WELCOME

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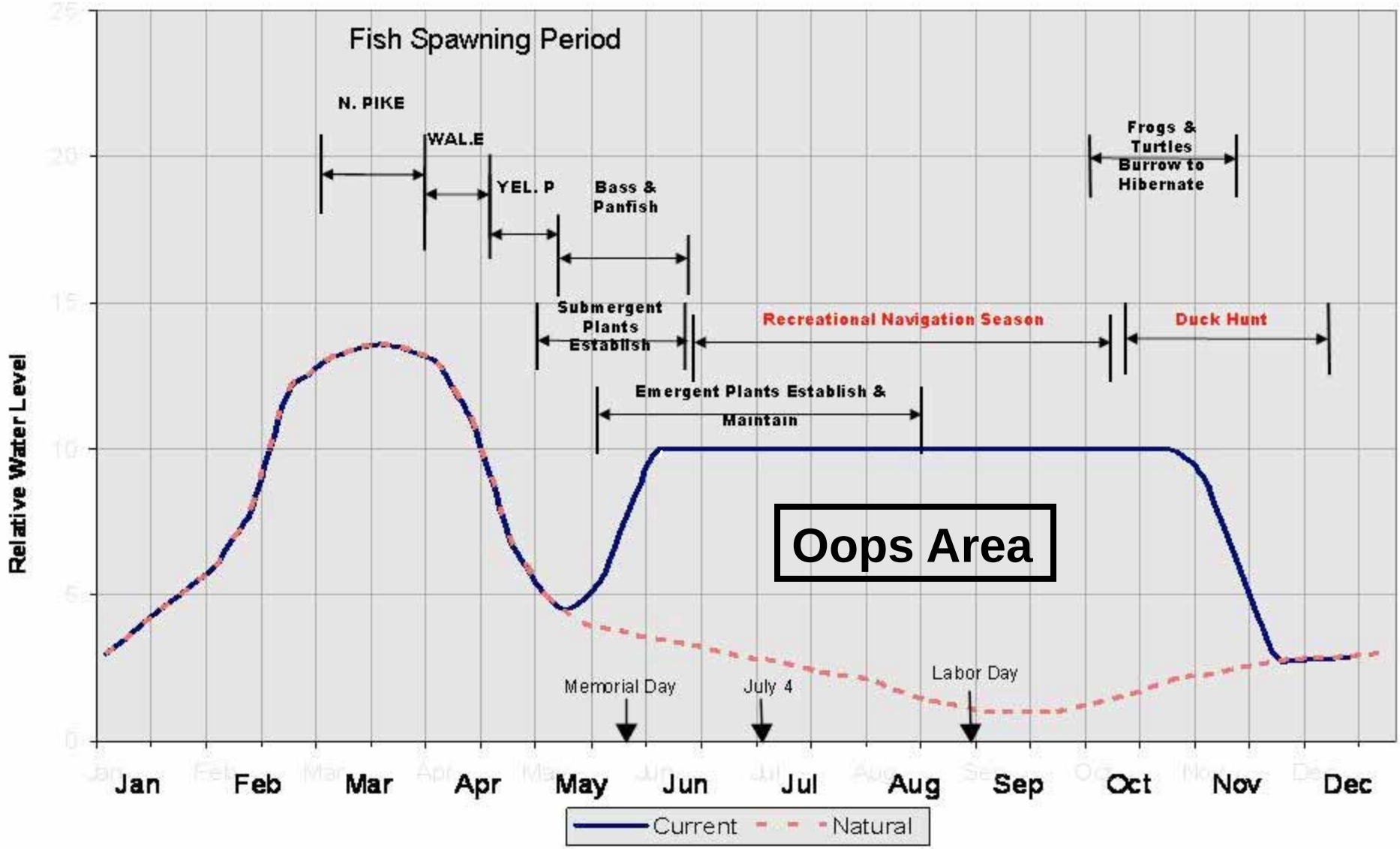
Water Level Flux to Control AIS and Restore Impoundments

WHY? Restore natural ebb and flow

- Restore natural rhythm of ecosystem
  - Evolution of plants and animals
- Allows a system to “heal”
- Increase diversity
- Good health management of lake.
- Can control some AIS (EWM)

It’s a good thing…

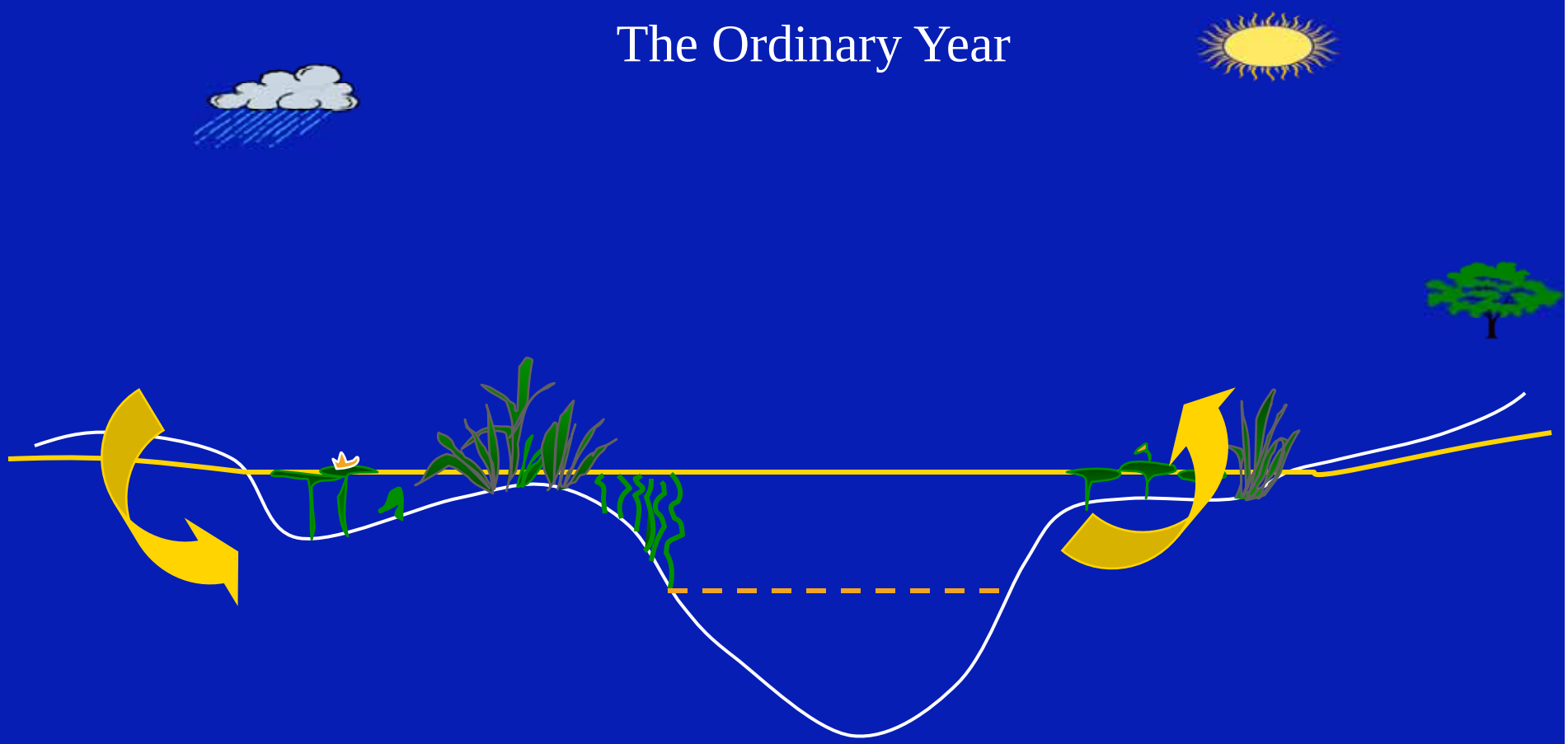
Water Level Changes
Fish, Habitat, & Recreation



(WI DNR/UWEX Upper Fox Basin)

