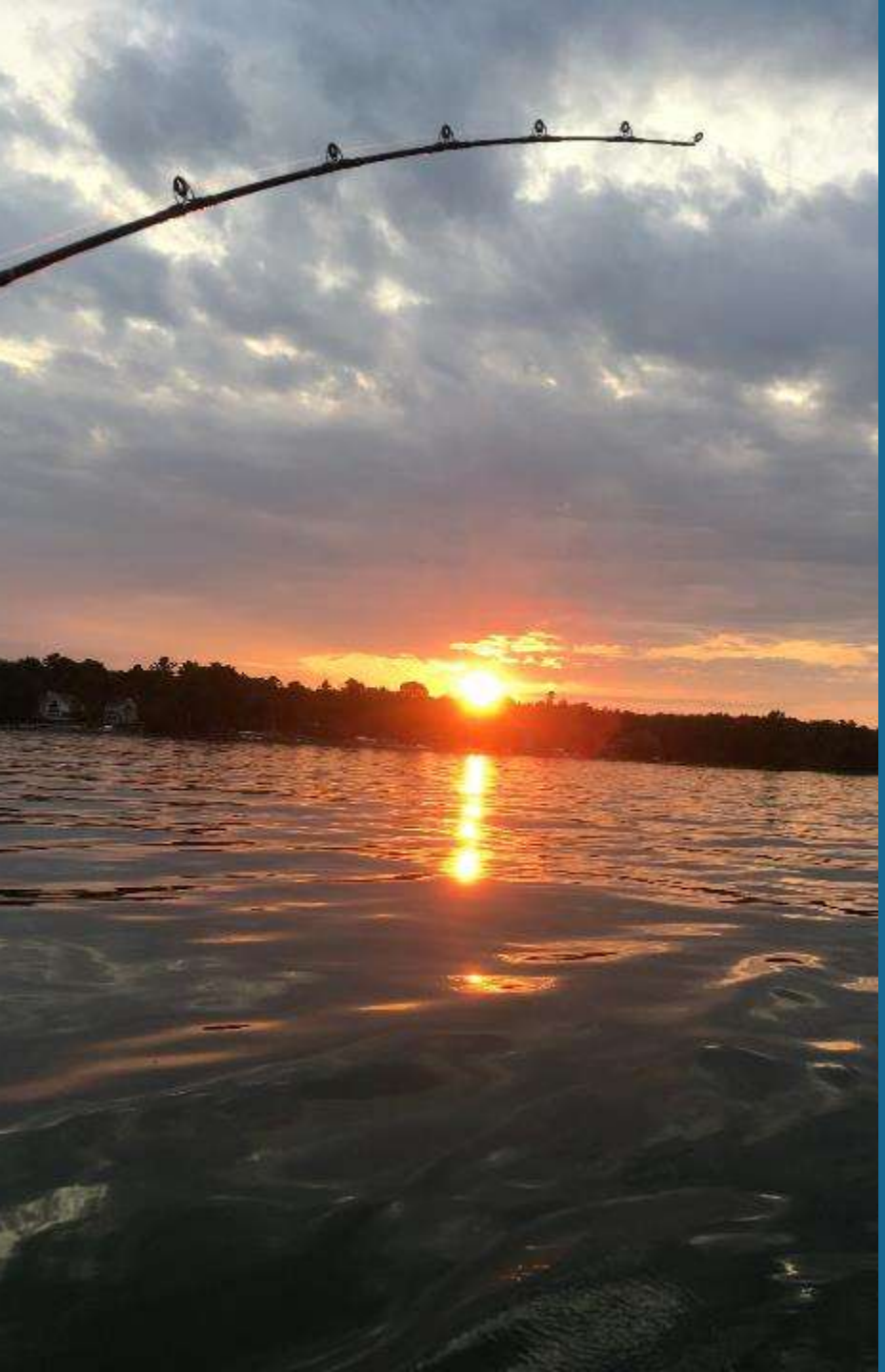

Health of Inland Lake Shorelines and Effects on Fishery Resources

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baumanj@michigan.gov
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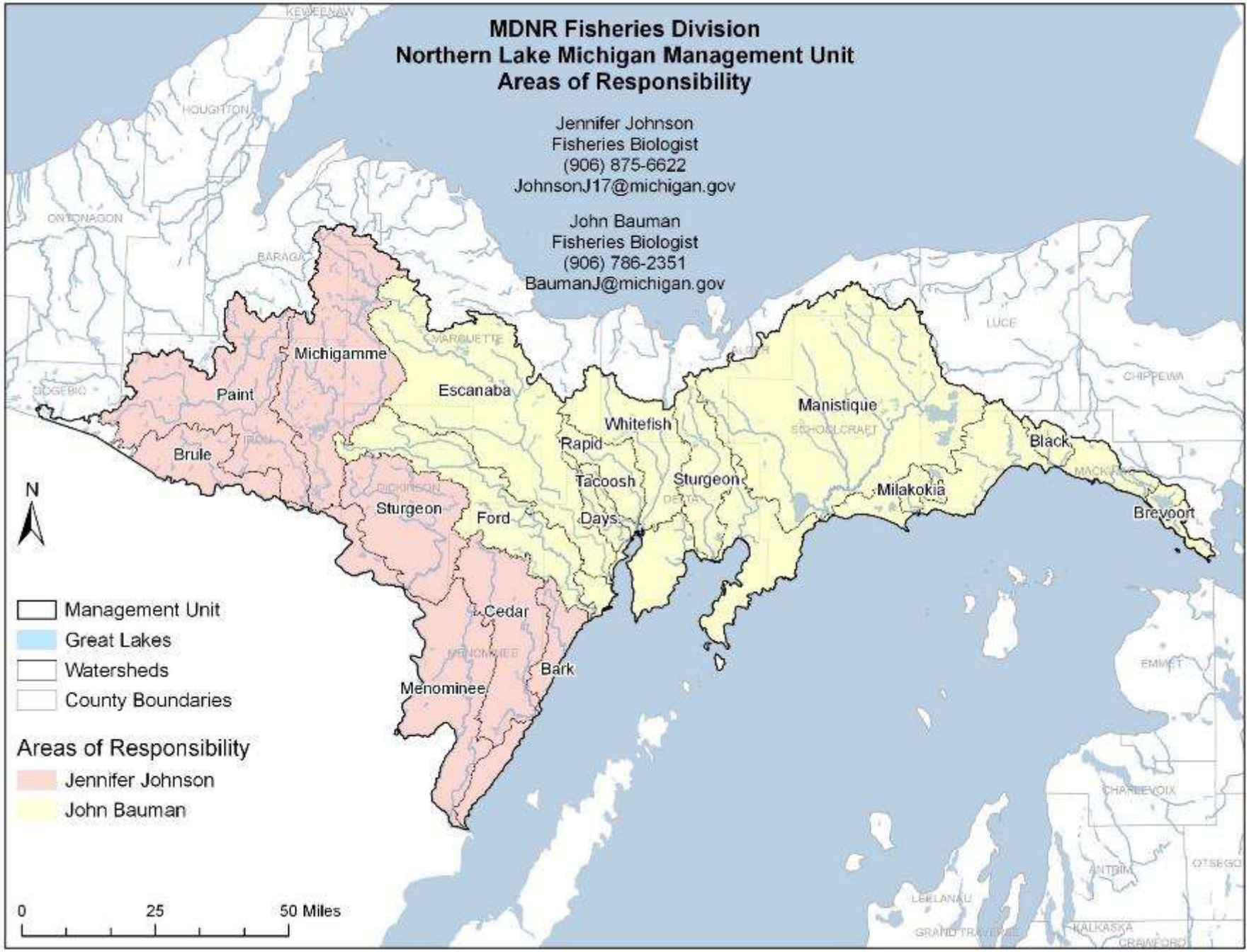
MDNR Fisheries Division
Northern Lake Michigan Management Unit
Areas of Responsibility
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Fisheries Biologist
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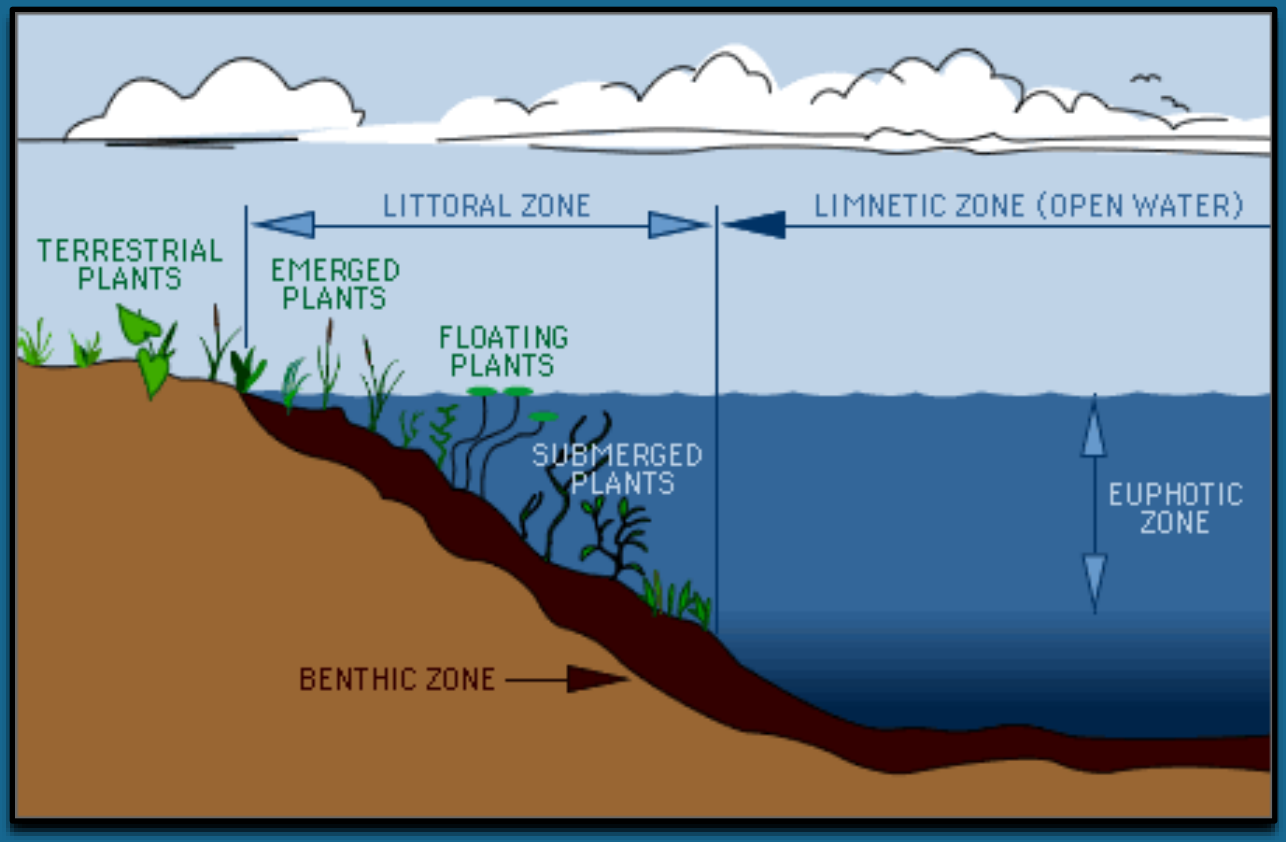
Michigamme
Paint
Brule
Escanaba
Sturgeon
Ford
Cedar
Menominee
Bark
Whitefish
Rapid
Tacoosh
Days
Sturgeon
Manistique
Milakokia
Black
Brevoort
N
Management Unit
Great Lakes
Watersheds
County Boundaries
Areas of Responsibility
Jennifer Johnson
John Bauman
0
25
50 Miles

Overview…

- Fish and habitat resources
- Current monitoring efforts
- results summary
- Take home message

Fish rely on littoral zones

- Provides critical habitat for at least 65 native species.



Status and Trends Surveys

- Uses a stratified random design to select lakes
- Collect biological and physical
  - Biological – Fish Community
    - Various net types and electrofishing
  - Physical – Residential Development
    - Docks / Dwellings / Percent Armoring / Submerged Trees
- ~430 lakes complete from 2002 – Present
- 2002 – 2007 Report

We have some questions…

- Catch rate for each species for each lake.
- Residential development for each lake.
  - Do catch rates for fish in lakes with “low” versus “high” residential development differ?
  - Do catch rates differ for groups of fishes?
    - Panfish, large gamefish
    - Reproductive guilds of fishes

Residential development

Physical Indicators	Low	25th	Median	75th	High	Max
Dwellings	<1.3	1.3	11.0	19.8	>19.8	43.6
Boat Docks	<1.3	1.3	7.7	14.9	>14.9	33.7
Shoreline Armoring	<0.0	0.0	2.2	15.1	>15.1	70.6
Large Woody Habitat	<24.9	24.9	87.1	214.9	>214.9	1,565.80

