WF4313/6413-Fisheries Management

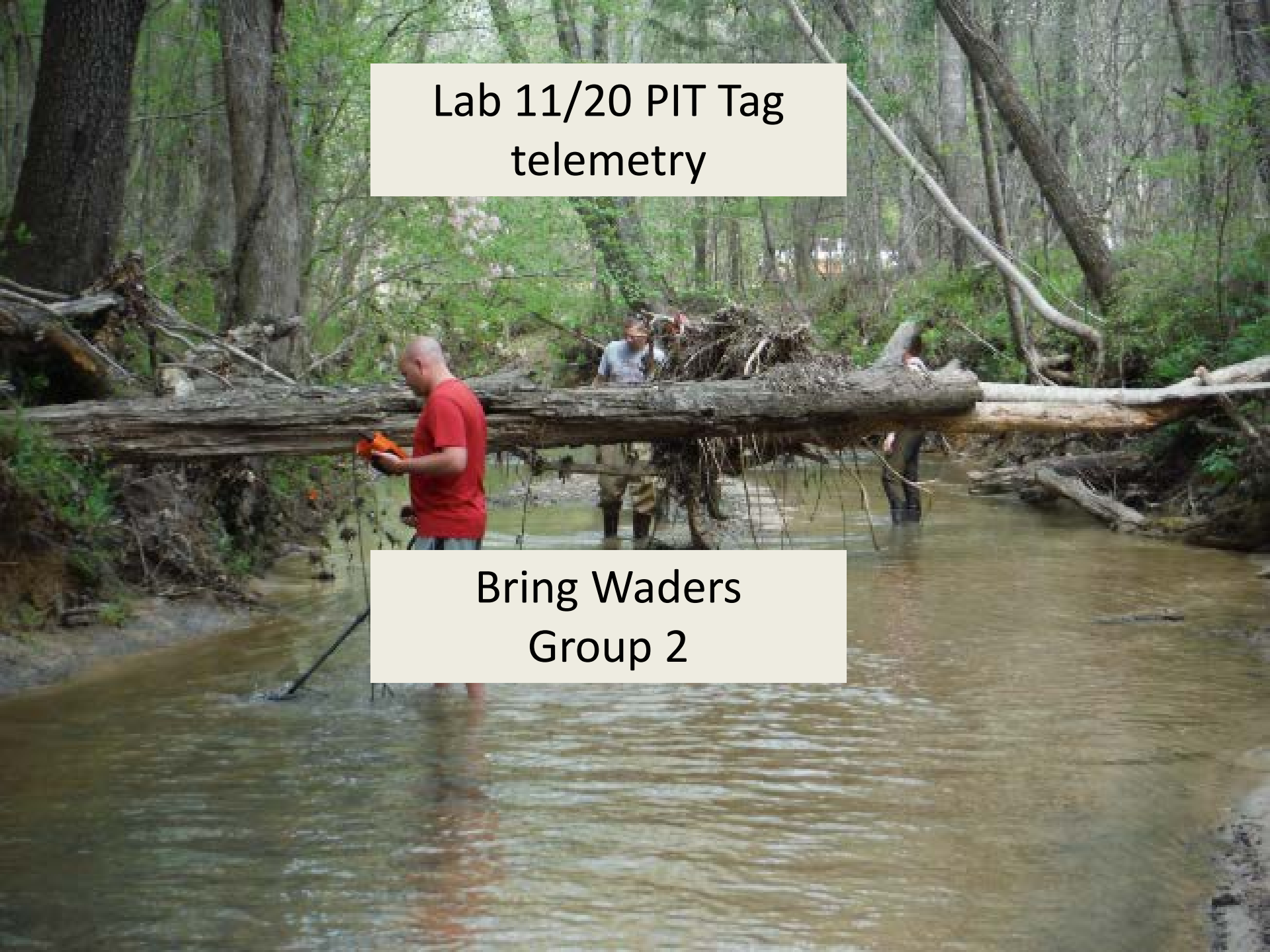
Class 19

Announcements

Revised Schedule**

- ~~October 30 = Group 1 @ Panther Creek~~
- ~~November 6th = Group 2 we'll do something~~
- November 13th = NO LAB… ☹
- Exam II = November 14th
- November 20th = PIT Tag Telemetry
- November 27th & December 4th ???

