Muskellunge Club of Wisconsin: UWSP/WICFRU Muskie Research Update

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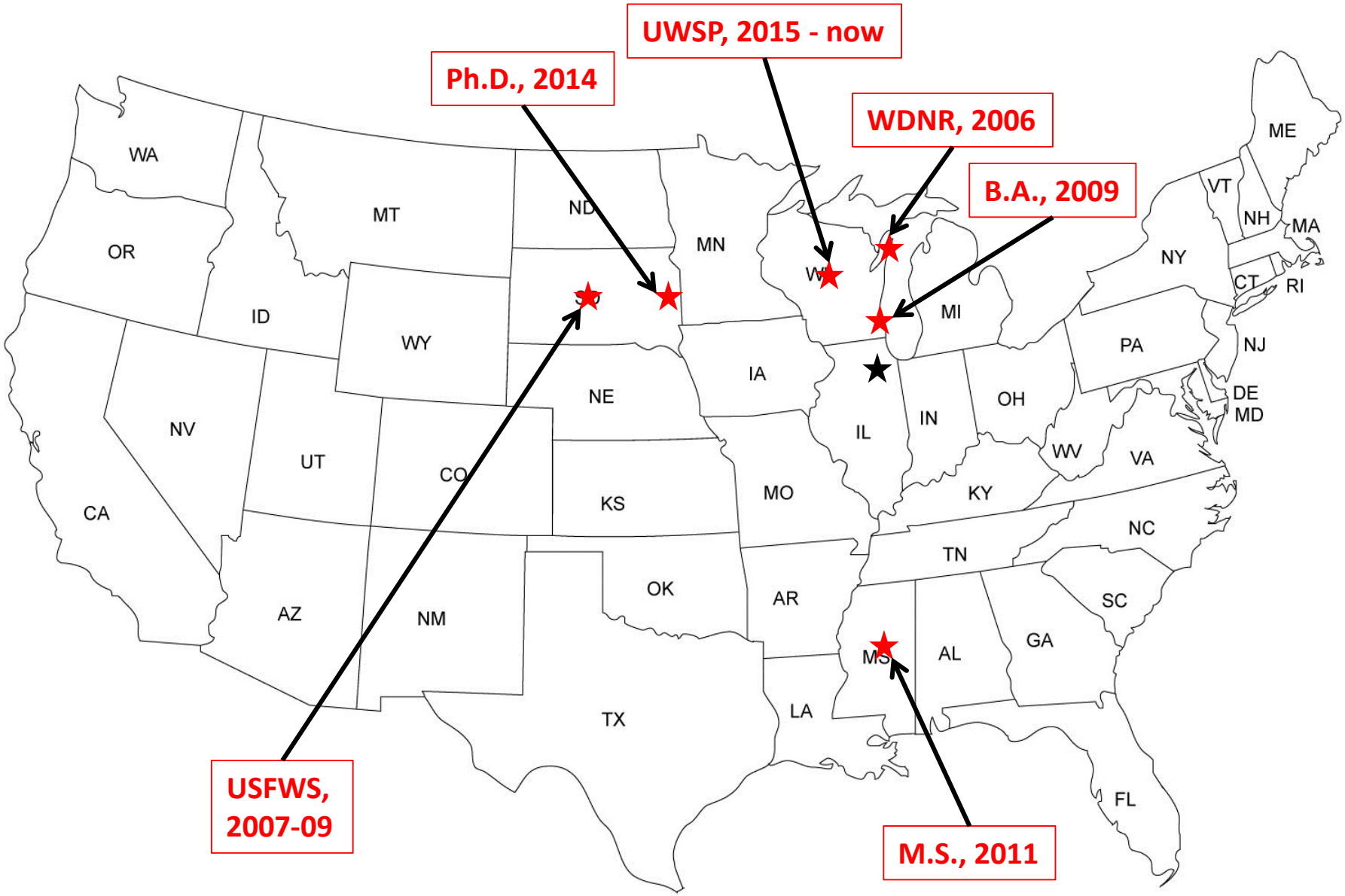
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Electrofishing catchability of age-0 muskellunge in northern Wisconsin lakes

THANK YOU!!

Musky Alliance Clubs	Club Location
Between the Lakes Chapter of Muskies, Inc.	Sheboygan Falls, WI
Bill's Musky Club, Inc.	Wausau, WI
C&R Musky Club	Appleton, WI
Capital City Chapter of Muskies, Inc.	Madison, WI
Consolidated Musky Club, Inc.	Wisconsin Rapids, WI
Dave's Musky Club, Inc.	Kaukauna, WI
First Wisconsin Chapter of Muskies, Inc.	Eau Claire/Chippewa Falls, WI
God's Country of Muskies, Inc.	La Crosse, WI
Hayward Lakes Chapter of Muskies, Inc.	Hayward, WI
Milwaukee Chapter of Muskies, Inc.	Milwaukee, WI
Muskellunge Club of Wisconsin	Milwaukee, WI
Northwoods Muskies Chapter of Muskies, Inc.	Minocqua, WI
Titletown Muskies of Muskies, Inc.	Green Bay, WI
Twelve Apostles Musky Club, Inc	Stevens Point, WI
Winnebagoland Musky Club	Fond du Lac, WI

WDNR fisheries management

- Protect, restore, and enhance
  - Fisheries habitat
  - Self-sustaining fisheries
  - Fish assemblages
  - Aquatic communities

Science-based management

- Improve the information available for populations
  - Abundance
  - Size-structure
  - Relative abundance of the associated fish community

- Information is used to:
  - Track changes in populations through time
  - Evaluate regulations
  - Evaluate effectiveness of stocking

Wisconsin's stocking program

- Supplement natural reproduction
- Maintain populations where no natural recruitment occurs

Muskellunge population monitoring

- Frame netting surveys
  - Adult population estimates
- Electrofishing surveys
  - Age-0 recruitment estimates

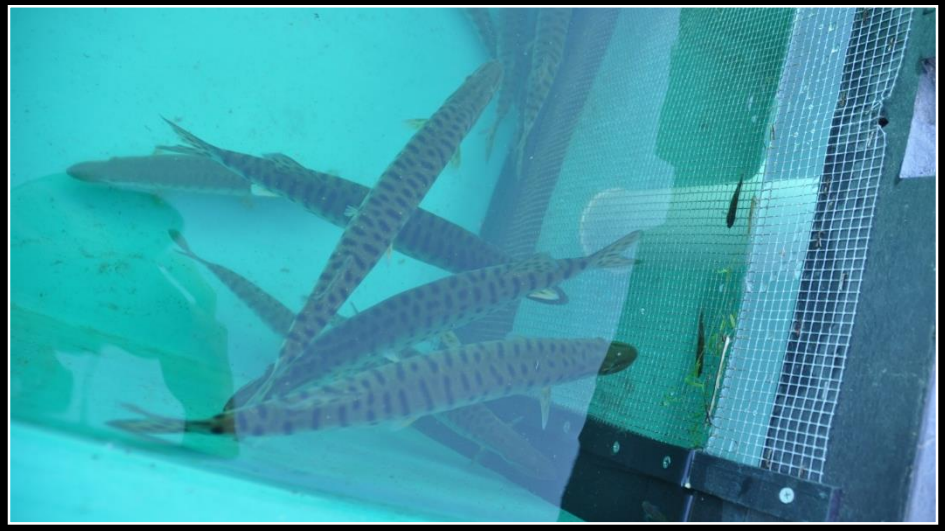
Catch per unit effort (CPUE)

- Index of population density
  - Number of fish caught per hour or mile of electrofishing

- Assumptions:
  - Constant catchability
  - Proportional to actual abundance
    - Changes in CPUE reflect changes in actual population abundance
      - i.e., higher CPUE = more fish in lake

Age-0 muskellunge

- Capture rates tend to be low for both wild and stocked fish
- CPUE may be an uncertain index of abundance?
  - Do changes in CPUE reflect changes in actual abundance?



