

# Mason Lake



**Mason Lake Management District Meeting**

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**Fisheries Biologist**

**8/31/2024**

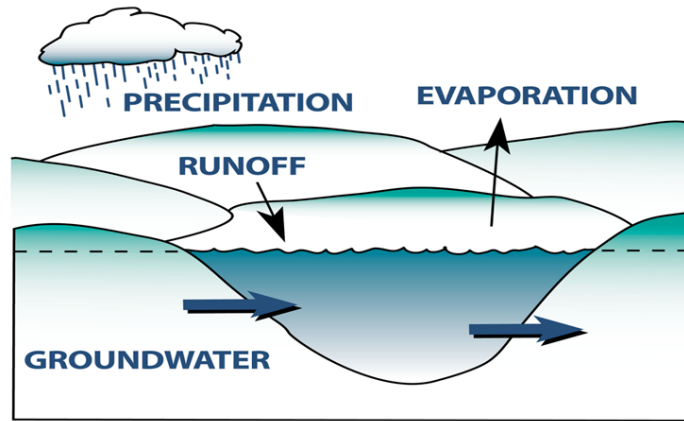
# Outline

- Stable States of Shallow Lakes – Clear vs Turbid States
- Where has Mason Lake been and where is it at?
- Survey of Property Owners – What do they want in terms of Lake State?
- Restoration; Chemical Treatment – What's involved?

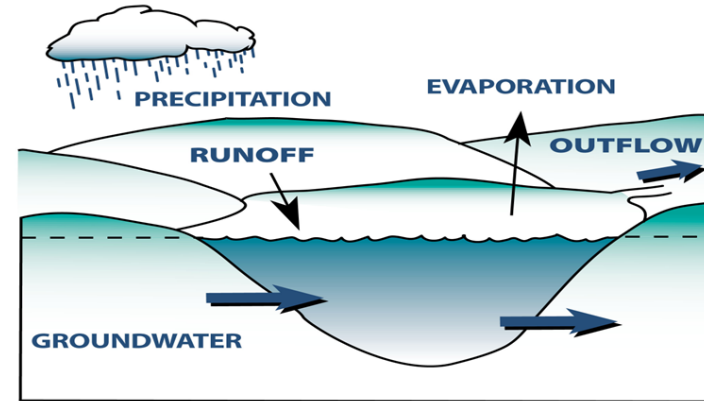
# What is a Shallow Lake?

- Average depth is less than 9.8 ft and maximum depth less than 16ft.
- Entire water column is frequently mixed – polymictic.
- Intense sediment-water interaction (not like deep lakes)
- Aquatic macrophytes – strong hold for stability of system.
  - Nutrient uptake
  - Wind attenuation
  - Home/Protection for invertebrates & zooplankton – phytoplankton down
  - Helps prevent algae blooms
  - Keeps the fish community comprised of Piscivores

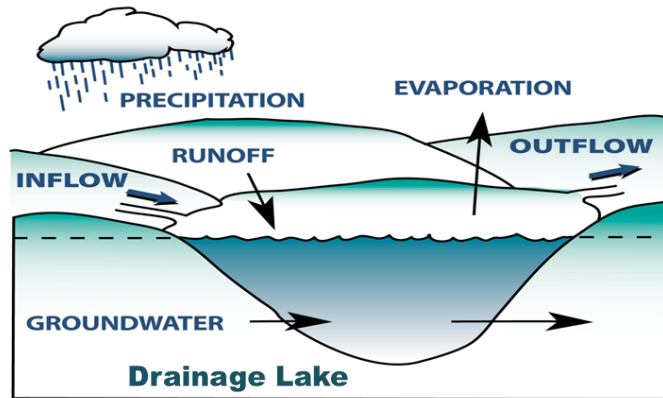
# What are the different types of lakes?