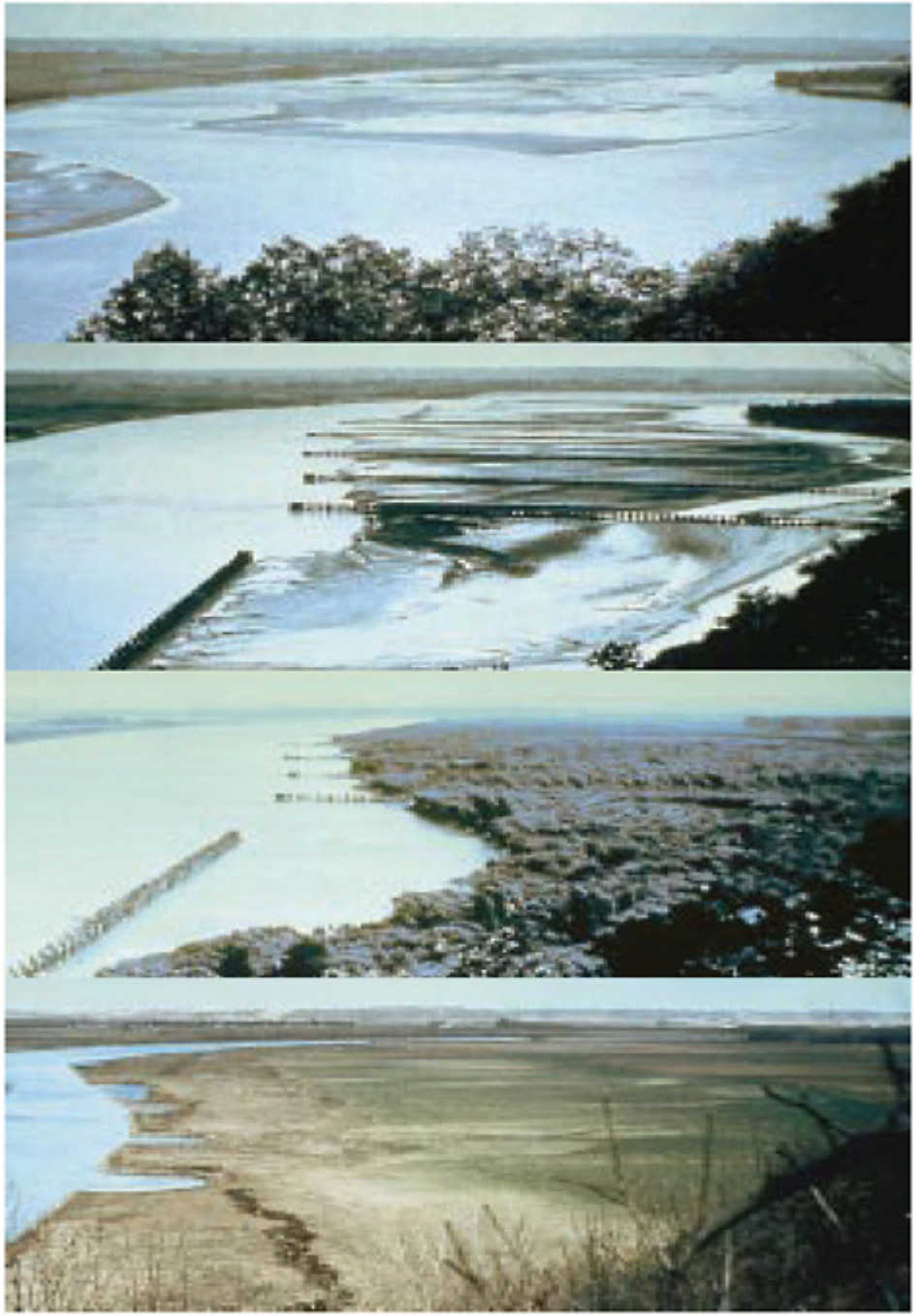
** Contingent on van availability


Lab 11/20 PIT Tag telemetry
Bring Waders
Group 2

Interested in chasing more lamprey? Opportunities to assist on an undergraduate research project. Sunday November 18th


WHERE WE LEFT OFF

Indian Cave Bend on the Missouri River near river mile 517, about 18 miles upstream from Rulo, Nebraska. They illustrate the river before (1934; top photo) and after (1935, 1946, and 1977) the construction of brush dikes that narrowed and channelized the river.