Objectives

- Primary
  - Determine the effectiveness of electrofishing for capturing age-0 muskellunge

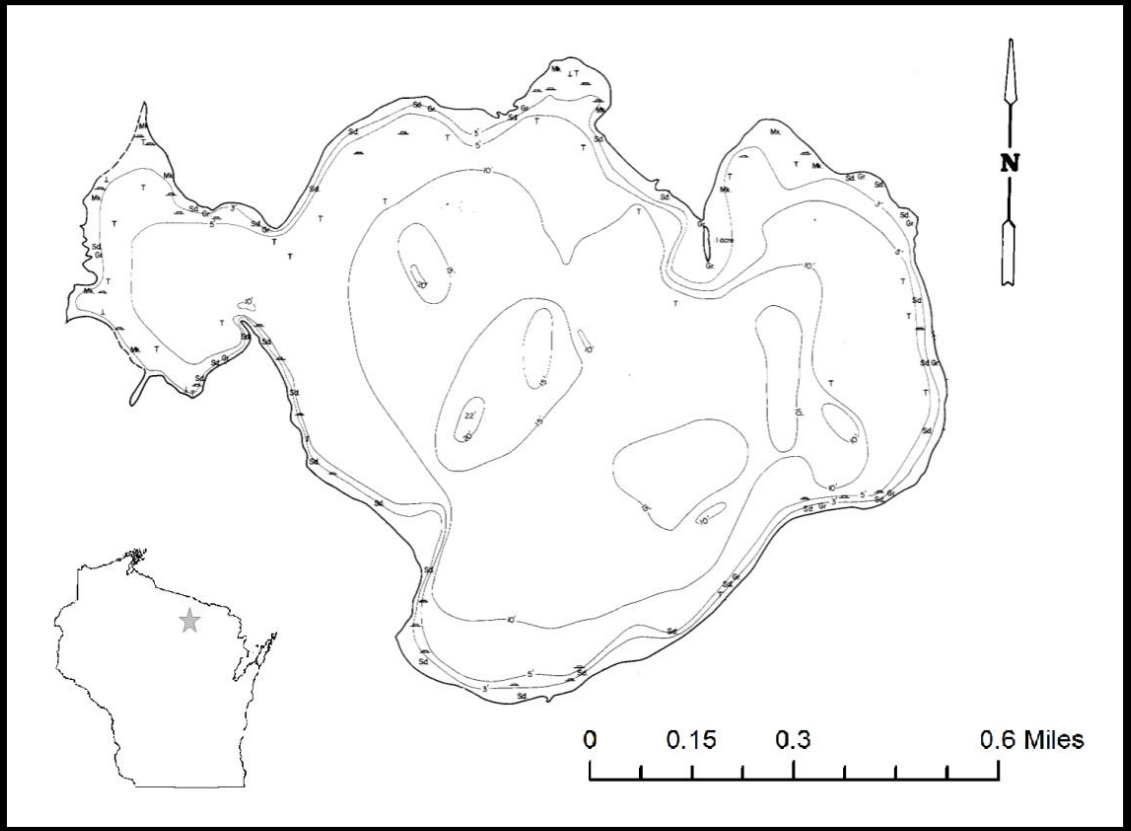
- Secondary
  - Estimate survival and dispersal of stocked fish

Muskellunge stocking

- Upper Gresham: 362 fish
- Stella: 415 fish
- Size: 10 – 14 inches

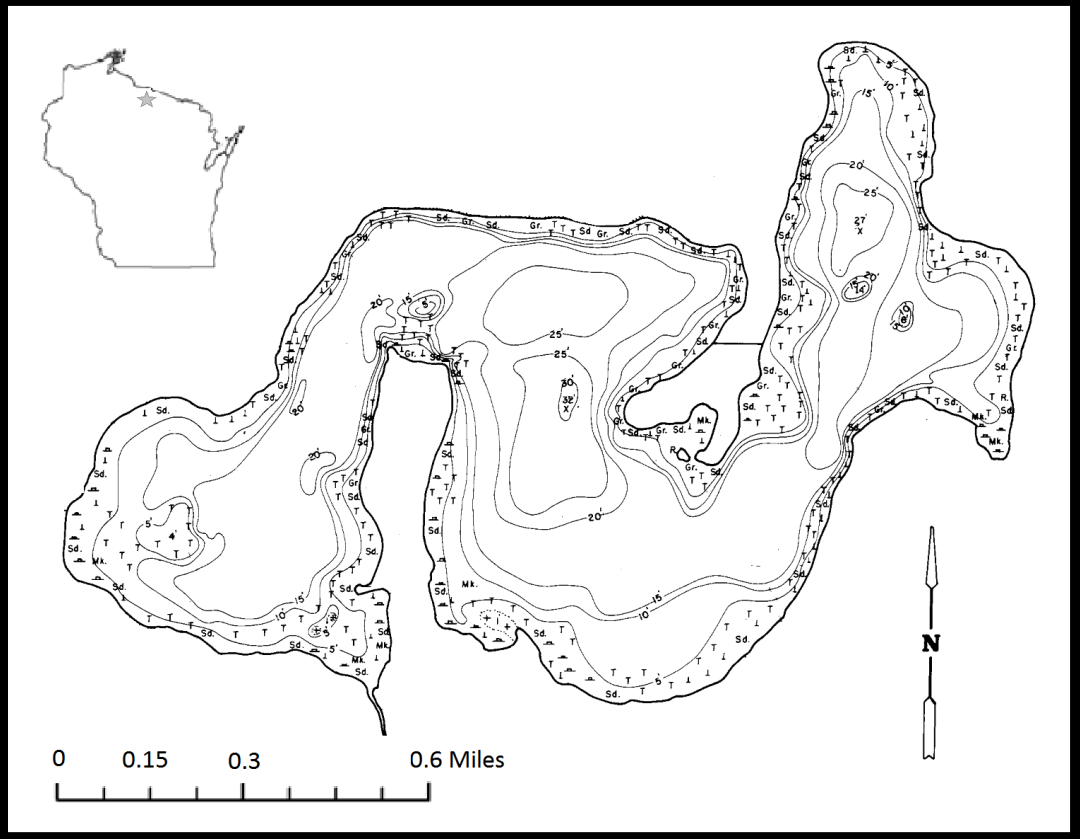
Stella Lake

- 415 acres
- 4.4 miles of shoreline
- 9 ft average depth
- 22 ft max depth



Upper Gresham Lake

- 362 acres
- 5.8 miles of shoreline
- 13 ft mean depth
- 32 ft max depth



Telemetry

- Implant 40 fish/lake
  - Radio and passive integrated transponders (PIT)
- One day and one night trip/lake/week for 4 weeks

Implanting transmitters

Average Surgery time
- 2.5 mins

Anesthesia
- Aqui-S

48 hr. recovery period

Electrofishing protocol

WDNR Protocol

- Night electrofishing
- Shock entire shoreline
- Water temps between 50 and 65° F
- Record length, marks, and scan for PIT tags

