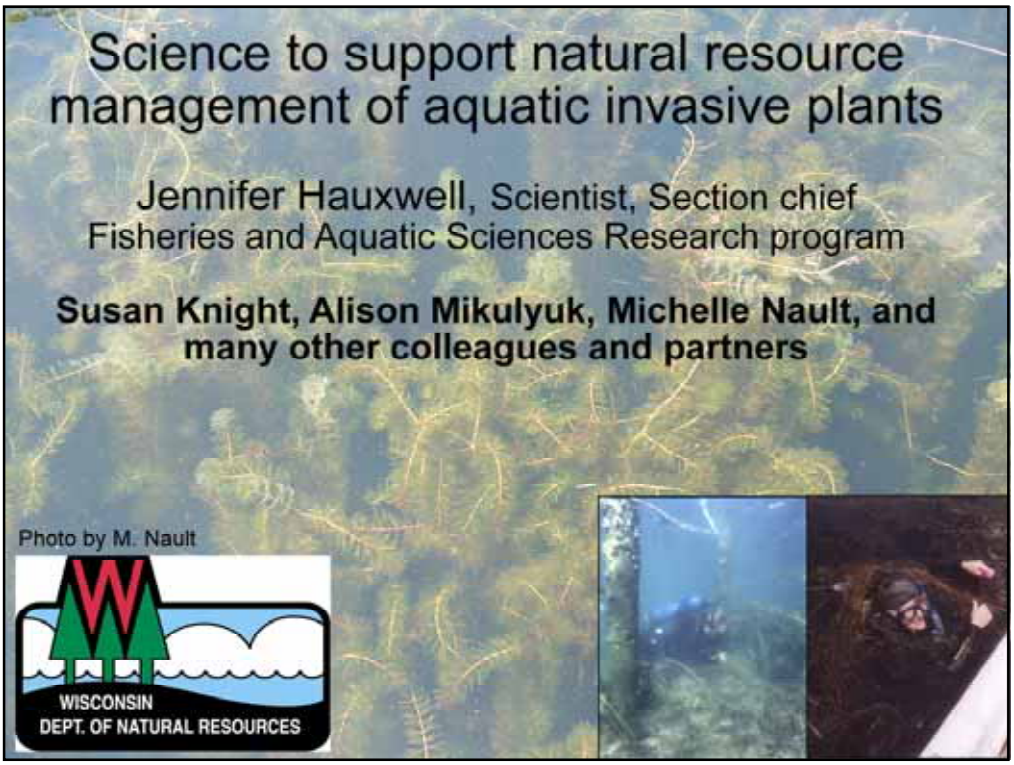
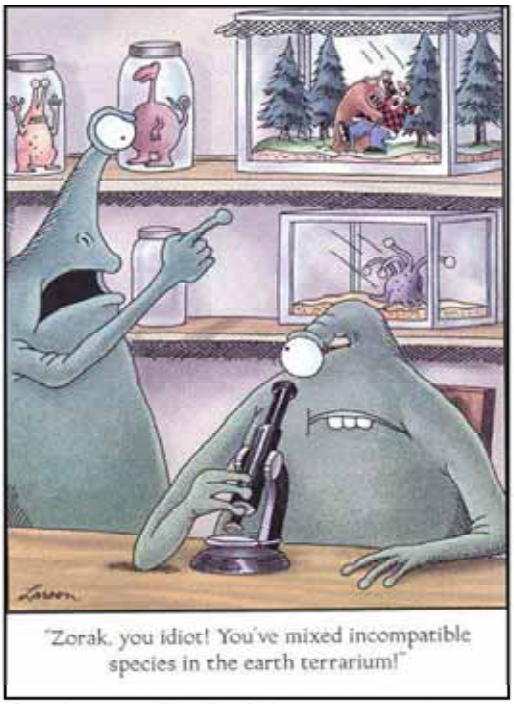


It's really a pleasure for me to be here today. I came to Wisconsin about 7 years ago and am everyday still amazed with the aquatic resources that this state is blessed with. I'm very proud to stand up here today as chief of our DNR aquatic research program. I firmly believe that the investment this state has made in science and research, coupled with a public that is so committed, is the primary reason we've been able to protect and enhance the lakes of this state as well as we have. That being said, I think we all know we've got a lot of challenges when in comes to lakes protection. Today I'm going to talk to you about how we can use science to help us manage and control aquatic invasive plants. I need to acknowledge several colleagues, fellow researchers… as well as many other colleages at the DNR including our DNR lake coordinators. I'm going to focus my talk today on aquatic invasive plants and algae. I have spent a good portion of my life UNDER water studying native habitats, as well as struggling through beds of invasives…



Gary Larson – *The Far Side*

Science as a perspective?

Various perspectives to inform decision-making (?):

-~~Scientific~~

-Social

-Economic

-Political

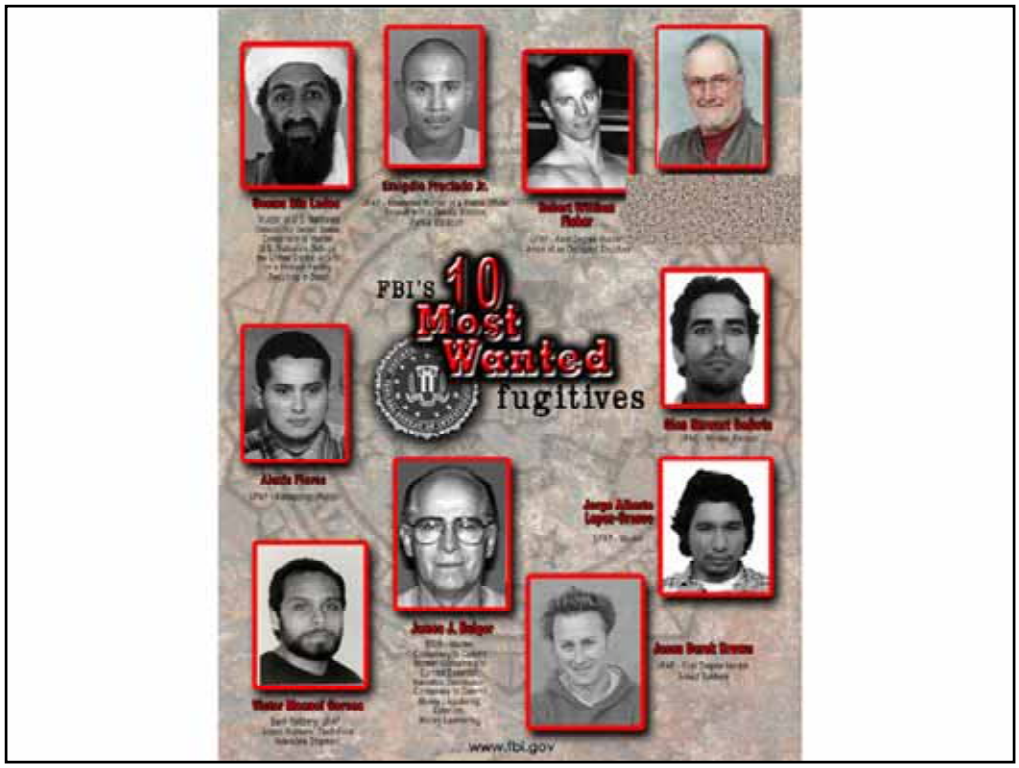
Science as a Tool!