Water Level Cycling in Natural Lakes

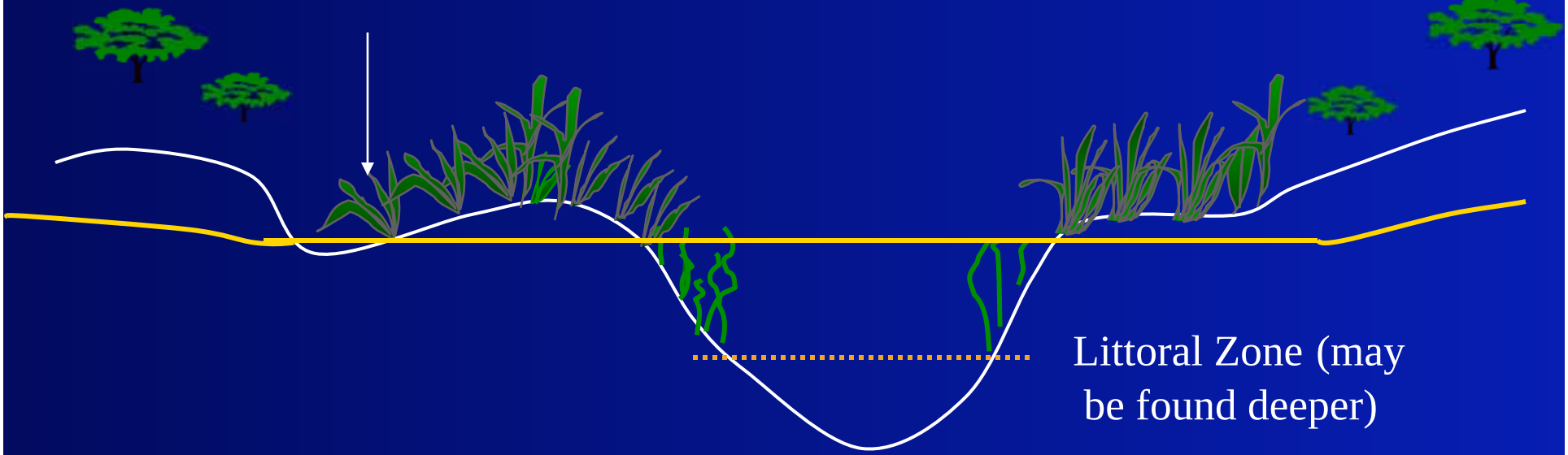
The Ordinary Year



Lake levels determined by rain and snow

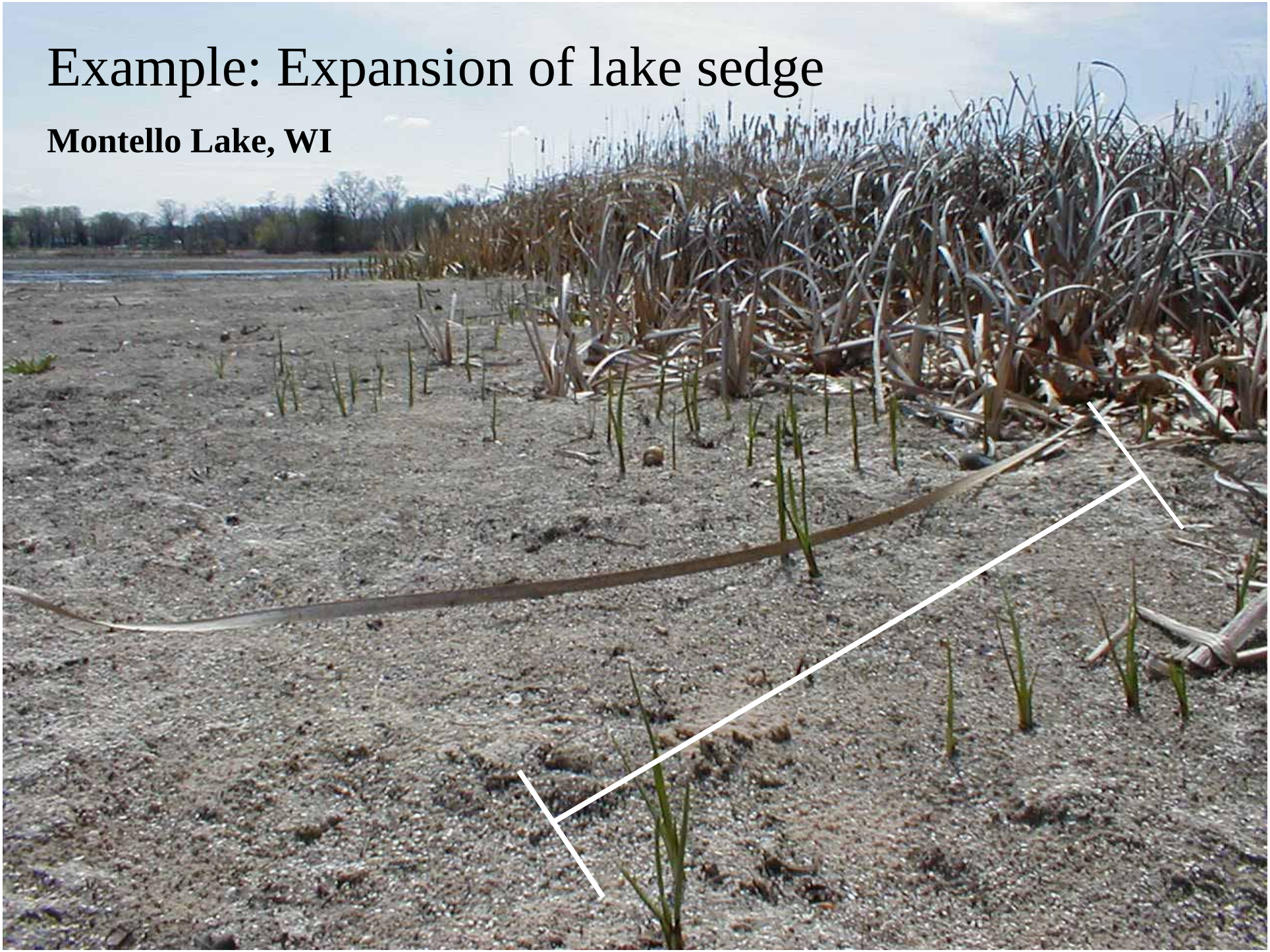
Water Level Cycling in Natural Lakes

The Low Year



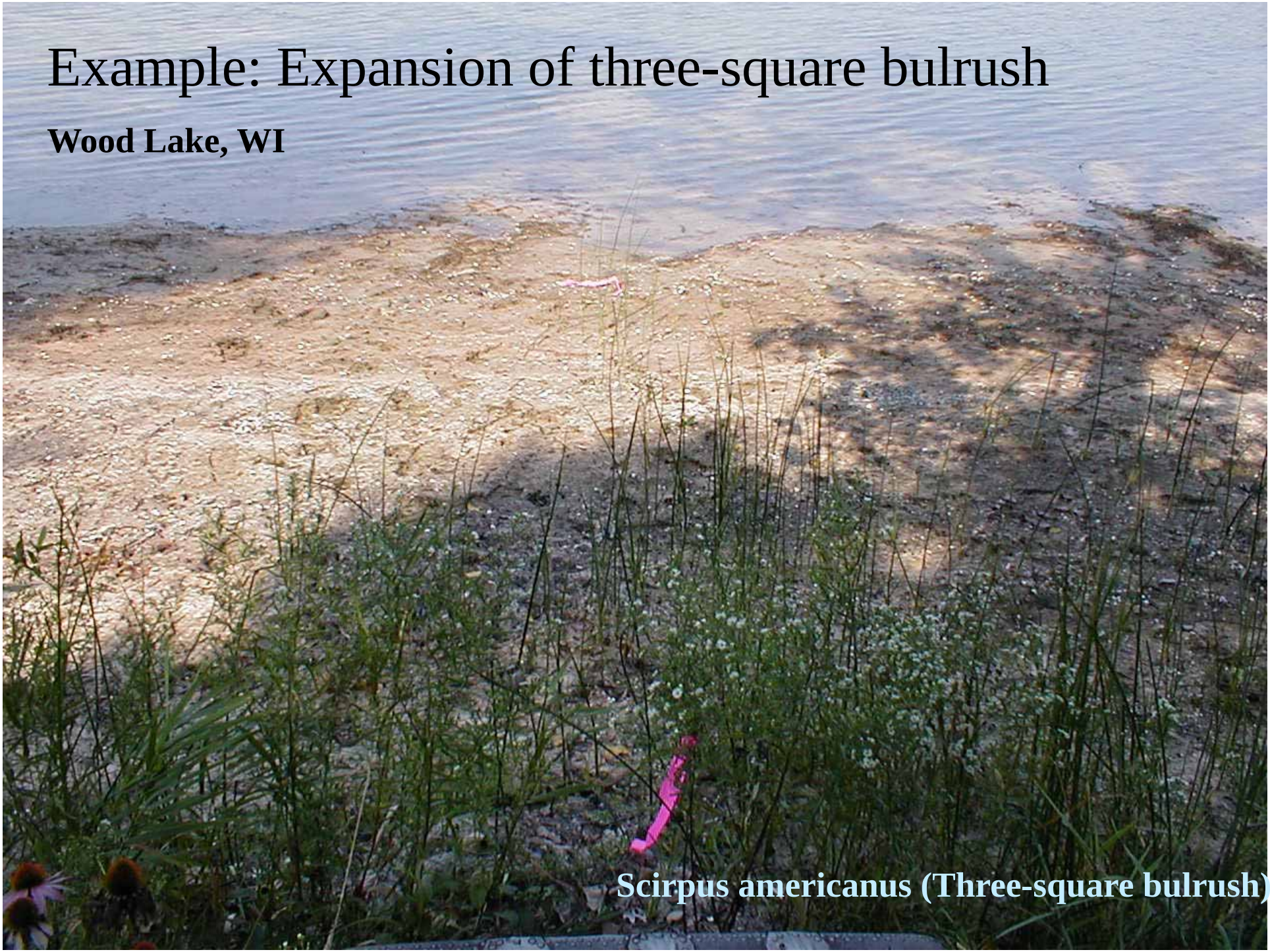
Example: Expansion of lake sedge