Study Protocol

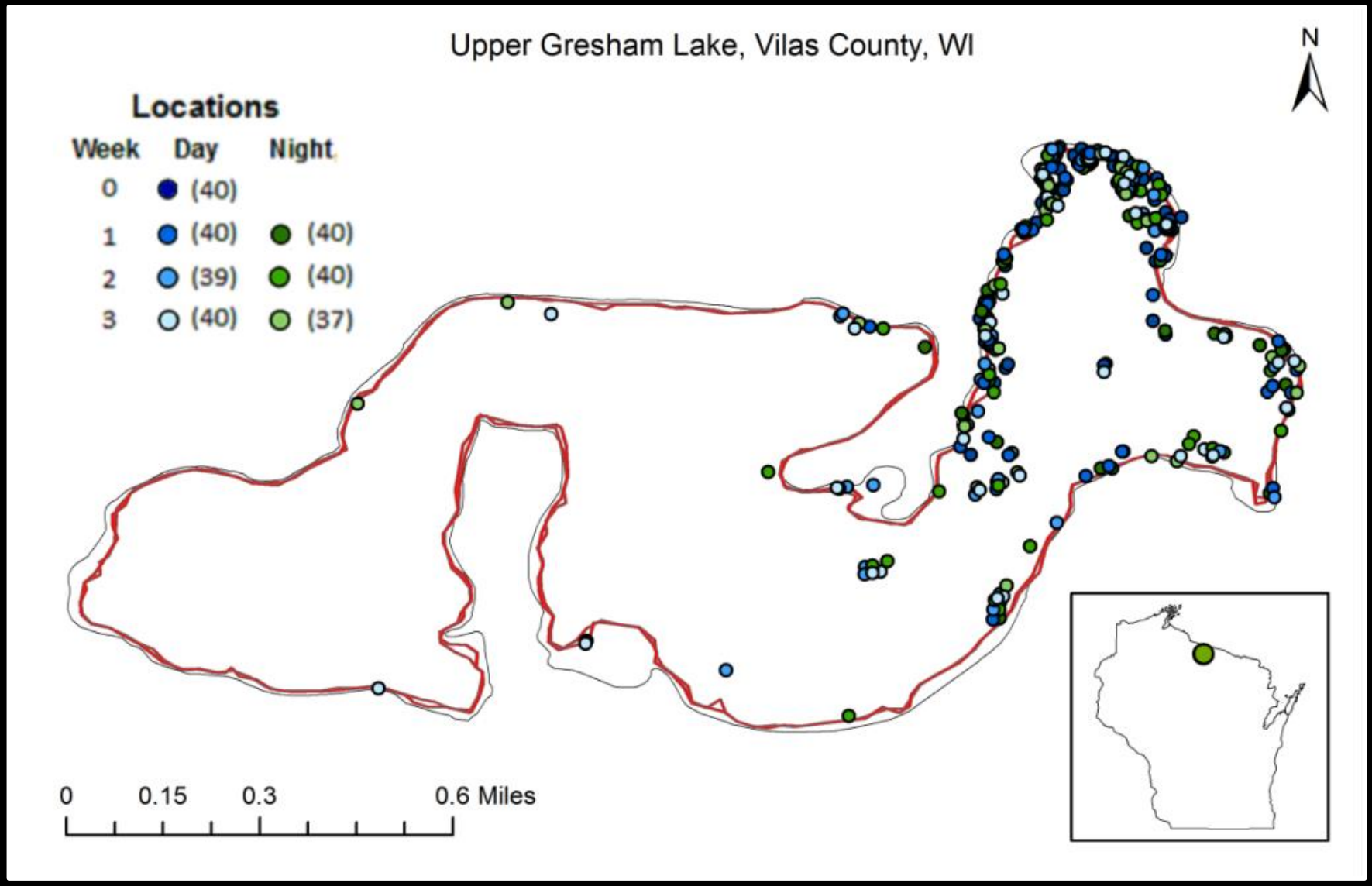
- Weekly for 3 weeks
- Record boat transect

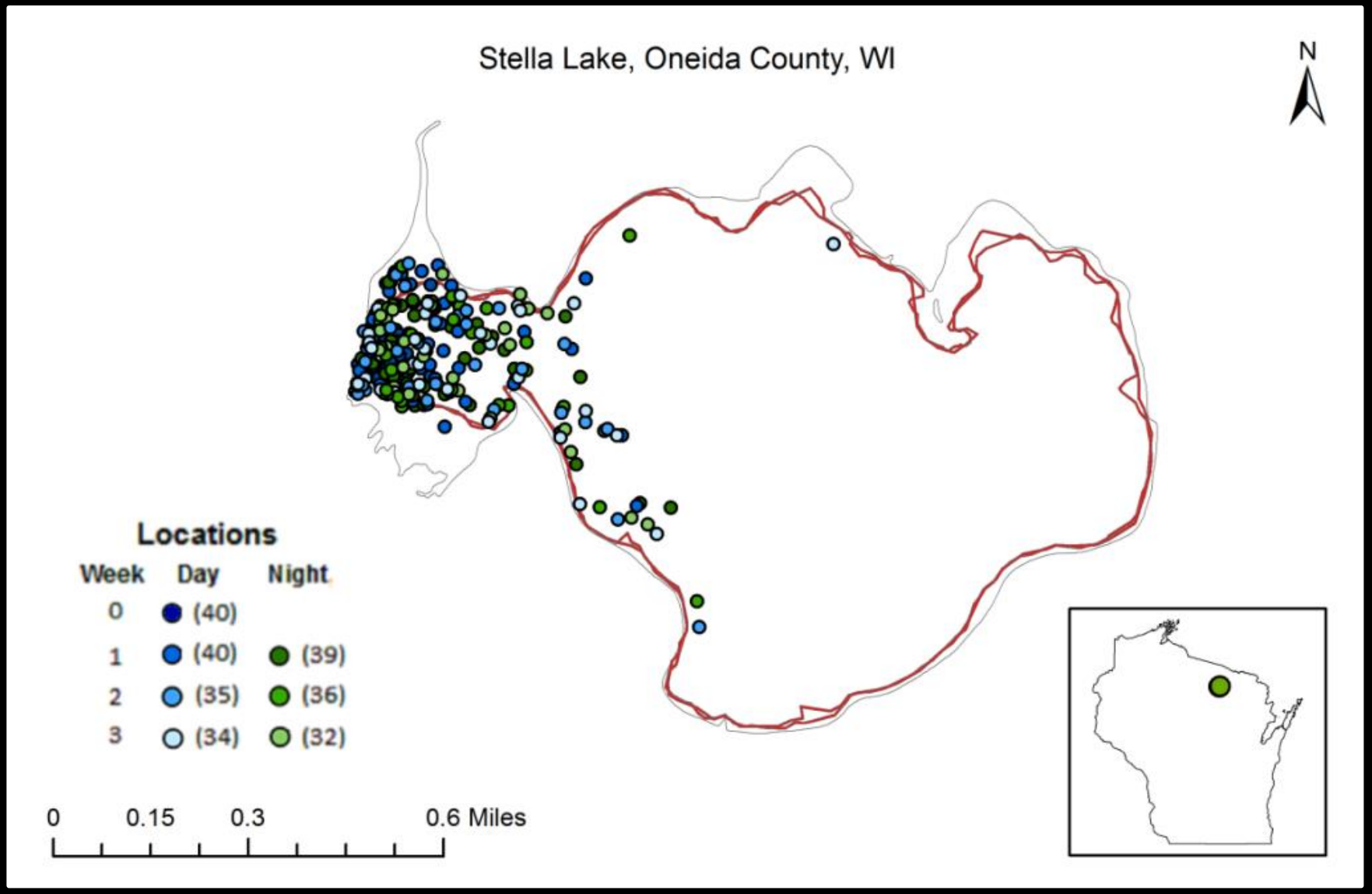
Analytical methods

- Catchability:
  - Compare path of electrofishing boat with locations of individual fish – what proportion of located fish were available to gear?
- Dispersal:
  - Measure average distance traveled from stocking location (i.e., boat launch).
- Survival:
  - What proportion of tagged fish were identified as “alive” at 2 weeks post-stocking?