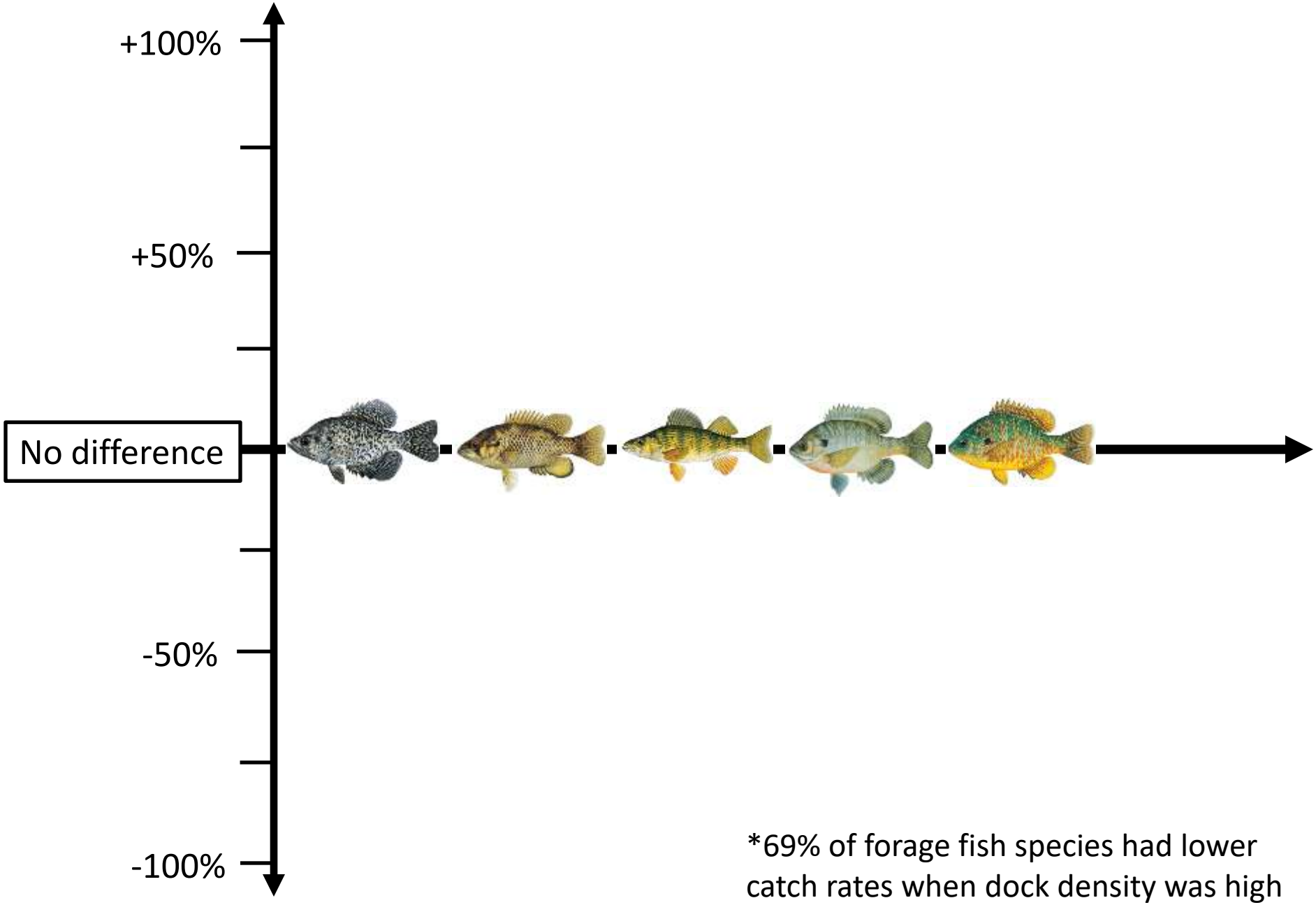
Number of docks per mile

- How do docks (large and small) affect fish and aquatic ecosystems?

Number of docks per shoreline mile

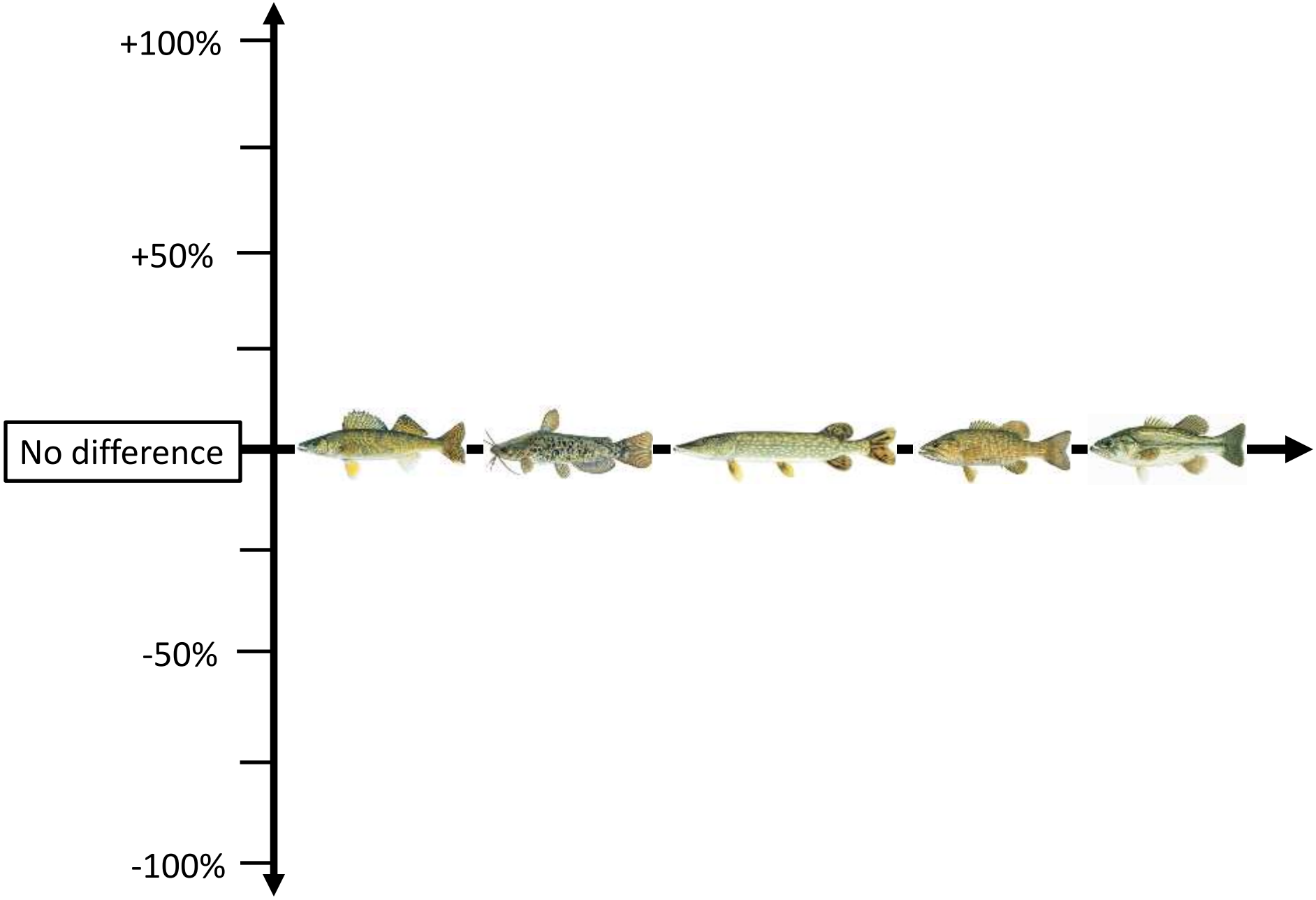
State of Michigan .....

Difference in panfish catch rates between lakes with low versus high <u>dock density</u>



