Managing Invasive Species in a Complicated World

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Key to Success

The three-legged stool of environmental management

- Science
- Economics
- Institutions

(includes regulatory aspect)

Addressing each of these areas is essential to successfully combat invasive species

We live in a world of conflicting signals…

Adjective Definitions

- Protected or RTE
- Native or Indigenous
- Introduced or Exotic
- Nuisance
- Invasive

What Is an Invasive Species?

An invasive species is often defined as:

- **species that are not native to the ecosystem under consideration**
- **species whose introduction causes or is likely to cause economic or environmental harm or harm to human health.**

Invasive species can be plants, animals, or microorganisms.

Hydrilla

Fire Ants

Regulatory Framework

- Protection of RTE species
- Invasive species transport prohibition
- Allowance for invasive/nuisance species control

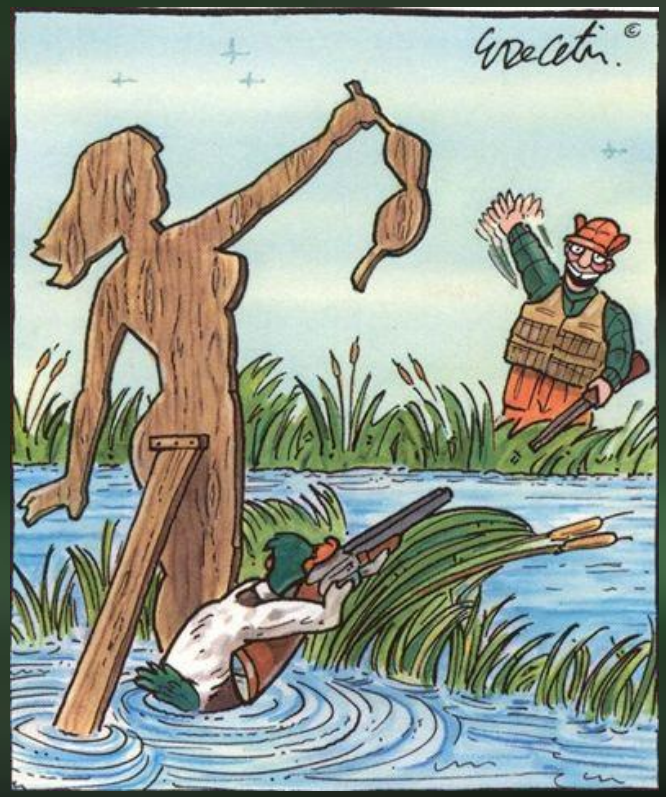
Regulations generally do not require action after an invasion has occurred, but action may be prevented if there is an impact to protected species

Invasive Effects on Imperiled Species

- **Miller et al. (1989): looked at North American fishes, and found that 68% of 40 extinctions had introduced species as a factor.**
- **Aquatic Nuisance Species Task Force (1994): 70% of all listings under ESA cited invasive species as a factor.**
- **Stein et al. (2000): Invasive species affect 57% of RTE plants.**
- **Research, including appropriate control effort monitoring, is needed to better understand the interaction of imperiled and invasive species.**

Carefully Considering the Issues

We need to see things for what they are and not be fooled by first impressions, superficial assessments, or conjecture.



Open Issues

- Invasive species as habitat
- Depression of richness and diversity by invasive species
- Depression of richness and diversity by control of invasive species
- Potential for eradication
- Control of nuisance species vs. control of invasive species

Management Conclusions

- **Prevention is far preferable to managing an infestation**
- **Early action is preferable to waiting when an invasion occurs**
- **Low probability of eradication once an invasive species is established suggests that a thorough management analysis is needed for such cases, but action should not be precluded by assumption**