Results

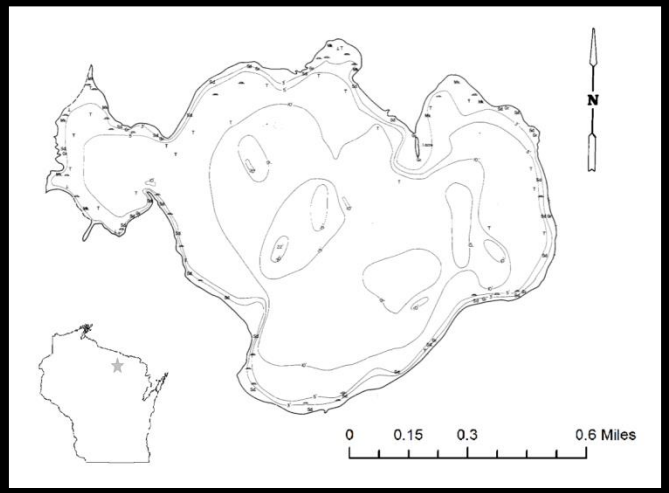
- Ninety fish tagged
  - Eight fish died or were removed from the study prior to stocking
  - Two transmitters failed
- Two week post stocking survival
  - Mortality defined by lack of movement
  - Upper Gresham (2 fish died): 93%
  - Stella (3 fish died): 95%

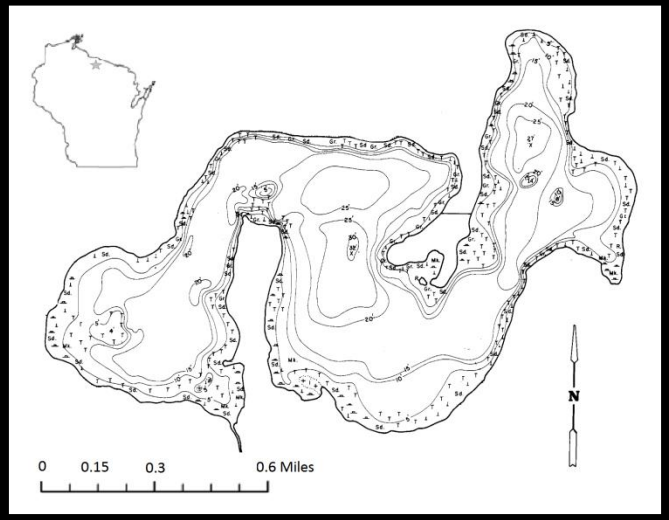

Upper Gresham Lake, Vilas County, WI
N
Locations
Week Day Night
0 (40)
1 (40) (40)
2 (39) (40)
3 (40) (37)
0 0.15 0.3 0.6 Miles


Stella Lake, Oneida County, WI
N
Locations
Week Day Night
0 (40)
1 (40) (39)
2 (35) (36)
3 (34) (32)
0 0.15 0.3 0.6 Miles

Result	Upper Gresham	Stella
Survival (2 wk)	93%	95%
Detection	99%	91%
Dispersal	0.40 miles	0.25 miles
CPUE	1.36 fish/mile	0.38 fish/mile
Vulnerability	**25%**	**6%**

Habitat matters





With your support, we were able to gather important info relative to:

- Catchability:
  - Relatively low, variable within and among lakes
    - Could be problematic, but a modified sampling scheme may help (see next slide)
- Dispersal:
  - Relatively low, but that’s what muskies do
- Survival:
  - High!

Moving forward

- If the goal is to maximize the number of stocked muskellunge captured, traditional shoreline transects may not be the best electrofishing strategy.

- Modify sampling protocols to evaluate muskellunge stocking success
  - Stratifying sampling effort
  - Spend more time sampling where fish are located

Future (ongoing) research

- Two additional lakes in southern Wisconsin:
  - Twin Valley
  - Yellowstone
- Sampling complete as of 10/21/16 – data preparation & analysis during Winter 2016/17
- Initial observations:
  - Several fish lost through water control structures, several lost to avian predation (cormorants)

Acknowledgments

- WICFRU
  - Andrea Musch
- Undergraduate students
  - Kate Carpenter
  - Zach Witzel
- Graduate students
  - Josh Schulze
  - Doug Zentner
- WDNR partners
  - Steve Gilbert
  - John Kubisiak

- Contributions from
  - Hugh C. Becker Foundation

Growth, Condition, and Short-term Survival of Age-0 Muskellunge Reared Using Two Different Techniques

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Muskellunge propagation

- 80% of musky fisheries in WI have been stocked
- In 2012, WDNR produced ≈ 100,000 large fingerlings
- Currently, concerns exist regarding:
  - Rising demand
  - Rising cost
  - Biosecurity
  - Logistical constraints

Problem

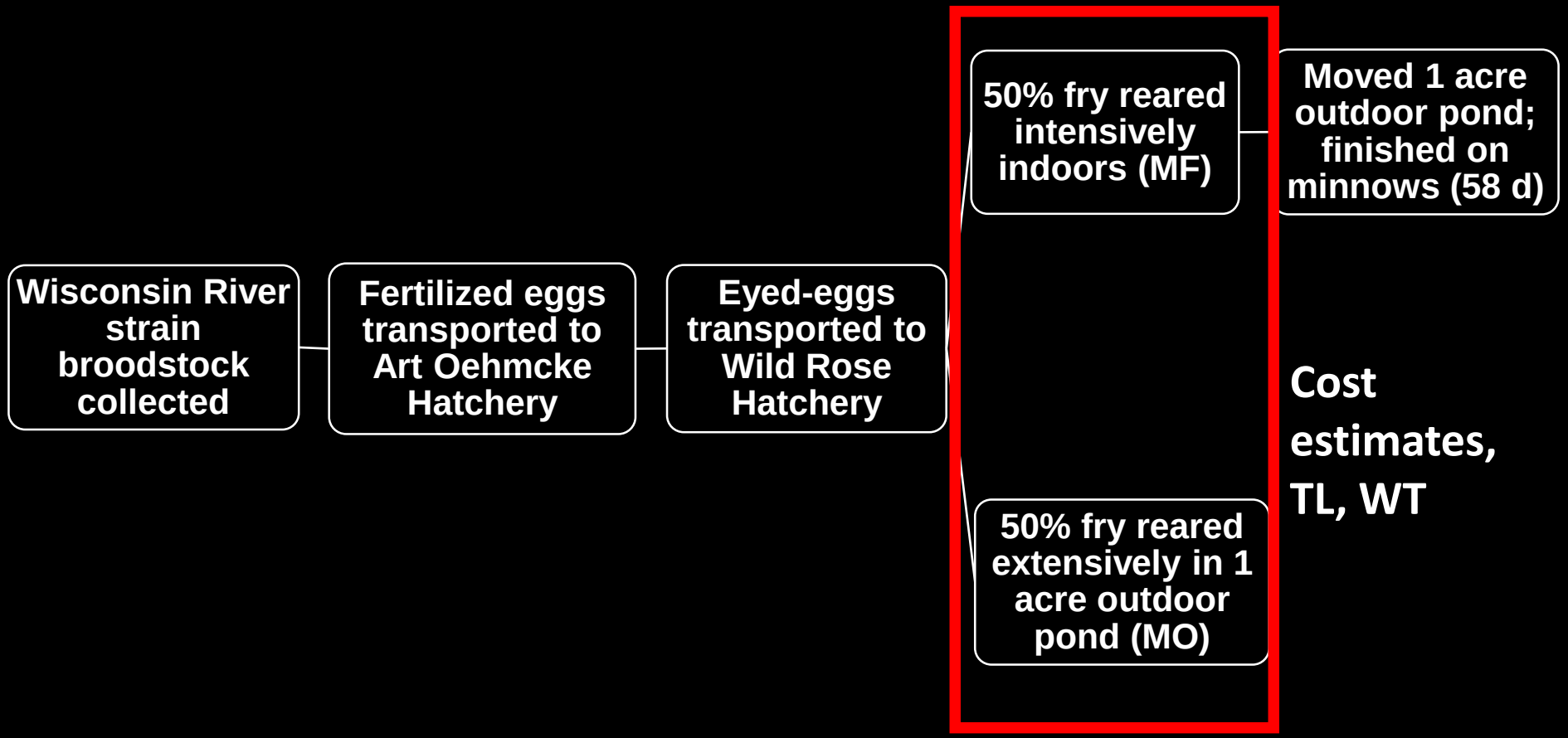
- Rearing muskellunge at current levels is not economically feasible
  - Thousands of dollars from private donations
- Current practices (forage fish) have led to concerns over biosecurity and disease
- Potential solution:
  - Rear muskellunge on dry, commercially available diets
    - Cheaper
    - Increased biosecurity
- Concerns regarding growth and survival
  - Will pellet fish “perform” the same as conventionally-reared minnow fish?

Objective

- Determine if growth, condition, short-term survival, rearing costs and health of muskellunge differed between rearing methods.