*69% of forage fish species had lower catch rates when dock density was high

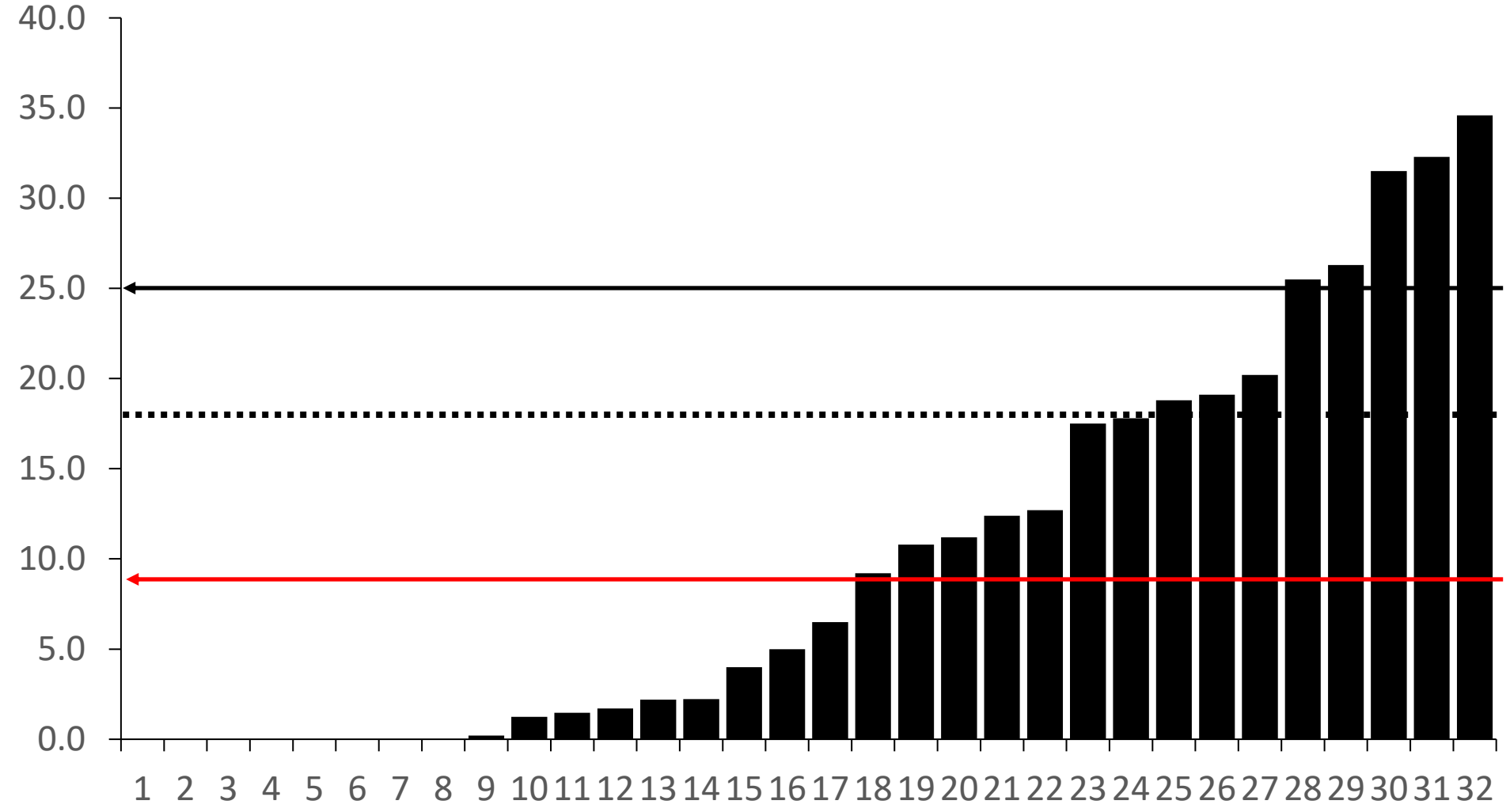
Difference in gamefish catch rates between lakes with low versus high <u>dock density</u>



Shoreline armoring

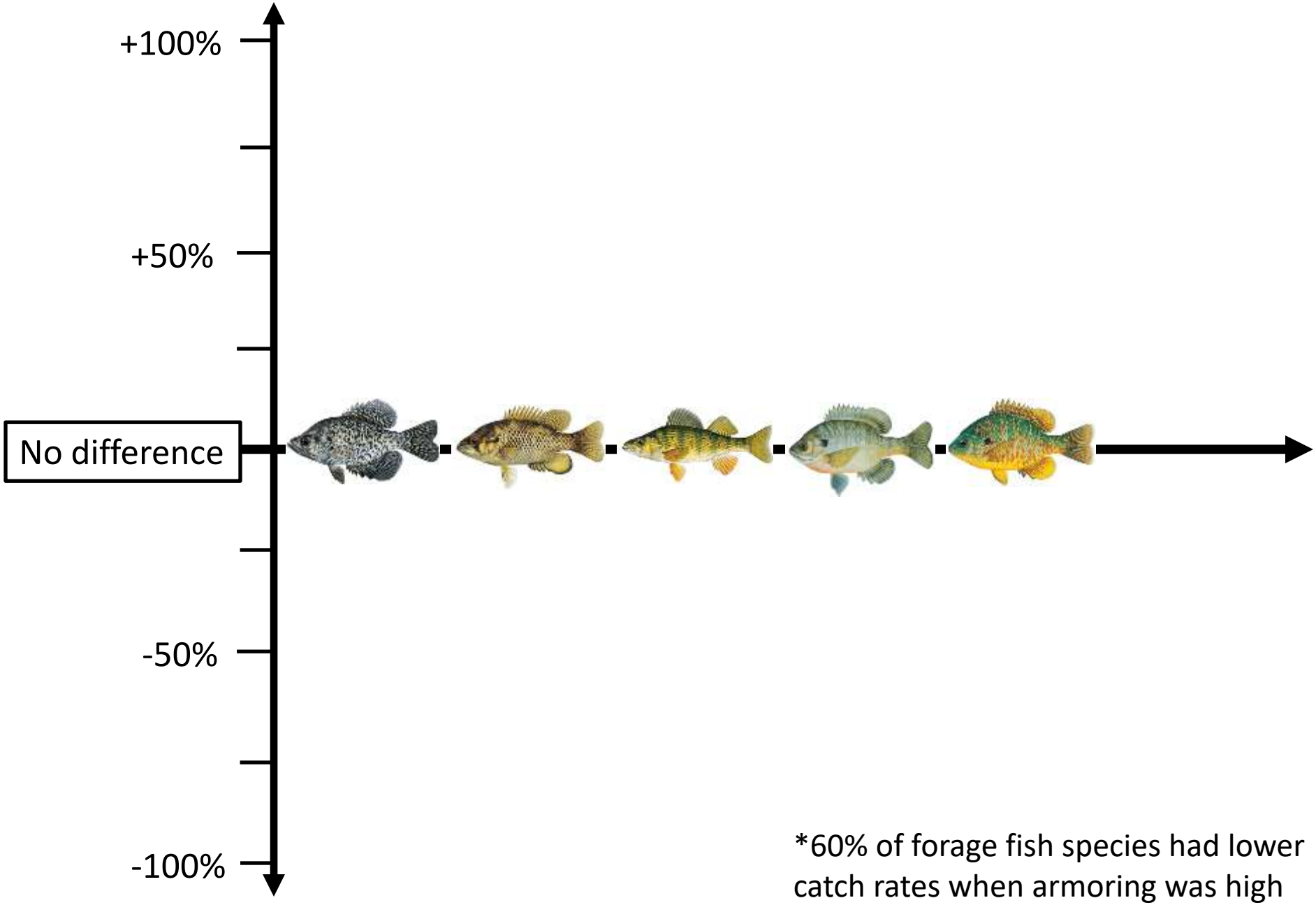
- How does shoreline armor impact fish and aquatic ecosystems?

