER
- BLUEGILL, PUMPKINSEED,
- GREEN SUNFISH, BROOK SILVERSIDE
- YELLOW PERCH, JOHNNY DARTER
- NORTHERN PIKE, BLUNTNOSE MINNOW
- WALLEYE
- GOLDEN SHINER
- YELLOW & BLACK BULLHEAD
- COMMON & SPOTFIN SHINER

DIET

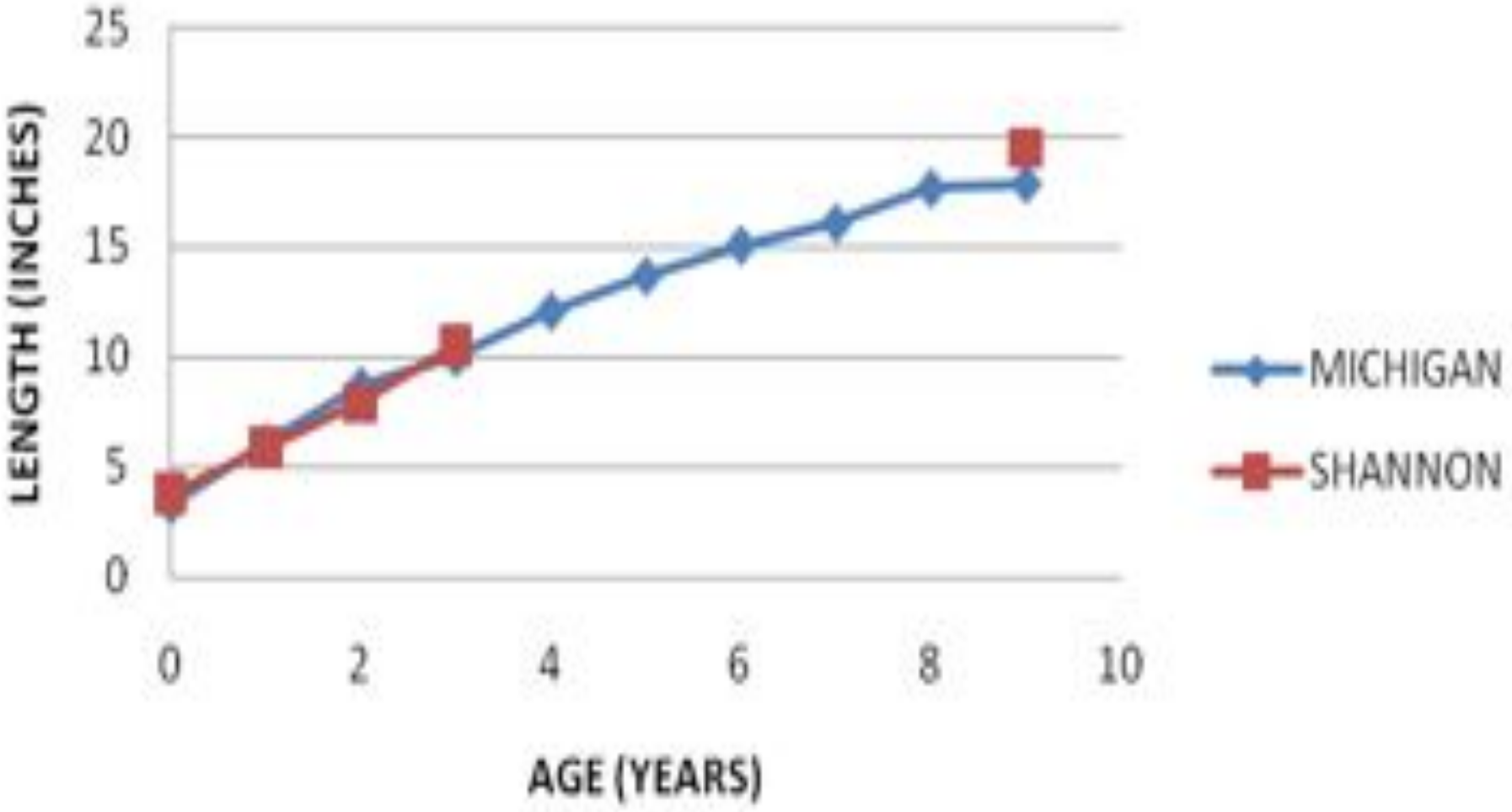
- BLACK CRAPPIE – EATING BLUEGILLS
- BLUEGILLS – ZOOPLANKTON/BENTHOS
- LARGEMOUTH BASS – BC AND BG
- YELLOW PERCH – ZOOP, CHIR, BG,JD,SV
- WALLEYE – EATING BLUEGILLS
- SMALLMOUTH BASS – EATING BLUEGILLS
- YELLOW BULLHEAD – EATING YELLOW P