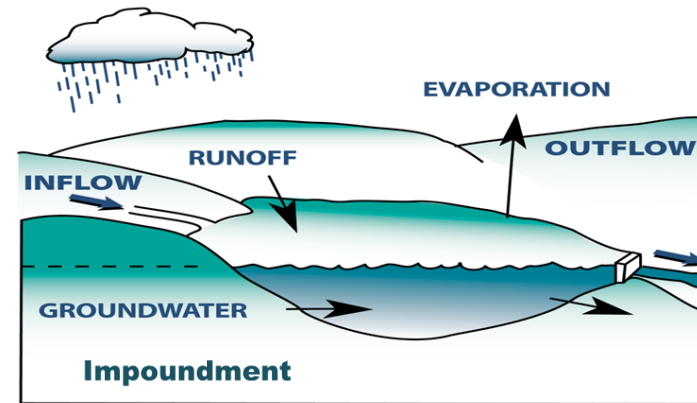
Seepage Lake



Groundwater Drainage Lake

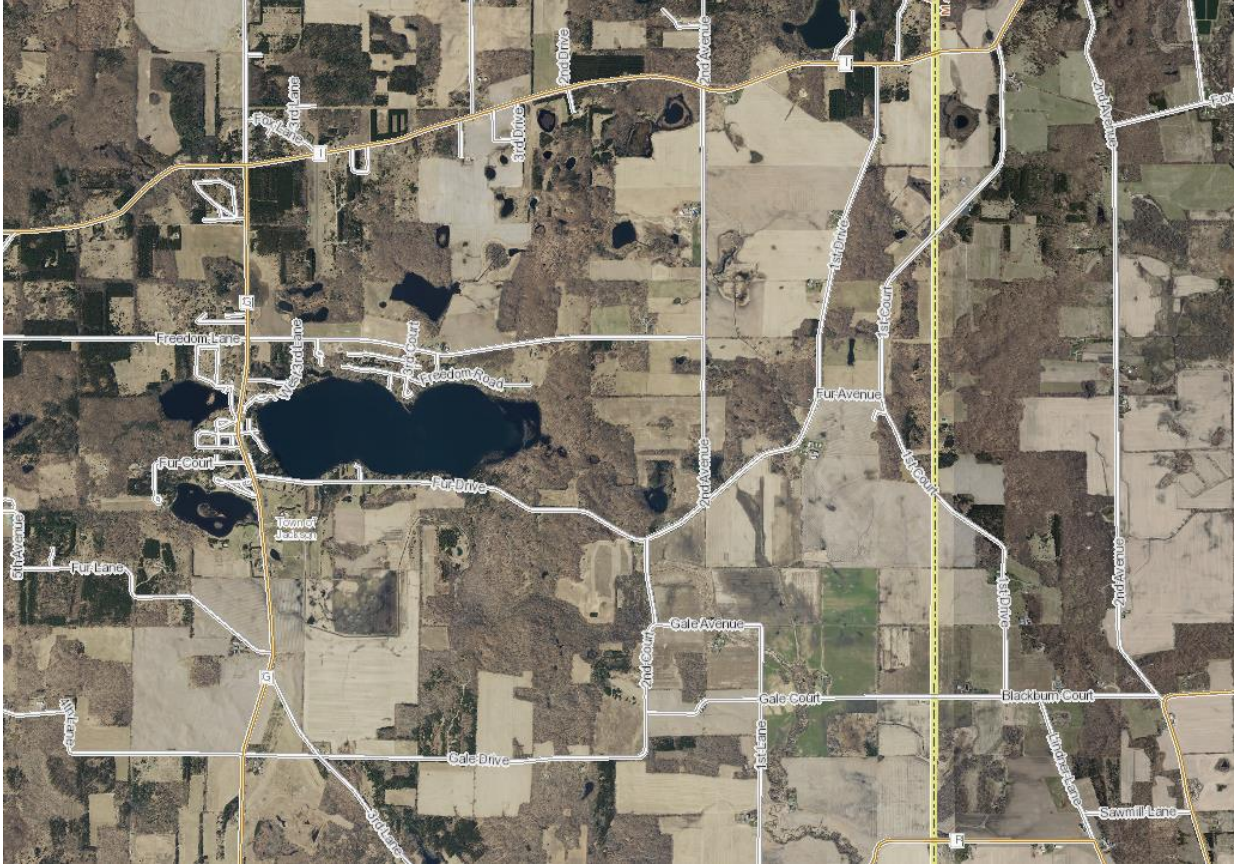


Drainage Lake



Impoundment

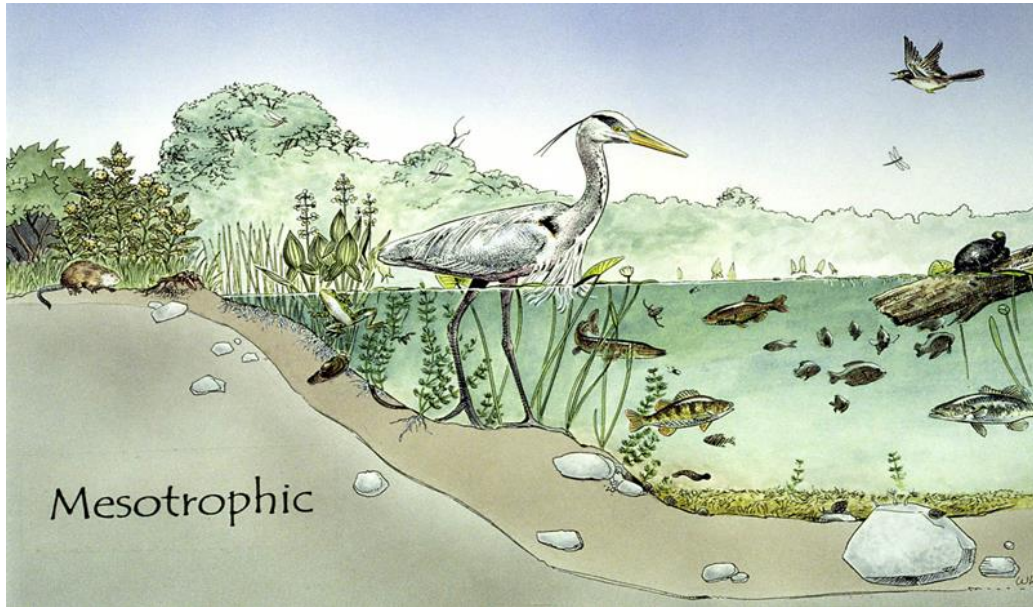
# Jordan Lake



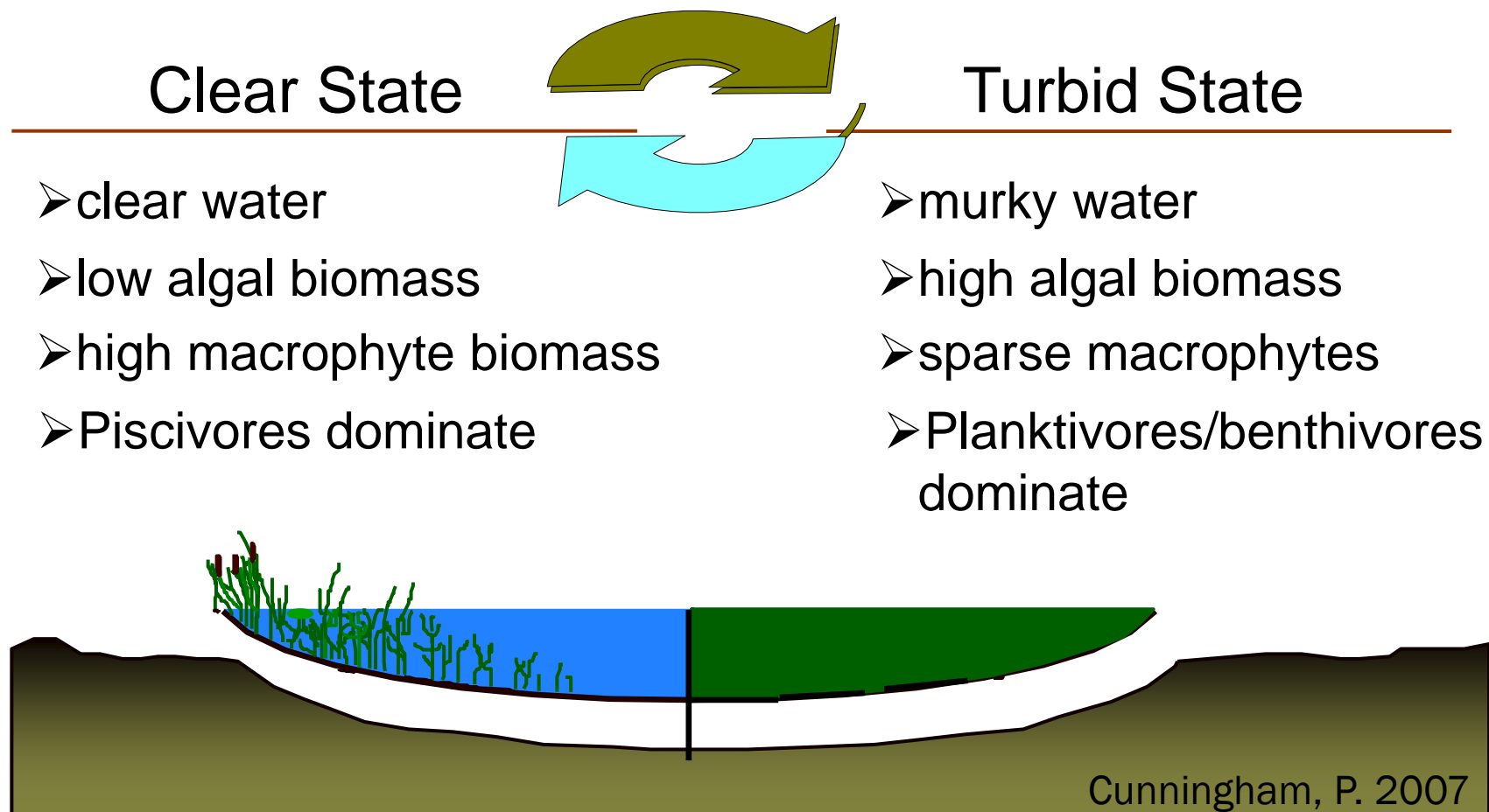
# Mason Lake



# Trophic States

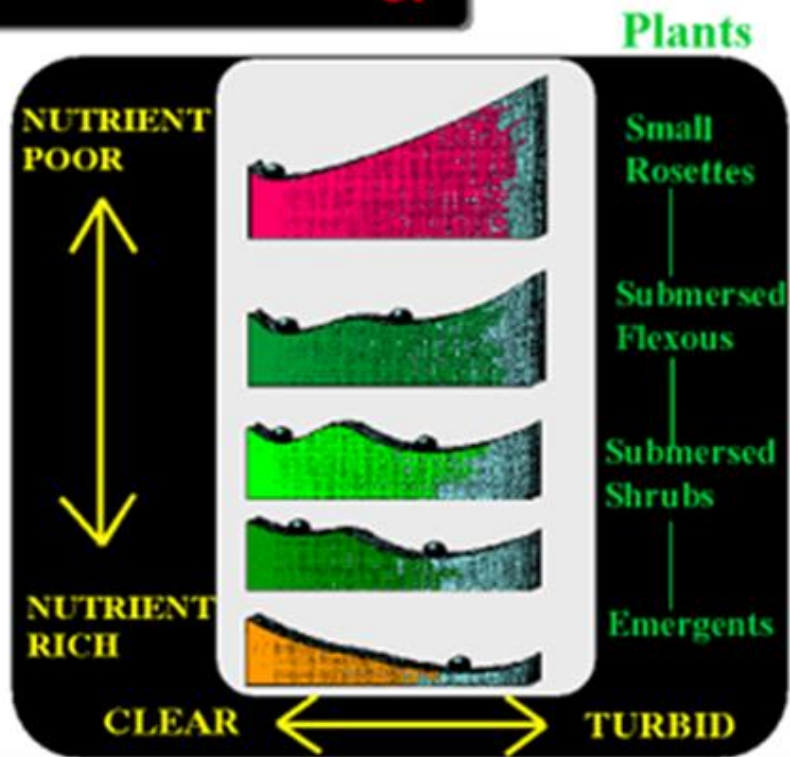


# Stable States in Shallow Lakes



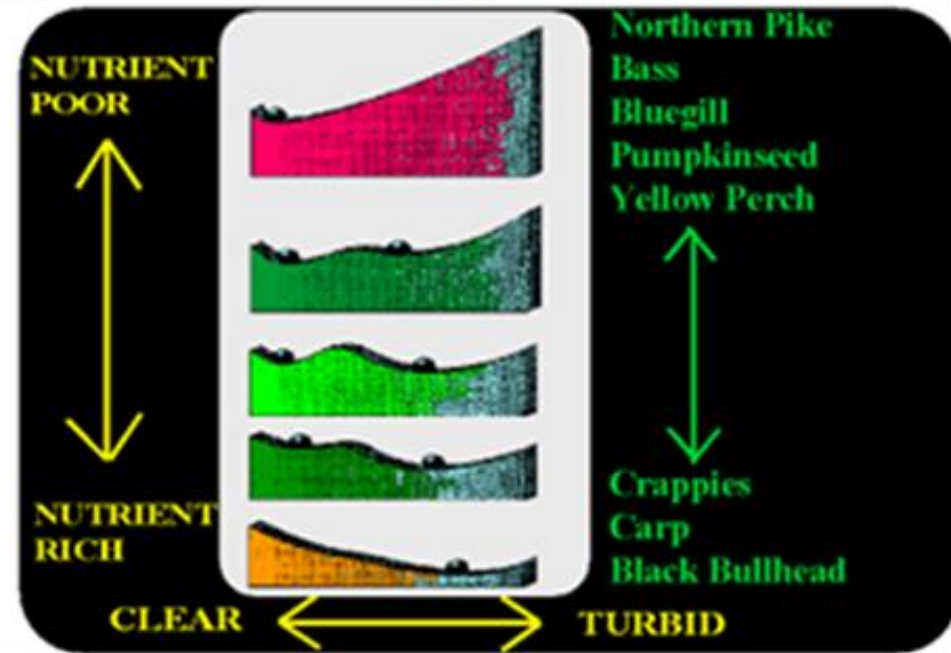
# Shallow Lake Ecology

(From Scheffer et al. 1993)



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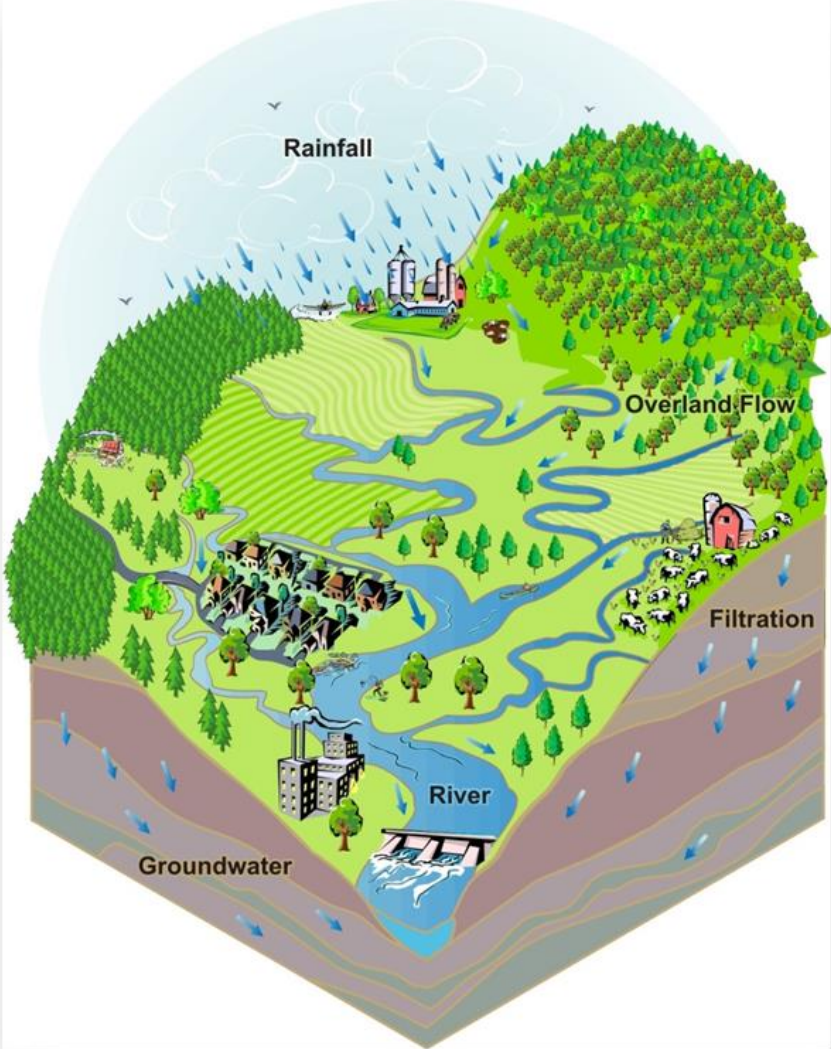