Rearing methods

- MO = Minnow only diet (current)
- MF = Pellet started, minnow finished



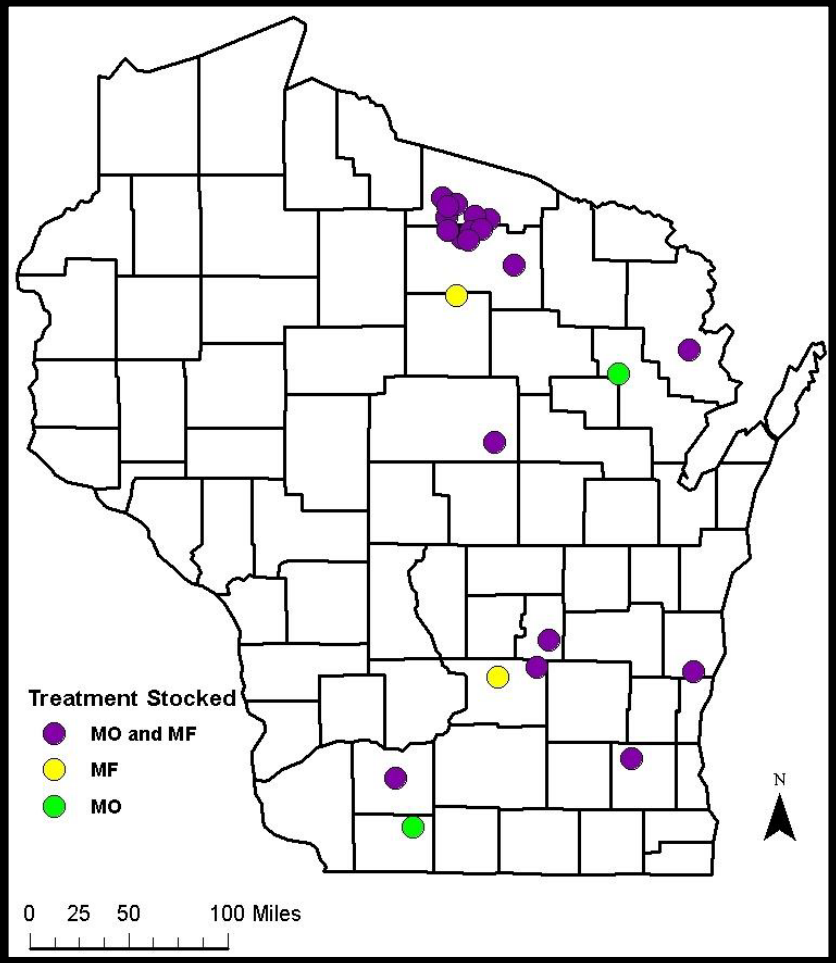
Pre-stocking methods

Fish harvested from ponds 23-24 Sept

Measure, weigh, health, differential fin-clips

Fish stocked into 23 lakes @ 1 fish/acre

Study area



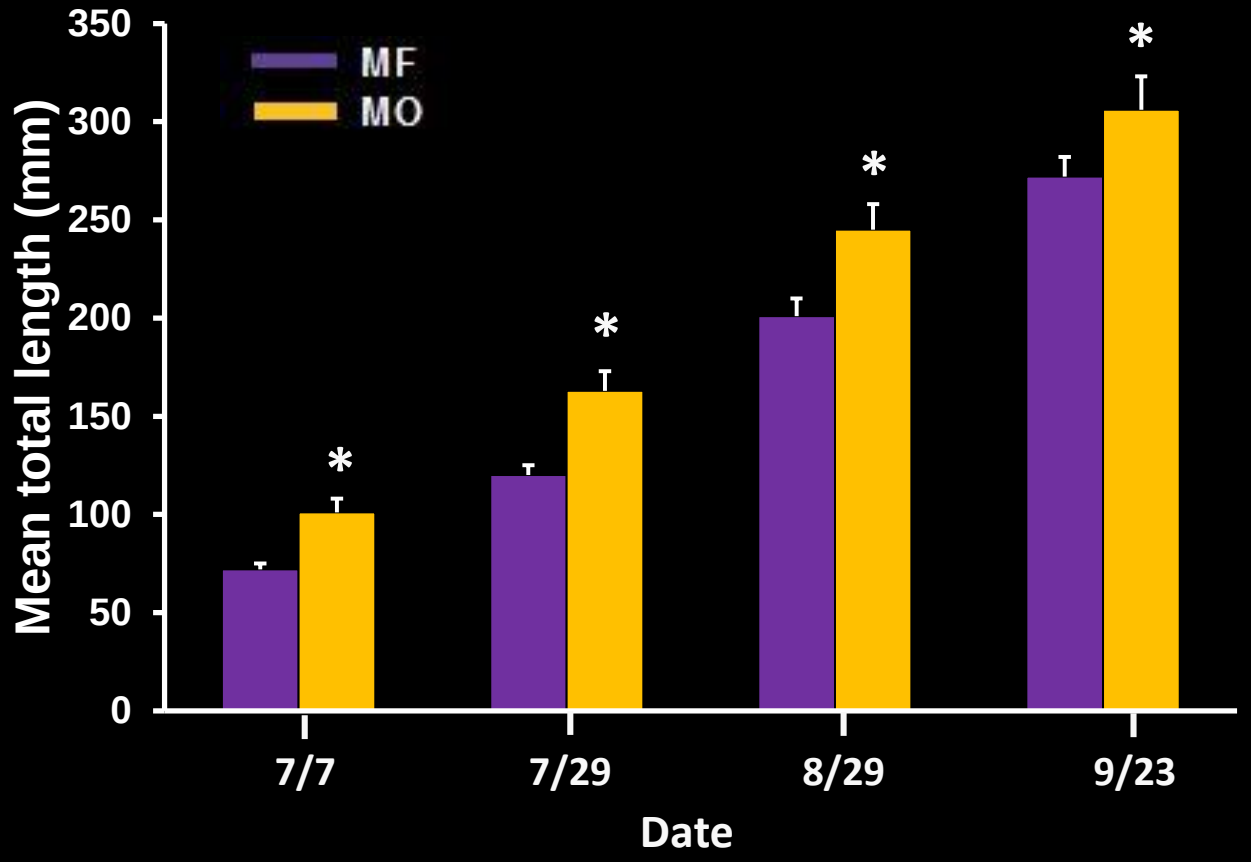
- 23 lakes
- Goal of encompassing variation in
  - Latitude
  - Longitude
  - Lake size
  - Trophic status
  - Fish communities
- Reference lakes
  - Assess competition