(to understanding this "Earth terrarium" and the consequences of our "mixing" of species across ecosystems)

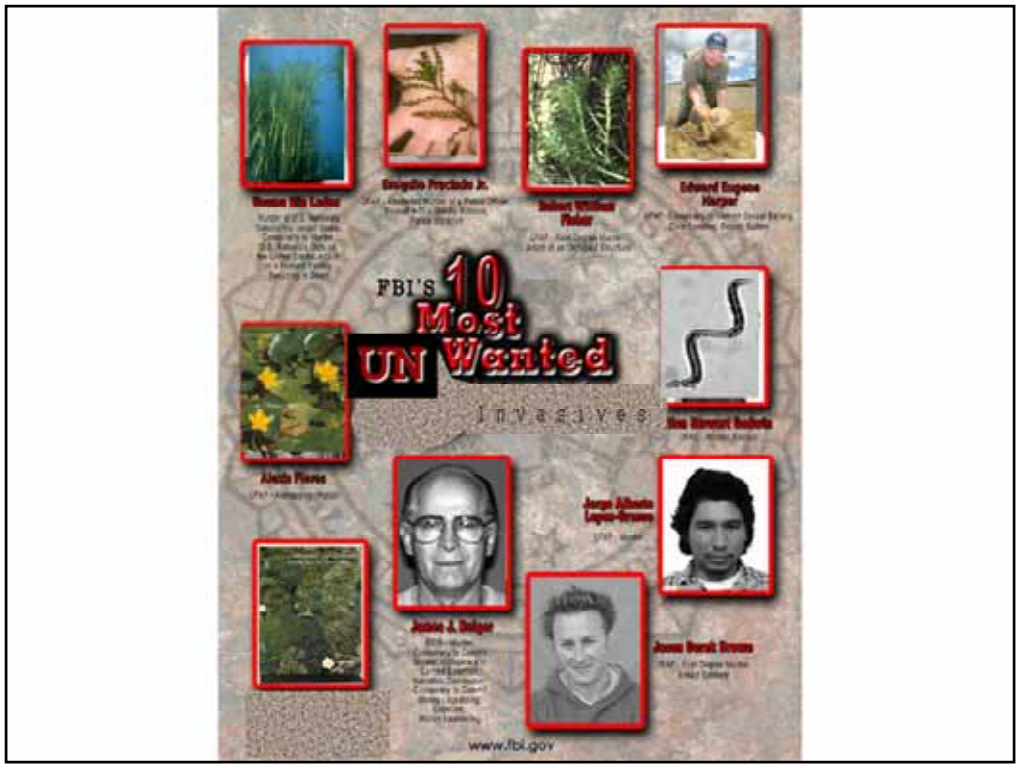
I like this comic, because I think it's a great illustration of how sometimes when you mix 2 species that are not used to being in close proximity to each other, there are sometime very obvious winners and losers. Very much like the aliens shown here, on our planet, people are major ecosystem engineers. We change ecosystems everyday on purpose to suit our needs. Also, simply because we have gotten so efficient at moving from one part of the planet to another, we can inadvertently transport and spread species from continent to continent in a matter of hours. Today I want to talk to you about the role of science in invasive species management. Science is often listed as a "perspective" along with many other critical perspectives necessary to solve any problem. I'd argue that it belongs in the mix but under a slightly different framework. Science is not a perspective… it's basically a way to get truthful information. Debate from people of different perspectives is obviously most productive if are arguing over what to do with the facts… not on the facts themselves. So, I see science as a foundation for informed ecosystem management and this is a major theme you will see throughout this talk.

Talk outline

- Introducing… the trouble-makers – plants and algae
- Science to support regulatory options
  - NR 40 - species and pathways
- Science to understand impacts on the environment (monitoring)
  - How much, where, variability across lakes
- Science to inform management options for milfoil
  - Focus on herbicides
- Keeping our efforts productive…
  - Some things we cannot control, focus on what we can



So first I'd like to introduce the troublesome species and I'm going with an analogy to start off with. So here's a recent copy of the FBI's most wanted list. This is a list, that as good citizens of this country, we should all be aware of and inform the proper authorities if you happen to spot any of them. I have heard that many of these fugitives have an affinity for lakes, so please keep an eye out. Anyways, along this same line, I'd like to introduce…



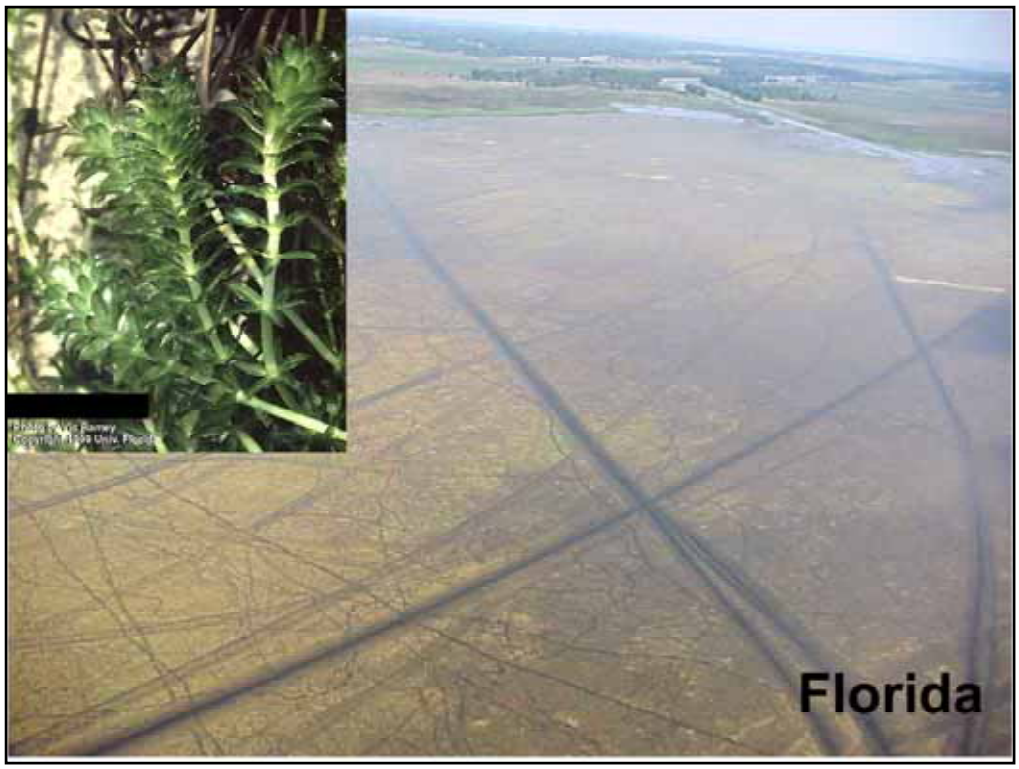
The DNR's 10 most unwanted invasives! Plants and algae. I know, it's kind of scary what you can do in ppt. Let's take a look at a few of these in more detail…

What are some notorious examples of invasive primary producers?