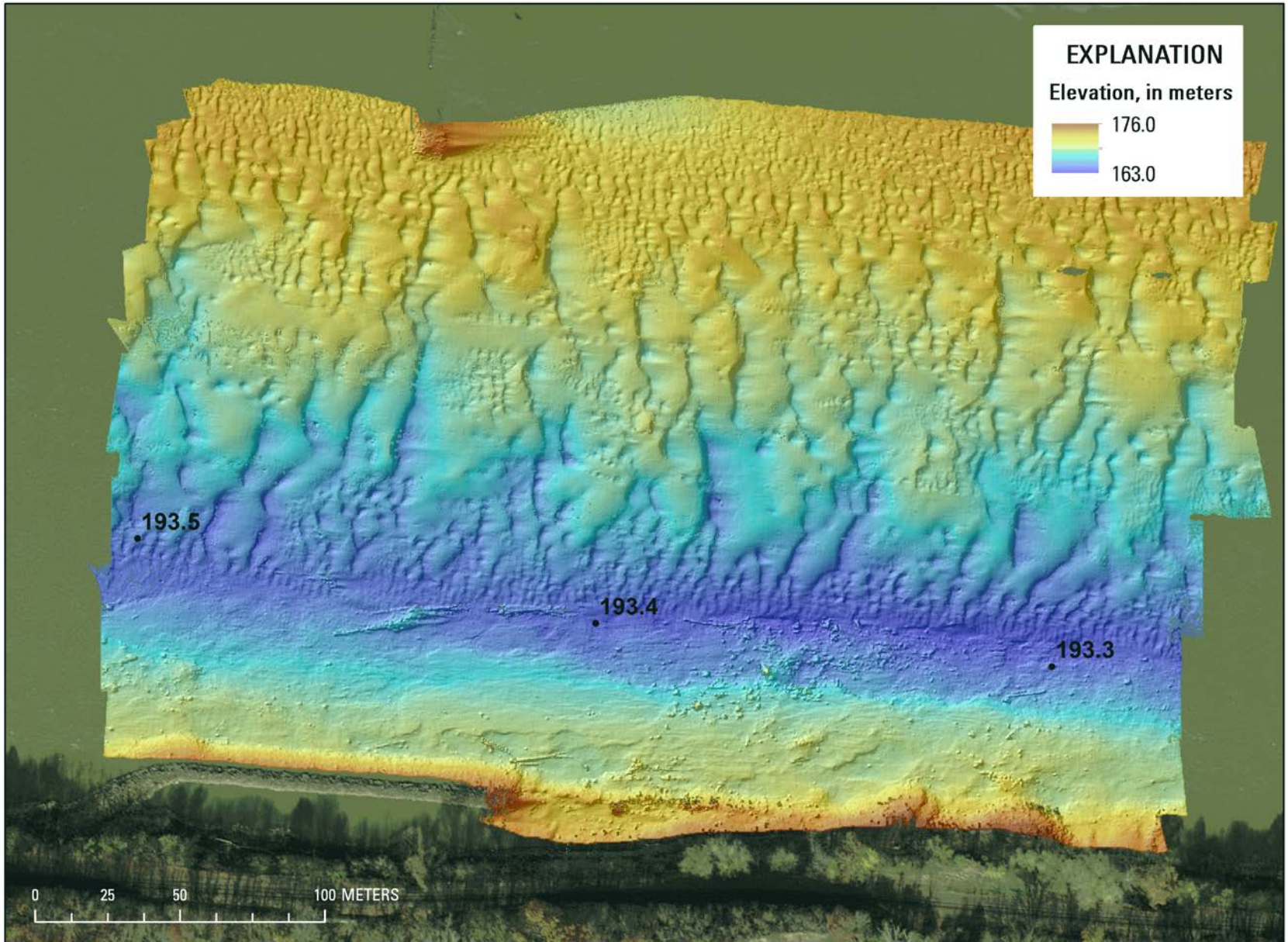


https://www.nap.edu/read/13019/chapter/4#32

Straightening Meanders

Elevated Flows

Dynamic Habitat

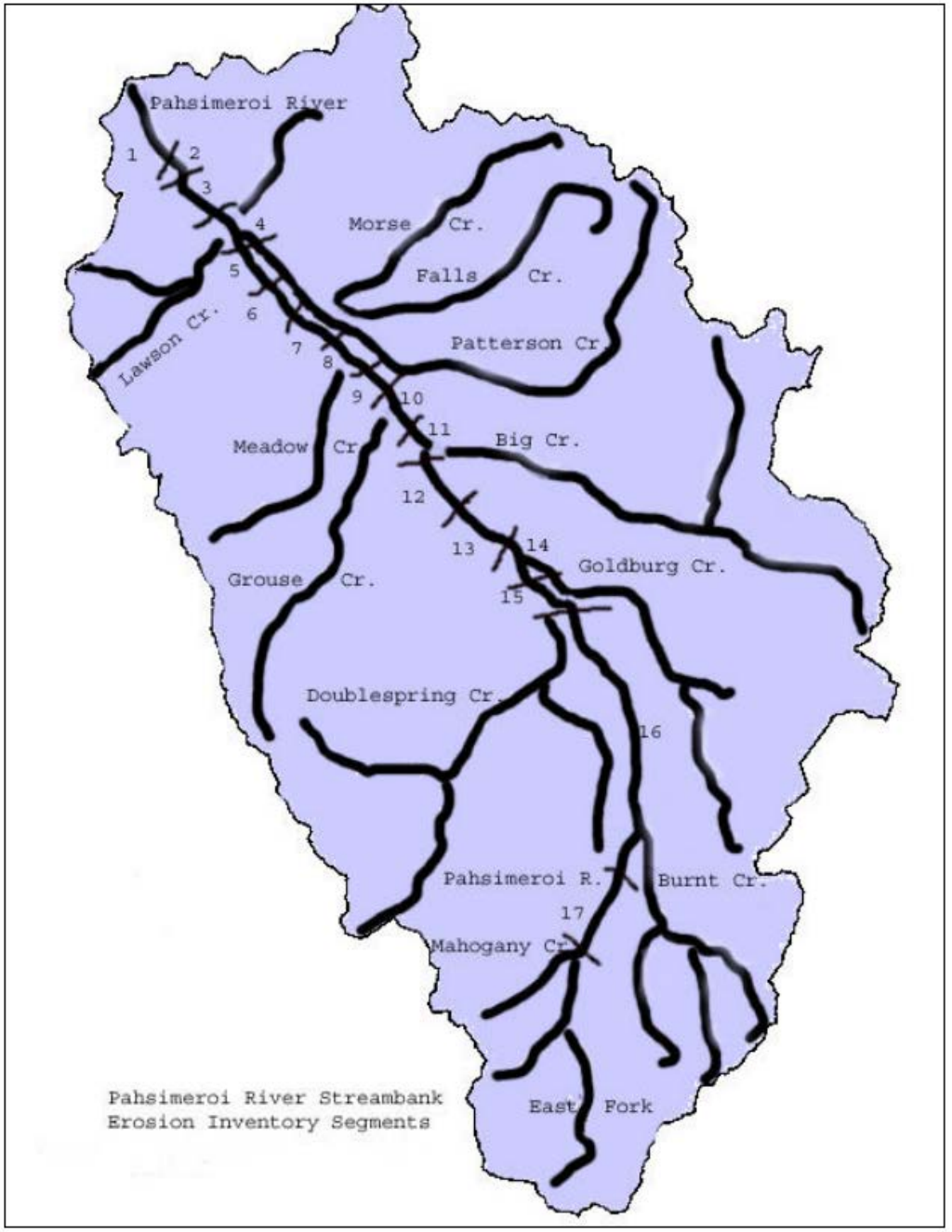


Upstream dams allow sediment to settle out & increase water clarity

Habitat Restoration

"Channels of the Big Muddy" flickr photo by Plains and Prairie Potholes Landscape Conservation https://flickr.com/photos/plainsandprairielcc/8044354882 shared under a Creative Commons (BY) license