Montello Lake, WI



Example: Expansion of three-square bulrush

Wood Lake, WI

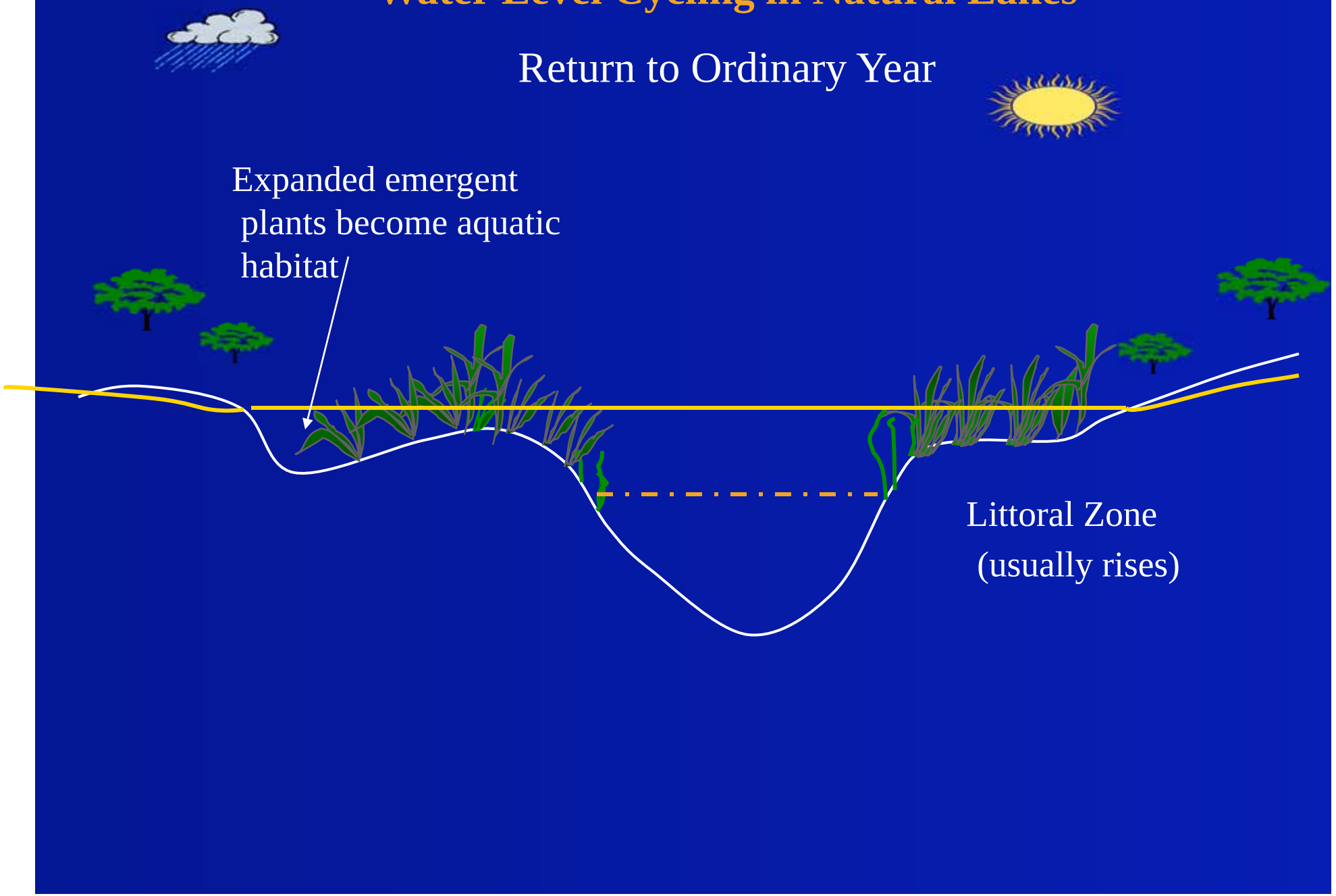


Example: Expansion of Fassett's Locoweed

Plainfield Lake, WI

Water Level Cycling in Natural Lakes

Return to Ordinary Year

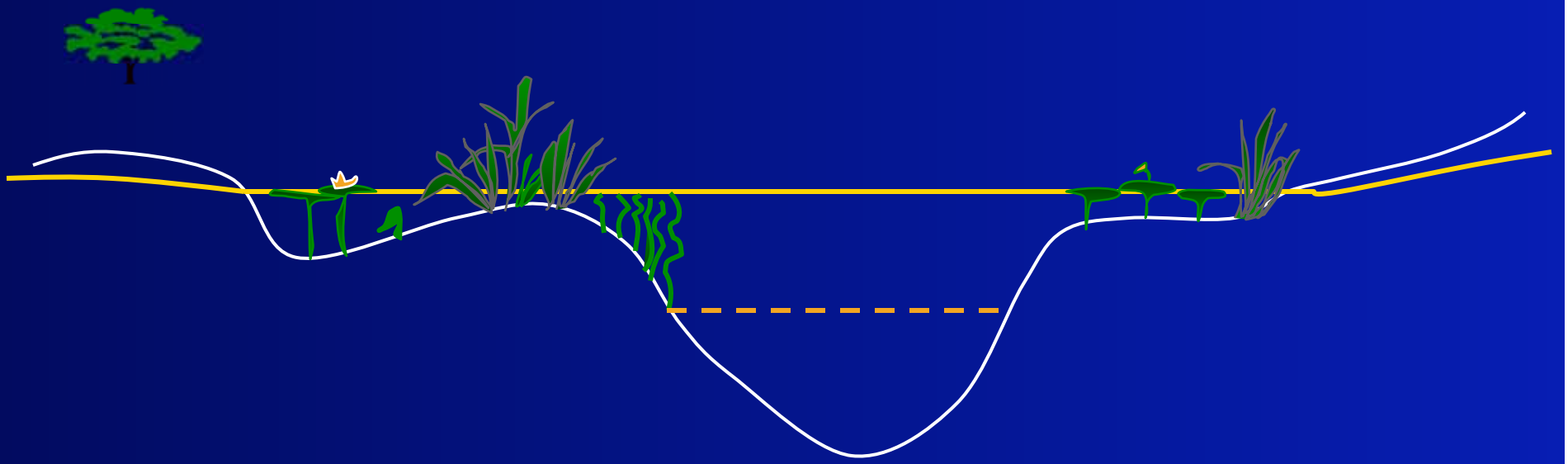