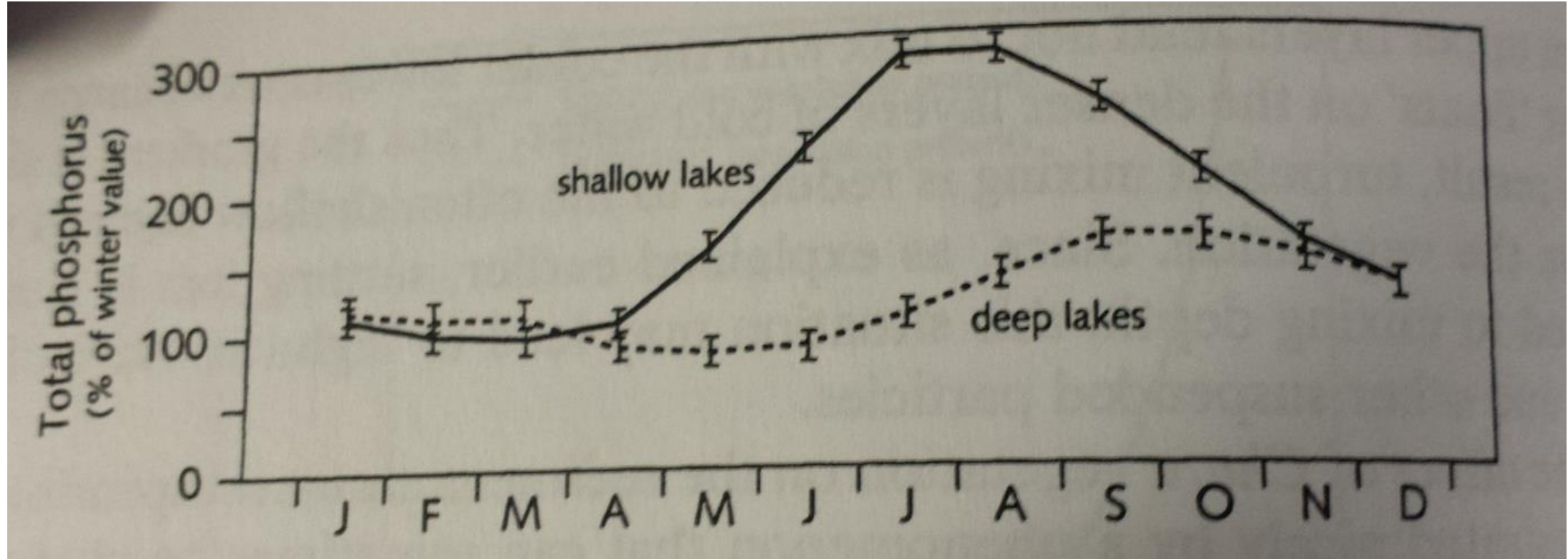
# Aquatic Plants



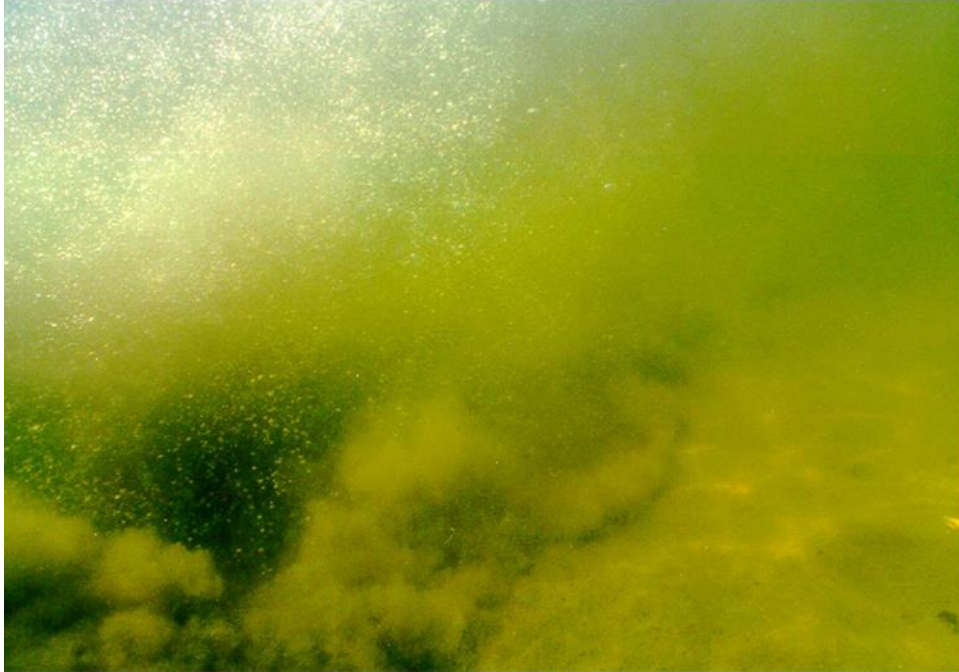
# External Nutrient Loading



# Internal Nutrient Loading



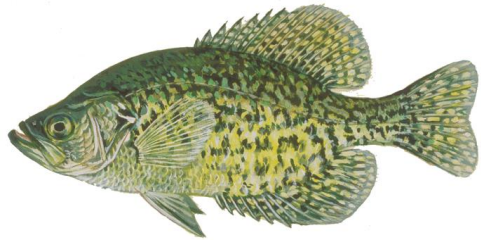
# Boats



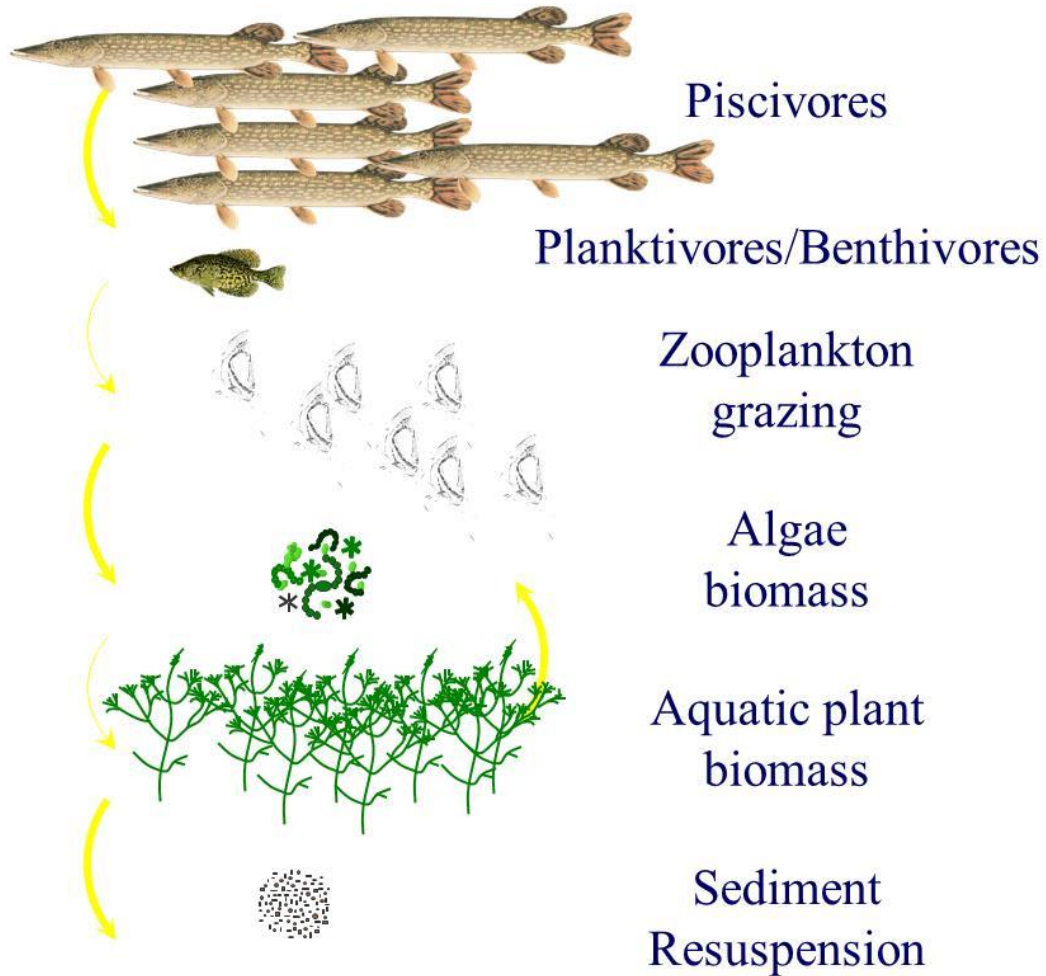
# Wind



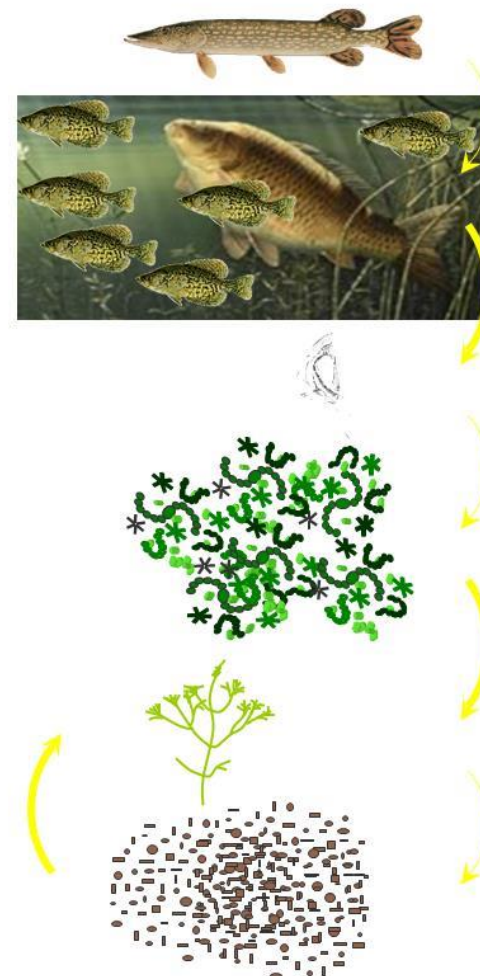
# Fish Community



## Clear-water State



## Turbid-water State

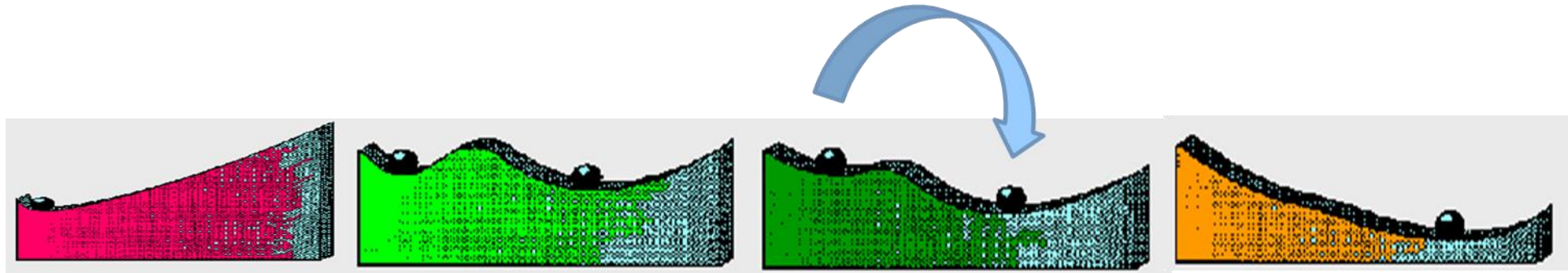


N. Hansel-Welch & M.B. Butler, 1997

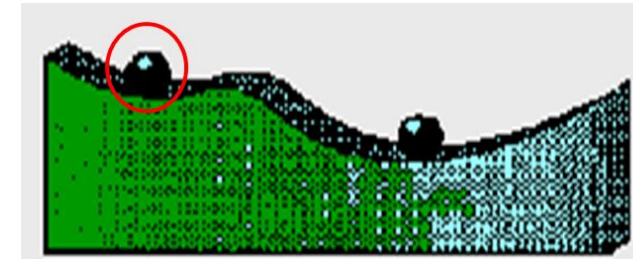




# Performance of Mason Lake

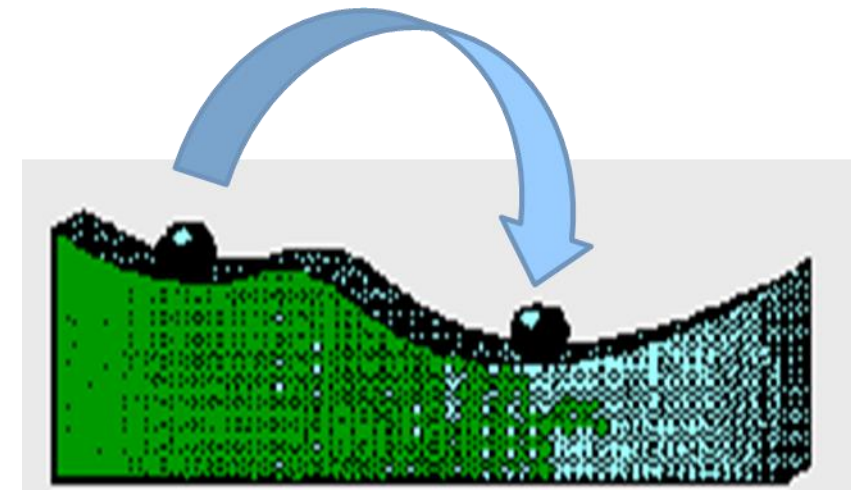


YEARS(S)	FISH & HABITAT HISTORY
1932-38	Rough fish removed 1932-34. Few carp reported. Largemouth bass, sunfish, crappies, pike suckers, and pickerel. "Weeds coming up thick." "Water quite green."
1938-41	Gamefish fishery begins to decline. Rough fish removed: 550 lb. (1938); 6,790 lb. (1939); 7,700 lb. (1940); 990 lb. (1941)
1942	No rough fish removal, six walleyes caught in nets. Gamefish continue to decline.



# Performance of Mason Lake

YEARS(S)	FISH & HABITAT HISTORY
1943-45	<p>Rough fish removal: 33,000 lb. (1943); 113,750 lb. (1944); 4,790 lb. (1945)</p> <p>Fish survey – Carp (4-10 lb. each), white sucker, northern pike, largemouth bass, sunfish, yellow bass, white bass, black crappies were dominant, channel catfish, brown bullheads. Stocked bass.</p> <p>First plant survey – “Floating and emergent vegetation in shoreline areas and in Burn’s and Morris Cove.” “Secchi Disk &lt; 1 foot.” Algae plant growth.</p>



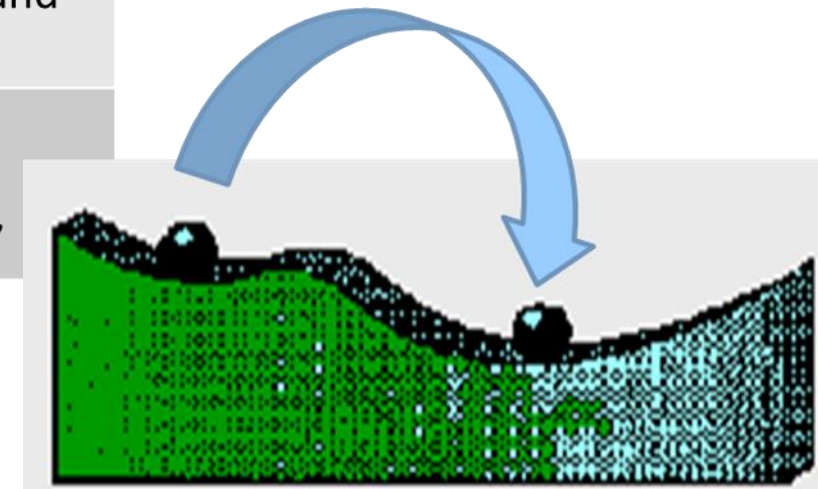
# Performance of Mason Lake

YEARS(S)	FISH & HABITAT HISTORY
1946-50	<p>Rough fish removal: 25,000 lb. (1946); 3,100 lb. (1947); 34,075 lb. (1948); 65,457 lb. (1949); 37,090 lb. (1950). "Skinny gamefish and panfish." Stocked bass.</p> <p>"Algae blooms intense."</p>
1951-52	<p>Rough fish removal: 199,930 lb. (1951); none due to market (1952) Stocked bass.</p> <p>"Few weed beds left." "Secchi disk depth &lt; 1 foot."</p>
1953-55	<p>Rough fish removal: 14,100 lb. (1953); none due to market (1954) Fish kills in 1954 and 1955.</p> <p>"Pea soup green and fish kill." "Bottom almost completely void of plants."</p>



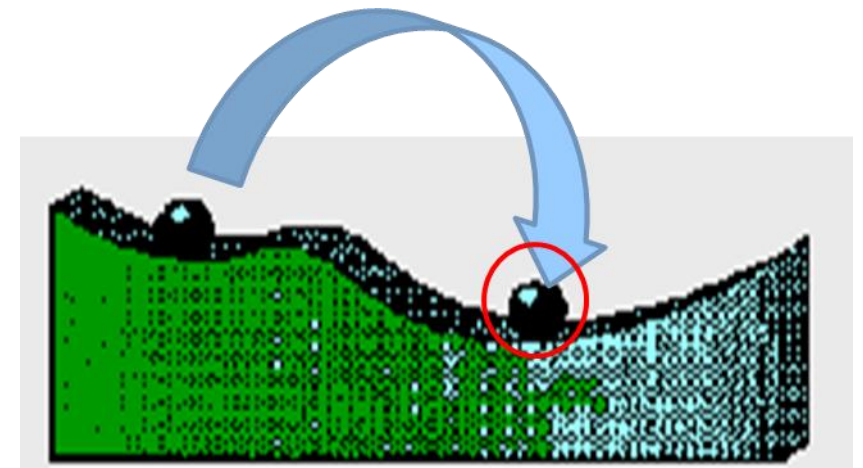
# Performance of Mason Lake

YEARS(S)	FISH & HABITAT HISTORY
1955	Lake Mason Improvement Association formed.  Drawdown and rotenone treatment. 400,000 lb. carp removed (average 3.4 lb. each). 108,328 lb. gamefish (sunfish, crappies, yellow bass).
1956-58	Not a complete carp eradication. Chemically treat Amey Pond. Continue to stock gamefish. Vegetation coming back. Secchi disk is 8.2 feet in spring 56', 10-17 inches in summer. Greatest cause of poor water clarity thought to be SW wind and wave action causing the resuspension of sediment, predominantly clay and silt.
1959	Rough fish removal: 154,050 lb. Stocked bass. "Vegetation planted in the spring." "Film of algae over most of the lake."



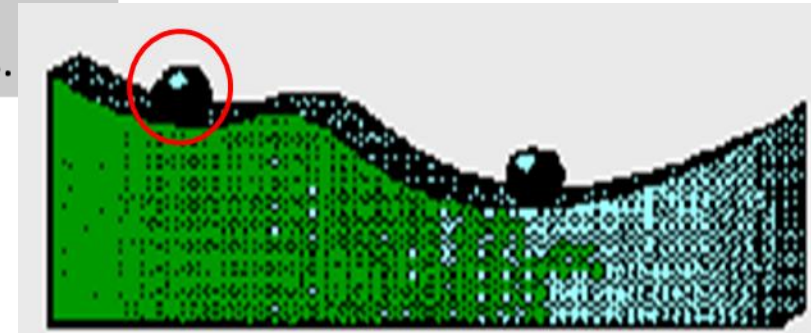
# Performance of Mason Lake

YEARS(S)	FISH & HABITAT HISTORY
1960-64	Rough fish removal: 96,440 lb. (1960); 133,050 lb. (1961); 129,050 lb. (1962), 89,900 lb. (1963) Chemically treated McCall Lake. Stocked: largemouth bass (10,066,400 fingerlings, 500 adults), bluegill (95,000 fingerings, 90 adults), northern pike (800 fingerlings, 50 adults)
1965-68	Rough fish removal: 69,000 lb. (1965); 62,500 lb. (1966); 87,500 lb. (1967). Stocked northern pike (3,183 8-22") "Water always dirty."