Percent shoreline armoring



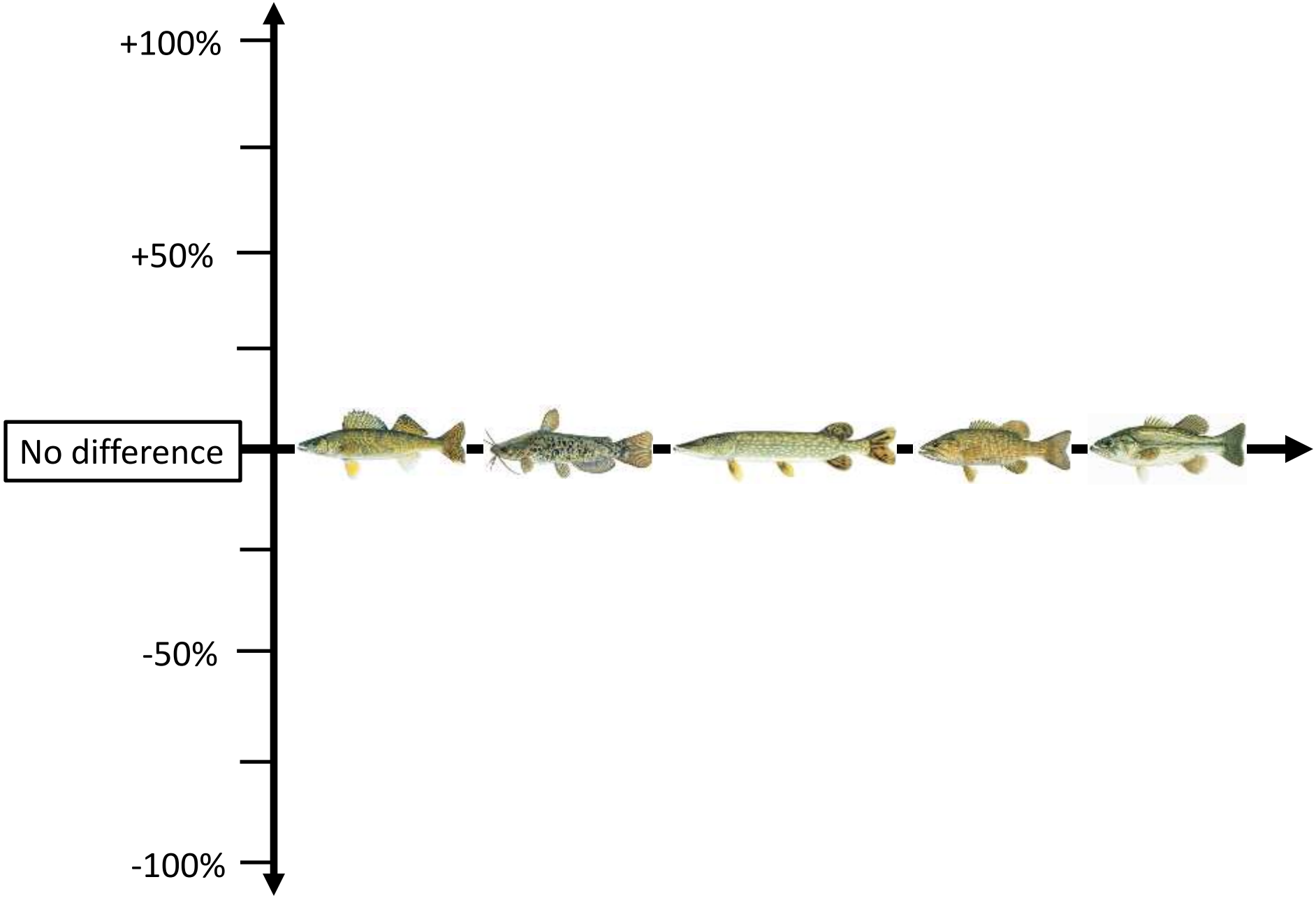
State of Michigan ..... Recommended ——

Difference in panfish catch rates between lakes with low versus high armoring



*60% of forage fish species had lower catch rates when armoring was high

Difference in gamefish catch rates between lakes with low versus high armoring



Submerged logs or trees

- Why are submerged logs important to fish and aquatic ecosystems?