Example: Flooded vegetation following low

Lake Pucaway, WI

Water Level Cycling in Natural Lakes

Completed Cycle

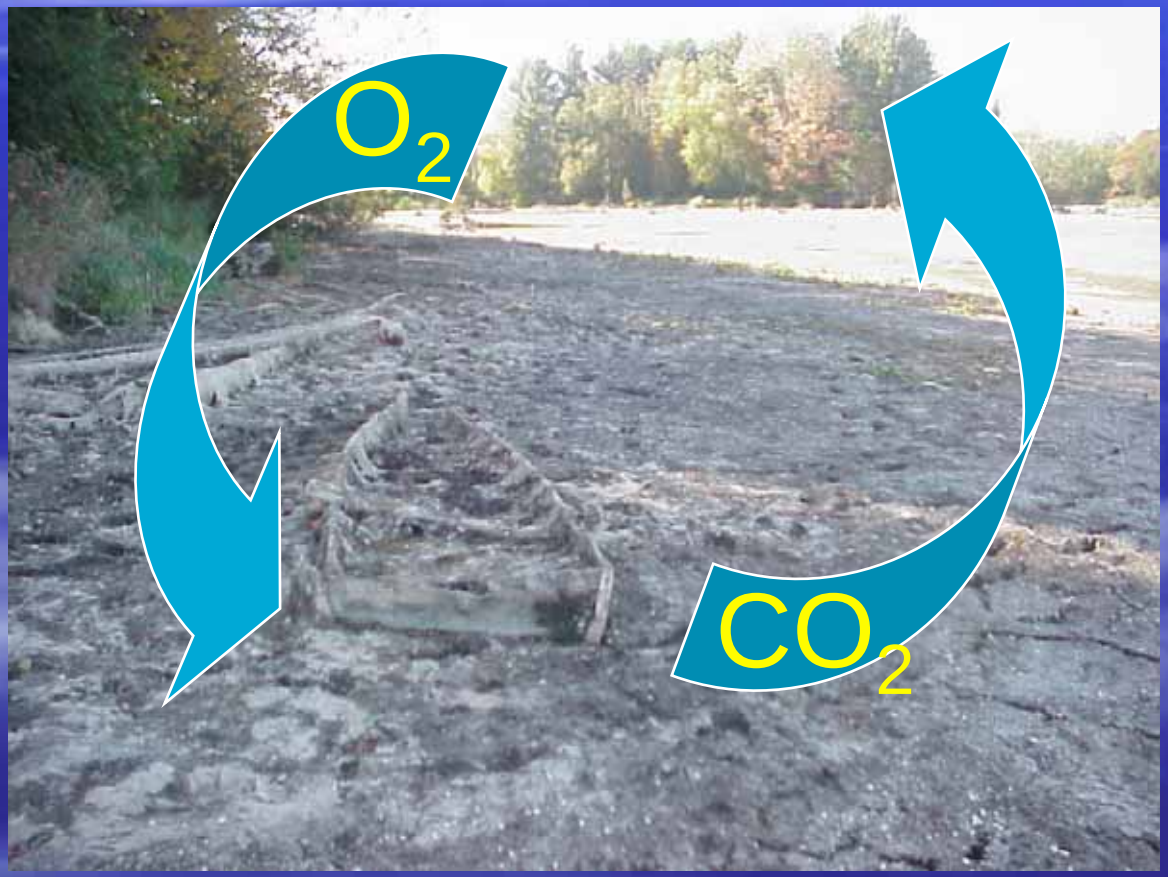


How does this work?

Dessication:

How does this work?

Aeration:

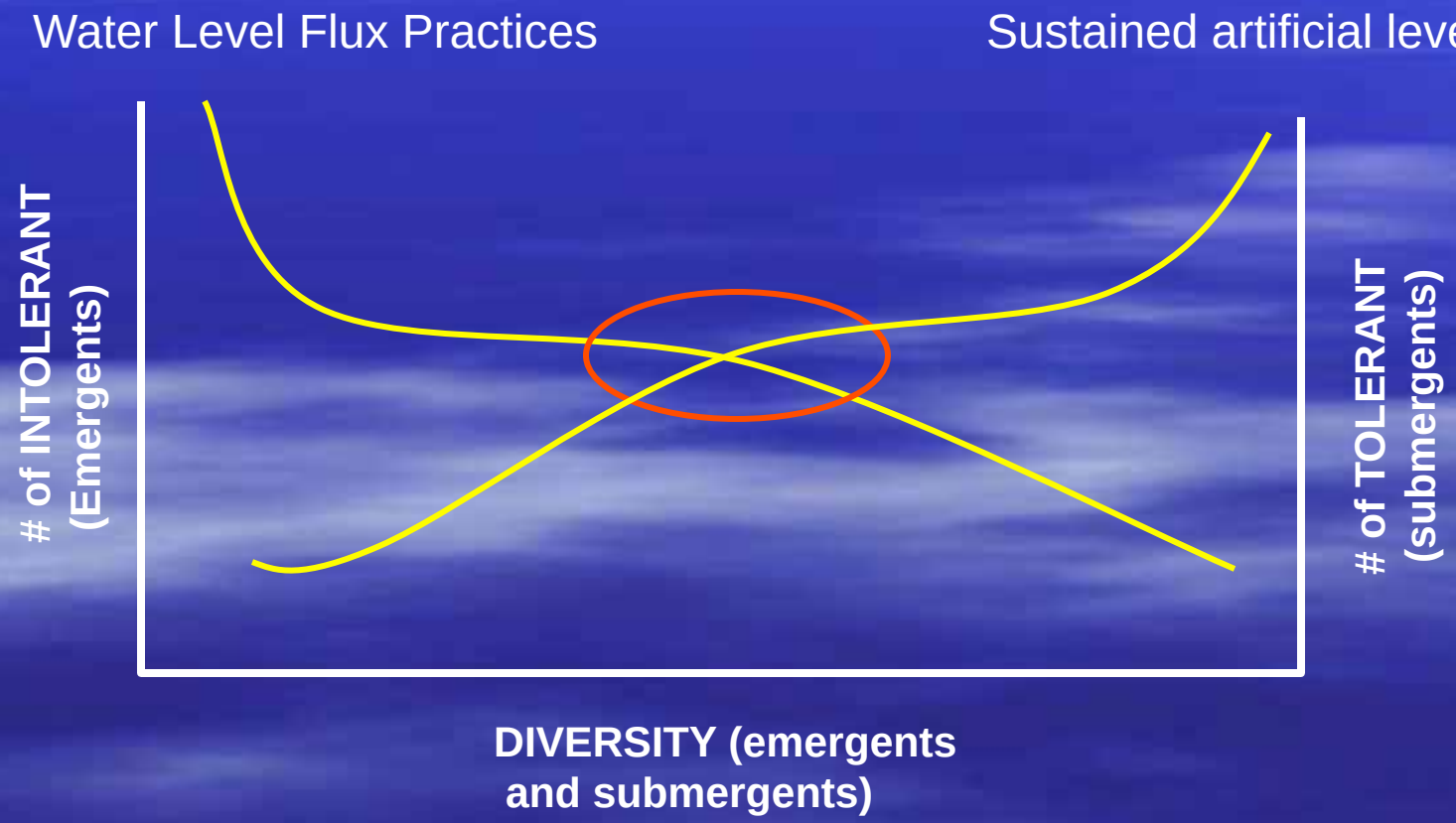


How does this work?