RESULTS

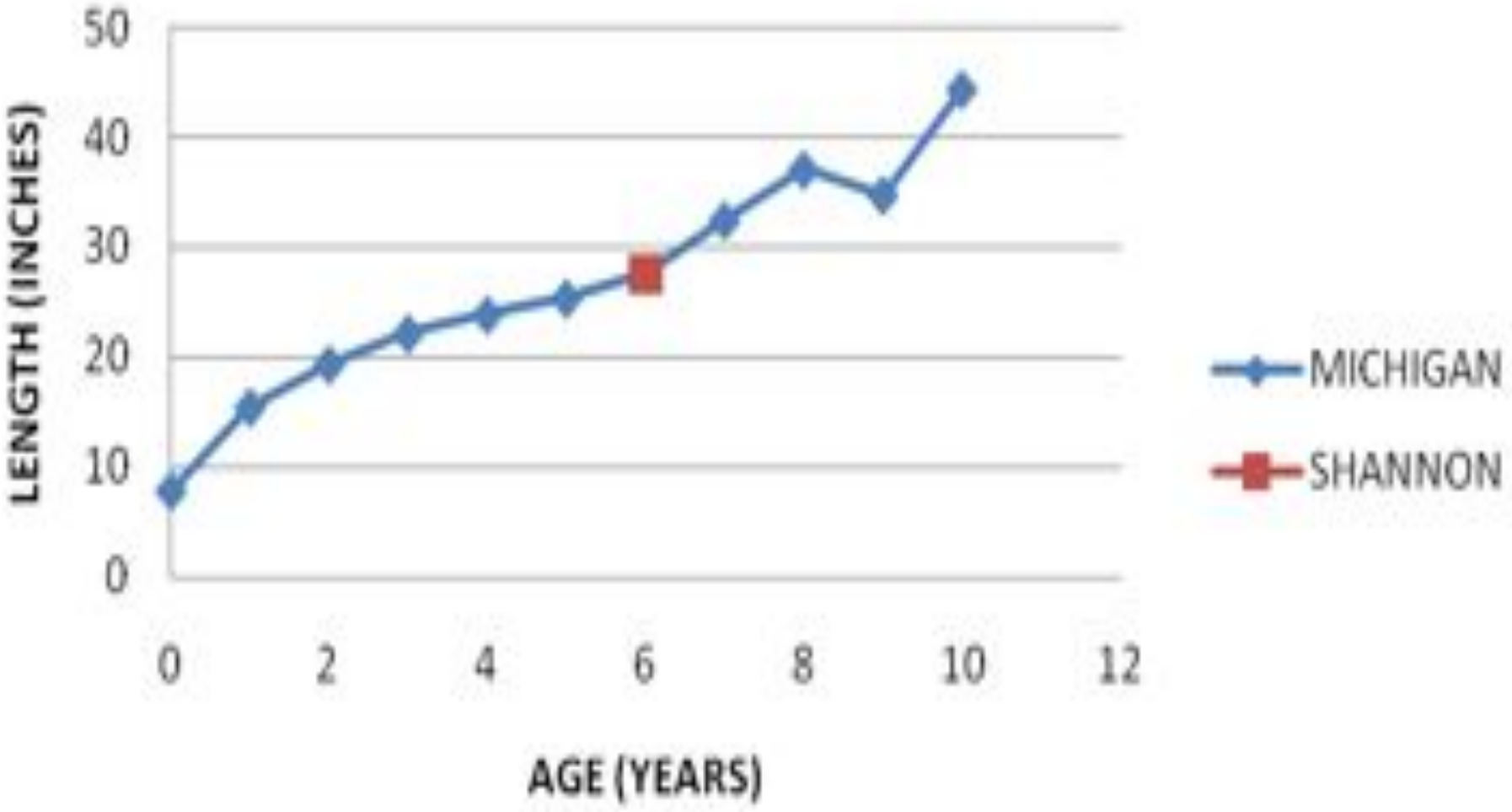
FISH COMMUNITY GROWTH



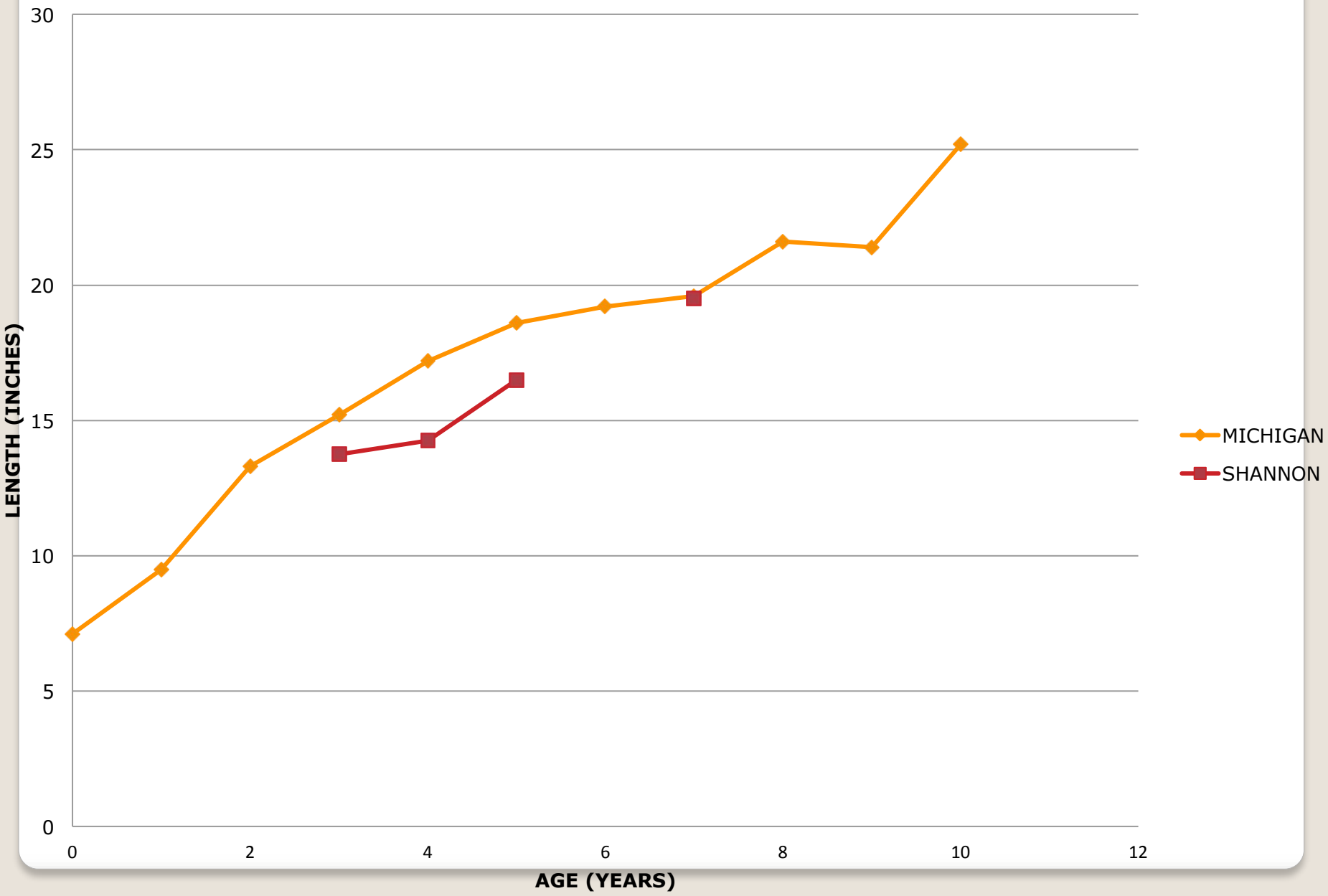