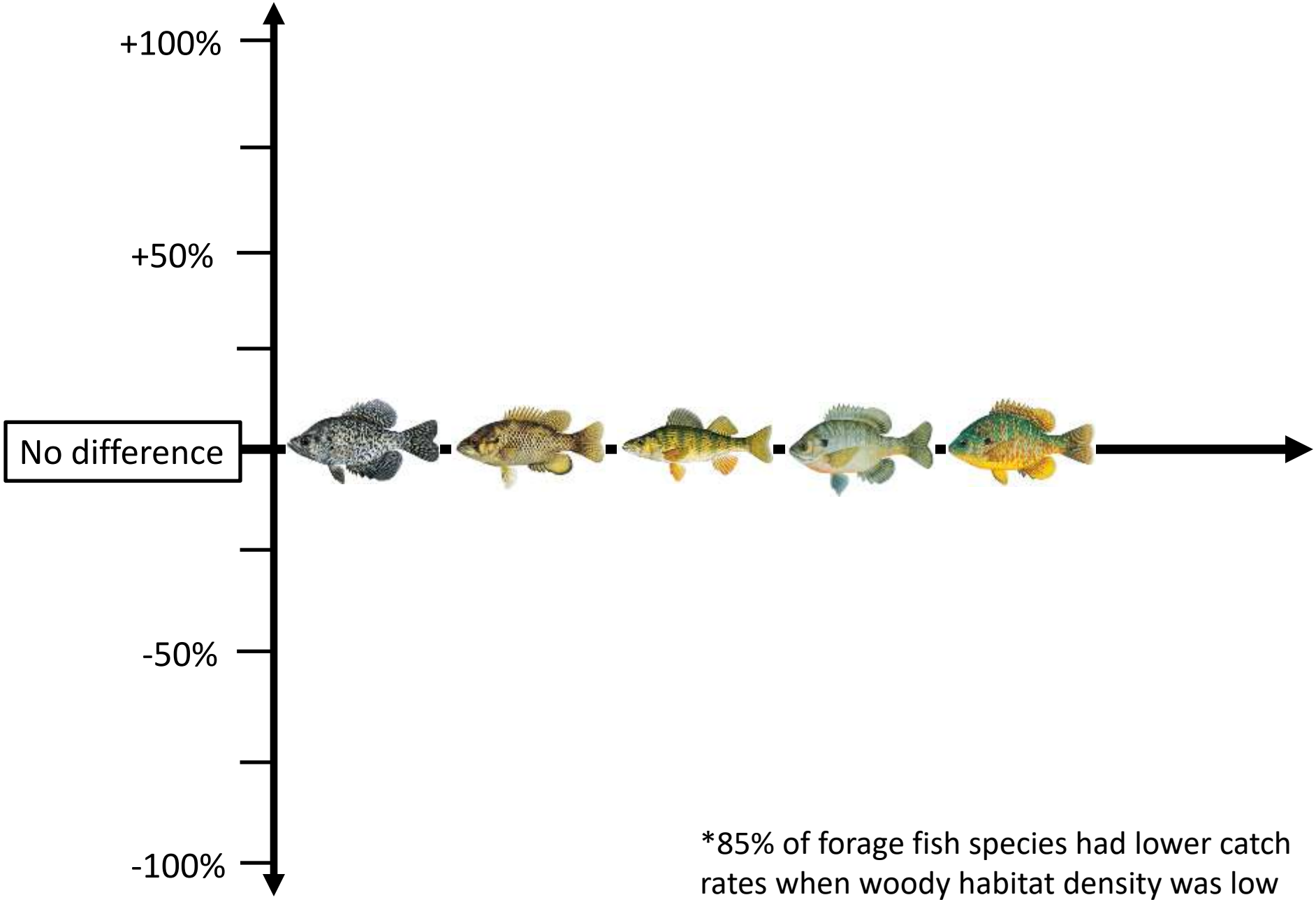
Number of submerged logs per mile

600
500
400
300
200
100
0

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

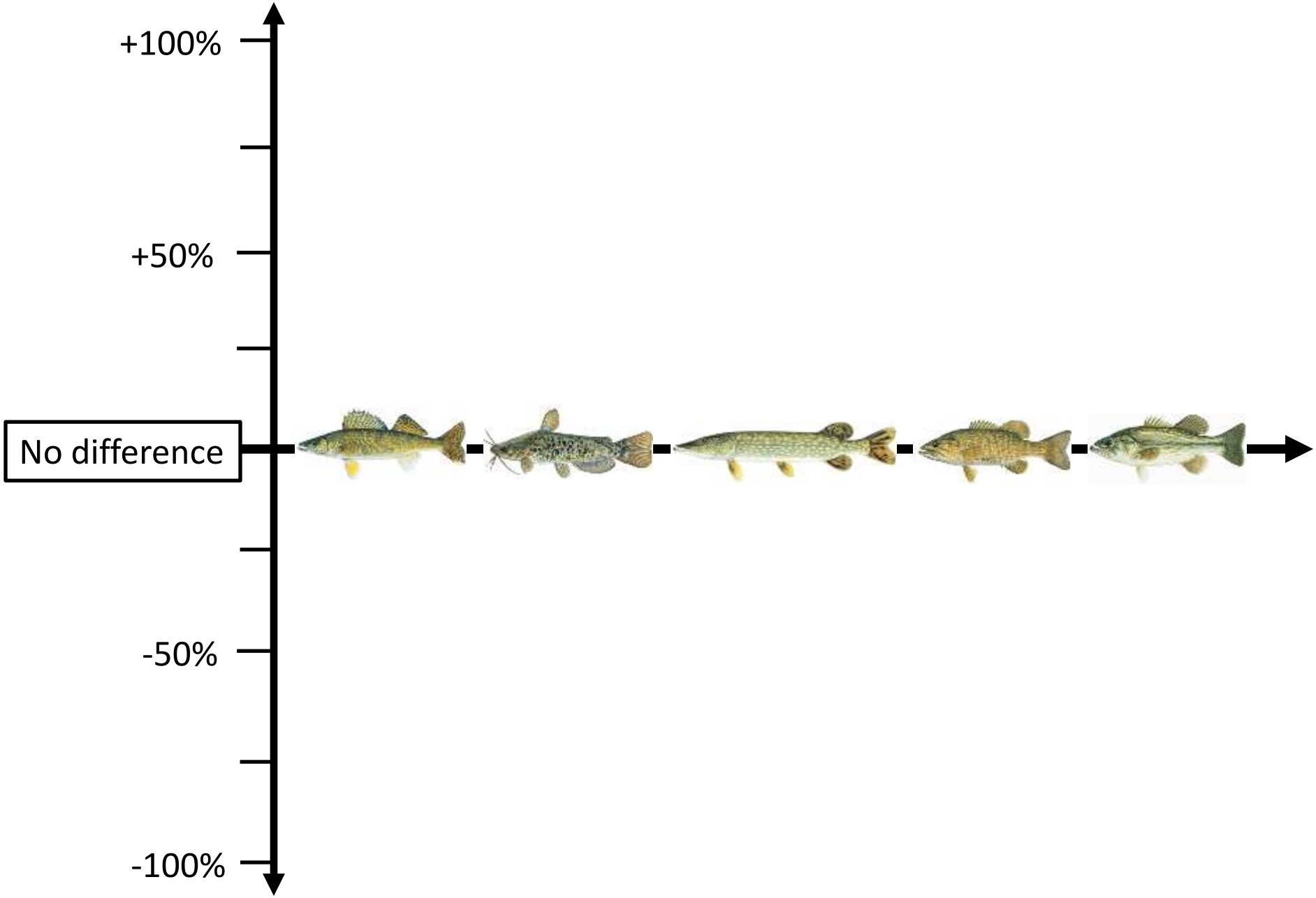
State of Michigan

Difference in panfish catch rates between lakes with high versus low <u>tree density</u>



*85% of forage fish species had lower catch rates when woody habitat density was low

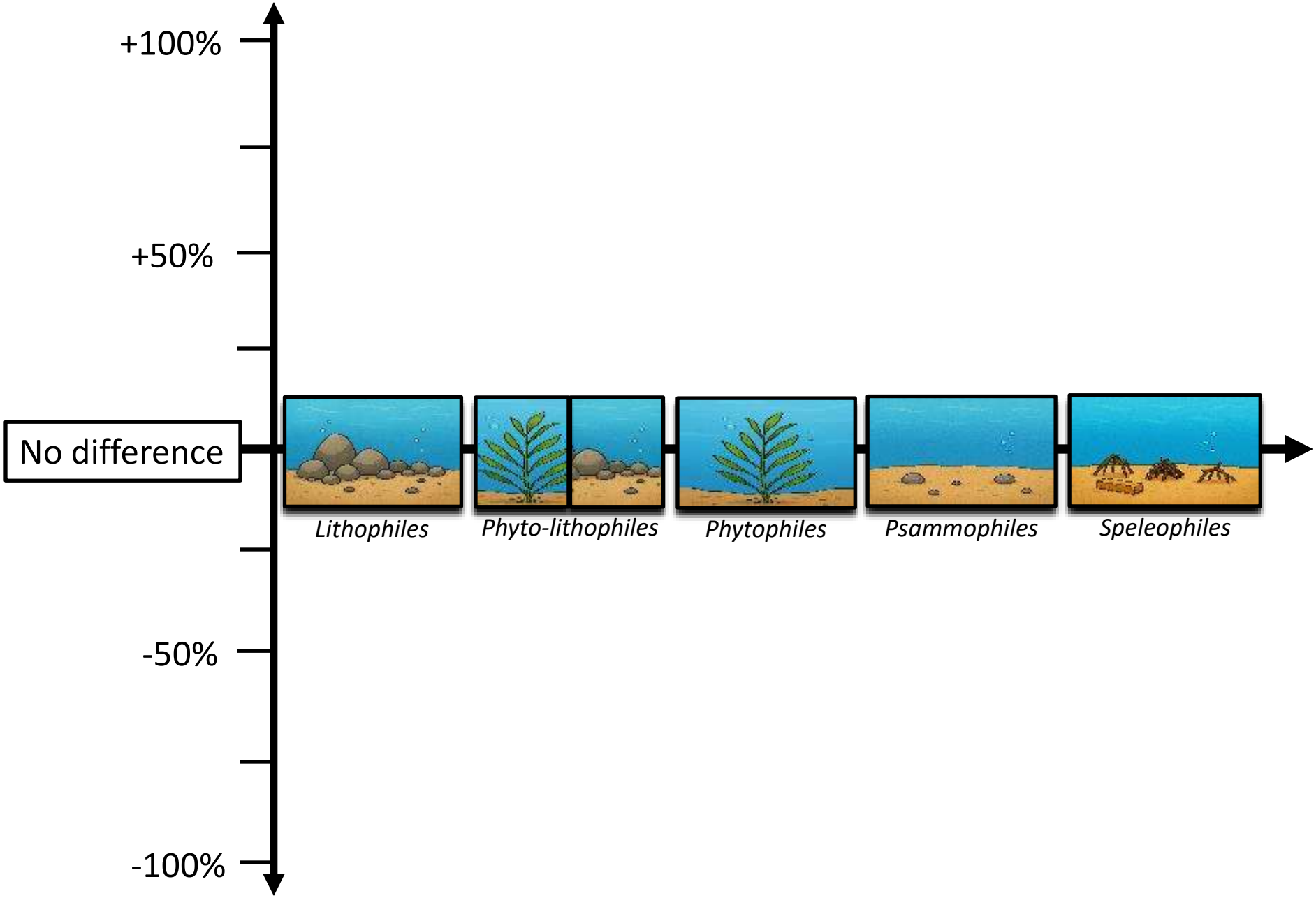
Difference in gamefish catch rates between lakes with high versus low <u>tree density</u>