Freezing:

Benefit of Alternation

Drawdown tolerant vs drawdown intolerant

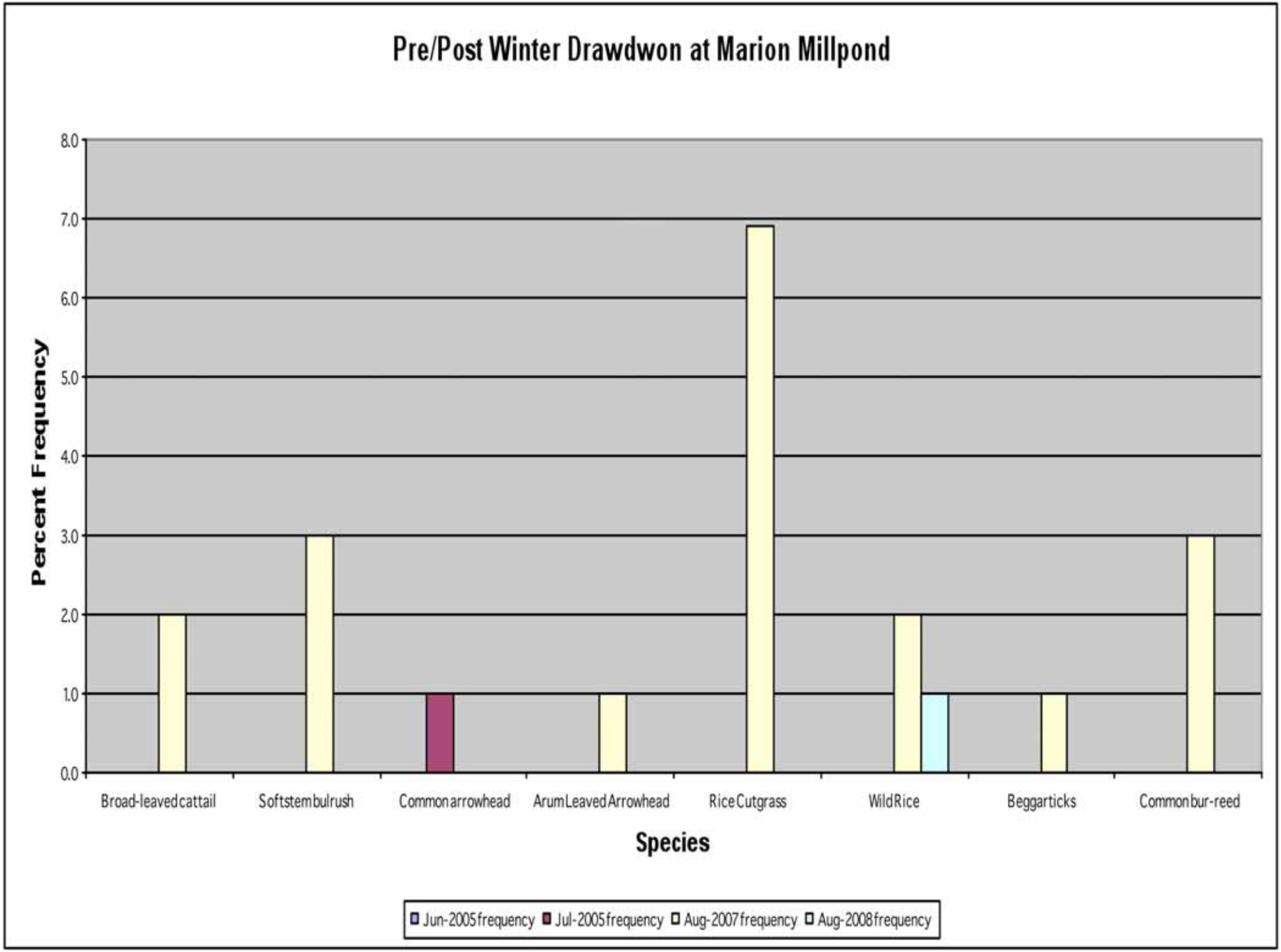


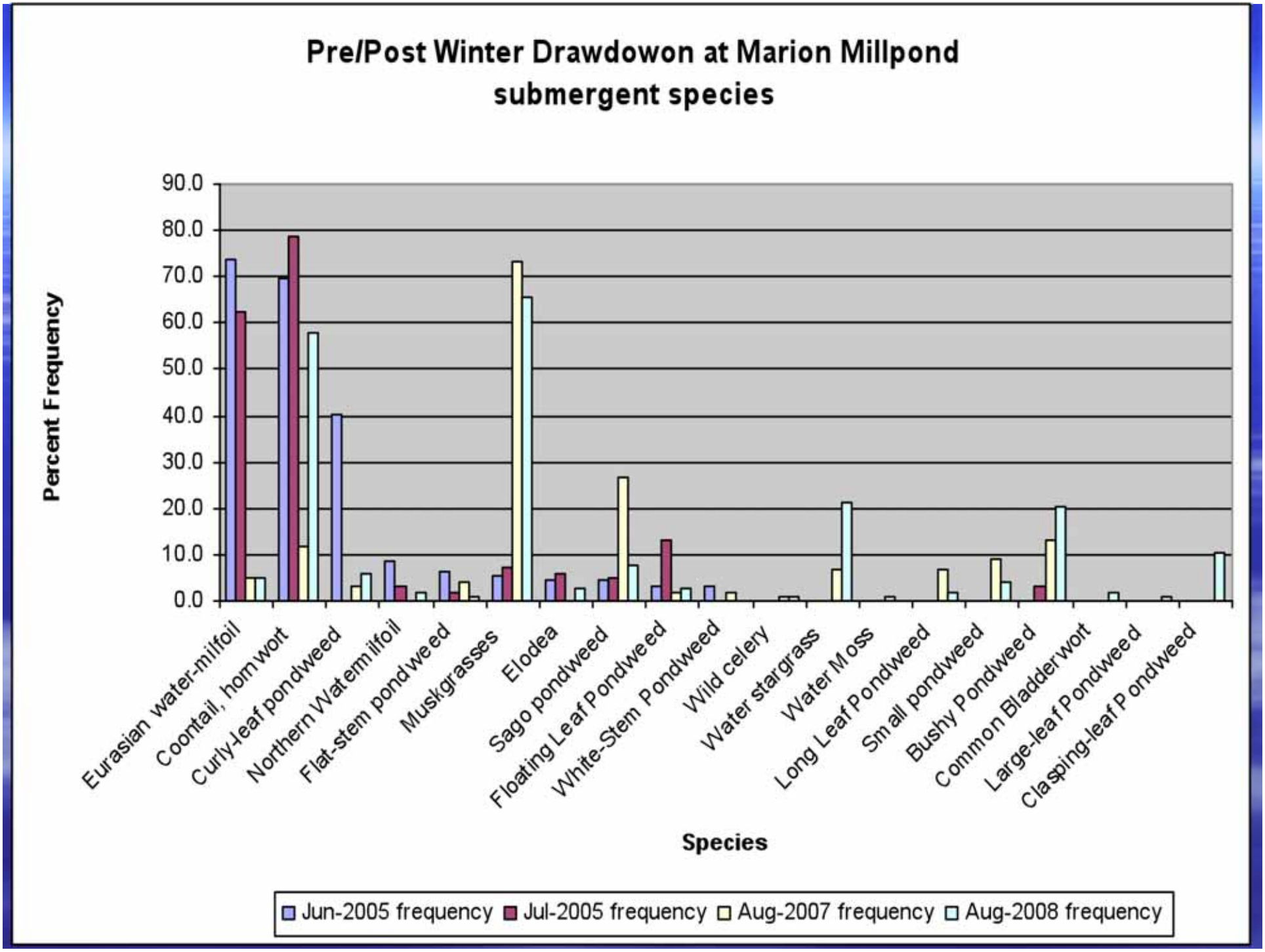
Understanding and Using the Tool

- Mimic Mother Nature.
- Used Nationally - USGS (Great Lakes Science Center)
- Used in Wisconsin - NER, WCR