AGE-LENGTH RELATIONSHIP FOR LARGEMOUTH BASS, SHANNON LAKE

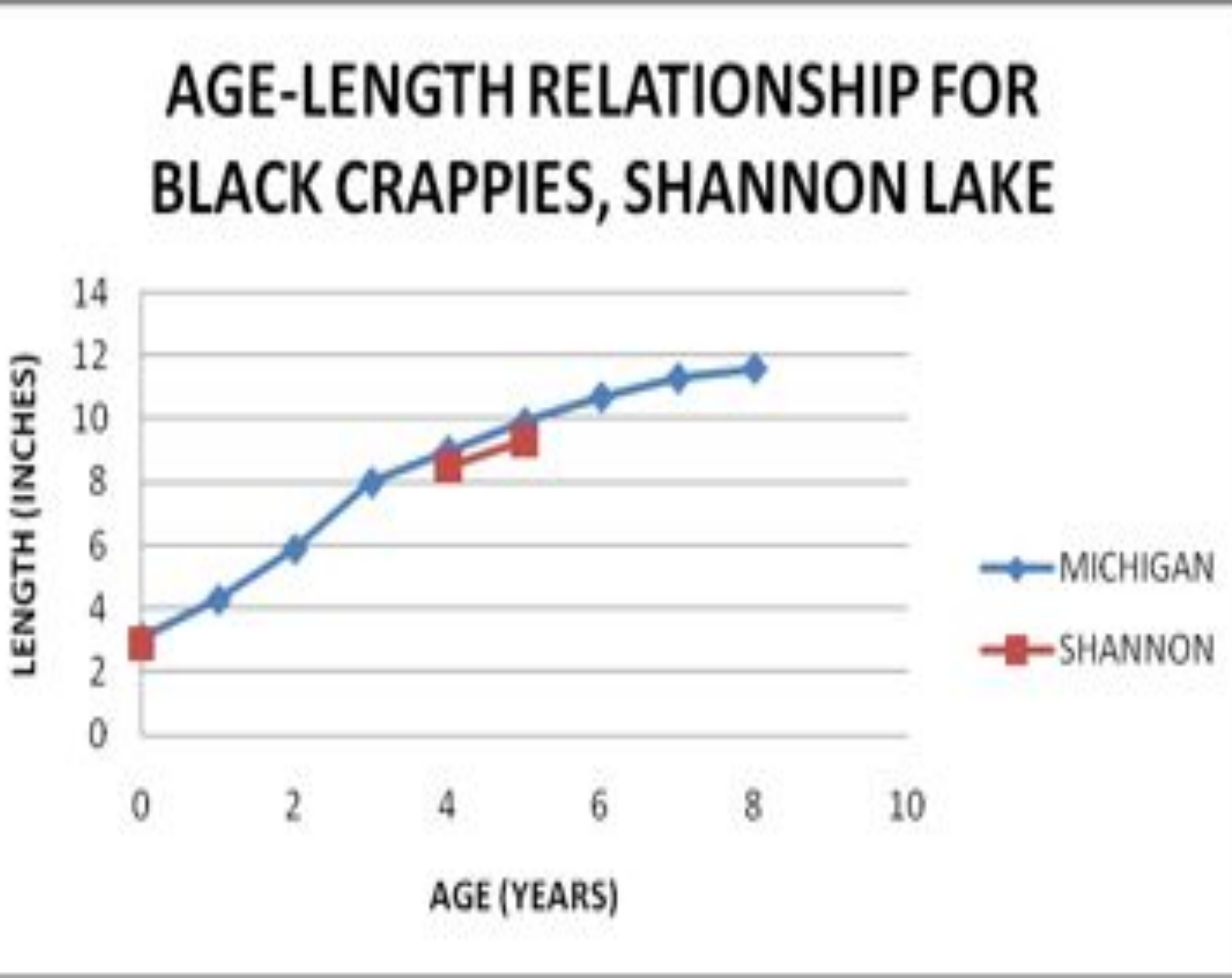