Post-stocking methods

- 2-6 weeks post-stocking
- Night-time boat electrofishing
- 3 nights/lake

2013: Pre-stocking lengths

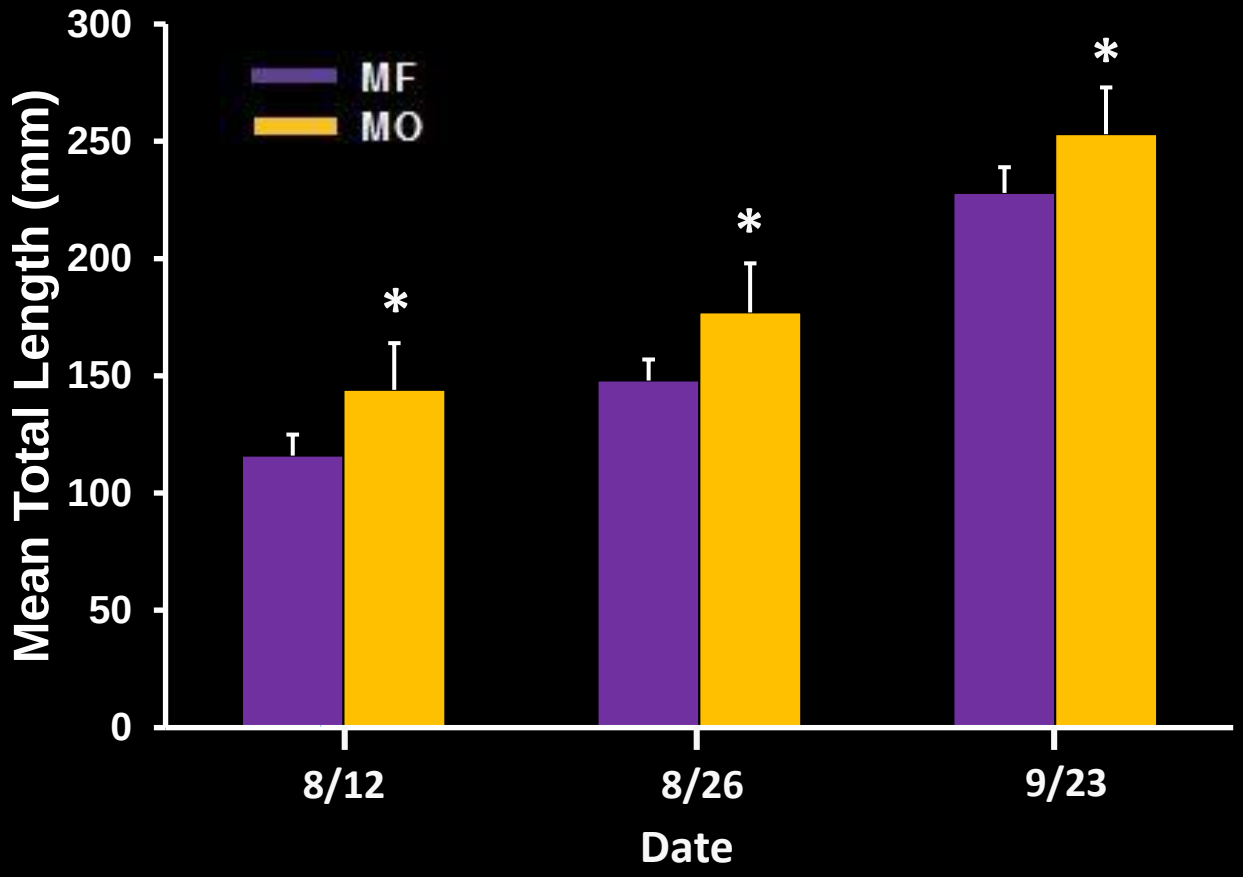
- Mean total length
- MO = 306 mm (±17)
  ~ 12”
- MF = 272 mm (±10)
  ~ 10.7”



Lakes stocked 9/23 and 9/24

2014: Pre-stocking lengths

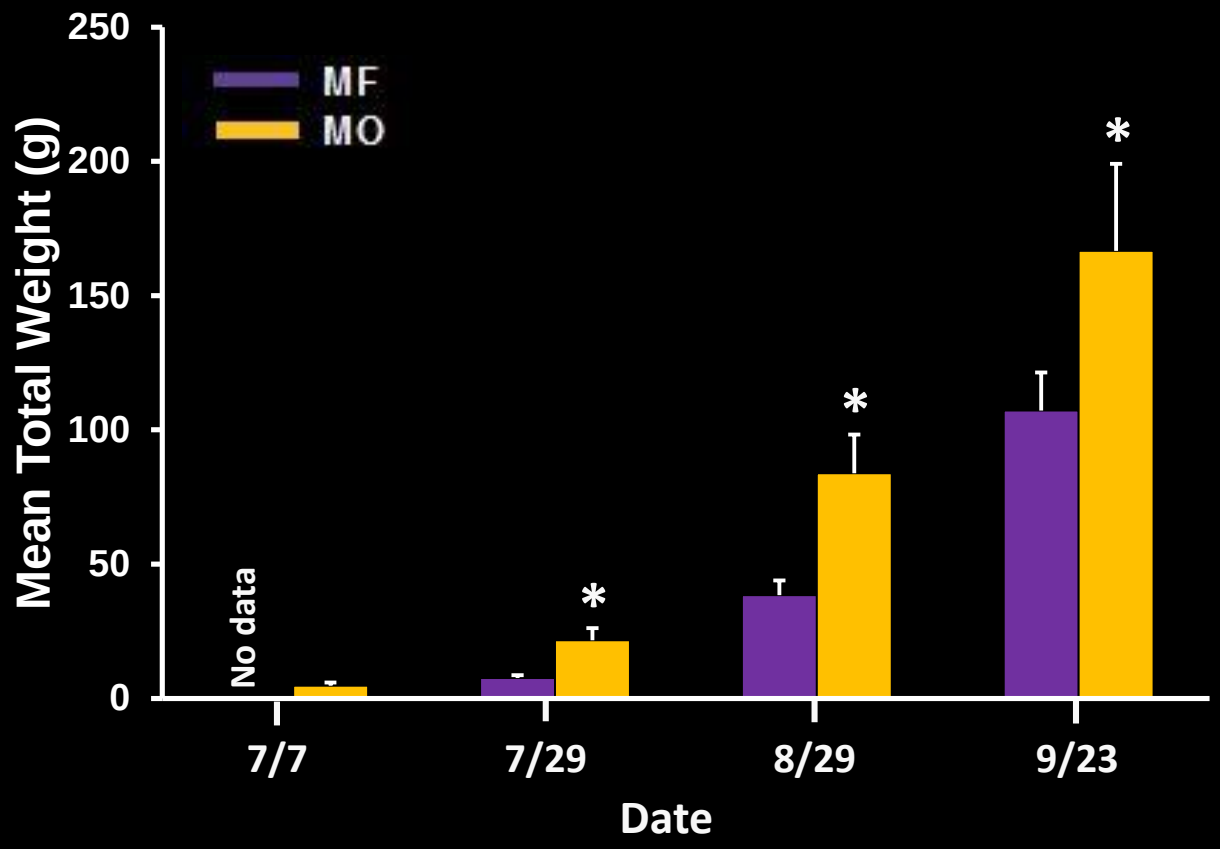
- Mean total length
- MO = 253 mm (±20)
  ~ 9.9”
- MF = 228 mm (±11)
  ~ 8.9”



Lakes stocked 9/23 and 9/24

2013: Pre-stocking weight

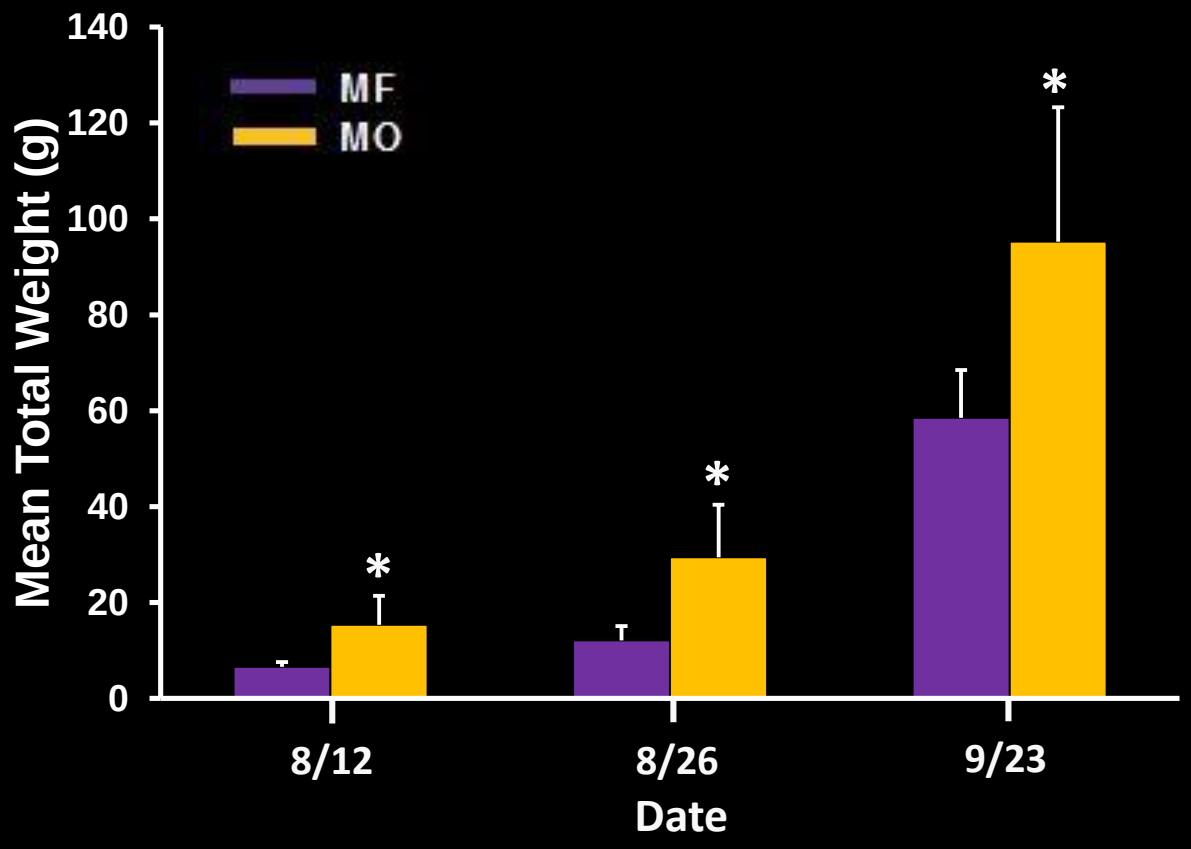
- Mean weight
- MO = 167 g (±32)
  ~ 0.36 lbs
- MF = 107 g (±14)
  ~ 0.24 lbs