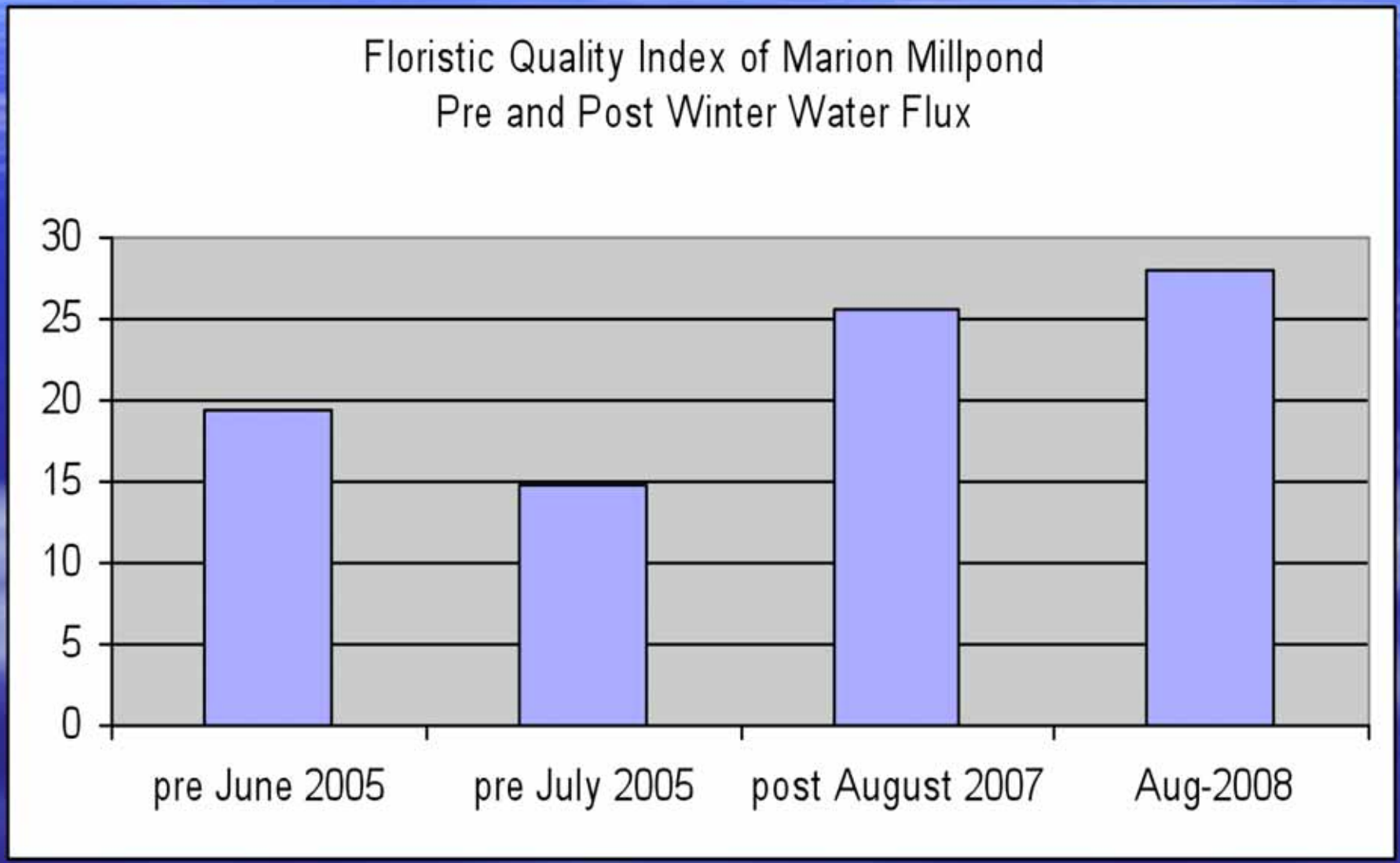
Sediments at Fish Point wetland in Saginaw Bay of Lake Huron exposed by low lake levels in 1988

Fish Point in 1989 after seed bank germination and recolonization of exposed substrate by emergent vegetation


Pre/Post Winter Drawdwon at Marion Millpond
Percent Frequency
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Broad-leaved cattail
Softstem bulrush
Common arrowhead
Arum Leaved Arrowhead
Rice Cutgrass
Wild Rice
Beggarticks
Common bur-reed
Species
Jun-2005 frequency
Jul-2005 frequency
Aug-2007 frequency
Aug-2008 frequency


Pre/Post Winter Drawdowon at Marion Millpond
submergent species
Percent Frequency
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Eurasian water-milfoil
Coontail, hornwort
Curly-leaf pondweed
Northern Watermilfoil
Flat-stem pondweed
Muskgrasses
Elodea
Sago pondweed
Floating Leaf Pondweed
White-Stem Pondweed
Wild celery
Water stargrass
Water Moss
Long Leaf Pondweed
Small pondweed
Bushy Pondweed
Common Bladderwort
Large-leaf Pondweed
Clasping-leaf Pondweed
Species
Jun-2005 frequency
Jul-2005 frequency
Aug-2007 frequency
Aug-2008 frequency

FQI Following Winter DD
Marion Millpond, WI



How can we use this for AIS?

Intolerant	Examples	Tolerant
EWM		Bulrush
CLP? (I think so)		Water Celery
Needle Spike Rush		Water Marigold
Yellow Pond Lily		Bushy Pondweed
Coontail (can recover quickly)		Floating-Leaf

A shift to tolerant species can reduce EWM and potentially CLP

Using the Tool for AIS Control

- Used Internationally – Czech Republic, et al.
- Used Nationally

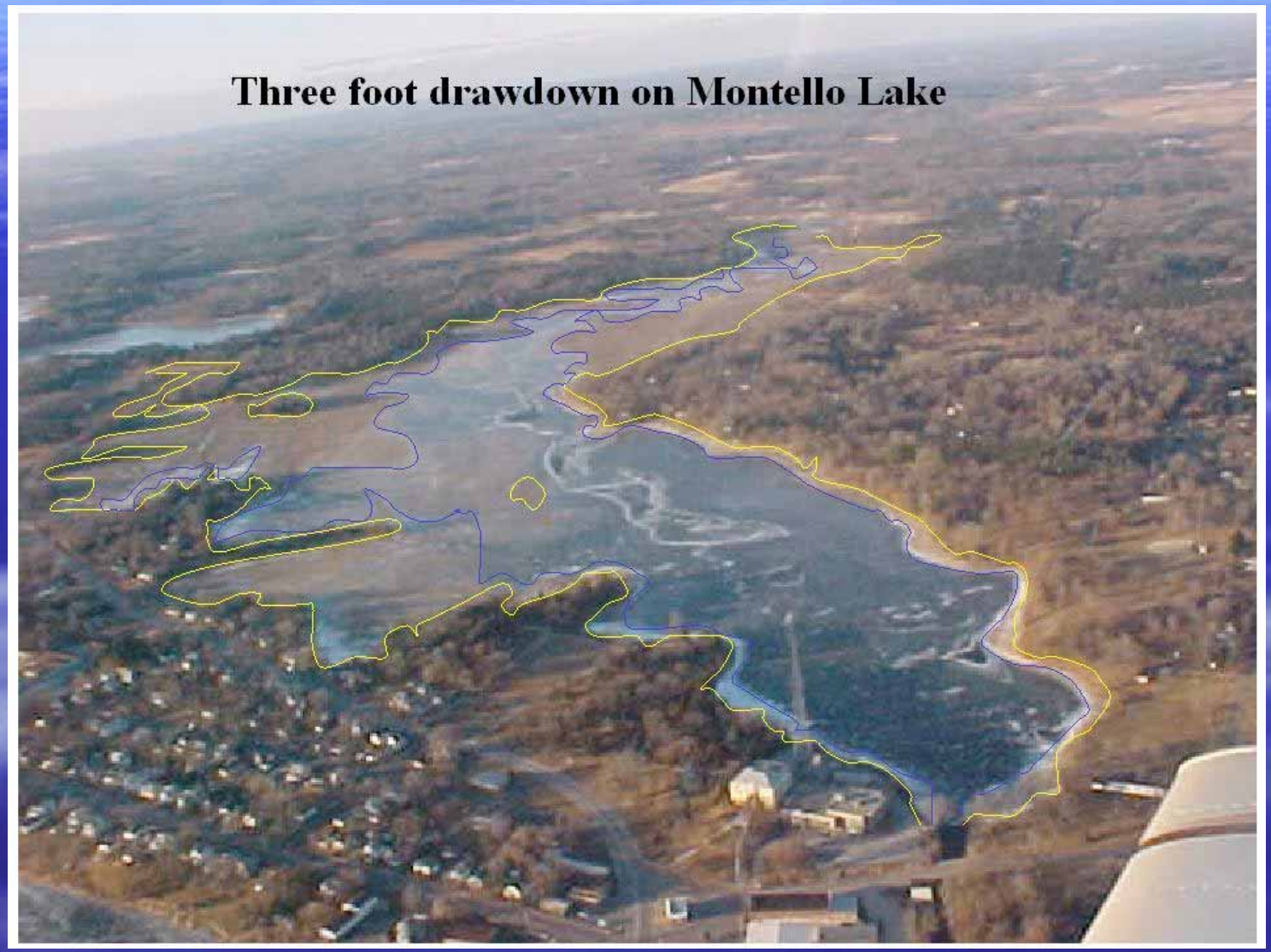
  TVA, WA, OR, NY, CN, WI, MN,
- Used in Wisconsin