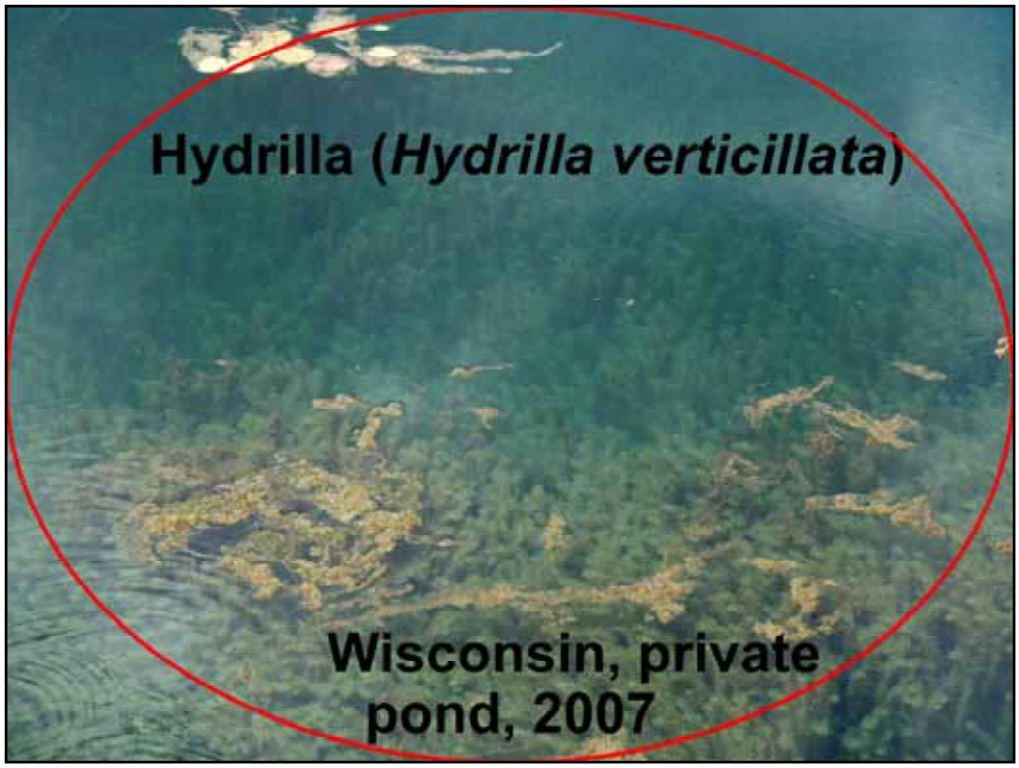
Eurasian watermilfoil (*Myriophyllum spicatum*)

In WI

Curly leaf pondweed (*Potamogeton crispus*)


Florida


Wisconsin, private pond, 2005


Hydrilla (*Hydrilla verticillata*)
Wisconsin, private pond, 2007


1996 Kerry Dressler
Brazilian elodea
(Egeria densa)
Photo by W.T. Haller
2003 Center for Aquatic and Invasive
False alarm! Trout creek, WI
In MN, IN

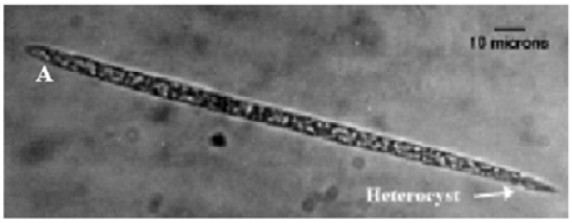
In WI, private pond only?

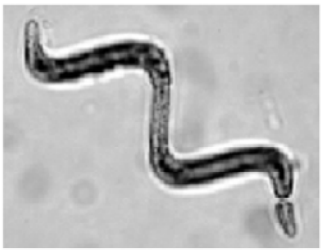
Yellow floating Heart (*Nymphoides peltata*)

Water chestnut (*Trapa natans*)

Not yet here?

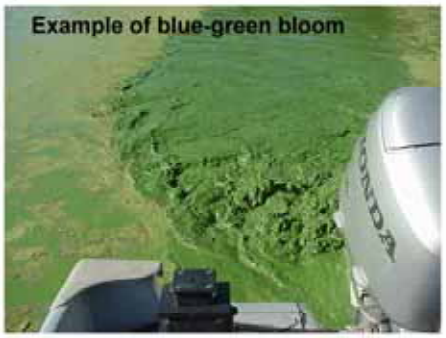
John M Randall, The Nature Conservancy, New England





Photos courtesy of Ann St. Amand

Cylindro (cyanobacteria) (*Cylindrospermopsis raciborskii*)

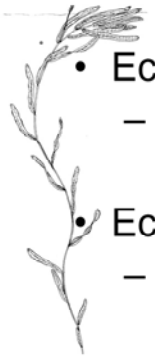


In WI

Rock Snot
(algae, diatom)
(*Dydimosphenia geminata*)

Not in inland systems?
(ND, SD, New England)

Why worry about non-native invasive aquatic plants and algae?



- Economic impacts
  - cost of management, tourism / recreational impairment, home values
- Ecological impacts
  - loss of diversity, changes to biological, physical, and biogeochemical features of lake habitats (form and function)
- Aesthetics
  - odors, piles of rotting vegetation
- Health
  - toxic blue-greens (mostly natives…)