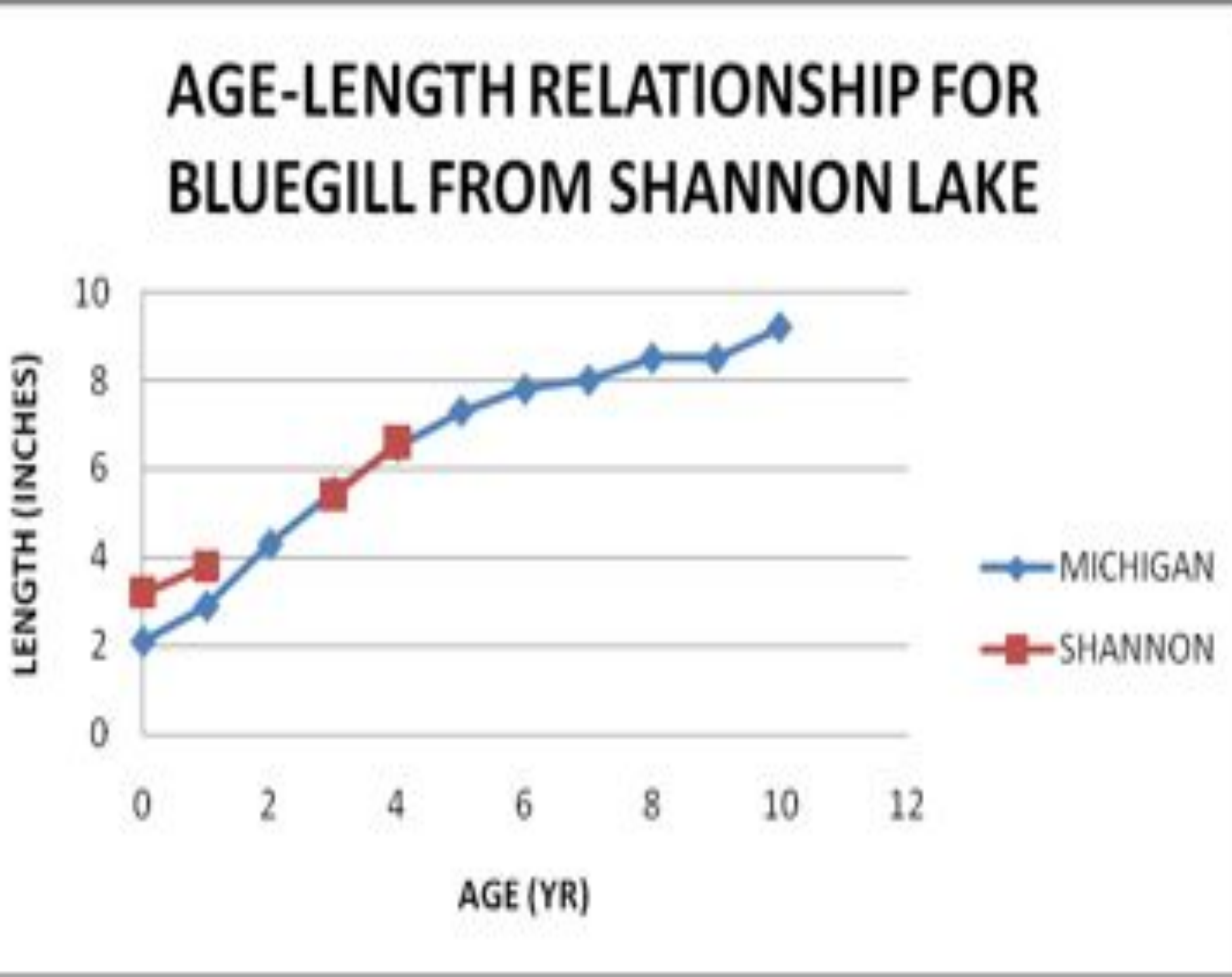
AGE-LENGTH RELATIONSHIP FOR NORTHERN PIKE, SHANNON LAKE