  NER, WCR

Climates capable of freezing; southern states less control

Partial Winter Drawdown Montello Lake, WI

September though April



EWM Control Montello Lake 2002-2003

Pre DD EWM frequency ~80 %

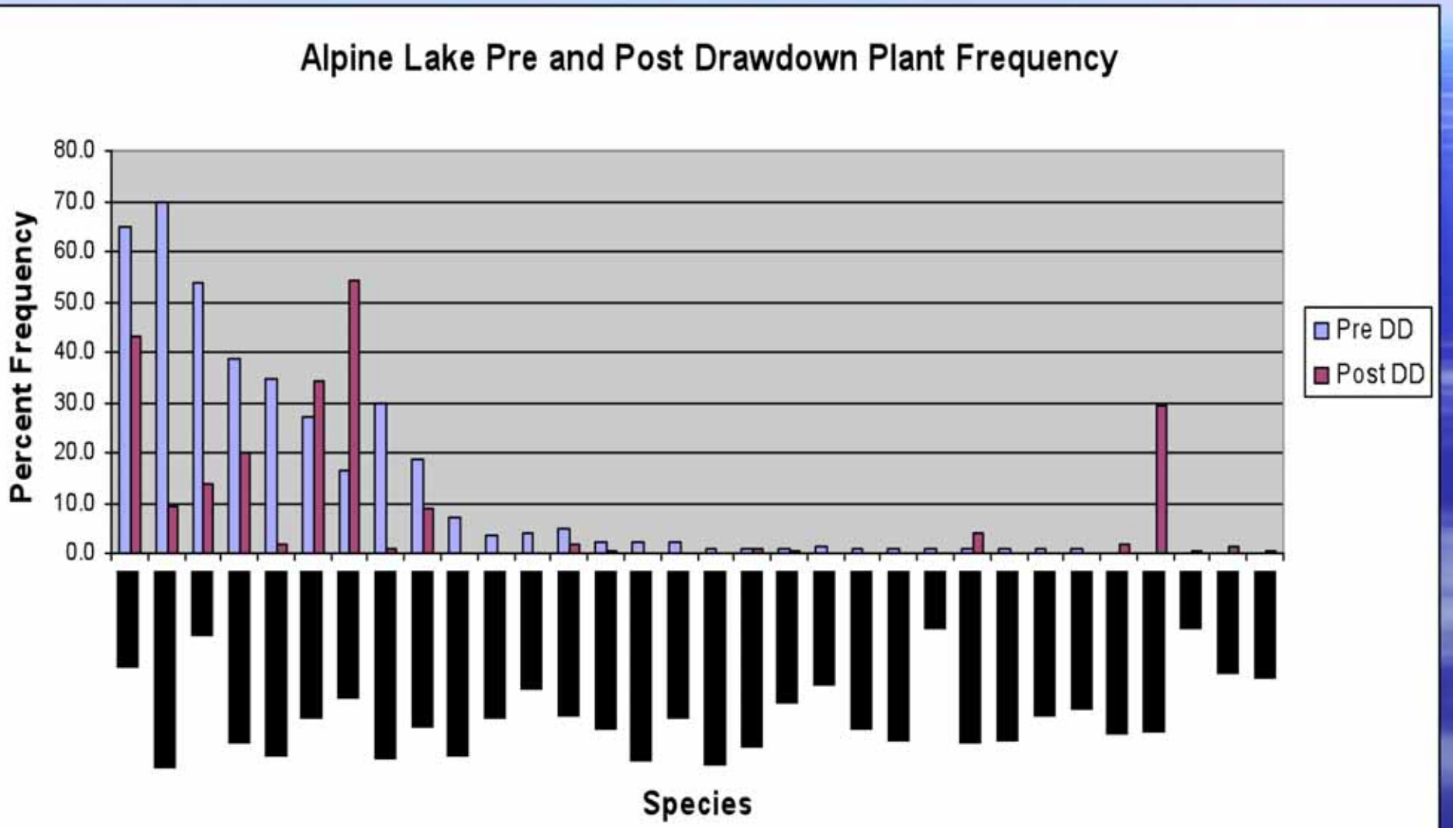
Post DD EWM frequency ~ 6 %

Partial Winter Drawdown Alpine Lake, WI

September though April

EWM Control Alpine Lake 2005-2006

Pre DD EWM frequency	69.7%
Post DD EWM frequency	9.2%


Alpine Lake Pre and Post Drawdown Plant Frequency
Percent Frequency
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Pre DD
Post DD
Species

Partial Winter Drawdown Marion Millpond, WI

September though April

EWM Control Marion Millpond 2006-2007

Pre DD EWM frequency	73.9%
Post DD EWM frequency	5.0%

Sounds great, but…….

- Short-term fishery Impacts - flow is key
- Physical constraints – dam capabilities
- Economic impacts – tourism, fisheries, industrial, hydro power
- Social concerns – history, emotions
- Frame it correctly!

That's why…..

Know how to proceed

Good Plan (not just a plan)