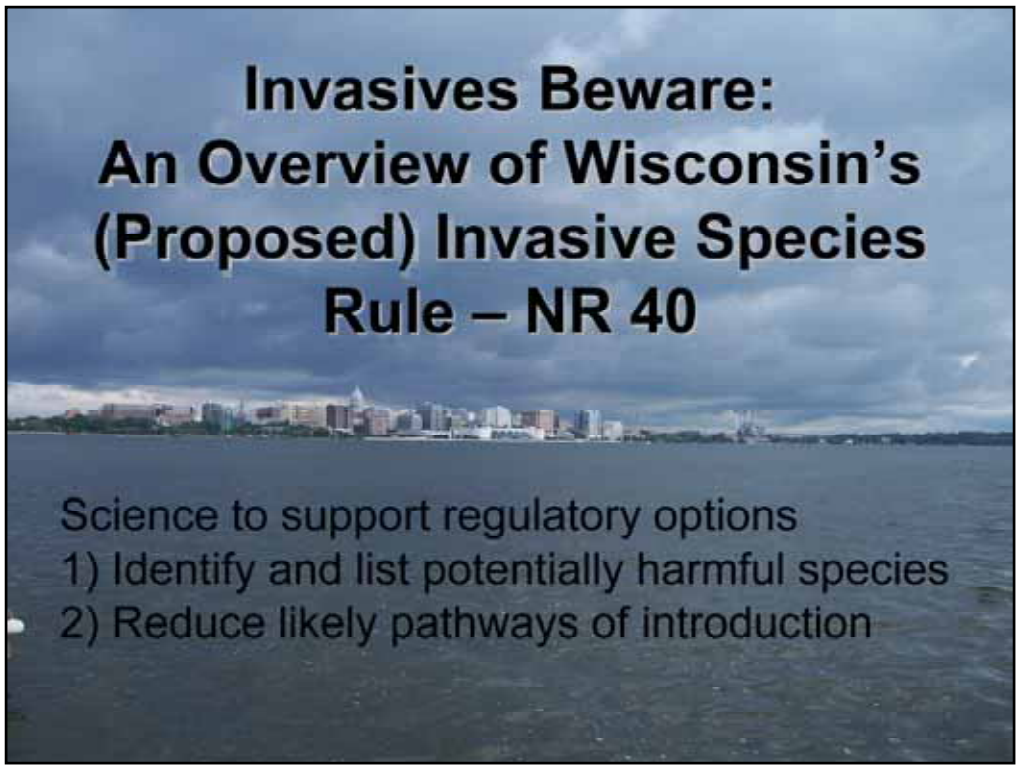
How are aquatic invasive plants currently regulated?

Current "patchwork":

- Federal Noxious Weed Act - prohibits importation and interstate transport of listed plants
- NR 109, (Stat 23.24) - designates Eurasian watermilfoil, curly leaf pondweed, and purple loosestrife as invasive, limits intentional introduction, can designate additional species for a water body or group of water bodies.
- Stat 30.715 - illegal to **launch** with any aquatic plants, if the person has **"reason to believe"** aquatic plants attached
- Local or county ordinances may be in place
- Many good programs to educate on "voluntary" best management practices

Section 23.22, Wis. Stats., orders DNR to identify, classify and control invasive species

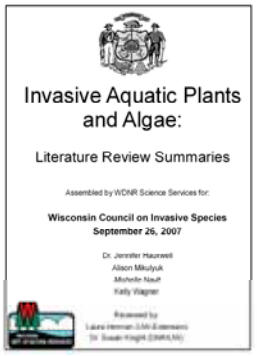

http://dnr.wi.gov/invasives/
Search
Home
About
Topics
Contact Us
Invasive Species
Proposed Classification Rule
Classification Table
Assessment Summary Tables
Wisconsin DNR's Draft Invasive Species Identification, Classification and Control Rule
Why We Are Doing This
Invasives species are a known threat to the aquatic and terrestrial resources of Wisconsin. Current state and federal laws on invasive species are inconsistent between species groups. For some, such as fish and forest insects and diseases, there are a number of existing laws that give the Department of Natural Resources (DNR) and the Department of Agriculture, Trade and Consumer Protection (DATCP) authority to regulate them in some ways. For other groups of species, such as terrestrial plants, existing state and federal laws are very limited and there are no state agencies with regulatory authority.
The proposed rules will establish a fairly consistent classification and regulatory system for all listed invasive species. The rules will set specific restrictions on actions such as sales, transporting and planting or releasing certain species to the wild. It will allow DNR to work with local units of government and landowners to quickly contain new infestations of species likely to become problematic.
Description of the Rule
The Department of Natural Resources (DNR) and the Wisconsin Council on Invasive Species (Council) have been working over the last two years to develop rules to classify and regulate invasive species.
A Wisconsin Department of Natural Resources working group has met regularly over the past two years to develop a draft classification system for invasive species. The purpose of these rules is to prevent the introduction and spread of invasive species in the state. The key components of the rule package include: 1) the legal classification categories - prohibited, restricted, and the informal categories - watch and non-restricted; 2) criteria for classifying species; 3) a listing or


Invasives Beware:
An Overview of Wisconsin's (Proposed) Invasive Species Rule – NR 40
Science to support regulatory options
1) Identify and list potentially harmful species
2) Reduce likely pathways of introduction

1) Identification of species and regulated activities

6 Species Assessment Groups

- **Aquatic plants and algae**
- **Aquatic animals** (fish and invertebrates)
- **Woody plants**
- **Herbaceous plants**
- **Terrestrial vertebrates**
- **Terrestrial invertebrates & plant disease-causing microorganisms**


Invasive Aquatic Plants and Algae:

Literature Review Summaries

Assembled by WDNR Science Services for:

Wisconsin Council on Invasive Species
September 26, 2007

Dr. Jennifer Hauxwell
Alison Mikulyuk
Michelle Nault
Kelly Wagner

Reviewed by
Laura Herman (UW-Extension)
Dr. Susan Knight (DNR/UW)

Developed lists of harmful species –
Cannot "transfer, transport, introduce, or possess"

In total…

For submergent aquatic plants and algae, we are concerned about:

- 3 established species (EWM, CLP, flowering rush)
- 16 species of plants and algae not yet established statewide (e.g., hydrilla, rock snot)
- 14 “caution” species

Google “WDNR and Invasives”
http://dnr.wi.gov/invasives/classification/

In addition, many species of aquatic animals, and wetland plants

2) Preventive measures

- **Illegal to launch or transport**

AND

- **Immediate removal and drainage required**
  - Vehicle, boat, trailer, **equipment or gear of any type**
  - Visible "Stuff" - All attached aquatic plants or animals
  - Water (algae, early life stages invertebrates)

- **Introduction prohibited**
  - Non-native aquatic plants, algae to public waters

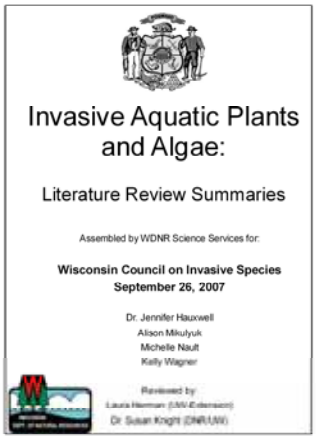
This rule, coupled with the recently adopted rules on VHS the fish disease…

Process and next steps

- WI Council on Invasive Species (WCIS) created by Legislature – advisory to DNR
- Developed process, criteria, categories, draft regulations
- Created species lists, conducted literature reviews
- Species Assessment Group evaluations
- Draft rule
- Informal Public Listening Sessions
- DNR responds to comments – revises rule
- Proposed rule to Natural Resources Board
- Formal public hearings around state
- DNR revises rule based on public comments
- **Proposed rule to NRB for adoption (April 2009)**
- **Legislative review and possible hearings**
- **Publication—rule takes effect**

