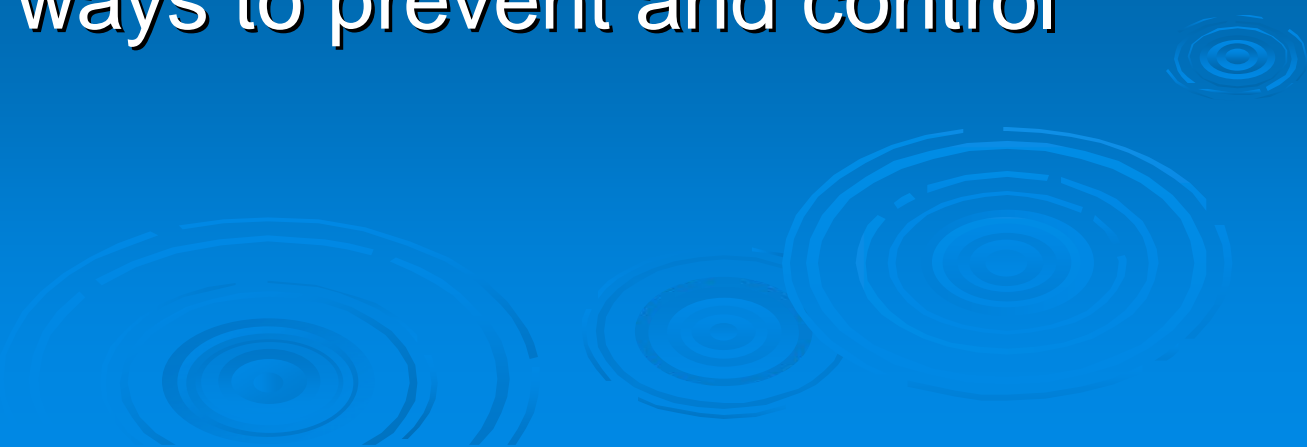


➤ L. Breck McAlexander, M.S.

➤ Aquatic Invasive Species
(AIS) Coordinator

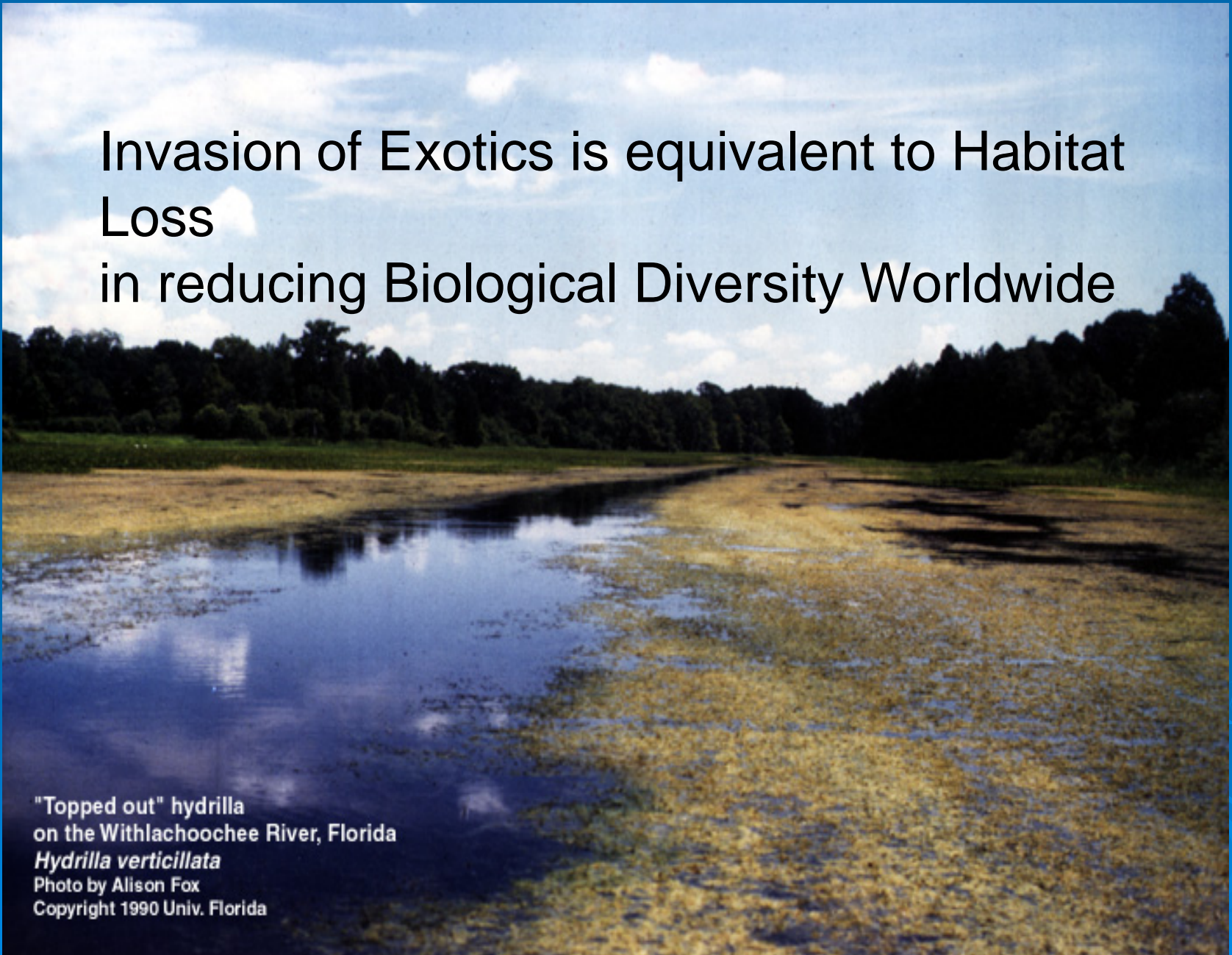
- CA Department of Fish and Game
 - Northern Region
 - Redding Office