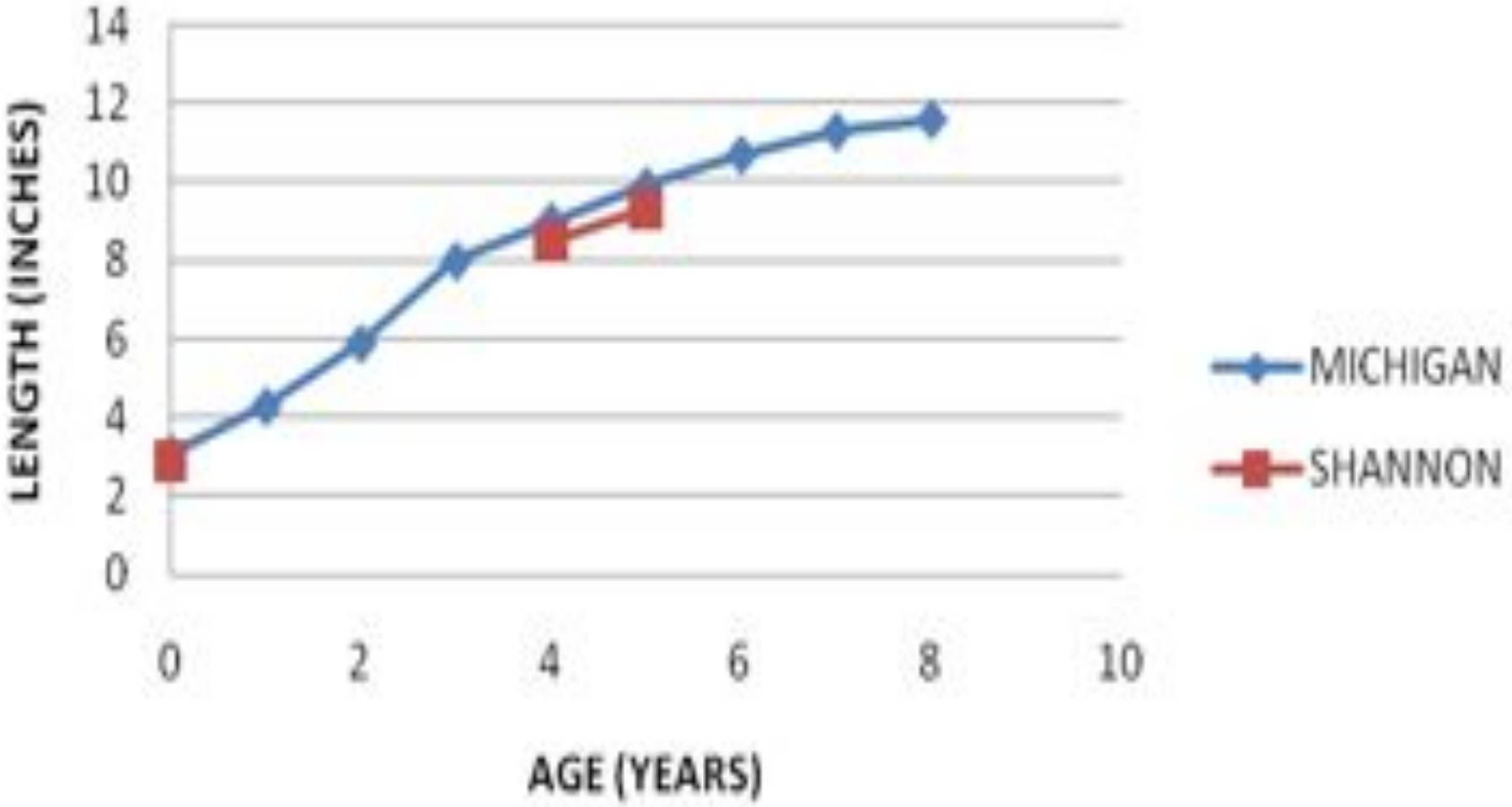
AGE-LENGTH RELATIONSHIP FOR WALLEYE, SHANNON LAKE