An Example

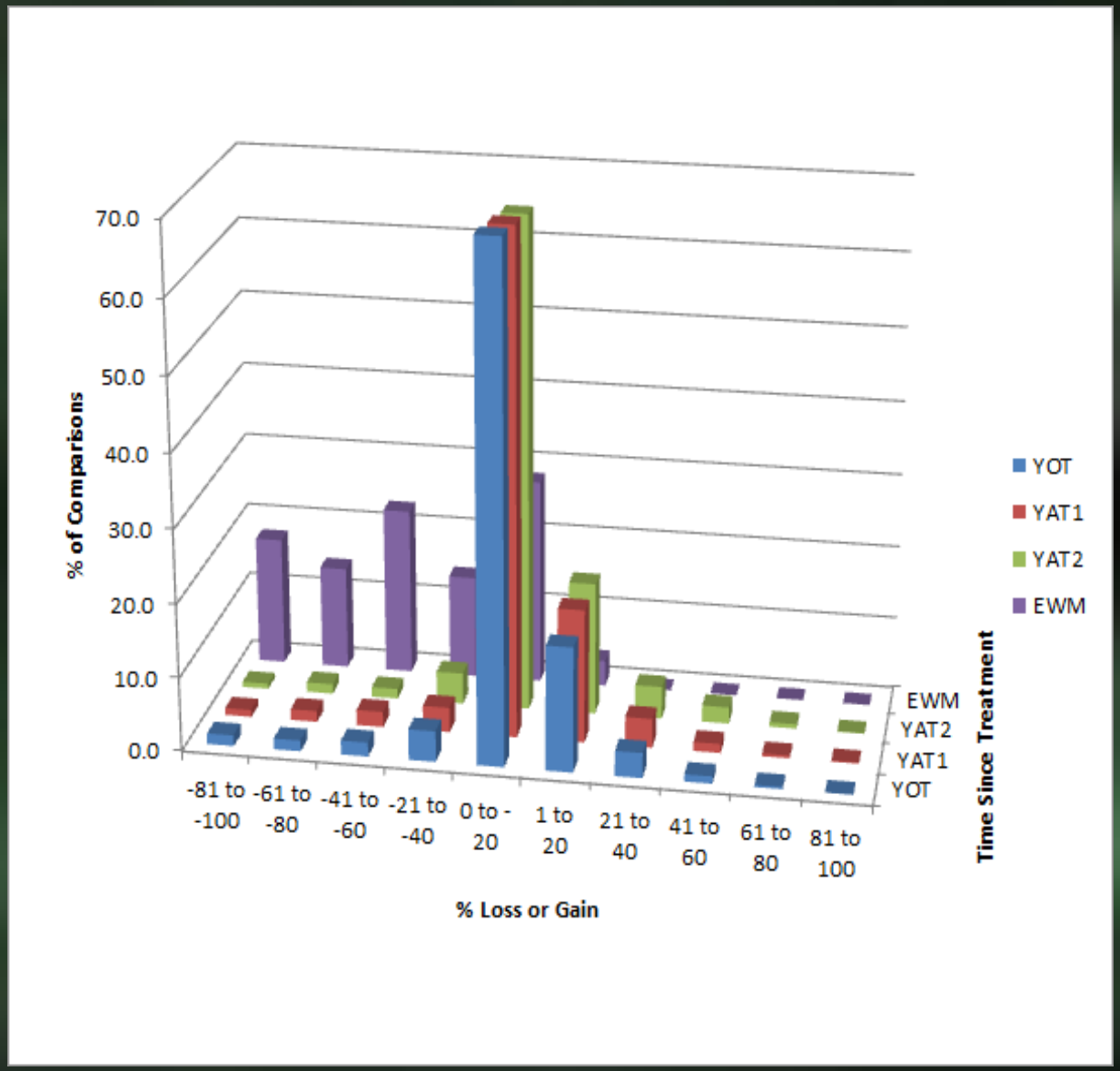
Eurasian water milfoil (EWM) can take over a lake in 2-5 years

Species richness declines slightly, but diversity plummets

Control on lakewide basis is often feared due to damage to non-target plants

An Example

- Treatment with fluridone
- Eurasian milfoil with major decline in 72% of cases
- >85% of native species lose or gain <20%



Another Example

Zebra mussels invaded Laurel Lake in Lee and Lenox, MA about 2007, discovered in 2009.

Overwinters on invasive milfoil stalks as well as hard surfaces.

By 2013 all other species of mussels eliminated.

Downstream movement of veligers appears to have caused infestations in Housatonic River, including two reservoirs in CT

Endangered snail present in the lake.

Any means to eradicate zebra mussels could harm the snail.

What should be done?

Management Advice

Treat invasive species like diseases

Expend effort to prevent invasions

Act swiftly and reject “wait and see” attitudes when an invasion is detected early.

Perform as thorough an analysis as possible when combatting an established invasive species.

Practice adaptive management where possible.

Monitoring and related data are essential.

Educate everyone involved.

Any Questions?