Goals of this Presentation

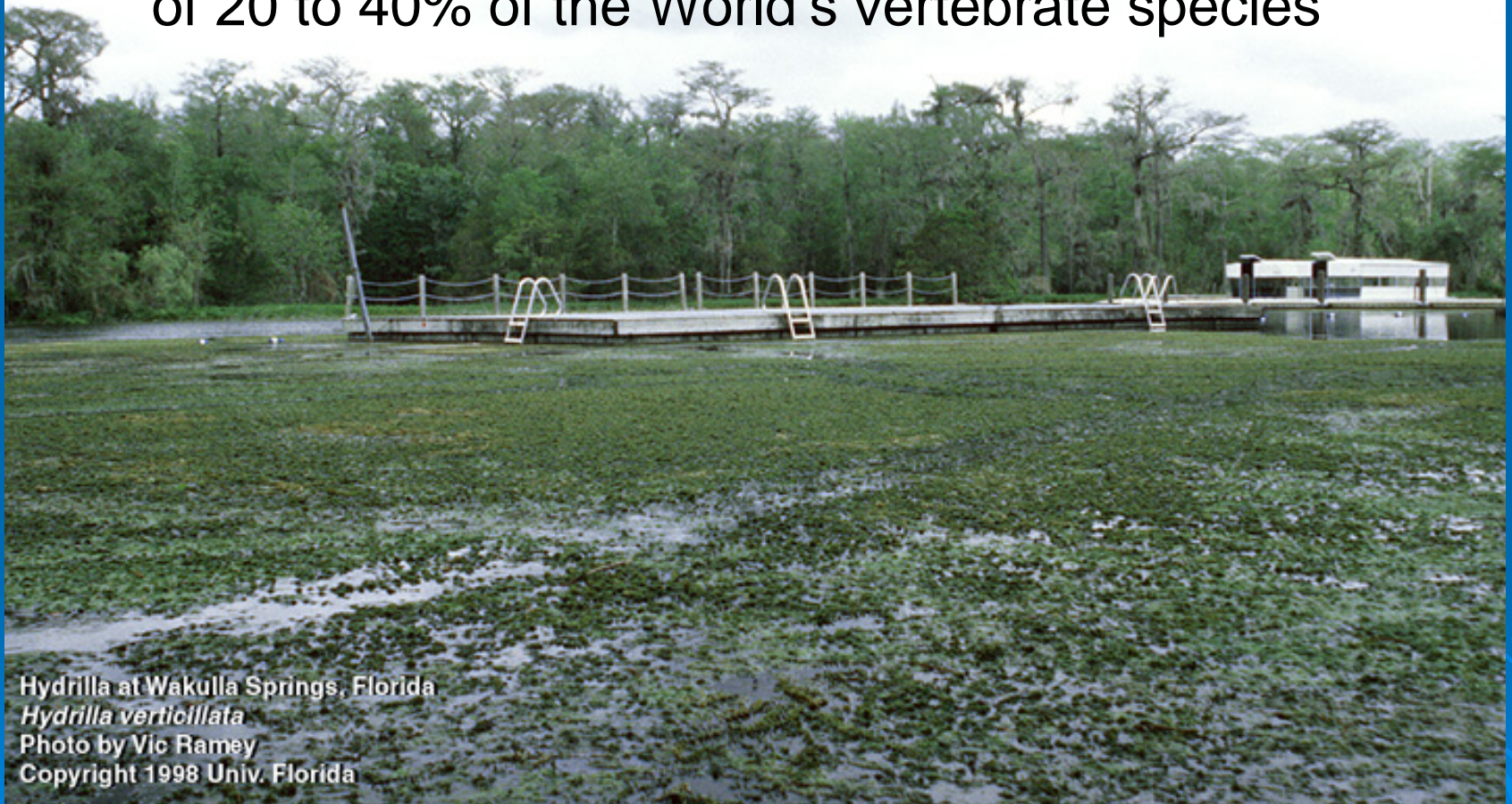
- Describe the ecological and economic harm caused by invasives
 - Give a quick biology of invasives
 - Give overview of the regulatory status
 - Introduce some invasives of concern
 - Talk about ways to prevent and control invasives
- 
- The bottom of the slide features a decorative graphic of several concentric circles, resembling ripples in water, rendered in a lighter shade of blue against the main blue background.