Pahsimeroi River

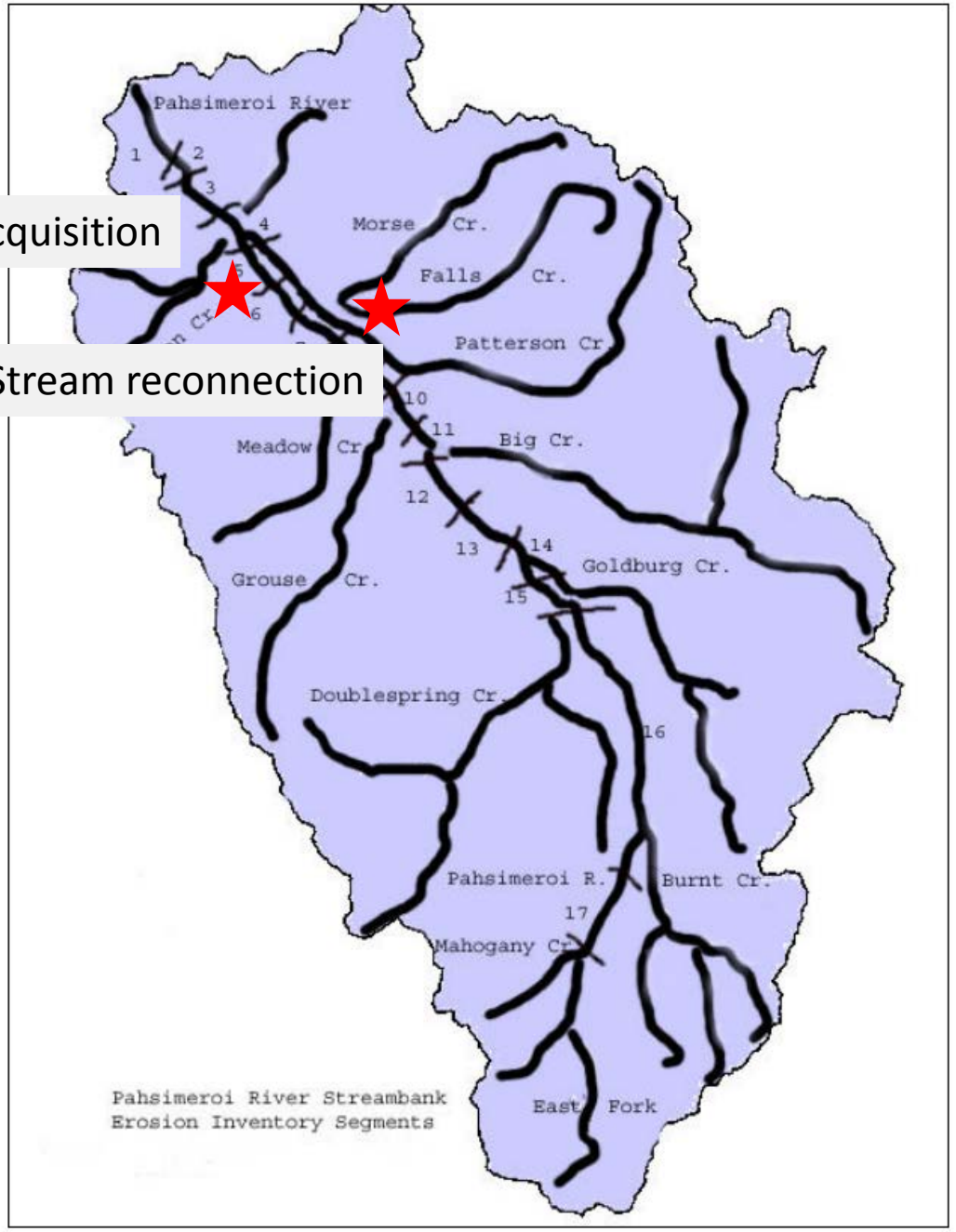


RESTORATION, CONSERVATION, & MITIGATION EXAMPLE

Pahsimeroi River

Land acquisition

Stream reconnection



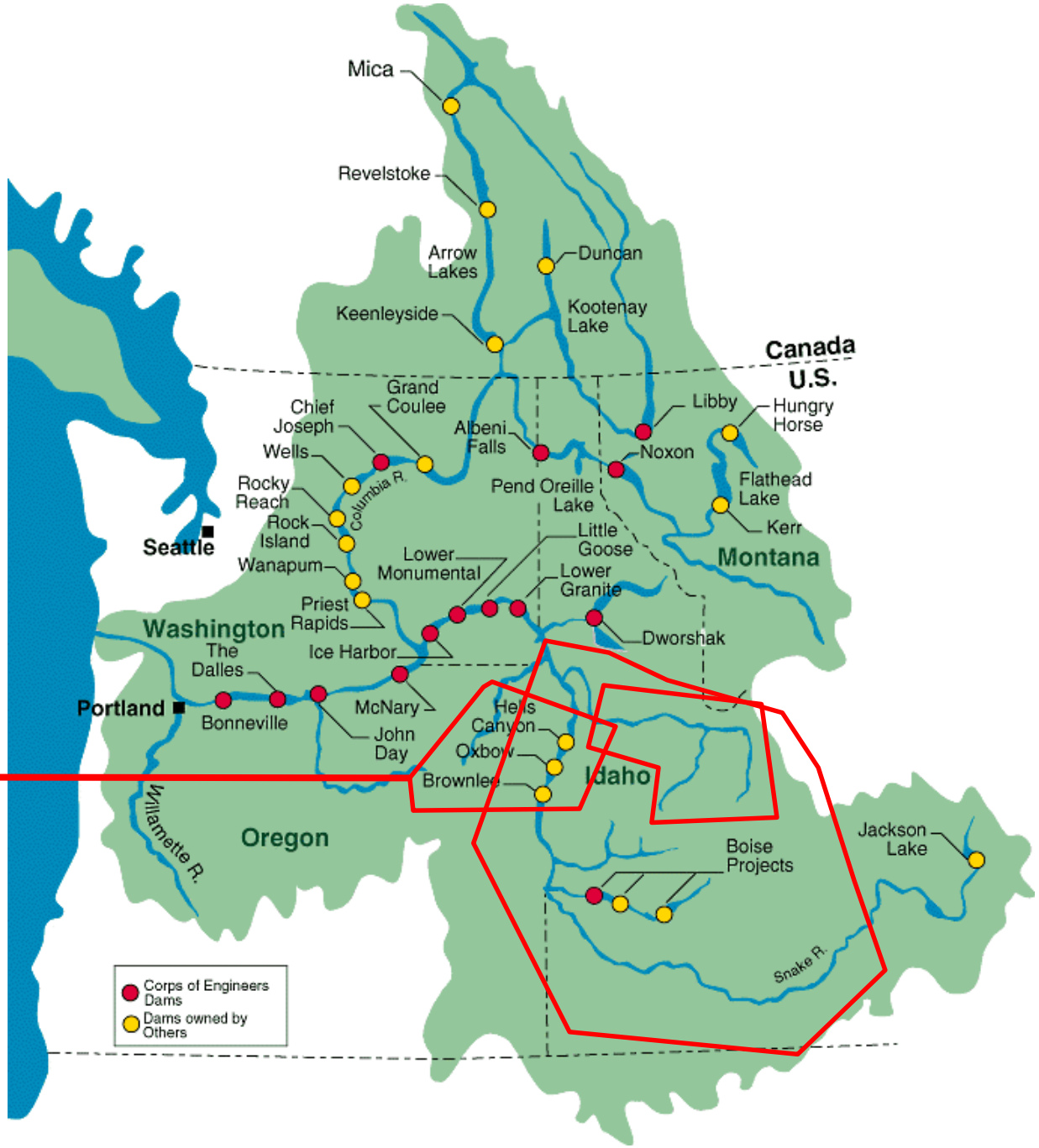
Conservation

- Fish screening- conserves fish in existing habitat

Mitigation

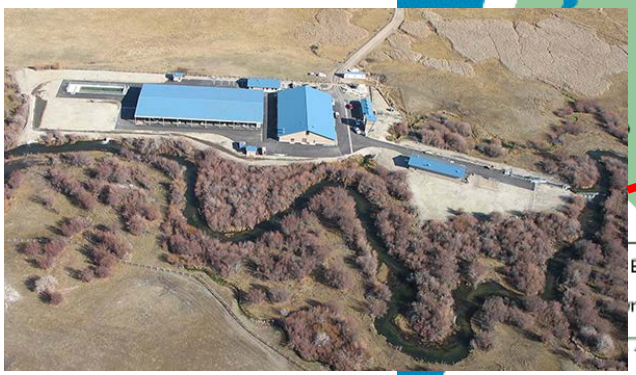
- Raise fish in other habitats

No Fish passage



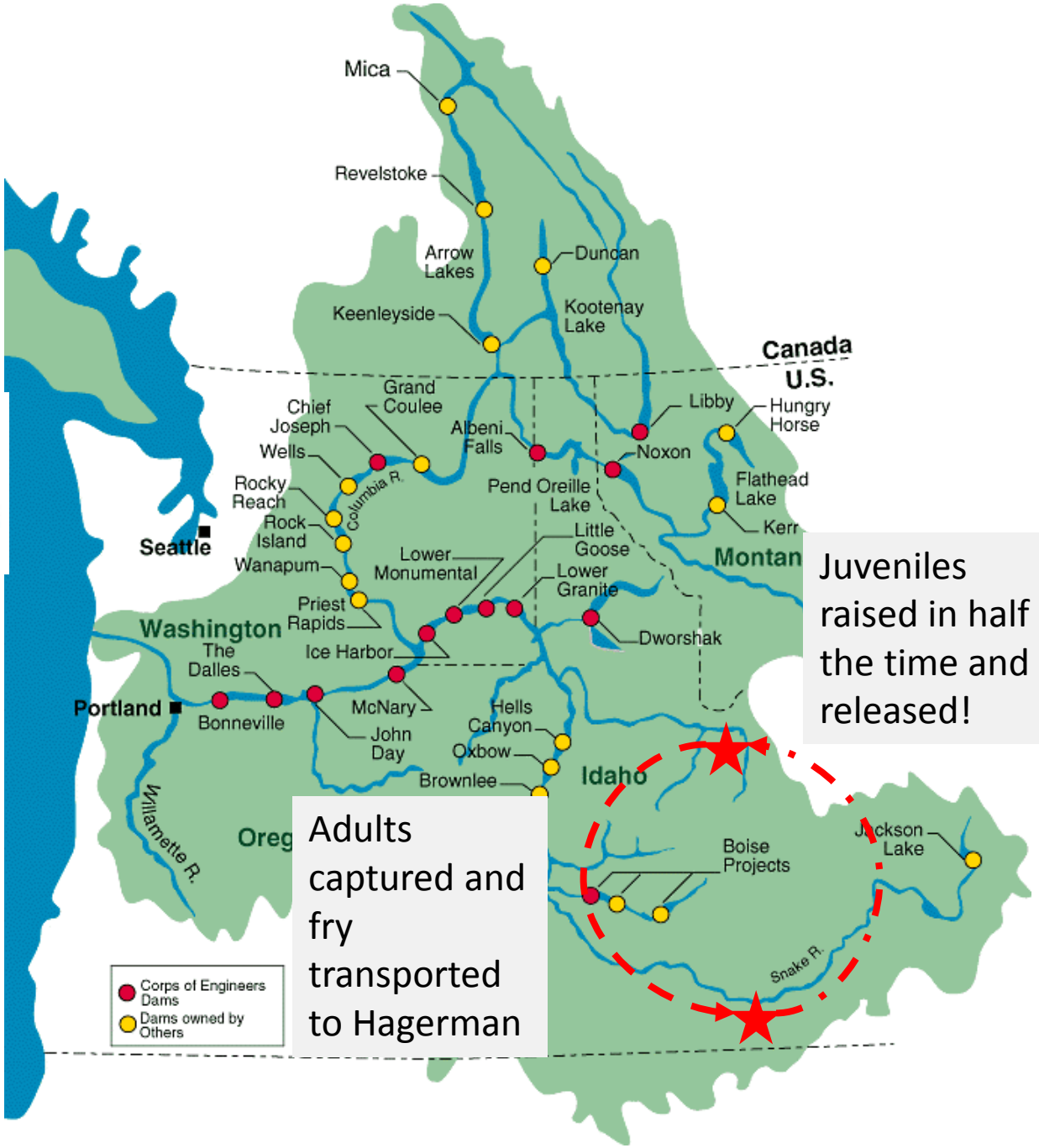
Salmon Mitigation

- Raising fish at a hatchery to mitigate for loss of Snake River Habitat



Steelhead

Juveniles rear for ~2yrs. before heading to ocean



Adults captured and fry transported to Hagerman

Juveniles raised in half the time and released!

Stream habitat types

- Water
- Spawning
- Rearing & foraging
- Growing
- Migratory
- Cover