Lakes stocked 9/23 and 9/24

2014: Pre-stocking weight

- Mean weight
- MO = 95 g (±28)
  ~ 0.21 lbs
- MF = 59 g (±10)
  ~ 0.13 lbs



Lakes stocked 9/23 and 9/24

Pre-stocking condition

- 2013
  - MO = 0.57 (± 0.03)
  - MF = 0.53 (± 0.03)
- 2014
  - MO = 0.57 (± 0.07)
  - MF = 0.49 (± 0.03)

Health metrics

- No major trends between treatments
  - Fat, liver, gall bladder, spleen, bacteriology
- Virology-2013
  - Negative for MO and MF fish
- Virology-2014
  - MF- tested positive for Golden Shiner virus (GSV)

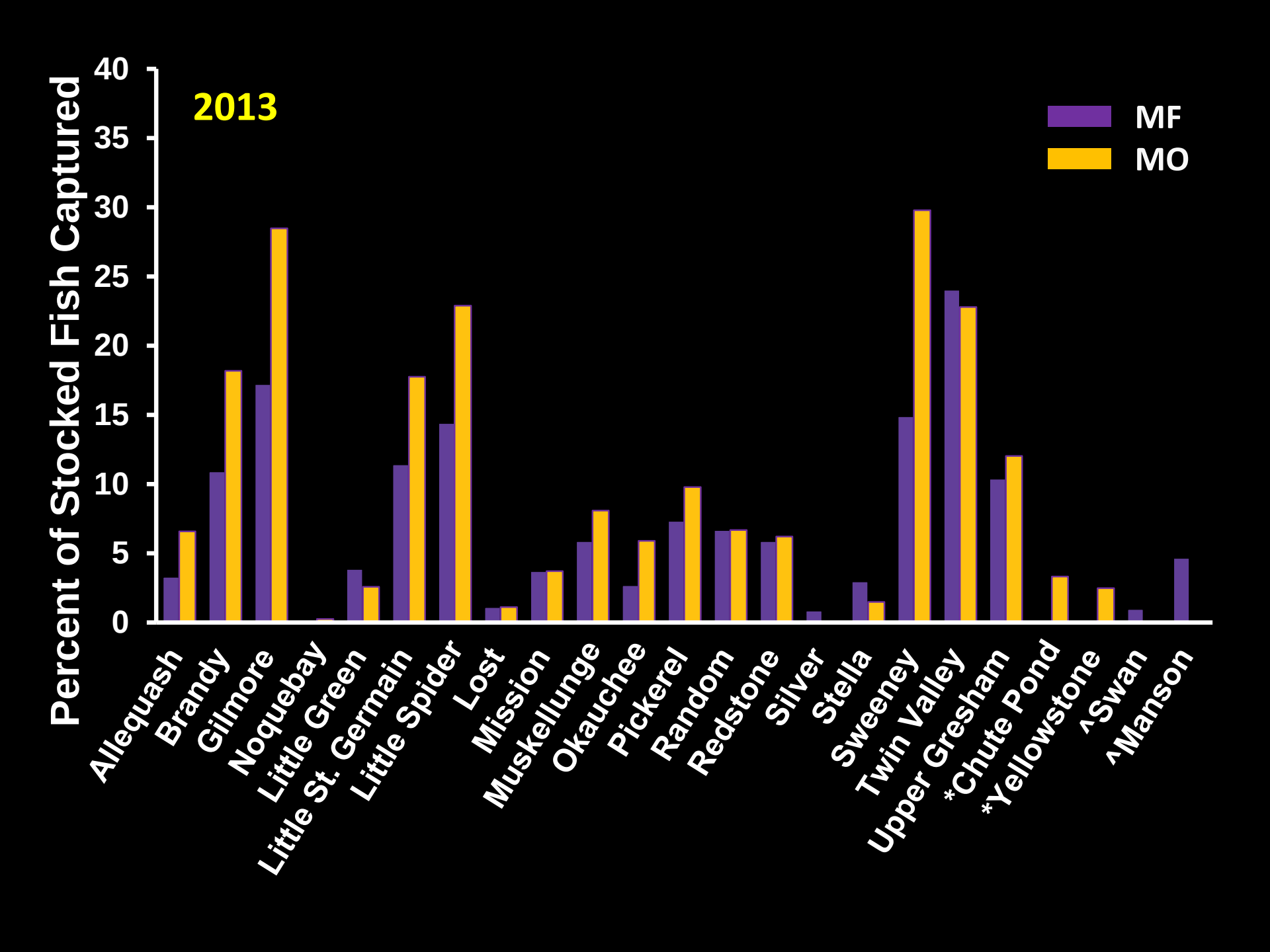
S. Marcquenski

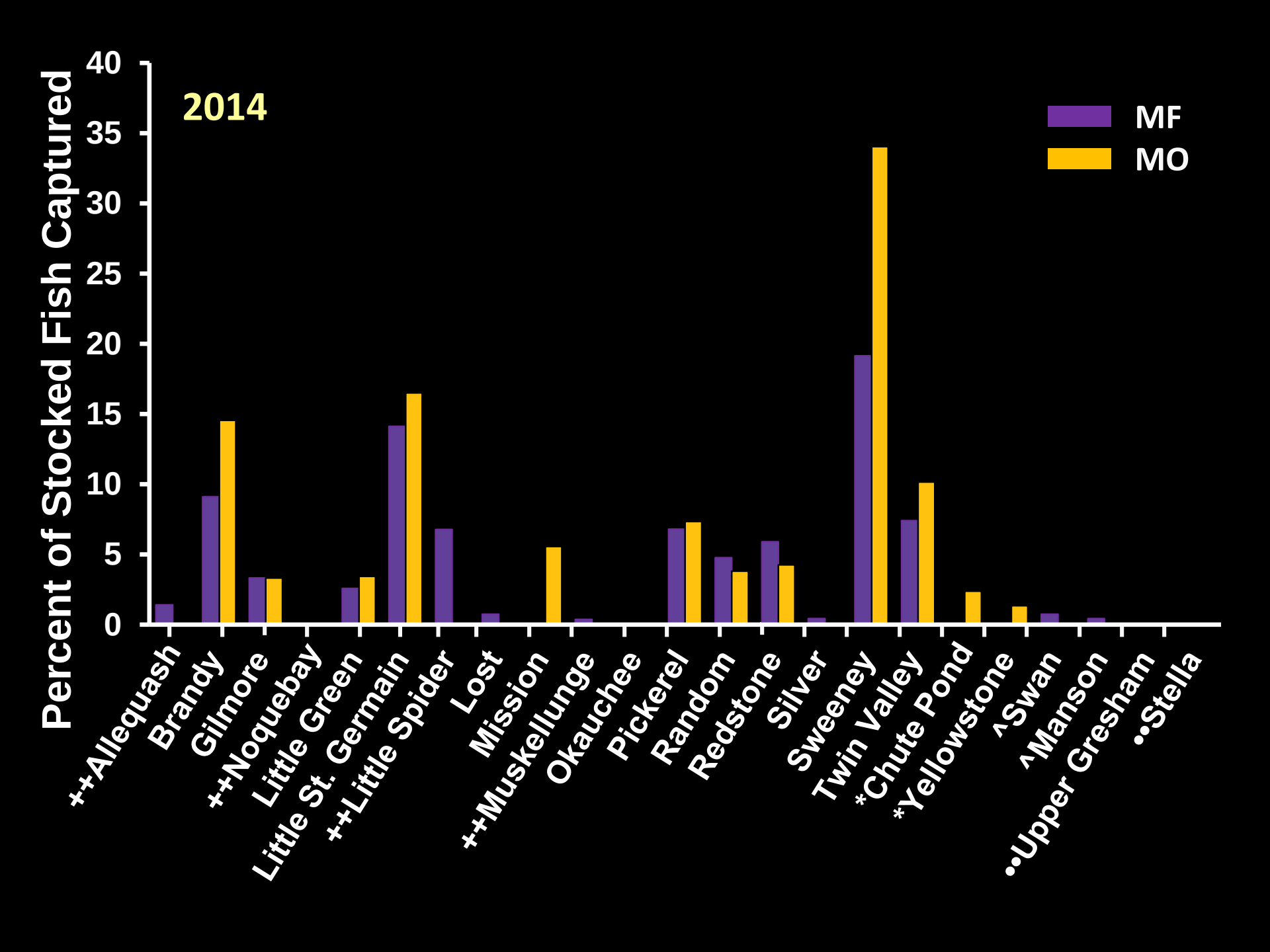
S. Marcquenski

Results: Post-stocking

- 2013- Recaptured 676 / 10,880 (6.2%) stocked fish
  - Mean recapture of MO fish (10%)
  - Mean recapture of MF fish (7.3%)
  - 1.4 to 1.0 ratio

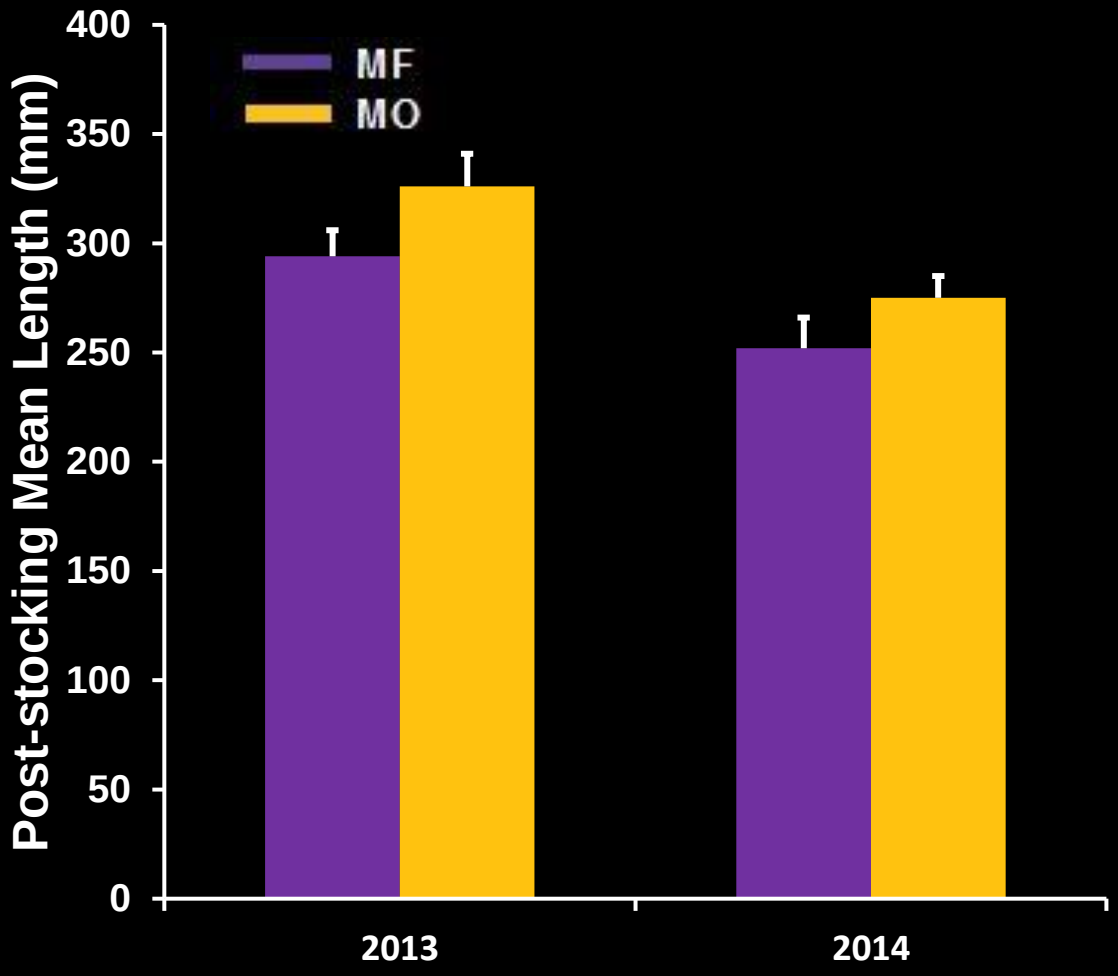
- 2014- Recaptured 395 / 10,828 (3.6%) stocked fish
  - Mean recapture of MO fish (7.1%)
  - Mean recapture of MF fish (4.4%)
  - 1.6 to 1.0 ratio


2013
MF
MO
Percent of Stocked Fish Captured
0
5
10
15
20
25
30
35
40
Allequash
Brandy
Gilmore
Noquebay
Little Green
Little St. Germain
Little Spider
Lost
Mission
Muskellunge
Okauchee
Pickerel
Random
Redstone
Silver
Stella
Sweeney
Twin Valley
Upper Gresham
*Chute Pond
*Yellowstone
^Swan
^Manson


2014
MF
MO
Percent of Stocked Fish Captured
0
5
10
15
20
25
30
35
40
++Allequash
Brandy
Gilmore
++Noquebay
Little Green
Little St. Germain
++Little Spider
Lost
Mission
++Muskellunge
Okauchee
Pickerel
Random