Spawning Guild Data

Spawning Guild	Spawning media	Species
Lithophil	Rock loving	Walleye, Sucker, Sbass
Phyto-lithophil	Vegetation-Rock	Perch, Darters
Phytophil	Vegetation	Crappie, Lbass, Pike
Psammophil	Sand loving	Logperch, Shiners
Speleophil	Cavern/Cavity/Wood	Minnows, Darters

Difference in spawning guild catch rates between lakes with low versus high development



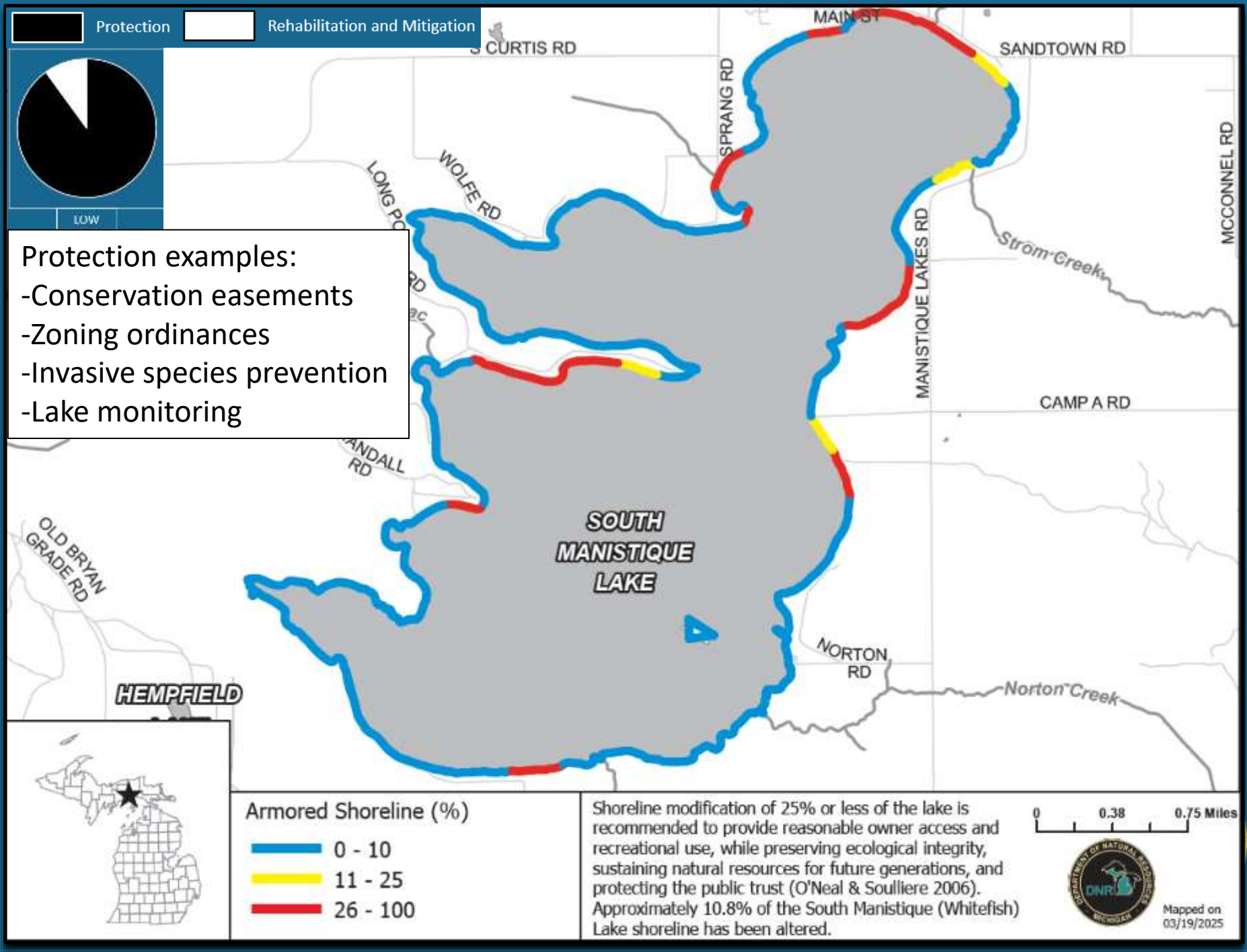
Summary of comparisons…

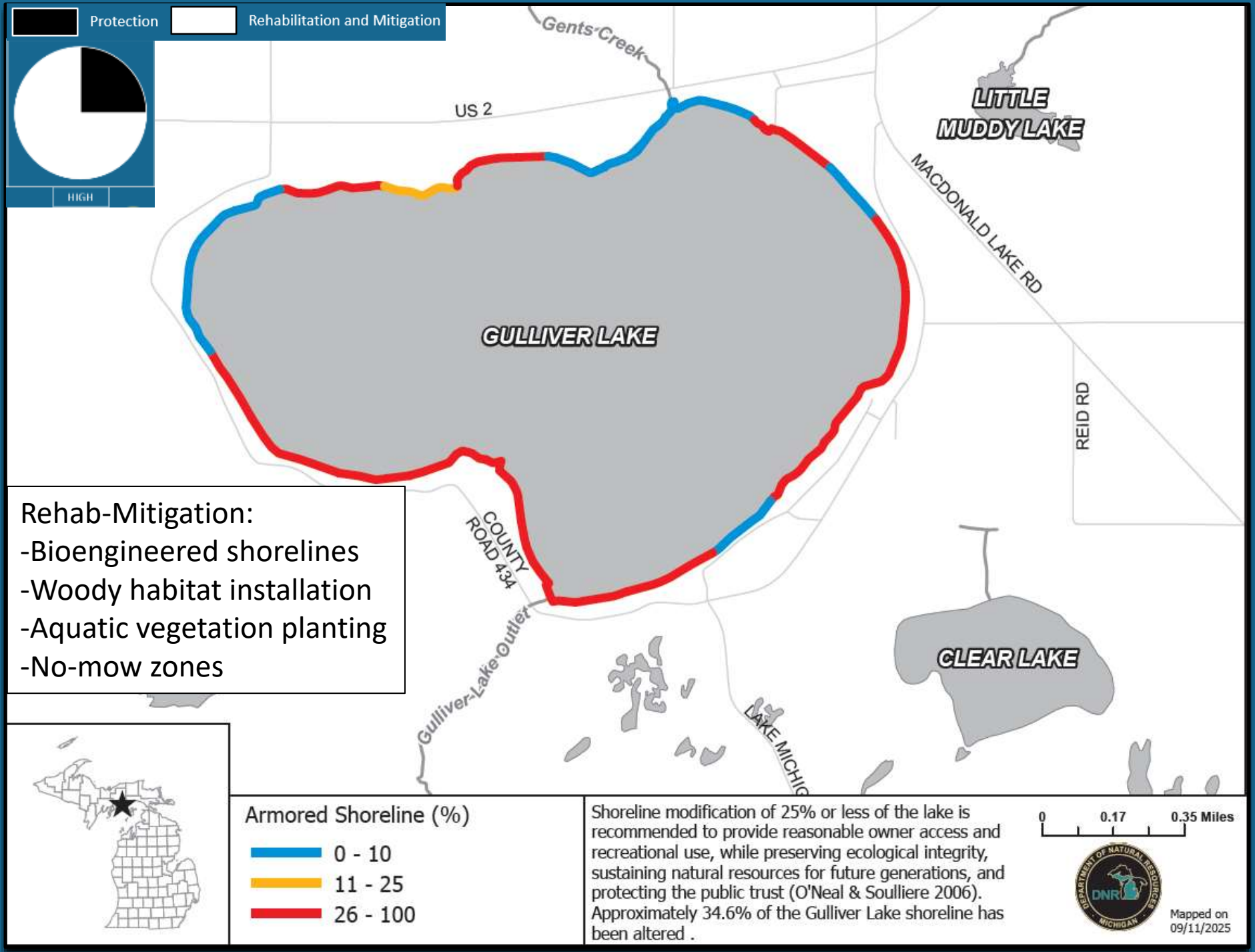
- Catch rates of forage fish as well as popular panfish and gamefish may be changing in response to an increase in residential development.
  - May be related to alteration of available spawning habitat.
  - Shoreline modification may select for rock and sand spawning fishes and select against plant spawners.