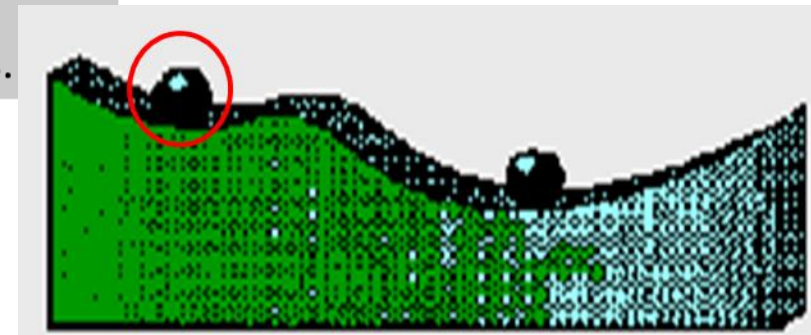
# Performance of Mason Lake

YEARS(S)	FISH & HABITAT HISTORY
1970	Complete chemical treatment.
1971-76	Stocked gamefish and minnows. Summer fish kills. “Algae chokes lake.” “Runoff extreme.” “Algae blooms.” Chemically treat plants.
1977-82	Chemically treat plants. Carp appear in 1979 survey.
1983	Fish kill. “Weeds not too bad.”
1984-87	Fish surveys. “Good fishery for bass, pike, bluegill, crappies.” Anglers become unhappy with bluegill size structure “stunted”. Too many plants.



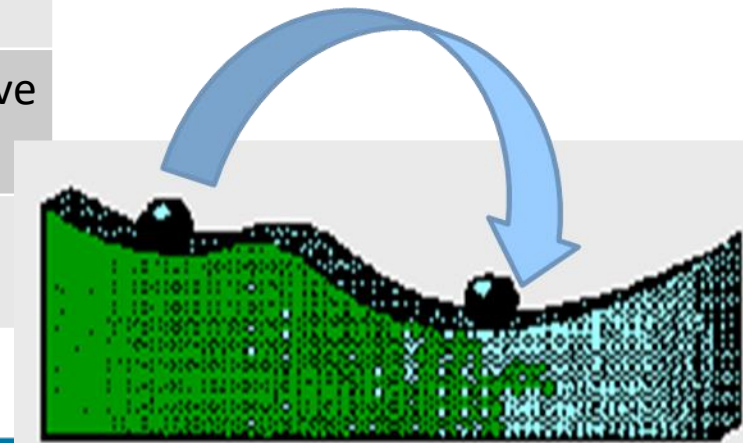
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# Performance of Mason Lake

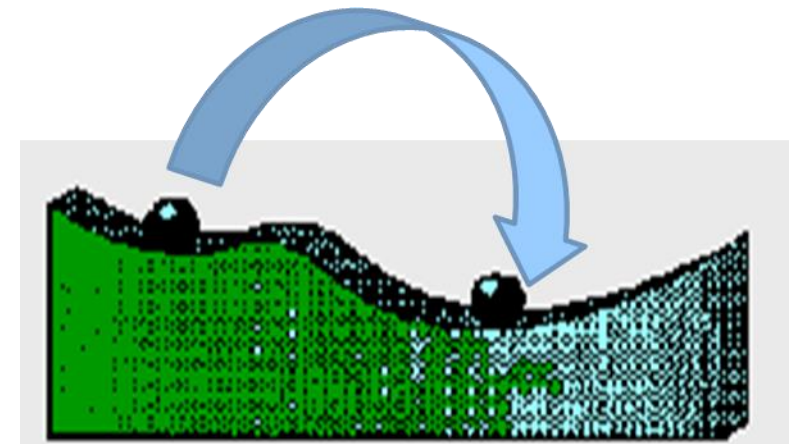
YEARS(S)	FISH & HABITAT HISTORY
1988-05	Removal of 50 M panfish. 1.5-5 ft drawdowns to reduce aquatic plants a 0-5ft depths. Chemically treat plants (1990-2005). Fish surveys. Plant survey shows a negative reduction in plants. Classifies lake as eutrophic to hypereutrophic. Warnings to stop chemical treatments.
2006-09	Chemically treat plants. No more permits issued in 2010.
2011	Complaints of carp.
2012, 15	Fisheries surveys. Carp not at high numbers in 2012, high in 2015. Gizzard shad caught, entered in 2004.
2016	Largemouth bass & panfish meeting; regulation change proposed to improve bass size structure and protect big fish. Stock predators.
2016-2020	Rough fish removal – little over 60,000 lbs of carp and 14,100 lbs of gizzard shad removed. Pike stockings, some bluegill stockings.

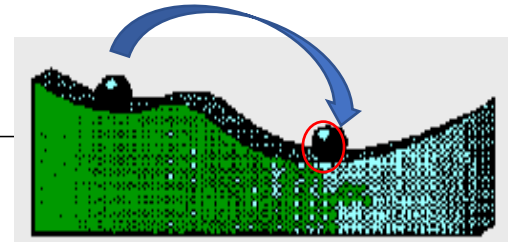
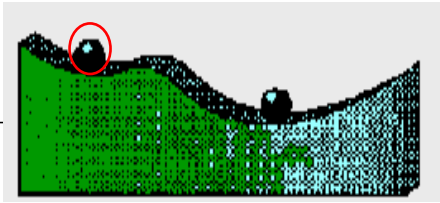




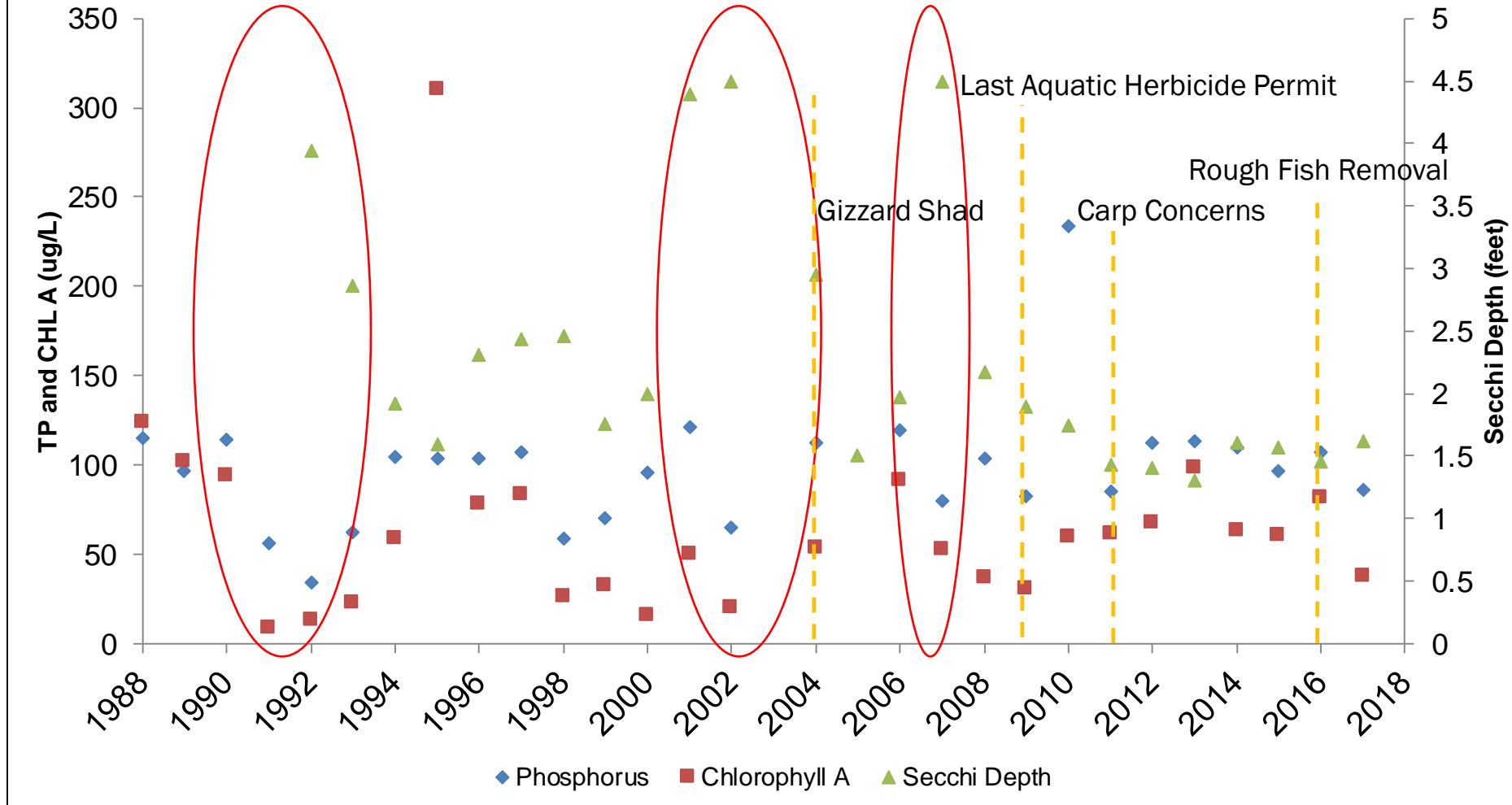
# Performance of Mason Lake

YEARS(S)	FISH & HABITAT HISTORY
2018	New largemouth bass and northern pike regulation go into affect.
2019	Water clarity in the spring too poor for an electrofishing survey, late-spring netting survey for bluegill. *Plants noted as coming up during the netting survey and lake much clearer than early-spring.
2020	Mechanical removal of plants; Partial winter drawdown – aquatic plants
2021	Good 2020-year class of carp; ~100,000 juvenile carp removed.  Early-spring electrofishing survey, noticed that YOY gizzard shad, YOY carp, YOY bluegill, and YOY yellow perch were abundant. Water clarity was clear, and curly leaf pondweed was forming in large masses near the middle edges of the lake. Secchi disk depth by summer – 1.5ft deep. Plant surveys – backwater areas; Amey Pond
2022	Northern pike stocking. Water Quality Data Collection.
2023	Rough Fish Contract – minimal removal. Water Quality Data Collection.
2024	Comprehensive fish survey; Rough Fish Contract – no removal. Water Quality Data Collection.