Redstone
Silver
Sweeney
Twin Valley
*Chute Pond
*Yellowstone
^Swan
^Manson
••Upper Gresham
••Stella

Results: Post-stocking size

- 2013
  - MO = 326 mm (± 15)
    ~ 12.8”
  - MF = 294 mm (± 12)
    ~ 11.6”
- 2014
  - MO = 275 mm (± 10)
    ~ 10.8”
  - MF = 252 mm (± 14)
    ~ 9.9”



Cost estimates

- MO require ≈ ½ the labor of MF to rear
- On average, feed costs for MO fish were 2.5x more than MF fish
  - Suckers and small forage cost a lot
  - Pellets greatly reduced feed cost
- Overall, MO fish cost ≈ 35% more to rear than MF

Summary

- MO fish were larger, in better condition at stocking
  - No differences in most health metrics
  - GSV detected in MF fish in 2014

- MO fish were captured in higher proportions
  - Average of 1.5:1 capture ratio

- MO fish cost ≈ 35% more to rear

Discussion

- Where is the balance between cost and survival?
- Short-term survival may not reflect survival to adult life stages
  - Long-term survival of MO and MF to adults
- Difference in survival at different stocking rates
  - 1 fish/acre every year is a high stocking rate

Acknowledgments

- Sport Fish Restoration
- Wisconsin Department of Natural Resources
  - Art Oehmcke State Fish Hatchery
  - Wild Rose State Fish Hatchery
  - Scot Stewart, Steve Hewett, Steve Avelallemant
- Wisconsin Cooperative Fishery Research Unit
- University of Wisconsin - Stevens Point

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Questions?

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