Identify objectives

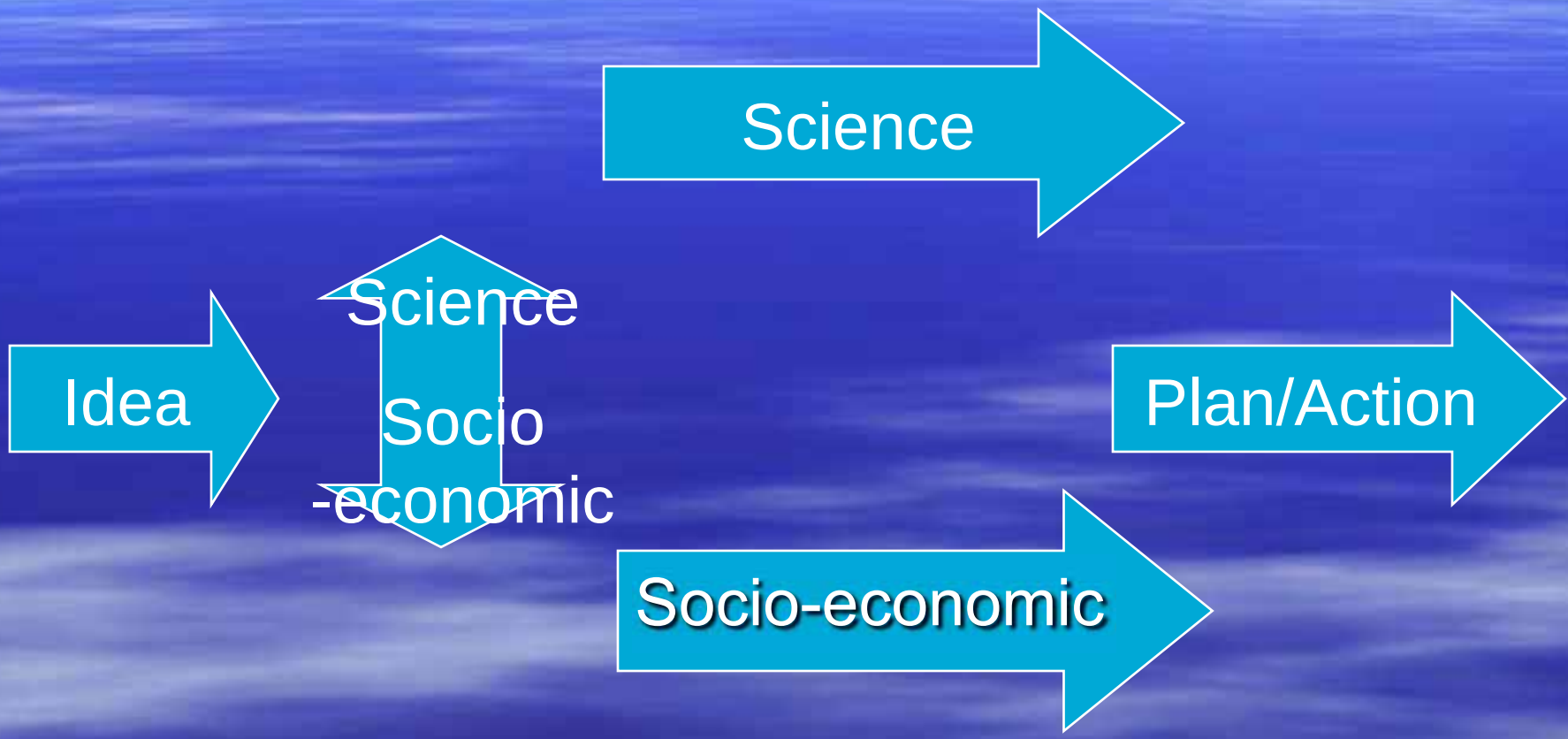
Simultaneous 2-prong approach

- science
- socio-economic

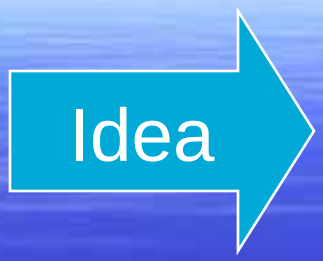
I and E

- history dictates amount

2 – Prong Approach



2 – Prong Approach



- **Preliminary discussions with lake residents and managers**
- **Gather information, literature search, history**
- **Identify data deficiencies**
- **Consult with managers (State, County, Consultants)**
- **Surveys (plant and social)**
- **Identify objective(s)**

2 – Prong Approach

Science

AP Survey

Bathymetry

T and E species

Fish data

Water control constraints

Feasibility

Socio-economic

Social survey

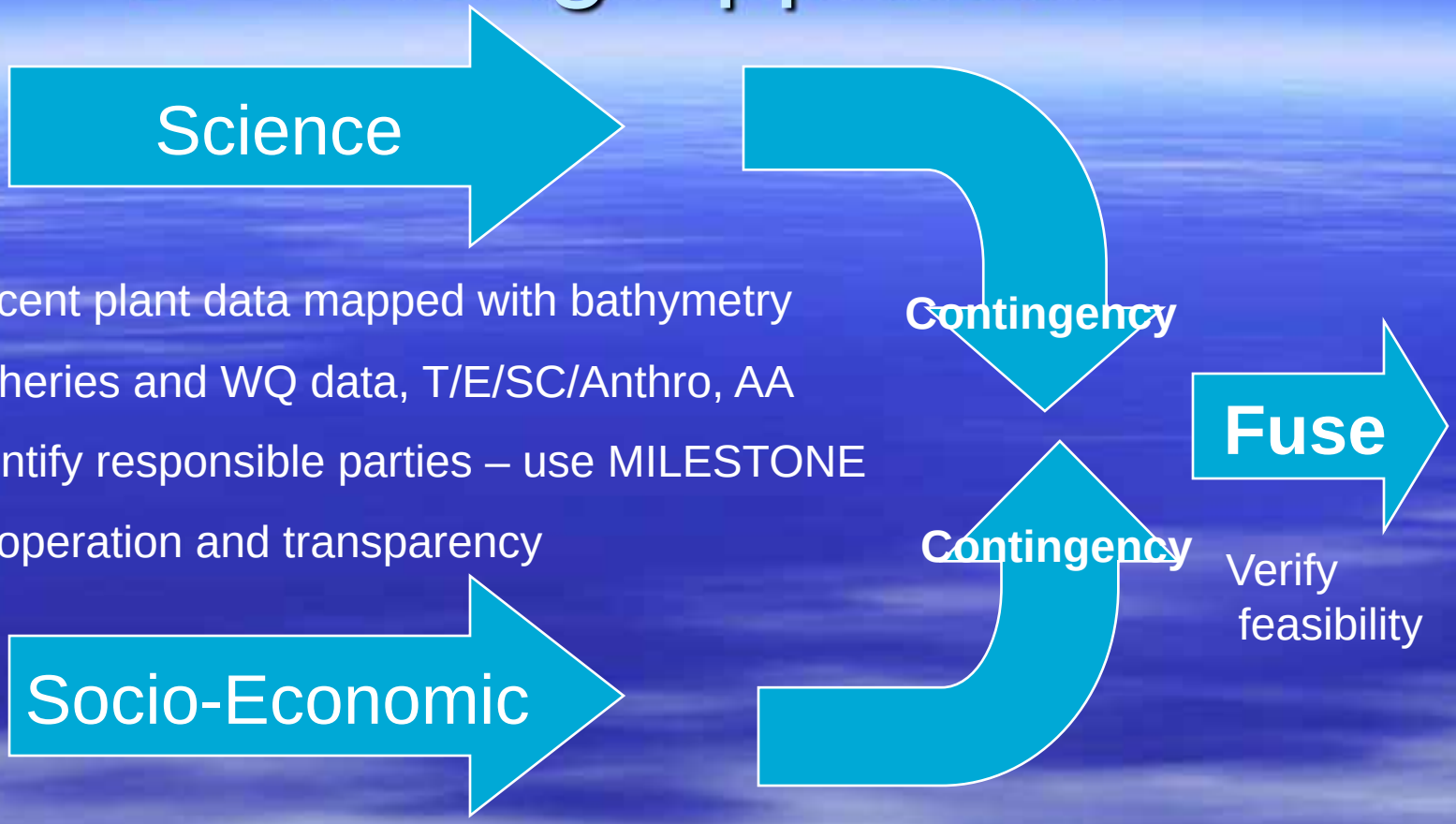
Local governments

Ownerhsip (dam, lakebed?)

Tourism

User Groups!

2 – Prong Approach



- Recent plant data mapped with bathymetry
- Fisheries and WQ data, T/E/SC/Anthro, AA
- Identify responsible parties – use MILESTONE
- Cooperation and transparency

- Summarized survey data, economic impacts, ownership, wells
- Cooperation and transparency
- I and E until it hurts (*tell 'em what you told them and then tall 'em again*)

2 – Prong Approach

Plan/Action

Holistic Plan, with public input, specific to objective

Permit process started early (4-6 months before start)

Ready for survey work (AP and public? survey)

Contingency plan ready

Your changing the lake to this, be ready!

Almost Done!

In Summary!

- Water level flux has been successfully employed in Wisconsin for AIS and restoration
- Solid plan needed (objectives, pre and post)
- More long-term monitoring needed
- I and E needed for society
- Frame it correctly

you're fighting this image…

QUESTIONS