Conclusions for NR 40

- Science plays a critical role in making good regulations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- So do stakeholders…

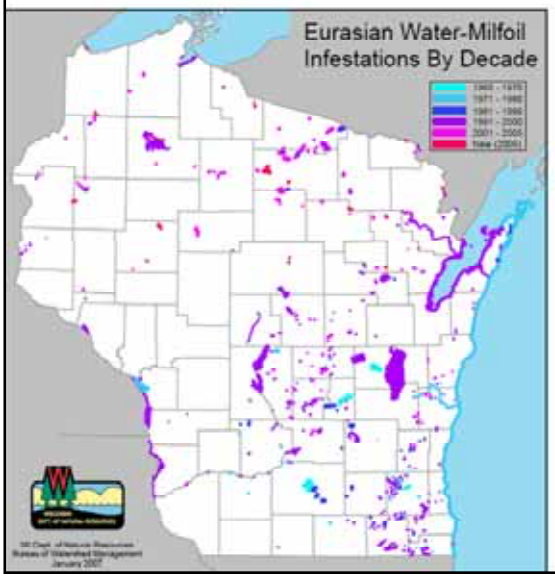
  Thanks to many of you!
  - Lake residents,
  - Lake organizations,
  - Industry reps,
  - Educators,
  - Local and county reps
  - SAG members

- Stay tuned

The Milfoil story in Wisconsin

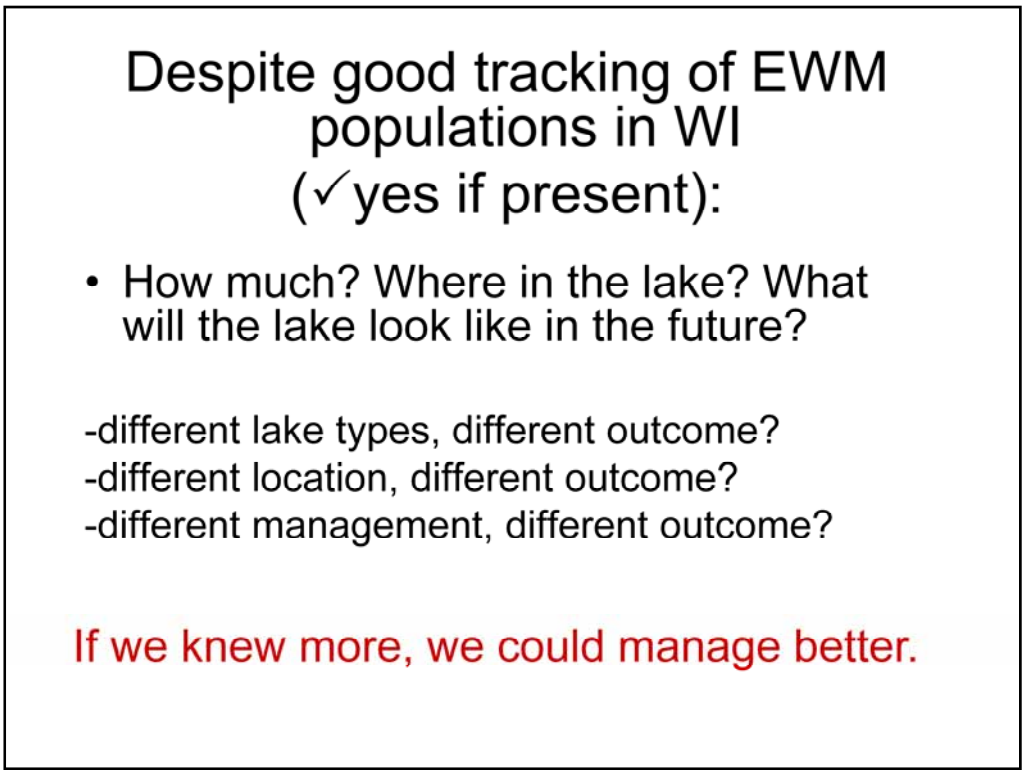
- Once, there was snow and ice covering most of the state (c.a. 10,000 – 110,000 BP)
- Then, there were many lakes
- Then, over time, those lakes were colonized by 7 “native” milfoils and many other species
- Then, along came a milfoil species from another continent and it got loose in the Chesapeake (1940s)
- Then, it showed up in the Madison lakes (1960s)
- 50 years later, it’s made it to northern Wisconsin
  - Human-mediated succession
  - What do we do about this?
  - First, get our facts straight.

We know in general:



Eurasian watermilfoil (EWM)

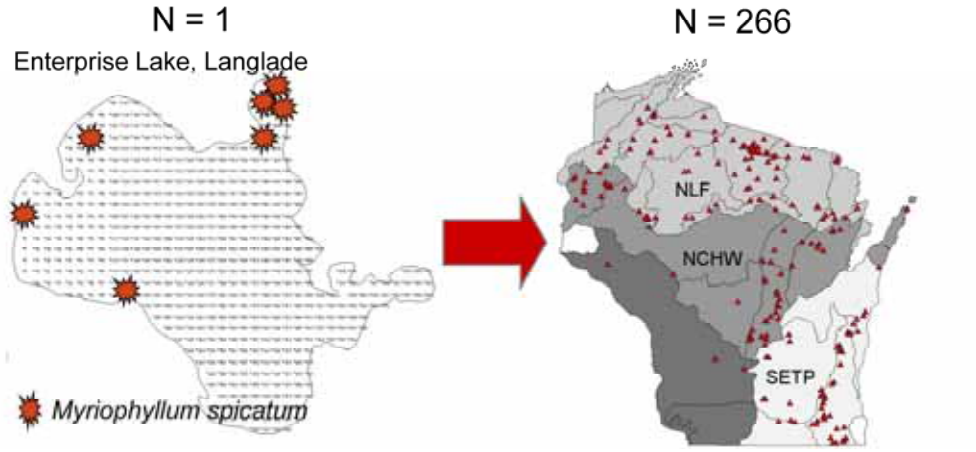
Recorded in:
- 46 states
- 479 lakes
  in WI



If we knew more, we could manage better. Define problem better.

1) Develop observation system (2004-2005)

- assess how aquatic plant communities vary in lakes across the state and over time



Making the best management decisions for WI lakes using data (What species? Where? How much? Response to management?)