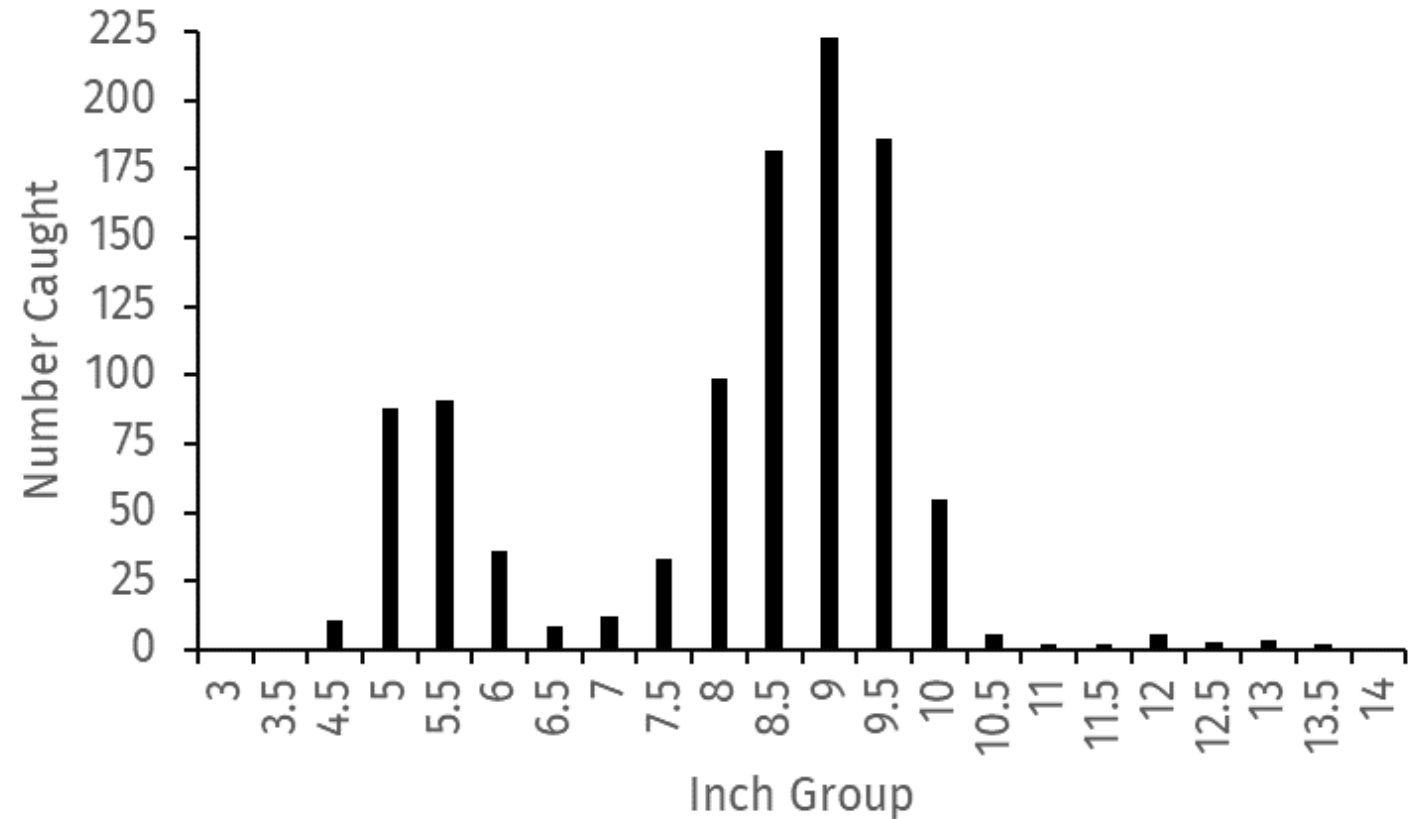


Mason Lake  
1988-2017  
Summer Means - Phosphorus, Chlorophyll A, Secchi Disc



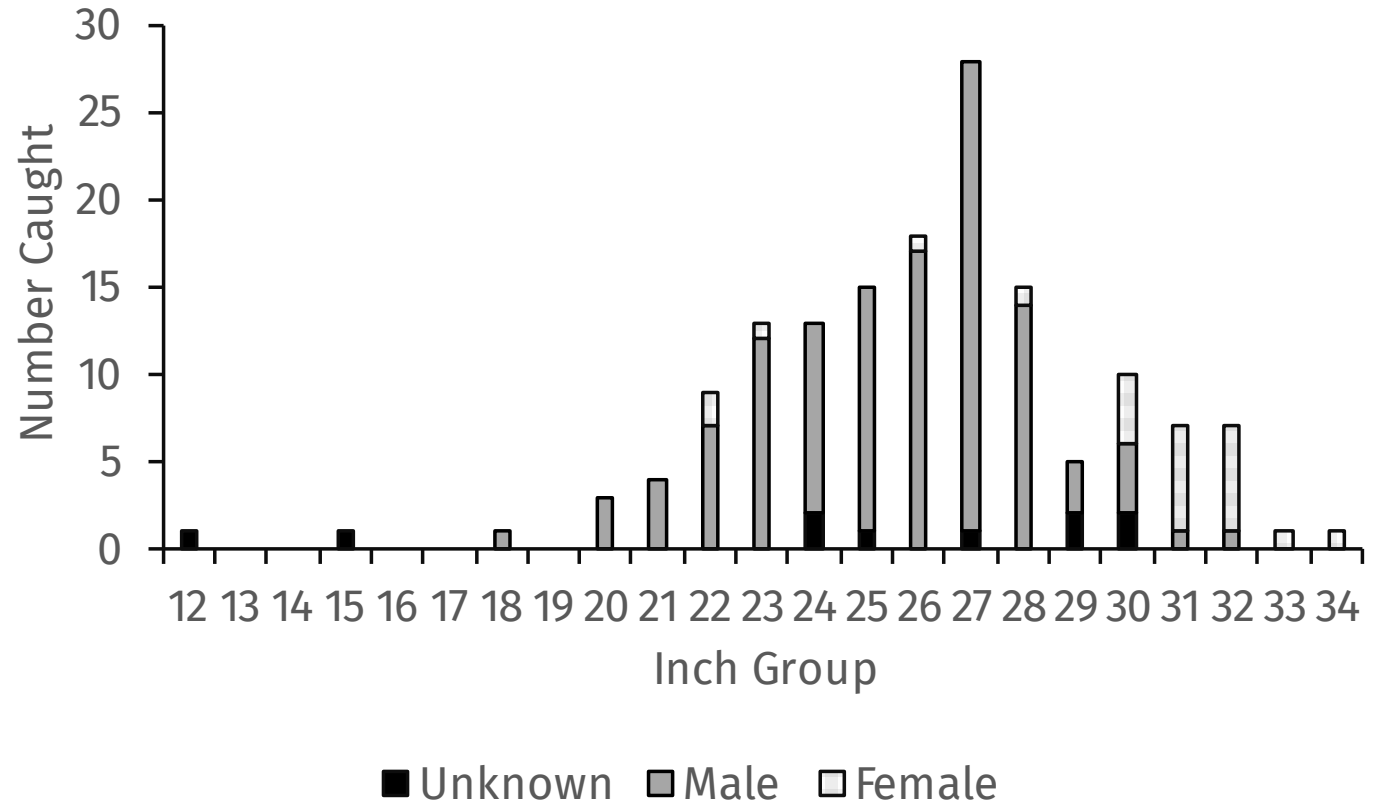
# Black Crappie

- 2,585 caught in nets
- 2012 vs 2024
  - 18 vs 81 fish per net-night.
- High Abundance (95<sup>th</sup> percentile)
- 3.2"-14.0", 8.3" Average
- 81% were 8" or larger



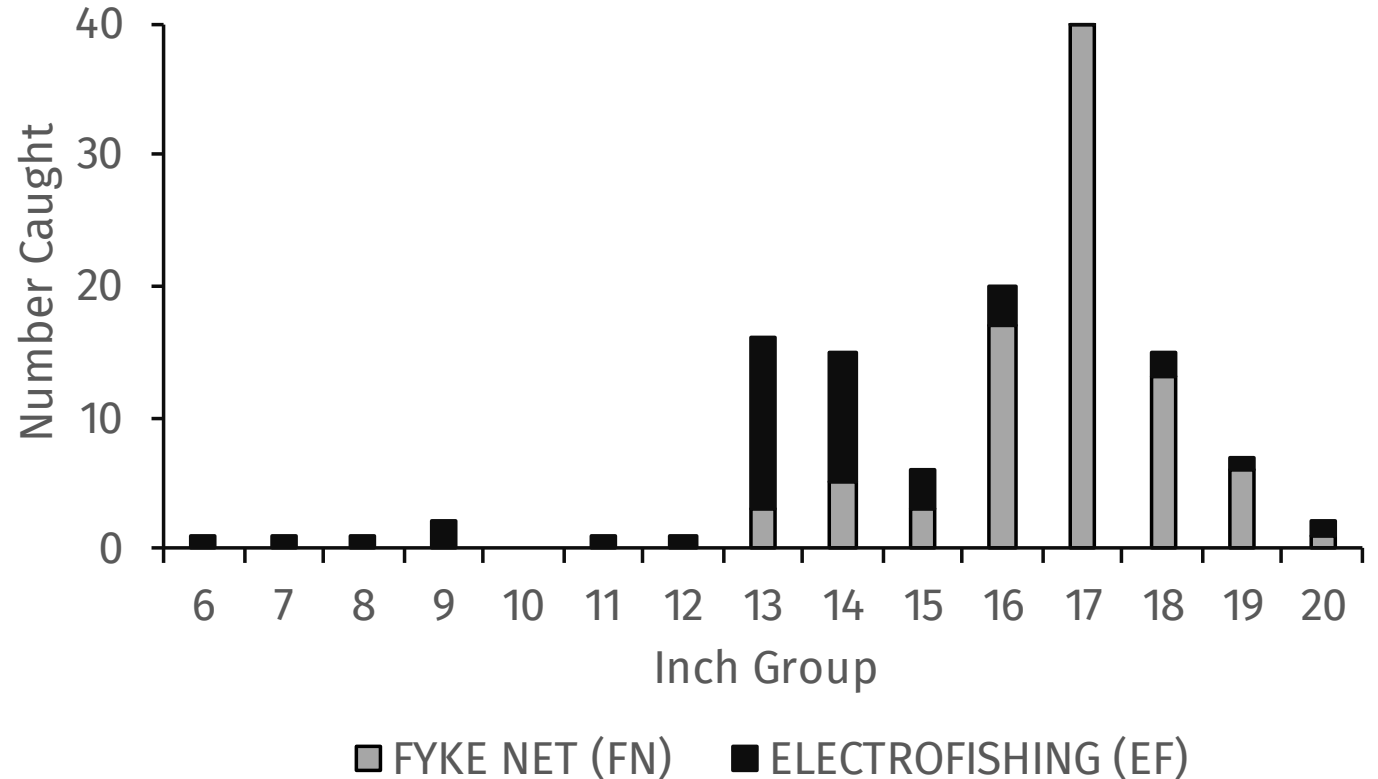
# Northern Pike

- 155 caught in nets
- 2012 vs 2024
  - 1 vs 5 fish per net-night.
- High Abundance (75<sup>th</sup> percentile)
- 12"-34.1", 26.5" Average
- 97% were  $\geq 21$ "
- 30% were  $\geq 28$ "
- 1% were  $\geq 34$ "
- Pike stocking in 2014-17, 19, 22.



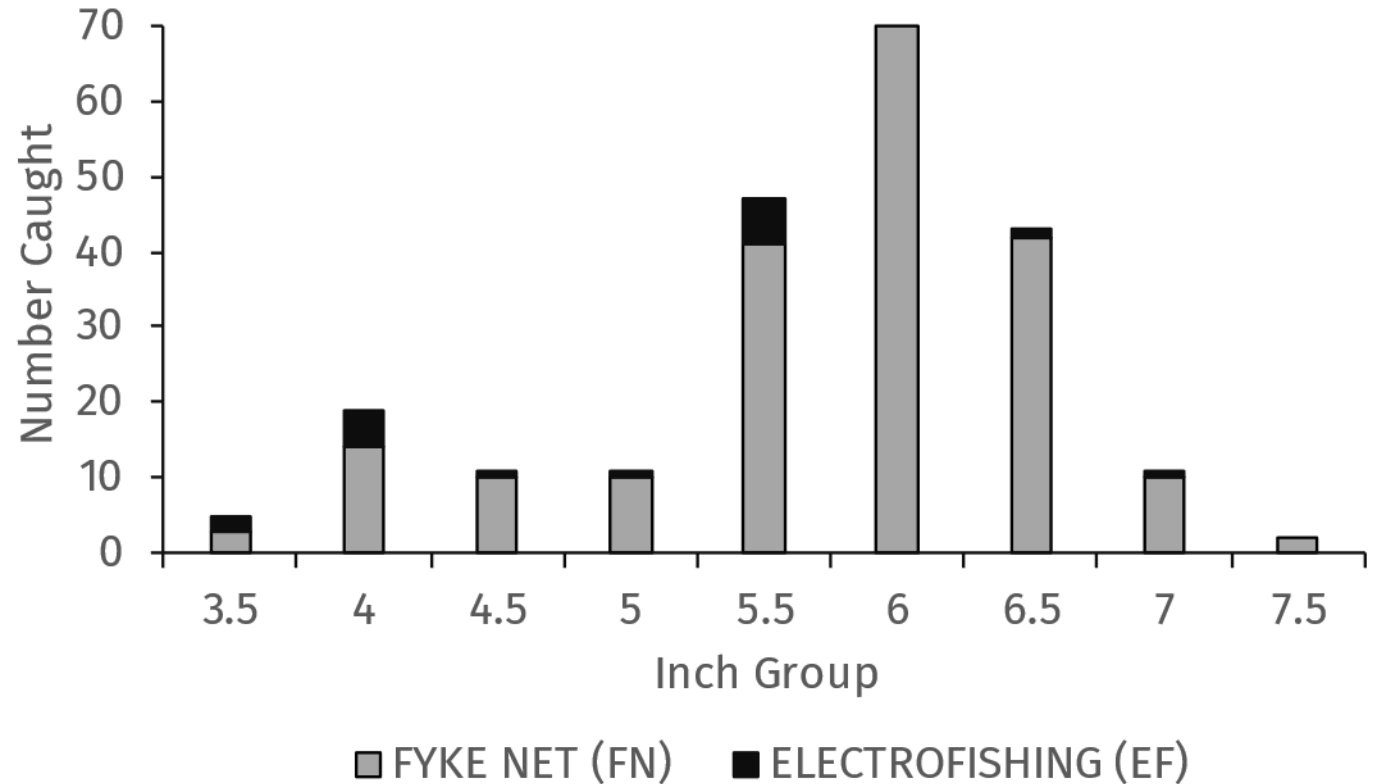
# Largemouth Bass

- 88 caught in nets
- 2012 vs 2024
  - 1.6 vs 2.8 fish per net-night.
  - 17%  $\geq$  15" vs 91%  $\geq$  15"
- 50 caught electrofishing
- 2021 vs 2024
  - 23 vs 12.5 per mile\*
  - Off spawning beds; No recaps; Likely Moderate Abundance
- 13.3"-20.3"; 17.2" Ave. (nets)
- 6.2"-20.0"; 14.6 Ave. (shocking)
- Big bass fishery – 99<sup>th</sup> Percentile



# Bluegill

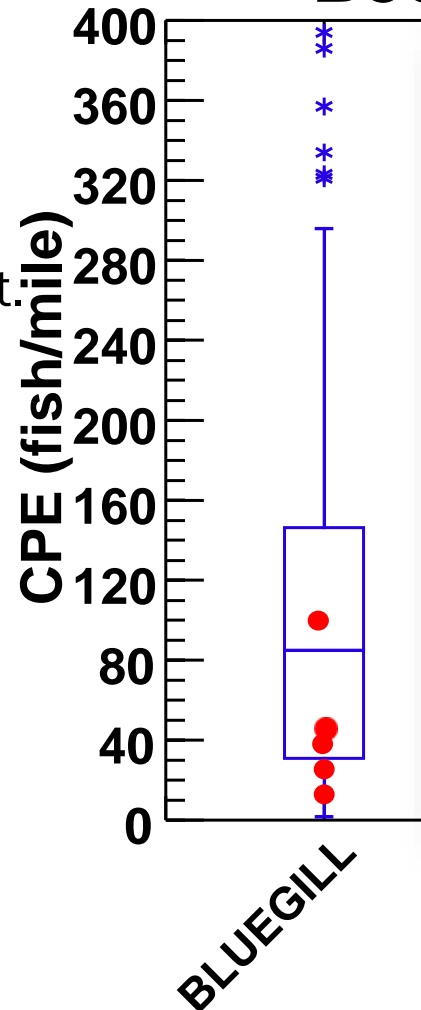
- 202 caught in nets
- 2012 vs 2024
  - 61.5 vs 6.3 fish per net-night.
- 17 caught electrofishing
  - Off spawning beds; Poor visibility?
- 3.6"-7.6"; 6.0" Ave. (nets)