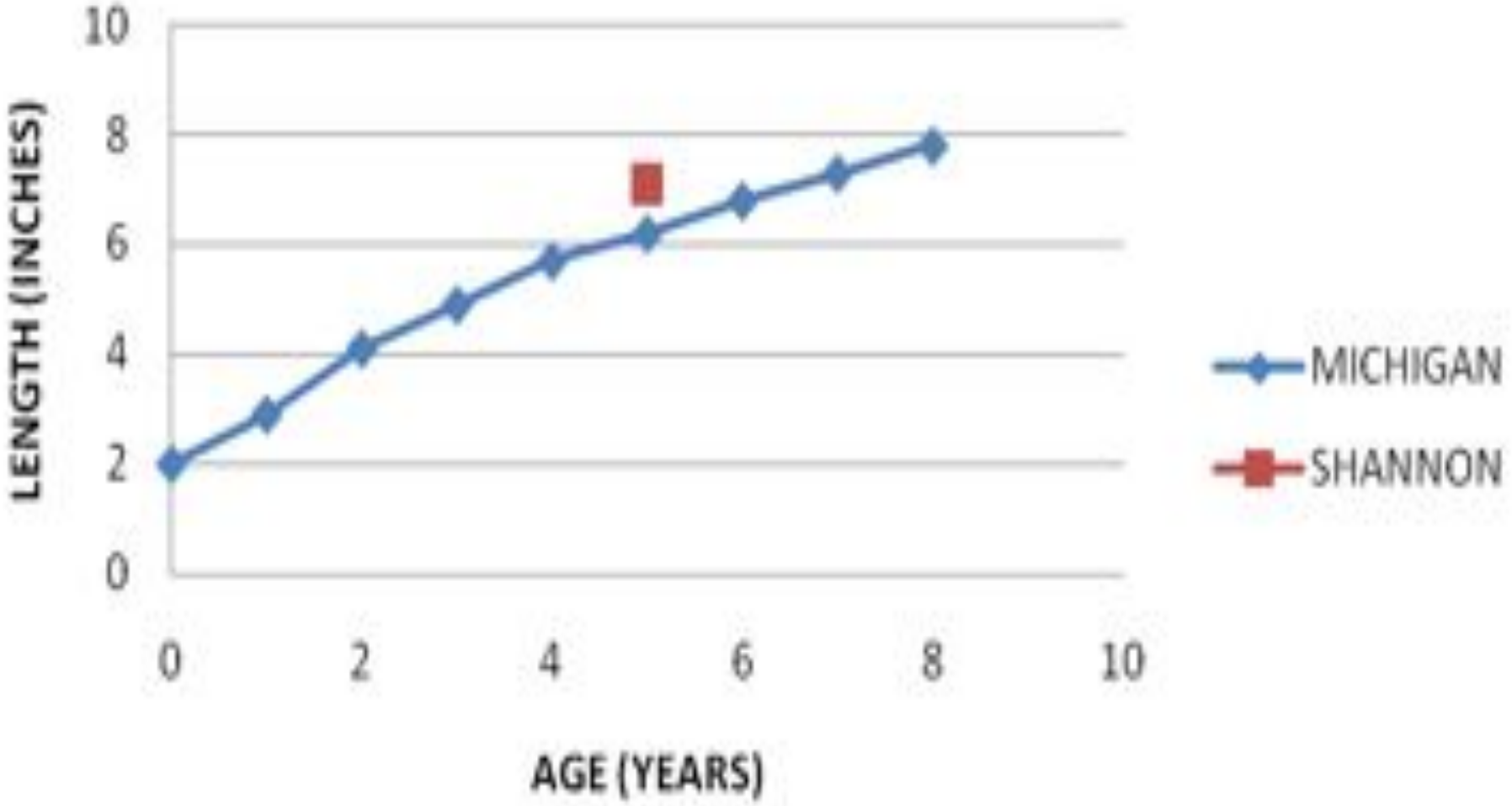

AGE-LENGTH RELATIONSHIP FOR BLACK CRAPPIES, SHANNON LAKE
LENGTH (INCHES)
14
12
10
8
6
4
2
0
0
2
4
6
8
10
AGE (YEARS)
MICHIGAN
SHANNON


AGE-LENGTH RELATIONSHIP FOR BLUEGILL FROM SHANNON LAKE
LENGTH (INCHES)
10
8
6
4
2
0
0
2
4
6
8
10
12
AGE (YR)
MICHIGAN
SHANNON

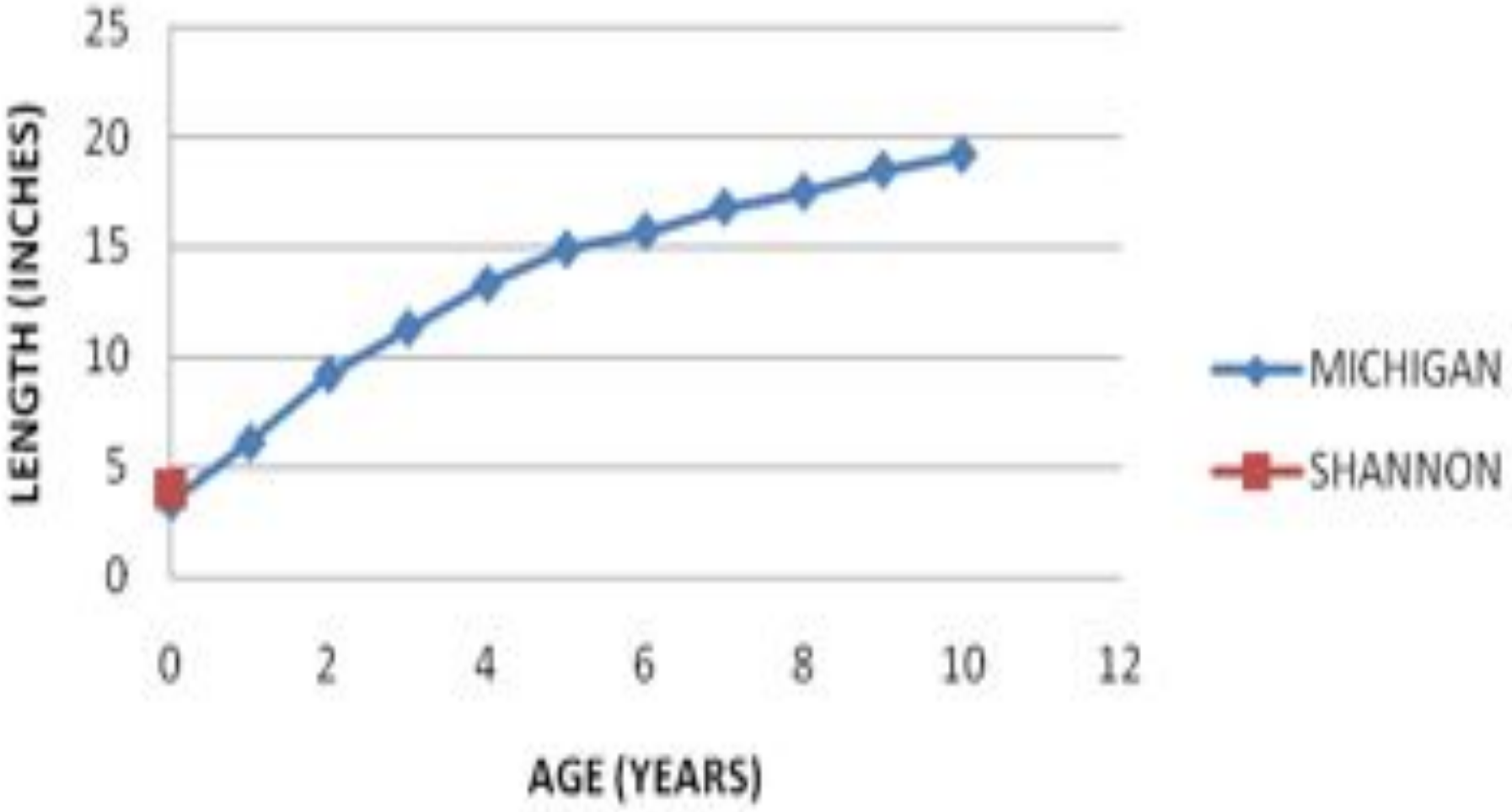
AGE-LENGTH RELATIONSHIP FOR YELLOW PERCH, SHANNON LAKE