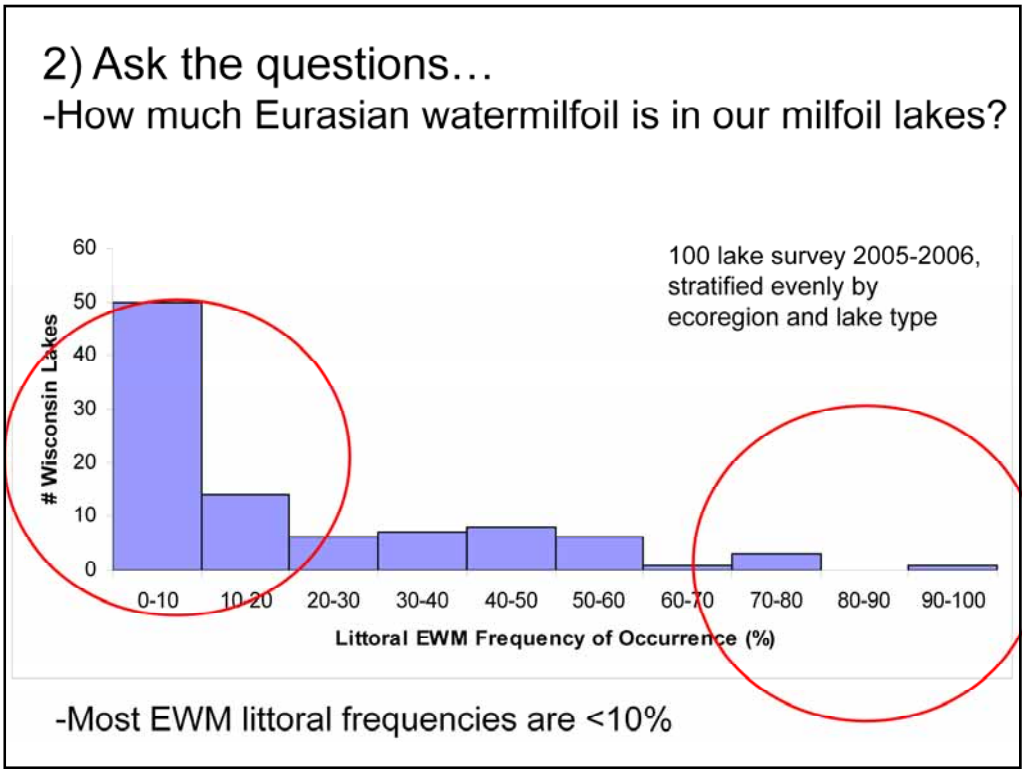
Goals of Statewide EWM Research in WI

1) Within a given lake - gain background data on EWM lakes to manage today and track future changes

2) Across lakes statewide - understand the factors that control EWM abundance and time course in lakes

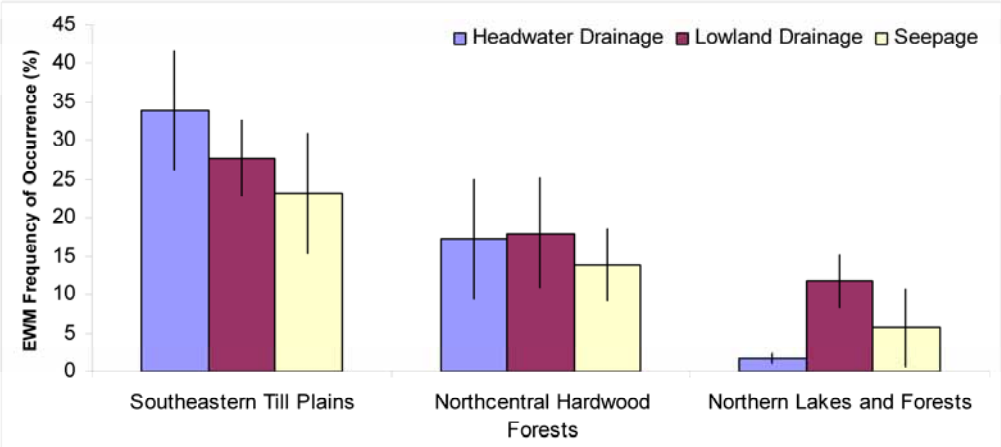
Approach – survey as many milfoil lakes as possible!!!

Search for patterns across meaningful gradients…



Knowing where a like might fall, will help plan appropriate management. Id lakes ahead of time that need more attention.

-What is a snapshot of abundance and distribution of Eurasian watermilfoil around the state?



EWM frequency varies by ecoregion (*P<0.001*)
Lake type/overall no significant difference

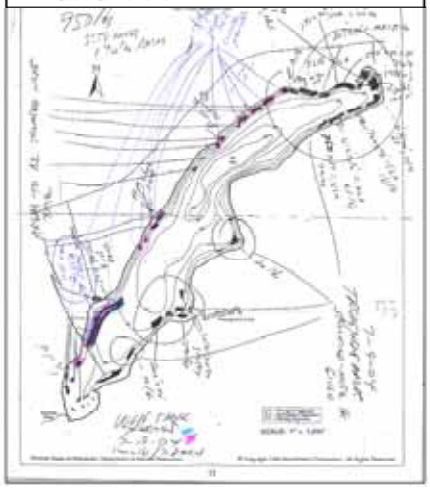
Significant difference by ecoregion, with the southeast higher than the north. In SE, frequencies of EWM were highest in headwater drainage, then lowland drainage, and lowest in seepage. This makes sense, based on increased nutrients further down drainage area. In Central and NLF, a different trend occurred, with headwater drainage having the lowest incidences of EWM, and lowland drainage lakes having the highest.

-How does abundance and distribution of Eurasian watermilfoil relate to how long it's been in the lake or past management?

Ideally, we'd know:
- Date of introduction
- Acreage of EWM
- Acreage of EWM treated
- Chemical used
- Amount used
- When
- Where

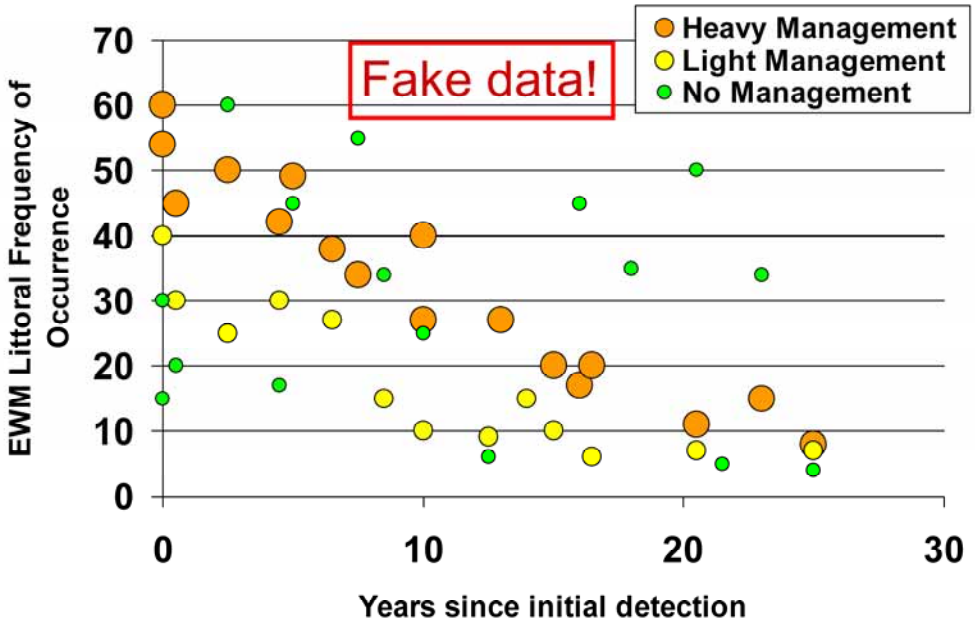
vs

- Date first detected,
- and ???