- Negative association between developed shorelines and:
  - Muskellunge spawning habitat (Nohner and Diana 2015)
  - Largemouth Bass and Yellow Perch (Sass et al. 2006)
  - Lake Trout, Lake Whitefish, Cisco (Clingerman et al. 2012)
  - Pike, Bluegill, Pumpkinseed (Radomski and Goeman 2001)
  - Fish diversity (Jennings et al. 1999)

What can we do with this information?

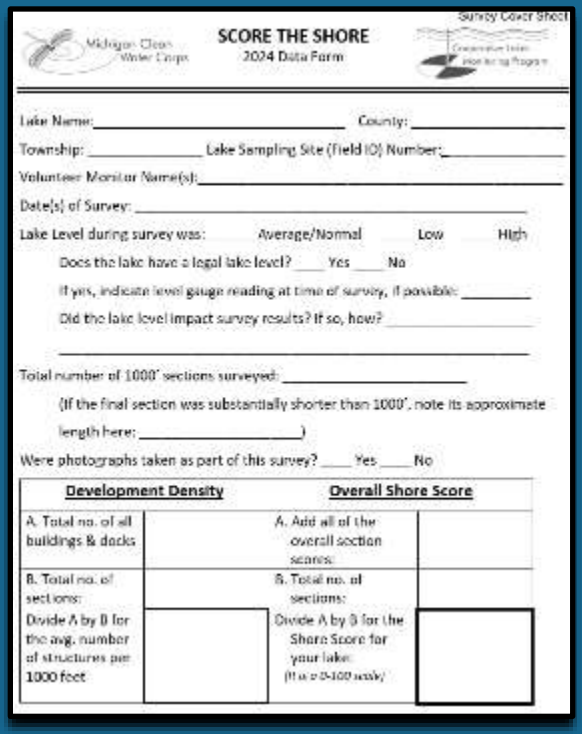
- *Midwest Glacial Lakes Partnership*


Protection
Rehabilitation and Mitigation
LOW
Protection examples:
-Conservation easements
-Zoning ordinances
-Invasive species prevention
-Lake monitoring
MAIN ST
S CURTIS RD
SANDTOWN RD
SPRANG RD
WOLFE RD
LONG PO
MANISTIQUE LAKES RD
MCCONNEL RD
Strom Creek
CAMP A RD
ANDALL RD
SOUTH MANISTIQUE LAKE
OLD BRYAN GRADE RD
NORTON RD
Norton Creek
HEMPFIELD
Armored Shoreline (%)
0 - 10
11 - 25
26 - 100
Shoreline modification of 25% or less of the lake is recommended to provide reasonable owner access and recreational use, while preserving ecological integrity, sustaining natural resources for future generations, and protecting the public trust (O'Neal & Soulliere 2006). Approximately 10.8% of the South Manistique (Whitefish) Lake shoreline has been altered.
0
0.38
0.75 Miles
DNR
Mapped on 03/19/2025


Protection
Rehabilitation and Mitigation
HIGH
Gents Creek
US 2
LITTLE MUDDY LAKE
MACDONALD LAKE RD
GULLIVER LAKE
REID RD
COUNTY ROAD 434
Gulliver Lake Outlet
CLEAR LAKE
LAKE MICHIG
Rehab-Mitigation:
-Bioengineered shorelines
-Woody habitat installation
-Aquatic vegetation planting
-No-mow zones
Armored Shoreline (%)
0 - 10
11 - 25
26 - 100
Shoreline modification of 25% or less of the lake is recommended to provide reasonable owner access and recreational use, while preserving ecological integrity, sustaining natural resources for future generations, and protecting the public trust (O'Neal & Soulliere 2006). Approximately 34.6% of the Gulliver Lake shoreline has been altered .
0
0.17
0.35 Miles
DNR
Mapped on 09/11/2025

Take home

1). Acknowledge we have an impact.
2). Take the lake's blood pressure.
3). Consult with professionals.



SCORE THE SHORE
2024 Data Form

Survey Cover Sheet

Lake Name: _____ County: _____

Township: _____ Lake Sampling Site (Field ID) Number: _____

Volunteer Monitor Name(s): _____

Date(s) of Survey: _____

Lake Level during survey was: Average/Normal Low High

Does the lake have a legal lake level? ___ Yes ___ No

If yes, indicate level gauge reading at time of survey, if possible: _____

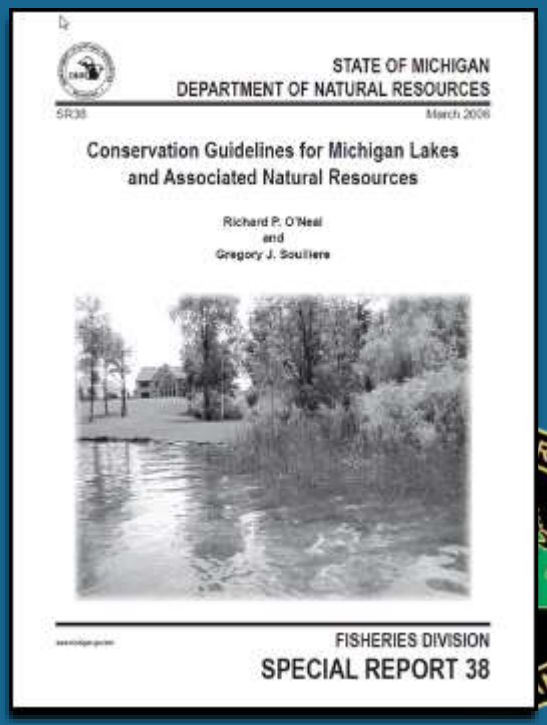
Did the lake level impact survey results? If so, how? _____

Total number of 1000' sections surveyed: _____

(If the final section was substantially shorter than 1000', note its approximate length here: _____)

Were photographs taken as part of this survey? ___ Yes ___ No

Development Density		Overall Shore Score	
A. Total no. of all buildings & docks		A. Add all of the overall section scores:	
B. Total no. of sections:		B. Total no. of sections:	
Divide A by B for the avg. number of structures per 1000 feet		Divide A by B for the Shore Score for your lake: (If in a 0-100 scale)	



STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES

SR38 March 2006

Conservation Guidelines for Michigan Lakes and Associated Natural Resources

Richard P. O'Neal
and
Gregory J. Soulliere

FISHERIES DIVISION
SPECIAL REPORT 38

Questions…

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  - 248-221-8110