AGE-LENGTH RELATIONSHIP FOR PUMPKINSEEDS IN SHANNON LAKE



AGE-LENGTH RELATIONSHIP FOR SMALLMOUTH BASS, LAKE SHANNON



RECOMMENDATIONS

LAKE MANAGEMENT PLAN

NUTRIENT INPUTS

A. SEDIMENTS – DRAWDOWN IS GOOD
B. RESIDENTS – APPENDIX 1
C. RUNOFF/RIVERINE – AGRICULTURAL INPUTS IMPORTANT

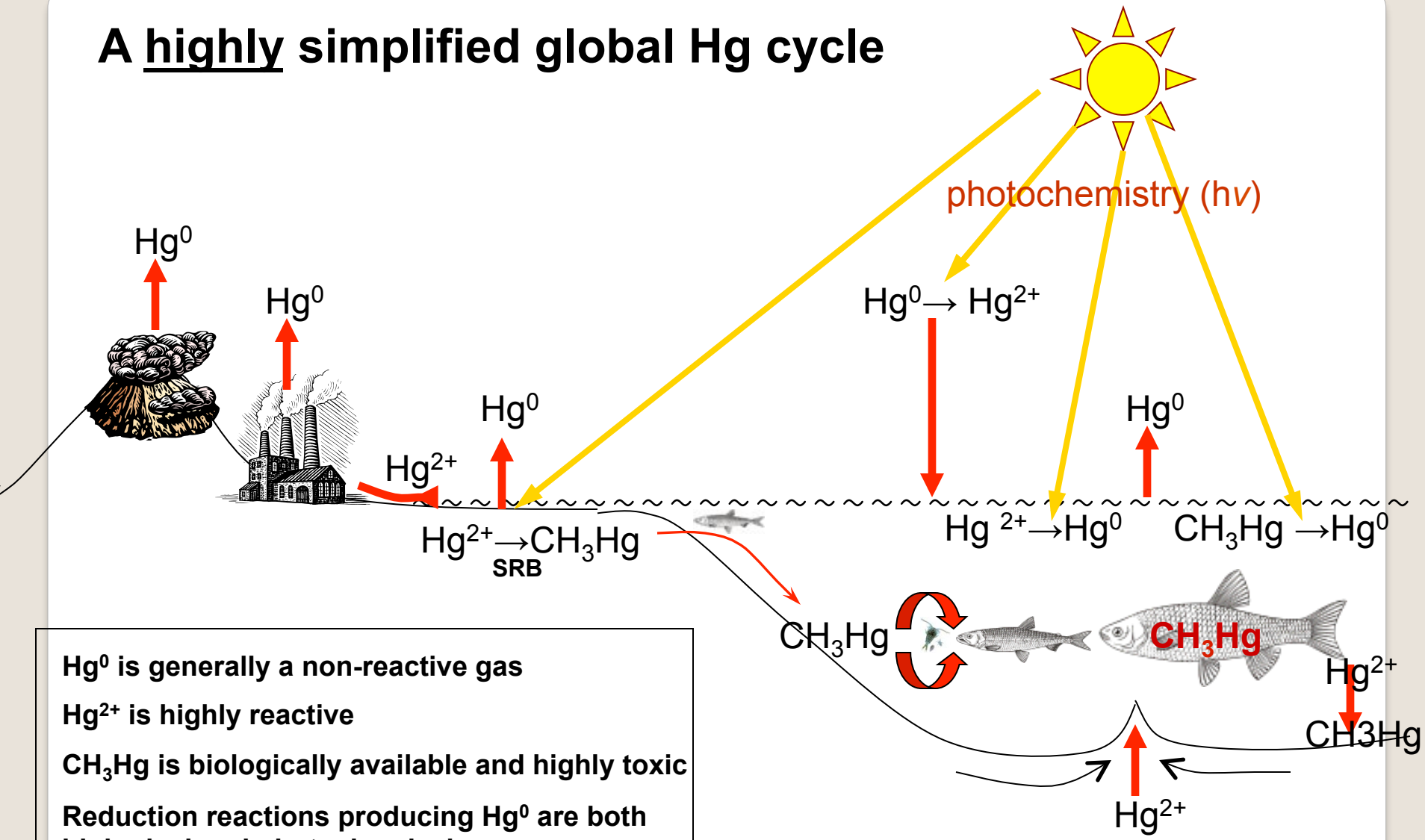
- 1. CONTINUE TO TREAT EURASIAN MILFOIL
- 2. DO NOT TREAT MILFOIL AFTER GROWING PERIOD IN AUGUST