# Bluegill

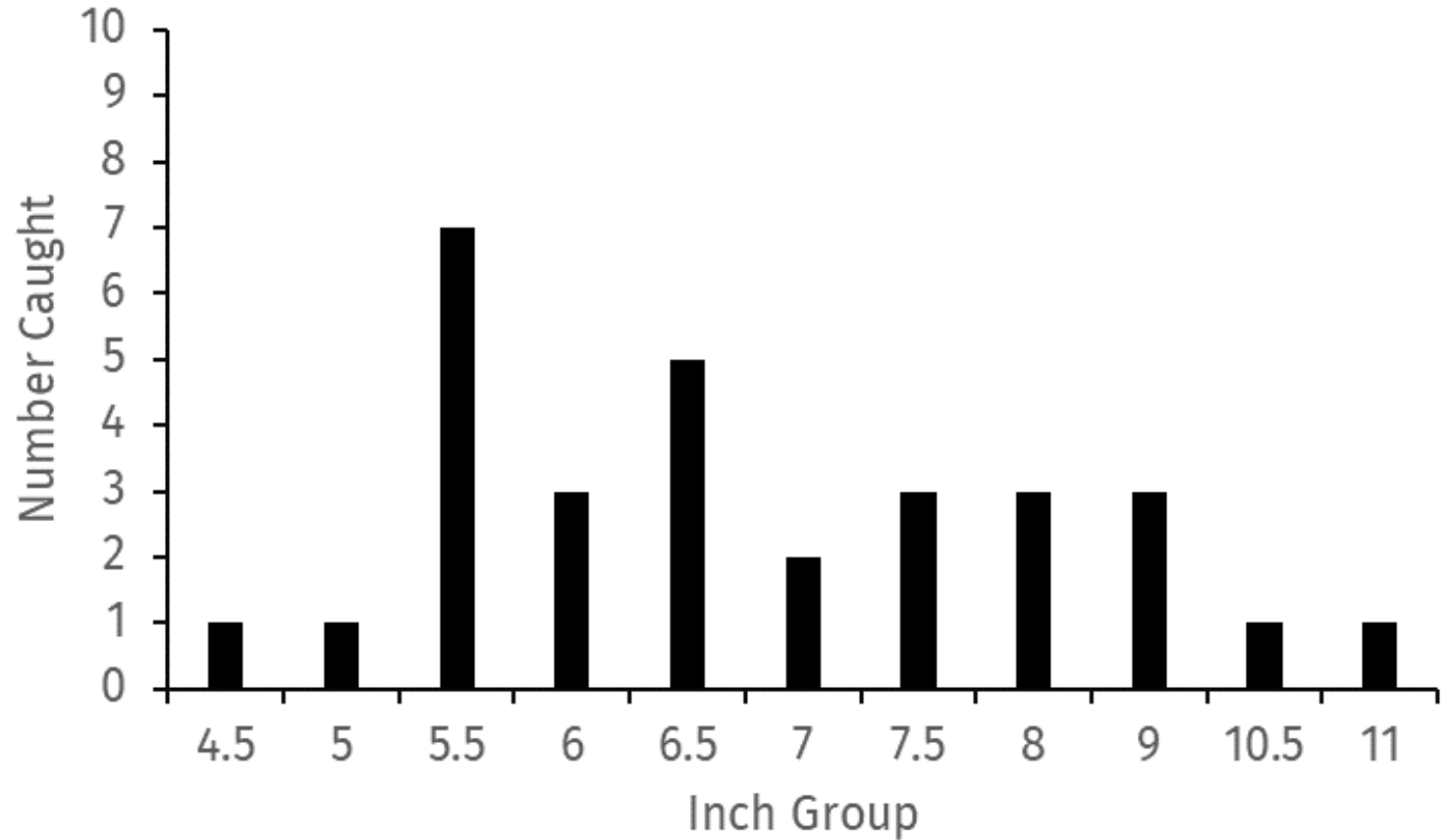
- 202 caught in nets
- 2012 vs 2019 vs 2024
  - 61.5 vs 15.3 vs 6.3 fish per net-night.
- 17 caught electrofishing
  - Off spawning beds; Poor visibility?
- 3.6"-7.6"; 6.0" Ave. (nets)
- A poorer bluegill fishery was identified by anglers that took the Mason Lake District public survey.

## Boomshocking (Panfish Survey)



# Yellow Perch

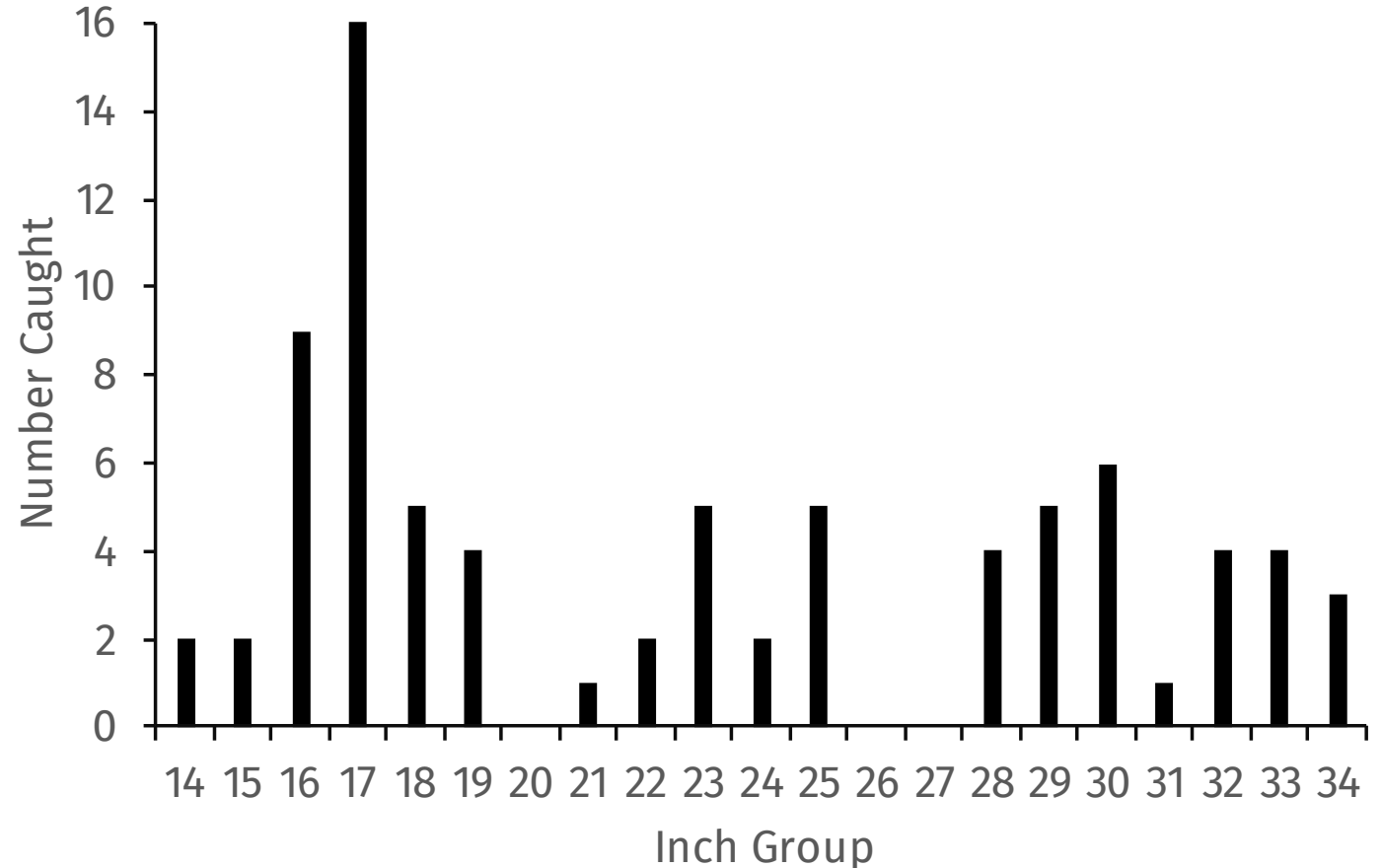
- 33 caught in nets
- 2012 vs 2024
  - 2.8 vs 1.0 fish per net-night.
- 4.5"-11.0"





# Common Carp

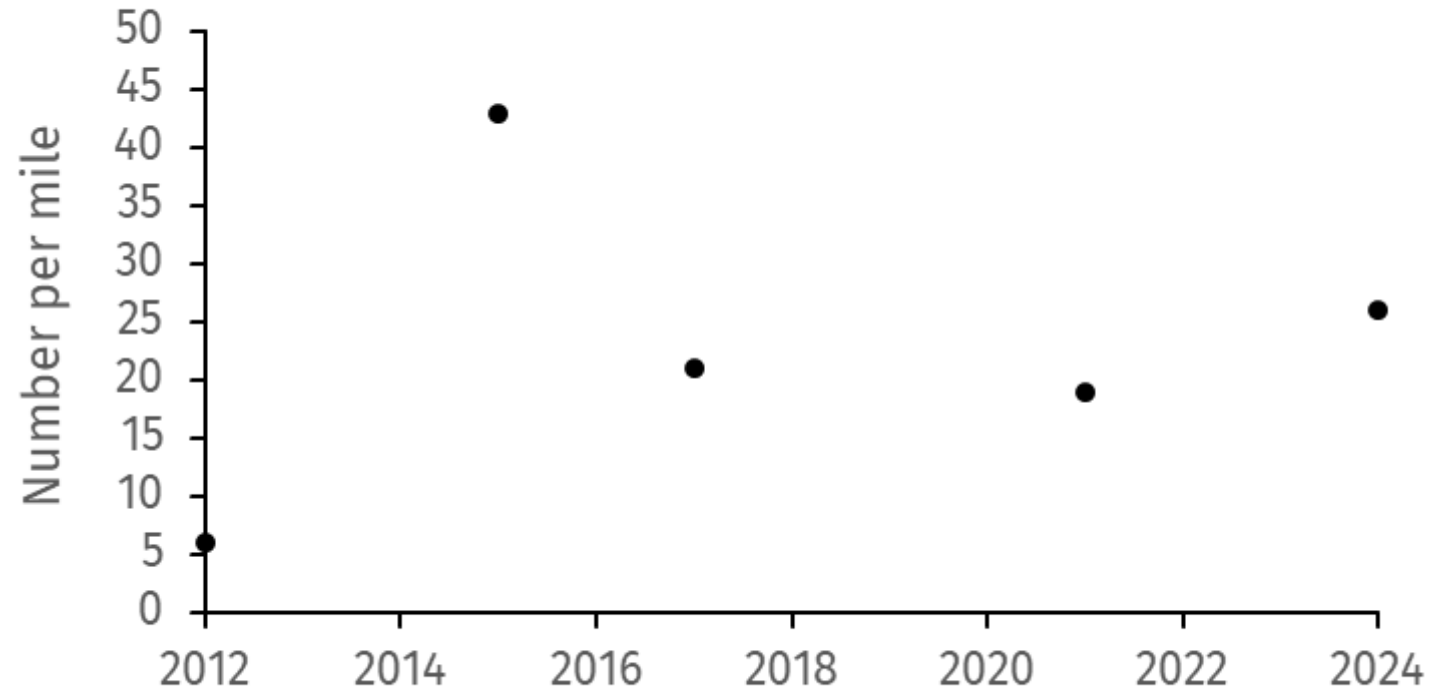
- 473 caught in nets
- 2012 vs 2024
  - 3.9 vs 14.8 fish per net-night.
- 66% ≤ 19”
- 13% were 20”-25”
- 21% were 26”-34”
- 2,111 pounds disposed
- Carp found in all nets and counted during the 4 miles shocking; through-out the lake.