Stream habitat Restoration

- Riparian zones: thermal input, organic input, trophic input, intercept sediment and nutrients
- Channel complexity: flow refuges (good for larval fish), provides cover (depth, turbulence)
- Coarse woody debris: contributes to channel complexity, provides cover, flow refuge, invertebrate substrates
- Connectivity: among stream reaches, floodplain

Stream habitat Mitigation

- Rearing fish in alternative habitats
- Rearing fish quicker to compensate for production

Stream habitat Conservation

- Keep fish in existing habitat
- Strategic land acquisitions
- Landuse policies minimizing stream degradation (i.e., livestock exclosures, riparian buffers, not till)

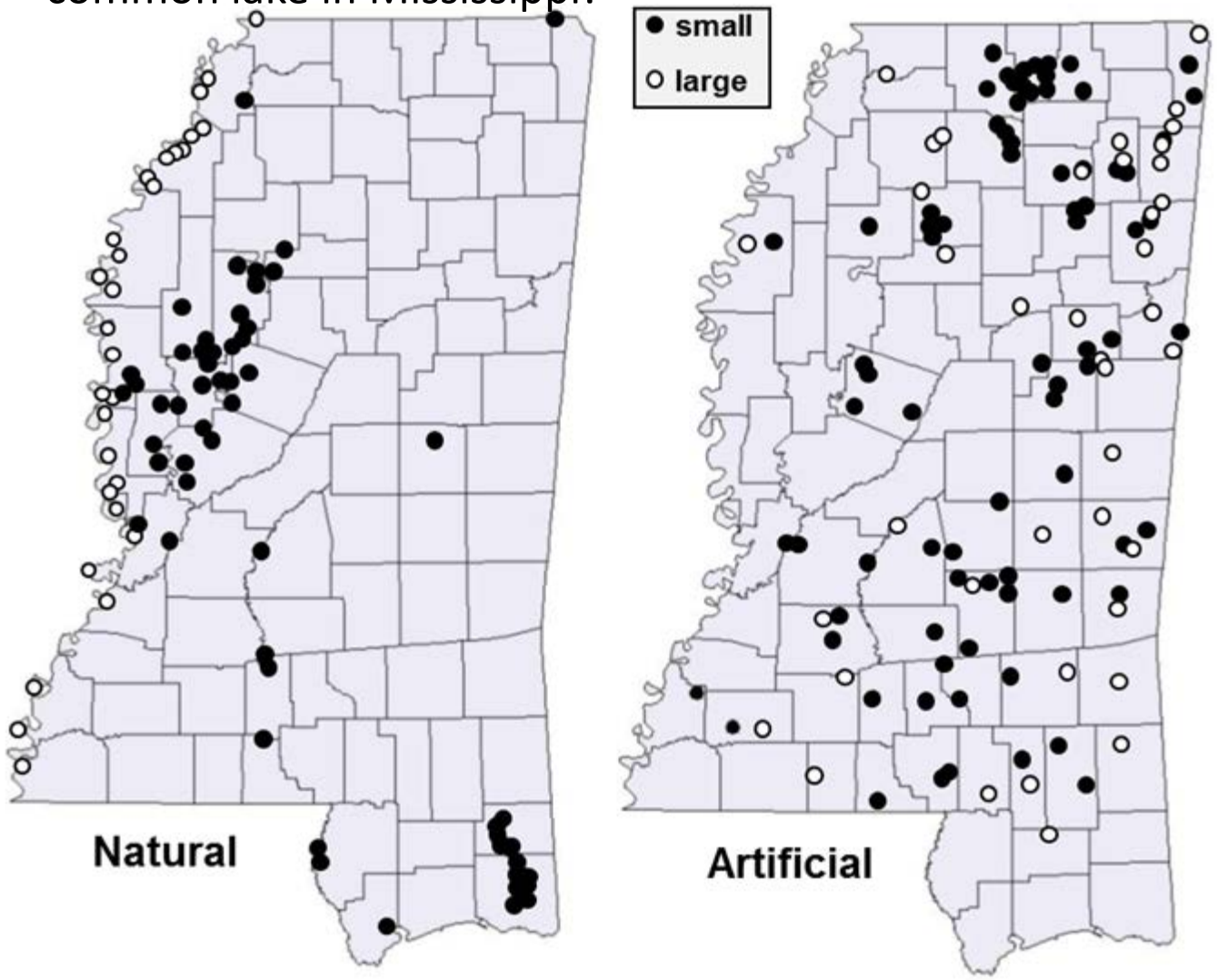
LENTIC HABITAT (AKA LAKES)