AQUATIC PLANTS AND ALGAE

FISH MANAGEMENT

- 1. NO STOCKING NP, SB, LB, YP
- 2. WALLEYE-STOCKING NOT RECOMMENDED, BUT >>>>>>>>>
- 3. CATCH AND RELEASE: HG
- 4. NO STOCKING BY RESIDENTS; CONSIDER A MINNOW BAIT BAN
- EXCELLENT BC AND LB,SB FISHERY
- GREAT DIVERSITY OF PREY:BG,GL,BC
- CHANNEL CATFISH – PRESENT

A highly simplified global Hg cycle



- Hg^0 is generally a non-reactive gas
- Hg^{2+} is highly reactive
- CH_3Hg is biologically available and highly toxic
- Reduction reactions producing Hg^0 are both biological and photochemical
- Anthropogenic 2-3 times natural emissions

NON-INDIGENOUS SPECIES

- 1. ALREADY HAVE: EURASIAN MILFOIL
- 2. PREVENT ZEBRA MUSSELS AND STARRY STONEWORT FROM ENTERING
- 3. PREVENT VIRAL HEMORRHAGIC SEPTICEMIA ENTRY BY CURTAILING ANY BAIT OR STOCKING BY RESIDENTS

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Ebola-like virus killing fish in Great Lakes

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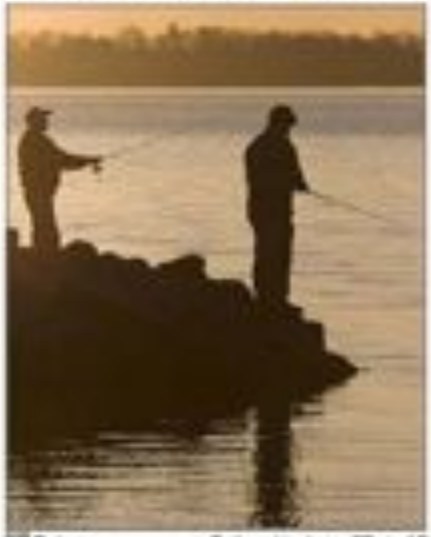

Enlarge By Lars Hagberg, CP via AP

Two men enjoy the early morning sunrise as they fish along the shore of Lake Ontario in Kingston, Ontario, on April 20. An Ebola-like virus has been killing fish in several Great Lakes, including Lake Ontario.

By Dennis Cauchon, USA TODAY

Mix It

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What's this?

A deadly Ebola-like virus is killing fish of all types in the Great Lakes, a development some scientists fear could trigger disaster for the USA's freshwater fish.

Because of a lack of genetic resistance to viral hemorrhagic septicemia, fish populations could be damaged in the same way the smallpox virus struck Native Americans and Dutch elm disease decimated elm trees, says Jim Winton, chief of fish health at the U.S. Geological Survey in Seattle.

The disease has been found in Lake Erie, Lake Ontario, Lake Huron, the St. Lawrence Seaway, the Niagara River and an inland lake in New York. The aggressive virus, which causes fish to hemorrhage, was unexpectedly found in the Great Lakes in 2006. Last year, it resulted in large fish kills that struck at least 20 species. Scientists are watching to see whether the disease returns in mid-May when water in the lakes warms to temperatures at which the virus attacks.

"VHS is the most important and dangerous fish virus known worldwide," Winton says. "Its discovery in our fresh water is disturbing and potentially catastrophic."

The United States and Canada try to contain the virus by restricting the transporting of fish and live bait and telling boaters to wash their boats when moving them between lakes. Michigan's Department of Natural Resources has taken the most dramatic action: closing hatcheries that produce three important sport fish — walleye, northern pike and muskellunge.

29 April 2007

Lorain, OH: Dave Kelch, Ohio Sea Grant Extension (2006)

Mohammed Faisal, USGS (2007)

QUAGGA
ZEBRA

MID-LAKE REEFS - 2001

MID-LAKE REEFS - 2005

STARRY STONEWORT

- INVASIVE GREEN ALGA, SIMILAR TO CHARA: NATIVE TO ASIA
- FOUND IN DETROIT RIVER IN 1983
- TAKING OVER MICHIGAN LAKES
- DESTROYS NATIVE PLANTS
- COVERS SPAWNING SITES FOR SUNFISH (BLUEGILL, PUMPKINSEED, BASS)
- WORSE THAN EURASIAN MILFOIL
- DIFFICULT TO CONTROL

NITELLOPSIS OBTUSA

What can you do?

- Do **not** release unused live bait or transport live game fish from one water body to another; consider banning live bait
- Clean and dry trailers, boats (especially live wells and bilges), and bait buckets after use or before use in a different body of water; treat with bleach if necessary
- Report unusual numbers of dead or dying fish, especially multi-species kills

QUESTIONS?

Freshwater Physicians Inc.

5293 Daniel • Brighton, MI 48116