# Common Carp

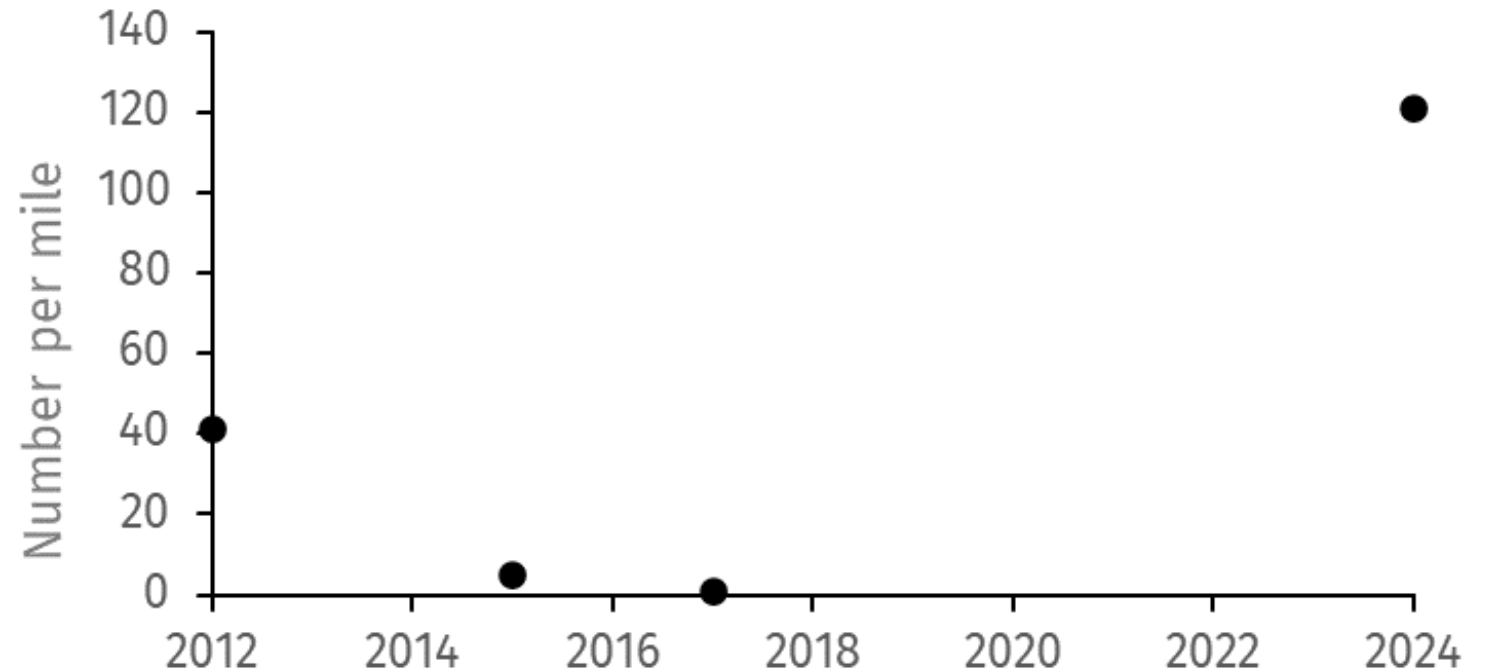
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\*72,445; 525,404 lbs. estimated in 2021.

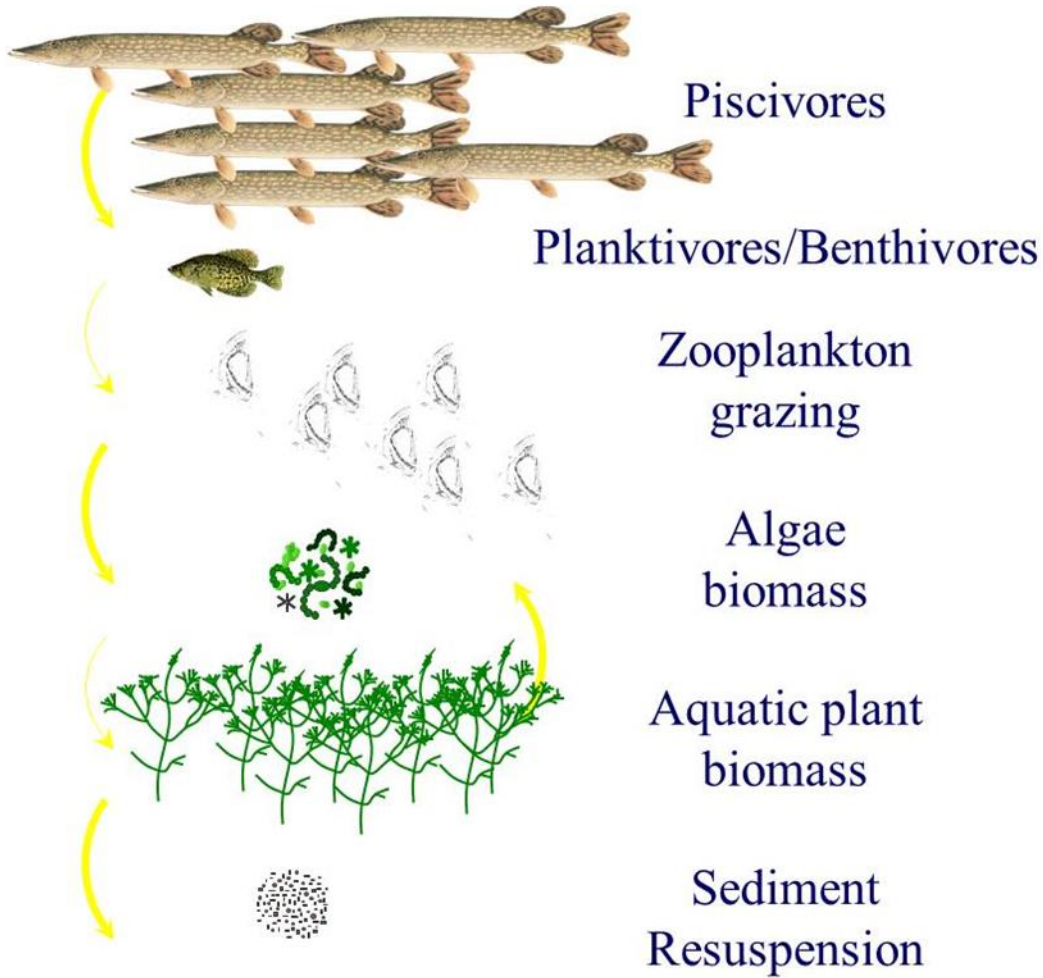


# Gizzard Shad

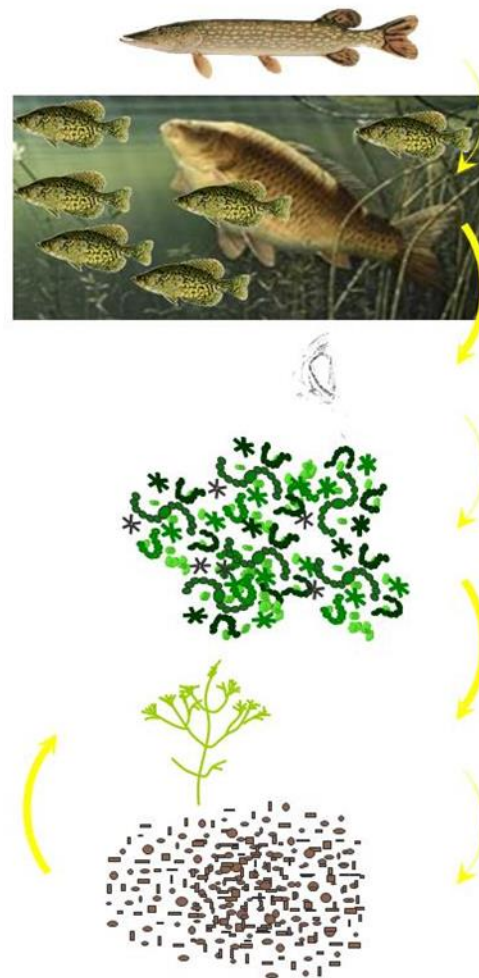
- 121 per mile (Most Abundant)
- ~543 age-1 (4"-5") disposed.
- 2021; age-1 abundant
- 2024; age-1 abundant
- Prey for largemouth bass and northern pike.
- Negative for water quality; trophic dynamics



## Clear-water State



## Turbid-water State



N. Hansel-Welch & M.B. Butler, 1997

- Fish community is primarily rough fish (carp and gizzard shad)
- Pike abundance high likely due to stocking efforts.
- Largemouth bass abundance moderate; large bass due to prey - gizzard shad.
- Black crappie is the primary panfish.



## Top 3 Reasons for Owning Property on or near Mason Lake?

What do people want?	LMMD Property Owners	Watershed Property Owners
Open Water Fishing	71%	55%
Relaxing/Entertaining	53%	30%
Motor Boating	37%	9%
Canoe/Kayak/Paddle B.	27%	16%
Swimming	22%	8%
Nature Viewing	22%	37%
Ice Fishing	21%	30%
Water Ski/Tubing	18%	2%
Hunting	6%	23%
Snowmobile/ATV	2%	6%
Other	7%	10%
None of the Above	1%	12%

# 2022 Survey - Fishing

- Species Preferences
  - Bluegill, largemouth, crappie
  - Northern pike and yellow perch still important.
- Majority (57-76%) of anglers thought quality of fishing became somewhat worse to much worse in the past 5 years.

- Current (2022) Fishing Experience

## LMMD

- 56% Poor-Very Poor
- 29% Fair
- 10% Good
- 5% Unsure

## Watershed

- 43% Poor-Very Poor
- 36 % Fair
- 12% Good
- 3% Excellent
- 6% Unsure

# Desired Conditions

*determine*

# Lake State

<i>Desired Condition</i>	<i>Macrophyte State</i>	<i>Turbid State</i>
More Aquatic Plants	●	
Shoreline/wetland erosion	●	
Reduced turbidity	●	
Deeper Lake	●	●
Firmer bottom	●	
Protect Wetlands	●	
Clear water	●	
No carp	●	
More gamefish	●	
Improved fishery	●	
Better swimming conditions	●	●
Fewer Conflicts	●	●
Reduced sediment	●	
Less nutrients	●	
Sustainability	●	●
Navigation		●

● Cunningham, P. 2007

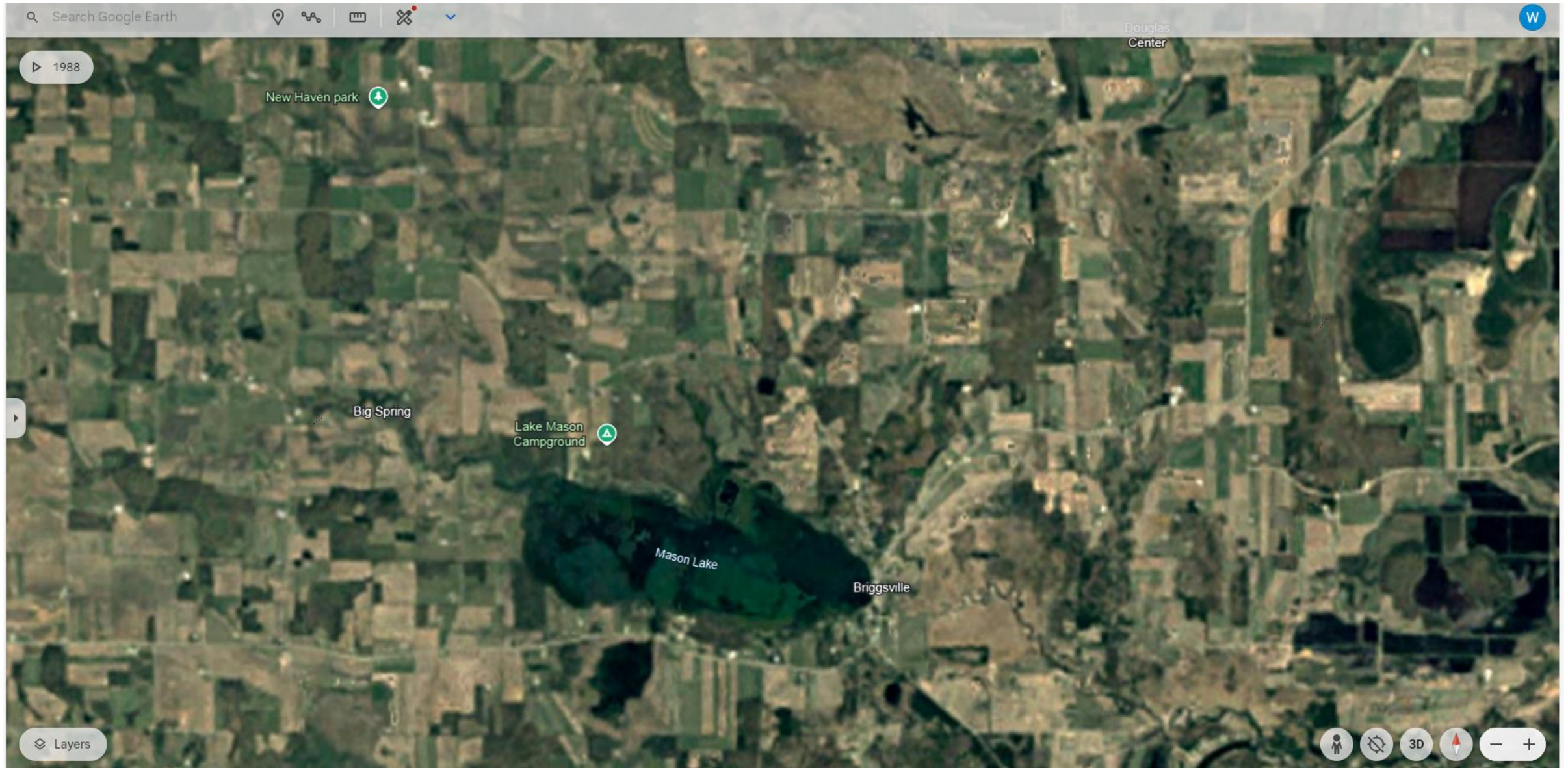
# Which Stable State Based on 2022 Survey?