We spend millions annually. And we want to know if we're spending wisely, or at the least, what we are getting. Strategic vs non strategic somewhere.

-How does past management relate to today's population levels?



Smart management and investment

- An ounce of prevention…
- Strategic vs non-strategic control

  Past management (non strategic) outcomes = **short term nuisance relief**

  Future management (strategic) outcomes = **long-term restoration?**

- Early season herbicide approach

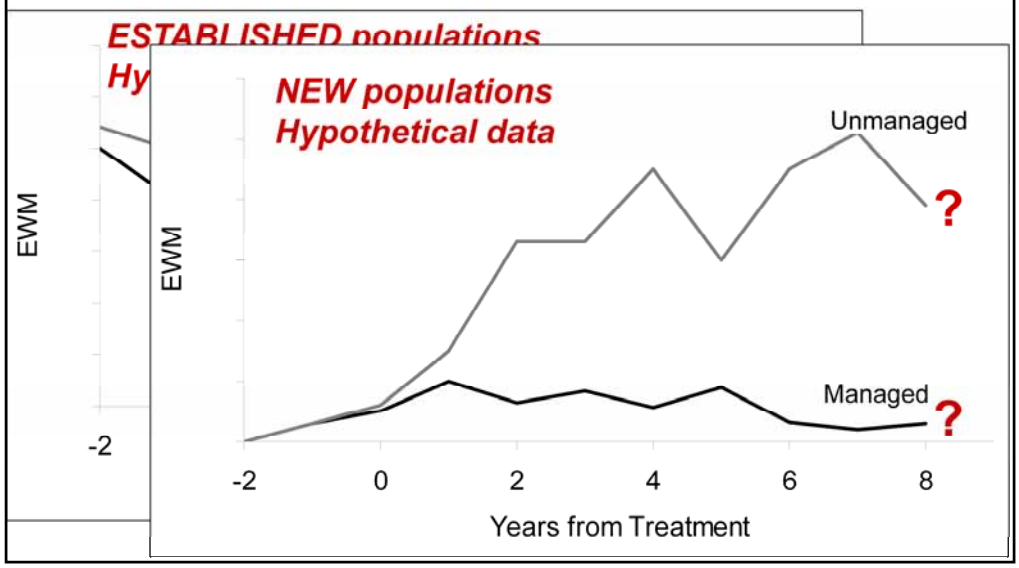
  Maximize control of milfoil, minimize effects on natives?

  Targeted treatment areas based on monitoring data
- Adaptive management based on good monitoring

How to spend $4 million wisely?

-How does *strategic* management affect long-term EWM population levels?

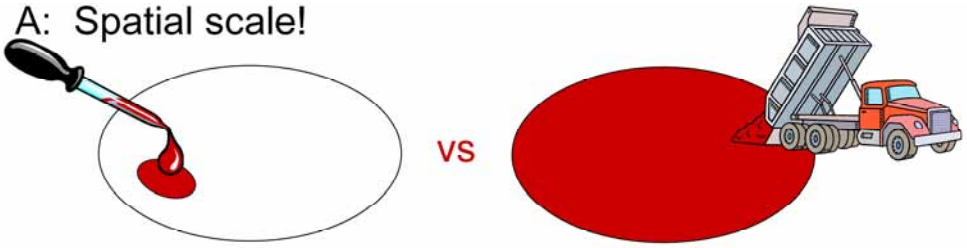
Tracking 24 lakes over time, 2007 – ongoing
3 regions, established and new, managed and unmanaged
Strategic management supported by monitoring



-How are aquatic plant communities affected by new management tools?

Whole-lake herbicide treatments for Eurasian watermilfoil using fluridone – established populations

Q: So what's the big deal with whole-lake treatments?
A: Spatial scale!



Whole lake treatment = Whole ecosystem manipulation

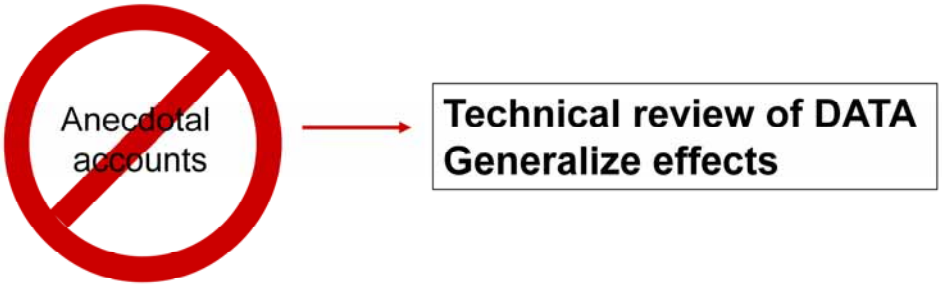
In defining BMP, part of this is continually evaluating new tools. So, not only evaluating what we already have and the most strategic use, but also new tools.

Specific Questions for Whole Lake Treatments

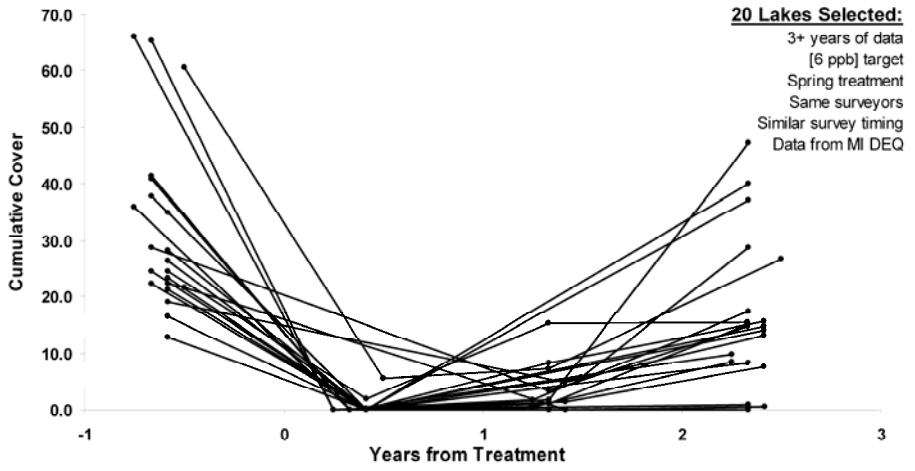
1) What are the primary and secondary ecological effects (both intended and unintended)?