Lentic habitat: major types

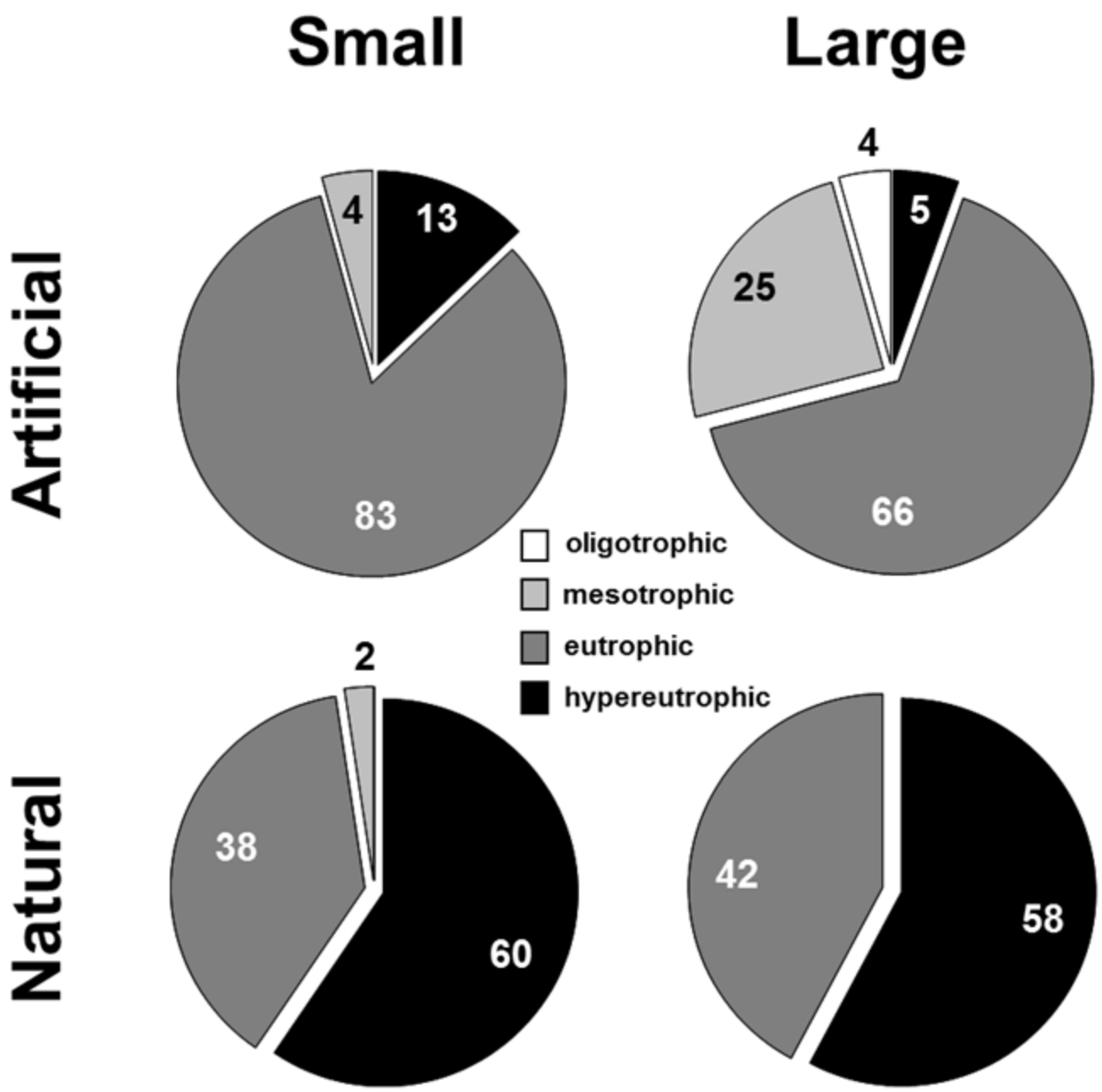
1. Glacial lake
2. **Oxbow lakes**
3. Reservoirs
4. Circque lakes
5. Terminal lakes
6. Sinkhole lakes

Birth of an oxbow

Oxbows are the most common lake in Mississippi!



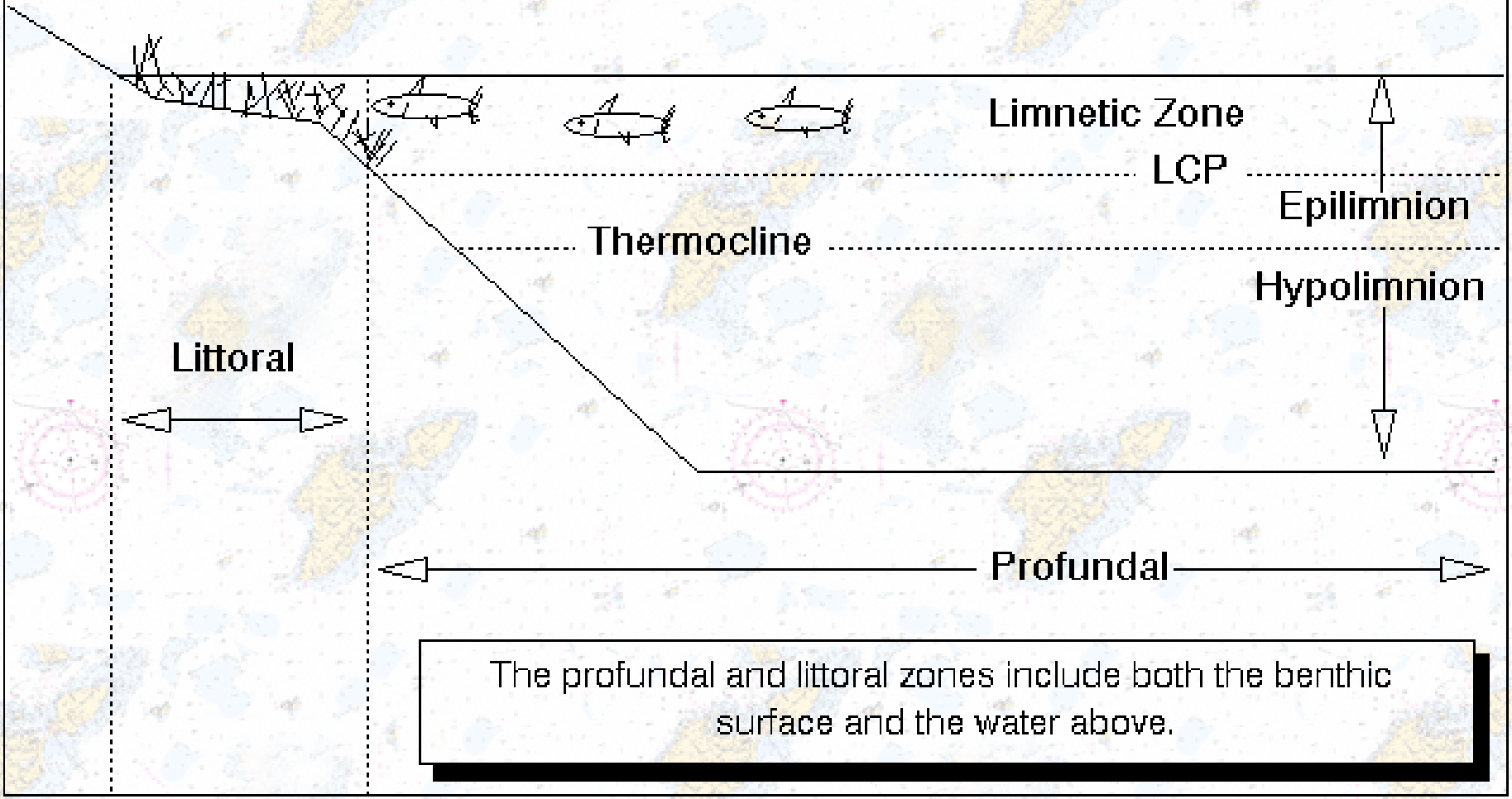
Only lakes ≥ 4 ha (2.5 acres) accessible to the public and monitored by MDWFP are shown.