Conditions	Clear Macrophyte State	Turbid State	What do People want?
Abundant Plants	X	X	Unsure
Bluegill	X		Clear State
Motor Boating		X	Turbid State
Clear Lake	X		Clear State
Good Water Quality	X		Clear State
No Carp/Shad	X		Clear State
Swimming	X	X	Unsure
Water Ski/Tubing		X	Turbid State
Wildlife (Hunting/Viewing)	X		Clear State
Reduce Shoreline Erosion	X		Clear State
More Fish Habitat	X		Clear State



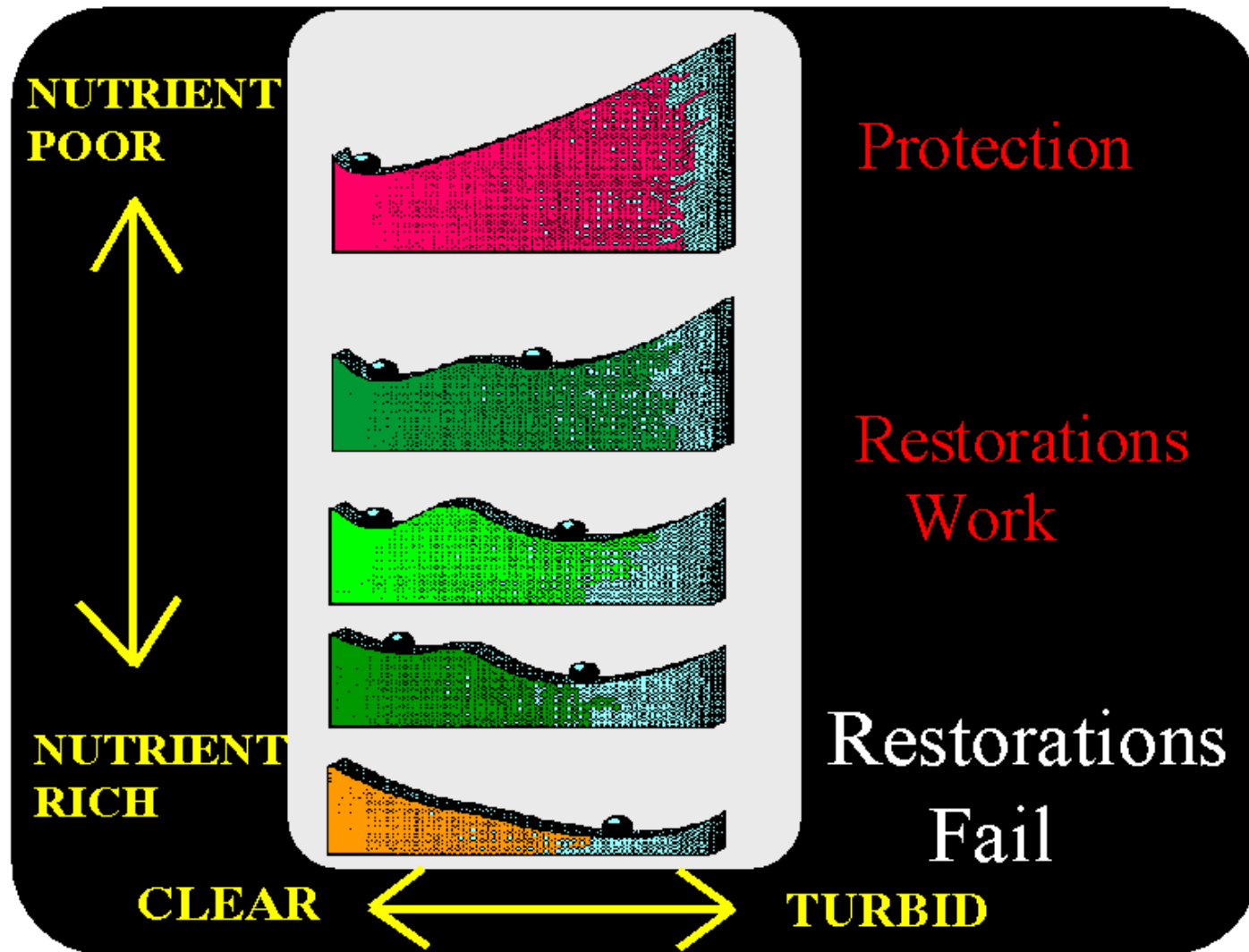


Cunningham, P. 2007



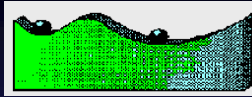
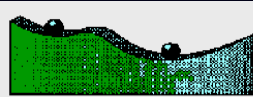
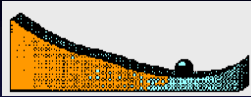
# Shallow Lake Ecology

(From Scheffer et al. 1993)



# Restoration to Clear/Macrophyte State

- Develop a Management Plan
- Identify Actions to Protect Stability of Lake
  - Aquatic Plants
  - Boating
  - Internal Nutrients (Fish, sediment)
  - External Nutrients (Watershed)
  - Shoreline Protection
  - Fishery Objectives (Piscivores)
- Multiple Partners & Stakeholders Collaborating

Attribute			
<b>Ext. Nutrient Load</b>	< 1 g/m <sup>2</sup> /yr	1-2 g/m <sup>2</sup> /yr	>2 g/m <sup>2</sup> /yr
<b>Inlake TP</b>	< 100 ug/l	100-250 ug/l	>250 ug/l
<b>Sediment Resuspension</b>	< 500 acres	500-5,000 acres	> 5,000 acres
<b>Hydrologic Connectivity</b>	Muti-basinal isolated waterbodies	↔	Direct Connection Floodplain/Riverine
<b>Macrophyte Potential</b>	>50% surface area	↔	<20% surface area
<b>Fish Biomass</b>	High (>400 lbs/acre)	↔	Low (<100 lbs/acre)
<b>Fish Community</b>	High Abundance Benthivores/Planktivores	↔	Low Abundance Benthivores/Planktivores

Cunningham, P. 2007

# Chemical Treatment – More Details?

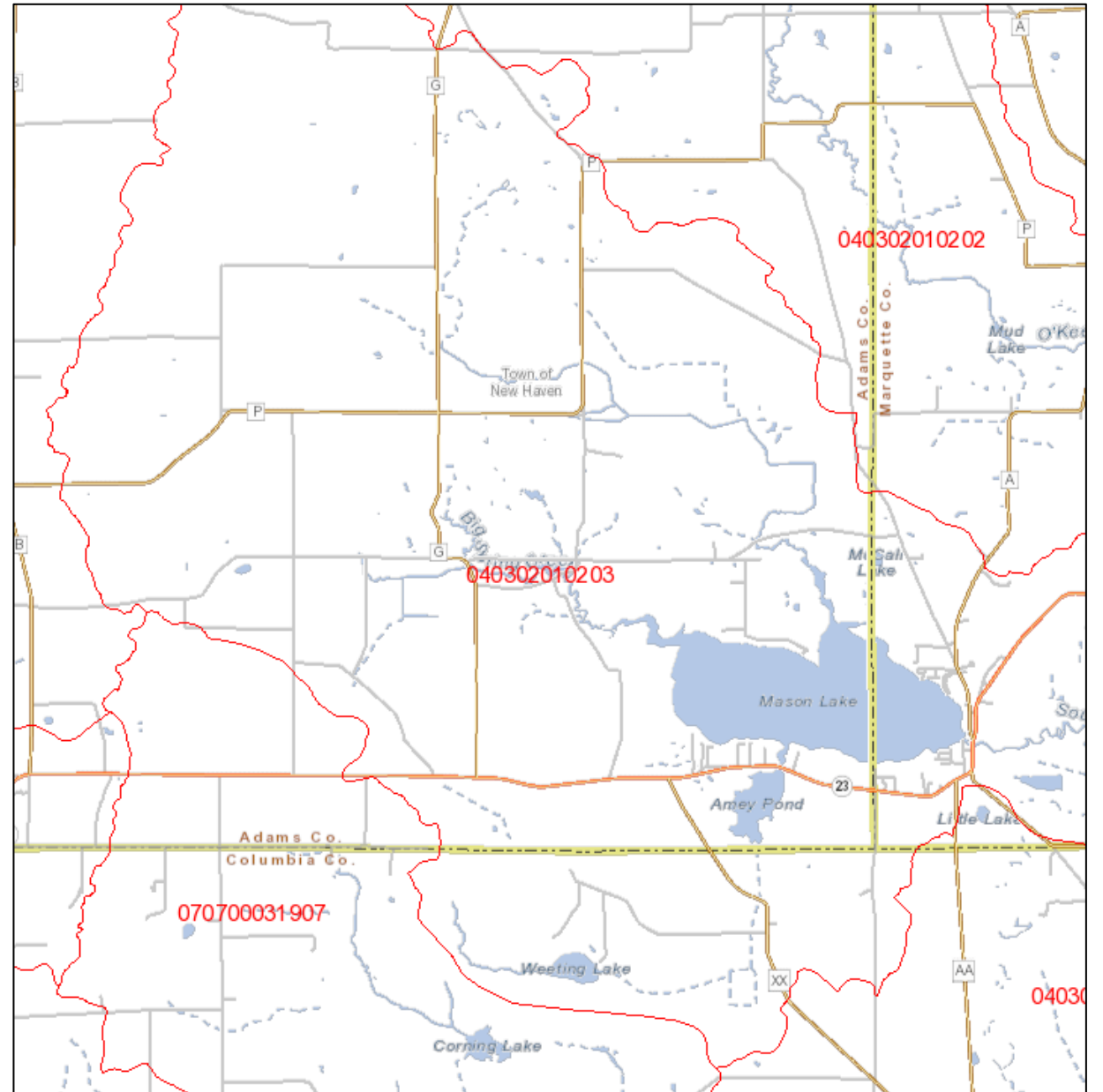
- What's Involved/Protocol?
- Re-Stocking?
- Example Timeline?

# What's Involved?

- Not every rehabilitation project/chemical treatment is the same, all waterbodies and conditions are unique.
- There is an action item list that is completed for chemical treatment projects.
- The department (Fisheries and the Rotenone Application Team) leads the effort, planning and implementation.
- Other groups and the department collaborating are essential – other units of government – Lake District, Counties, Town Boards, private landowners/neighbors, dam owner, Police & Emergency Services, etc.

# What's Involved?

- Scale of Project
  - Watershed treatment, not just lake.
  - How far up into the watershed for each tributary, stream, ditch?
    - Need to complete fisheries surveys.
    - Work with private landowners.
  - Lake drawn down as far as possible.
- Want to use as little chemical as possible and find all the hiding spots for carp & shad.



# What's Involved?

## Action Items

- Lake District applied for grant(s) or other funding secured for project planning and implementation?
- Sufficient funding for project?
  - \$100,000 (Max?)
- Lake Management Plan
  - How are future infestations of carp and shad going to be prevented?
- Bioassay work
- Dam info. & coordination
- Historic and/or current flow measurements
- Landowner access/permissions
- Coordinate with groups
- Timing of project?
- Fish stocking/wild fish transfer plan?

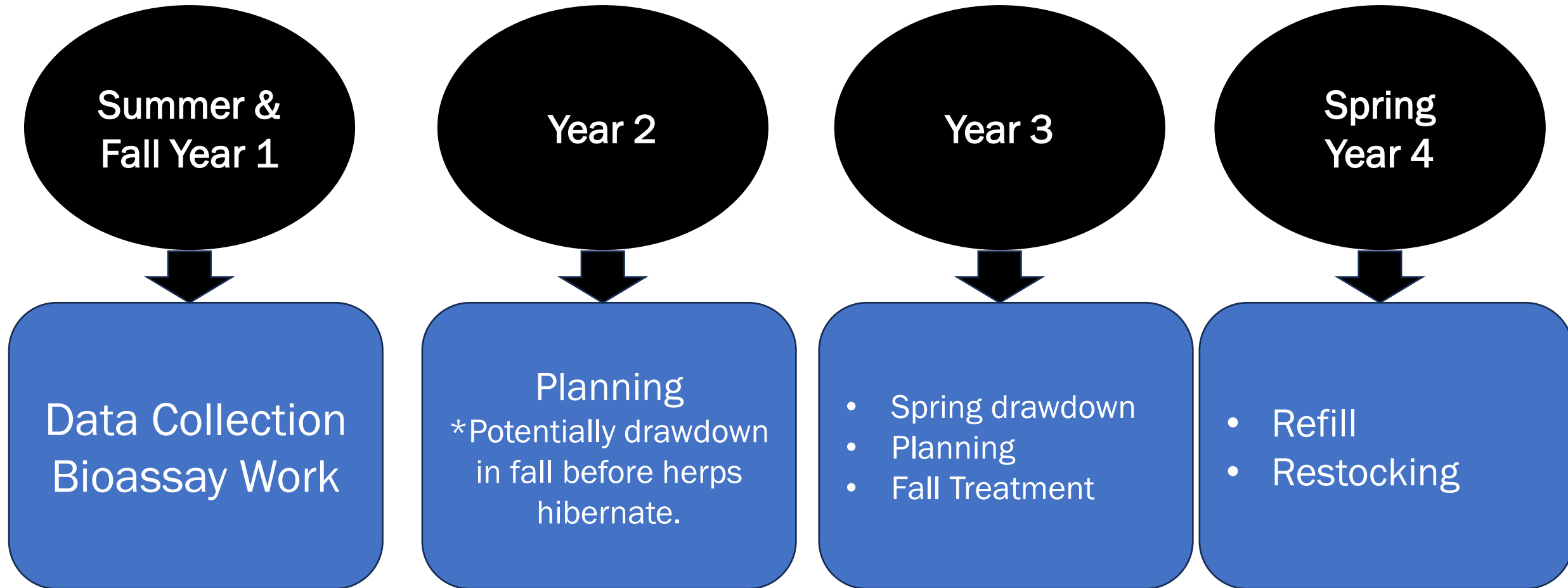


# What's Involved?

## Action Items

- Staging area for crew & equipment.
- Application method(s), equipment, crew needed?
- **Rotenone needed?**
- Operation Plan
- Department Administrative Approvals
- WPDES Pesticide Discharge Permit
- WEPA Memo/EA Exemption Determination or EA?
- Public notice and meeting(s)
- Final flow/volume measurements right before treatment date

# Example Timeline



# CONNECT WITH US

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OFF THE RECORD"