- *-Vegetation (exotic and native)*
- *-Water quality (algae)*
- *-Fisheries*

2) What has been done already to address those questions?

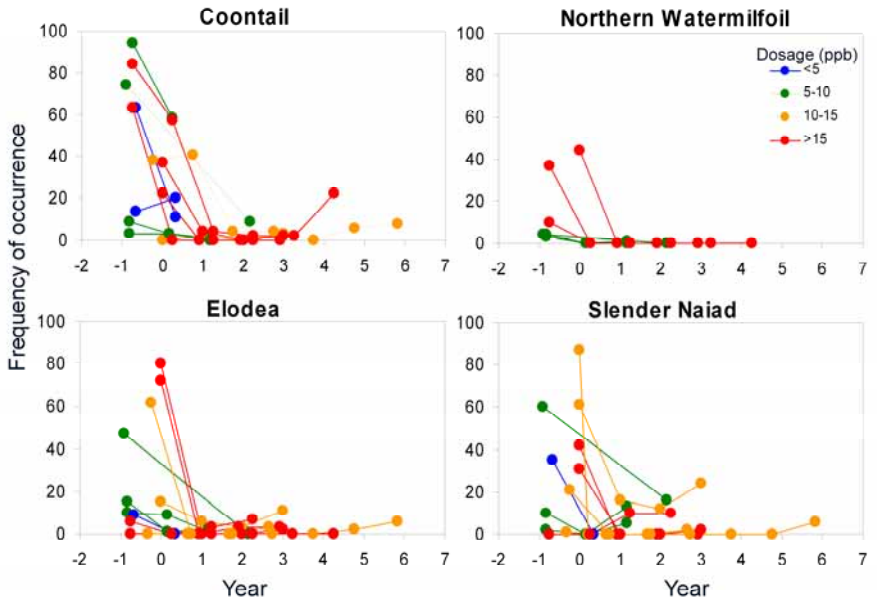


Long-term effects on EWM (3+ year data sets):



*Cumulative cover – indicates coverage and density of plants in lake

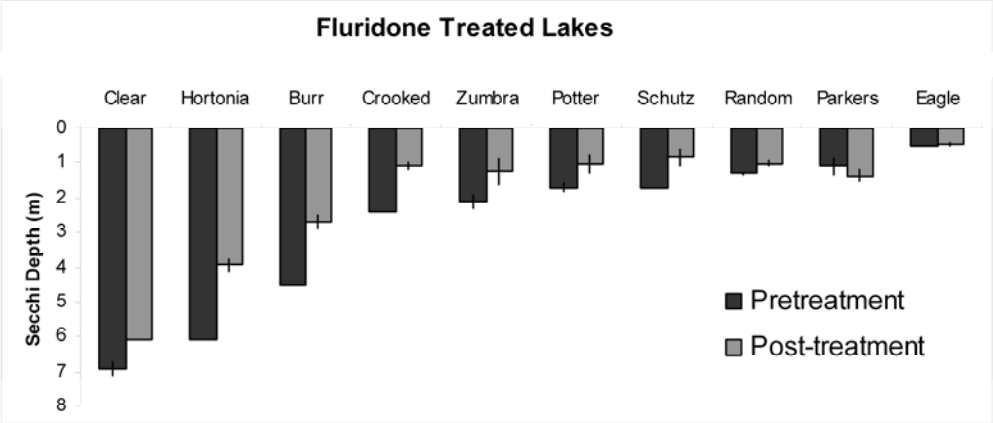
Long-term effects on susceptible native plants:



-Potential large decreases, regardless of dosage

Effects on algae / water clarity

-Since they compete for nutrients, trade-off between plants and algae
-Plant decay also provides nutrients for algal growth



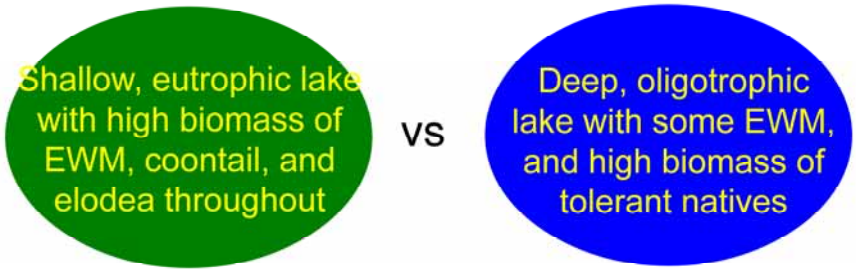
Statistically significant reductions in secchi depth in 80% of treated lakes


Potter Lake 9/30/05

Weighing the costs and benefits:

Depends on the lake:

- Amount of susceptible vegetation
- Amount of phosphorus
- Shape and depth of lake (% of lake area that is vegetated)



Deciding on the best management approach:

1) *Quantify the perceived problem! Data, data, data…*
   -Established vs new populations, locations in lake
2) *Set reasonable expectations (ecological and economical)*
   -Eradication(?) vs long-term management
   -Can incur unintended ecological effects – need to evaluate data
   lake by lake (physical features, plants, algae/water clarity, fisheries)
3) *Weigh the benefits with the risks*
4) *Recognize that managing invasives is a long-term commitment with any tool (action based on data)*
5) *Don't forget about the watershed*

-How does watershed and lakeshore development affect lakes?

(DNR staff? UW Extension staff? Lake Leaders? Universities?)

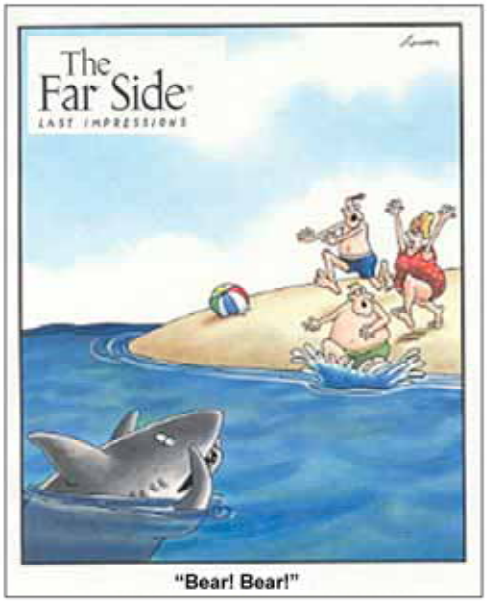
Water clarity?

Plants?

Fish?

Invasives?

Always look both ways…



"Bear! Bear!"

- "AIS! AIS!"
- Great energy and resources invested in our lakes surrounding our AIS challenges
- Don't forget to look back to the land