Small
Large
Artificial
Natural
4
13
83
4
5
25
66
2
38
60
42
58
oligotrophic
mesotrophic
eutrophic
hypereutrophic

Lentic versus lotic habitat

- Lotic
  - Flow
  - Geomorphic controls
  - Pools, runs, riffles…
  - Discrete habitat units
- Lentic
  - Little flow
  - One large habitat unit?

Zonation in a Lake

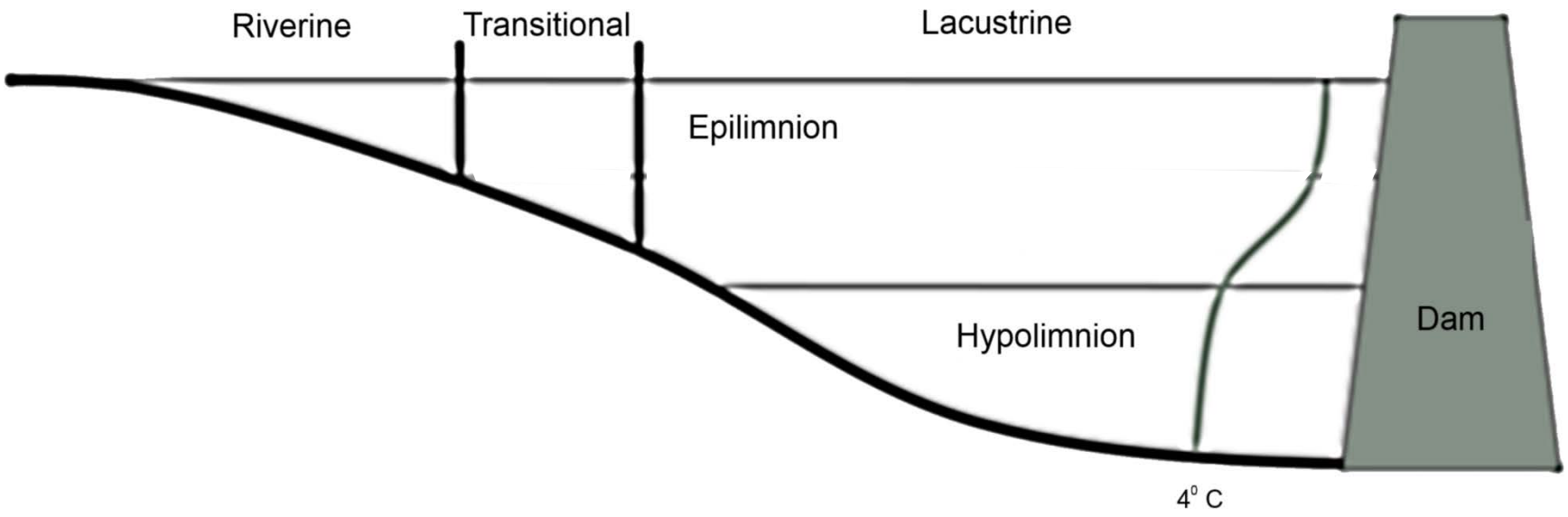


The profundal and littoral zones include both the benthic surface and the water above.

Lake zones

- Littoral-near shore area where sunlight penetrates all the way to the sediment and allows aquatic plants (macrophytes) to grow.
- Limnetic- well-lit, open surface waters in a lake, away from the shore. The vegetation of the littoral **zone** surrounds this expanse of open water and it is above the profundal **zone**. This is the main photosynthetic body of the lake.
- Epilimnion-the top-most layer in a thermally stratified lake, occurring above the deeper hypolimnion.
- Hypoliminion- the lower layer of water in a stratified lake, typically cooler than the water above and relatively stagnant.
- Profundal-a deep zone of an inland body of freestanding water, such as a lake or pond, located below the range of effective light penetration.

Reservoir habitat



Lake & reservoir habitat stressors

- External loading
  Sediment & Nutrients
- Water quality
- Non-native species
- Water withdrawals
- Fish kills
- Residential development

Lake & reservoir habitat management

Sediment loading management

- Sediment settling basins
- Watershed restoration
- Sediment bypass
- Dredging

Lake & reservoir habitat management

Nutrient management

- Settling basins
- Watershed restoration
- Bypass
- Aquafir restoration
- Rain?

Lake & reservoir habitat management

Non-native species management

- More to come later in semester

Lake & reservoir habitat management

Fish kills management

- Aerators
- Water quality restoration

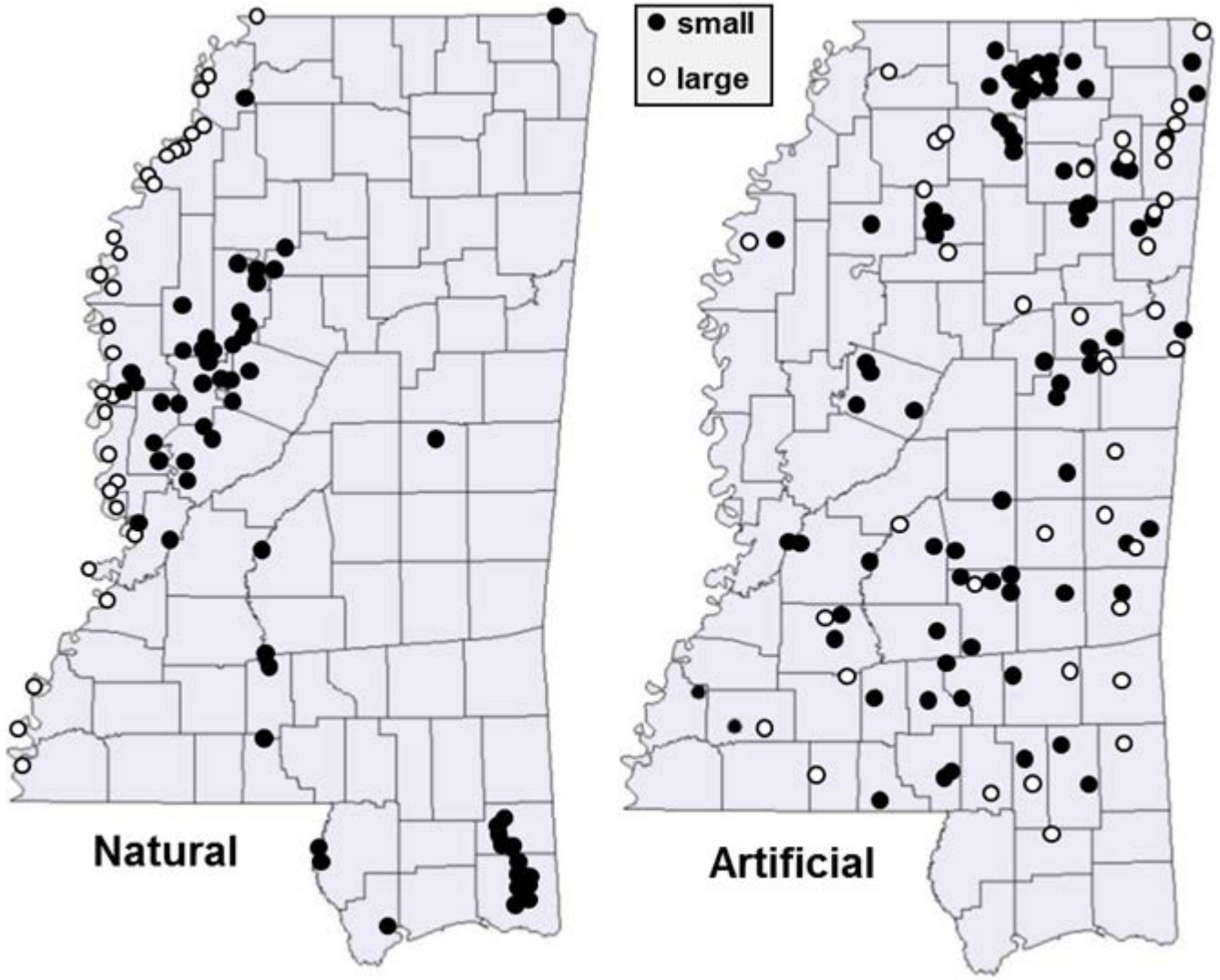
Lake & reservoir habitat management

Residential development

- Coarse woody debris additions
- Shoreline remediation

MDWFP LAKE MANAGEMENT PLANS

MDWFP State lakes



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Development of fishery management plans (FMP)

- Primary water bodies had to have a management plan and be sampled 1 out of 3 years
- Secondary was 1 out of 5 or so, forced biologist to get out to other systems

Elements of a FMP

- Introduction
- Goals and objectives
- Actions
- Monitoring results
  - Fish: electrofishing, trap netting
  - Fishery: creel
  - Habitat and facilities
- Discussion of monitoring

S.M.A.R.T. Goals & Objectives

- **Specific**: Goals should be simplistically written and clearly define what you are going to do.
- **Measurable**: Goals should be measurable so that you have tangible evidence that you have accomplished the goal. Usually, the entire goal statement is a measure for the project, but there are usually several short-term or smaller measurements built into the goal.
- **Achievable**: Goals should be achievable; they should stretch you slightly so you feel challenged, but defined well enough so that you can achieve them. You must possess the appropriate knowledge, skills, and abilities needed to achieve the goal.
- **Results focused**: Goals measure outcomes, not activities.
- **Time bound**: Goals should be linked to a timeframe that creates a practical sense of urgency, or results in tension between the current reality and the vision of the goal. Without such tension, the goal is unlikely to produce a relevant outcome.

Fishery Management Plan
Lake Washington
January 2015

Lake Washington is a 3,090 acre oxbow lake located in Washington County about 20 miles south of Greenville, MS and near the towns of Glen Allen and Chatham. It is one of Mississippi's largest natural lakes with scenic cypress forests in both ends and most of the western shore. Water levels normally fluctuate around 2-3 feet with average and maximum depths of 6 feet and 20 feet, respectively. The main line levee prevents a direct hydrological connection with the Mississippi River. A low head dam on Washington Bayou, the outlet of Lake Washington, elevates lake level four feet and permits boat navigation through much of the cypress forest. The dam has two culverts used mainly to drain excess water after heavy rains. The eastern shore and a section of the western shore are mostly residential development and fishing camps. There are two public boat ramps; one in Glen Allen which is maintained by Washington County and another in Paul Love Park on the Washington Bayou dam. There are six privately-operated, public fee ramps along with a marina, two fishing piers, bait shops, rental cabins, and trailer hook-ups.

The watershed of Lake Washington is approximately 27,860 acres. The watershed is generally flat and composed of around 45% cropland, 22% pasture land, 32% bottomland hardwood forest/swamp, and < 1% residential areas. Agriculture activities on the watershed greatly influence Lake Washington water quality, and problems with poor water quality have plagued the lake for over 30 years. The lake was closed to commercial fishing between 1973 and 1977 due to the pesticide contamination. There have also been problems with high nutrient levels and organic enrichment leading to extensive algal blooms, low DO levels, and partial fish kills (Lucas 1988). Lake Washington and two of its tributaries were listed on the 303(d) list in 1996 as impaired water bodies due to sediment/siltation, and TMDLs have been developed by MDEQ and approved by the USEPA to reduce sedimentation and to increase DO levels (Tetra Tech 2003).

Historically, Lake Washington has had a valuable multifaceted fishery that receives substantial fishing pressure and has positively influenced the local economy by attracting out-of-state anglers. Fish surveys show that sportfish populations were high in the 1990s with over 100 pounds of game fish per shoreline acre in 1992 (Lucas and Vyles 1998). Catfish are abundant in Lake Washington and have been since at least the 1950s when a fish community survey found a high percentage of the fish population to be catfish (Smith 1950). Recent surveys reveal that catfish are still abundant, and angler catch rates of catfish have increased dramatically since the early 1990s. In addition to traditional pole fisheries, yo-yo's and limblines are used extensively for crappie and catfish during certain times of the year. Trotlines and hand grabbling are also used for catfish. Sport fishing effort is usually the highest when high water in the Mississippi River makes it difficult to fish oxbow lakes directly connected to the river.

In the 1990s, fisheries management efforts focused on biomanipulation (Jones 1986) as a means to address the eutrophic status of Lake Washington (Lucas 1988). This top-down approach to water quality management contends that water quality in highly eutrophic lakes can be improved

Some Terminology

- Goals and objectives are used interchangeably
  - I use the word objective
- Outcome-the result of an action, outcomes should be related to the objective

Forming Objectives…

- What are some objectives for LMB angler satisfaction?
- What are some actions to achieve those objectives?
- What are the expected outcomes of those actions?
- How can you monitor the outcomes of the actions?