Invasion of Exotics is equivalent to Habitat Loss in reducing Biological Diversity Worldwide

"Topped out" hydrilla
on the Withlatchoochee River, Florida
Hydrilla verticillata
Photo by Alison Fox
Copyright 1990 Univ. Florida



Directly and indirectly it has caused extinction
of 20 to 40% of the World's vertebrate species



Hydrilla at Wakulla Springs, Florida
Hydrilla verticillata
Photo by Vic Ramey
Copyright 1998 Univ. Florida

Economic Damage

Aquatic invasive species cost taxpayers
\$x10⁹ dollars of damage each year.

Definitions

- Native
- Non-native
 - exotic
 - alien
 - naturalized
- Invasive
- Nuisance

Ecological changes

(type conversion)

- Out-compete resident species for available Resources
 - Space
 - Light
 - Nutrition
- May be a disease (pathogen) or introduce such to a resident population

Traits that allow invasives to prosper in disturbed environments

- Opportunistic:
 - Fast growth rate
 - Short maturity period
 - Very high reproduction rates
- Lack of natural predators, natural diseases and effective competitors

Regulatory Status

Federal Law

- Lacey Act (1900, amended 1998)
- Noxious Weed Act (1974)
- Non-indigenous Aquatic Nuisance Prevention and Control Act (1990)
- Alien Species Prevention and Enforcement Act (1992)
- Plant Pest Act (1994)
- Invasive Species Act (amended 1996)
- Executive Order 13112 (1999)

State Law

- Title 14 of CA Code of Regulations, Restricted Species
- Fish and Game Codes Sections 2116-2302
- Department of Agriculture Codes (30+)

Project Permitting Framework

- NEPA
- CEQA

Some invasives of the West

➤ Not comprehensive

- because lack of information and available science



Chitrid Fungus

or *Bd*

Batrachochytrium dendrobatidis



Bd



New Zealand Mudsnail

Potamopyrgus antipodarum



NZMS

at Big Lagoon, Humboldt Co.

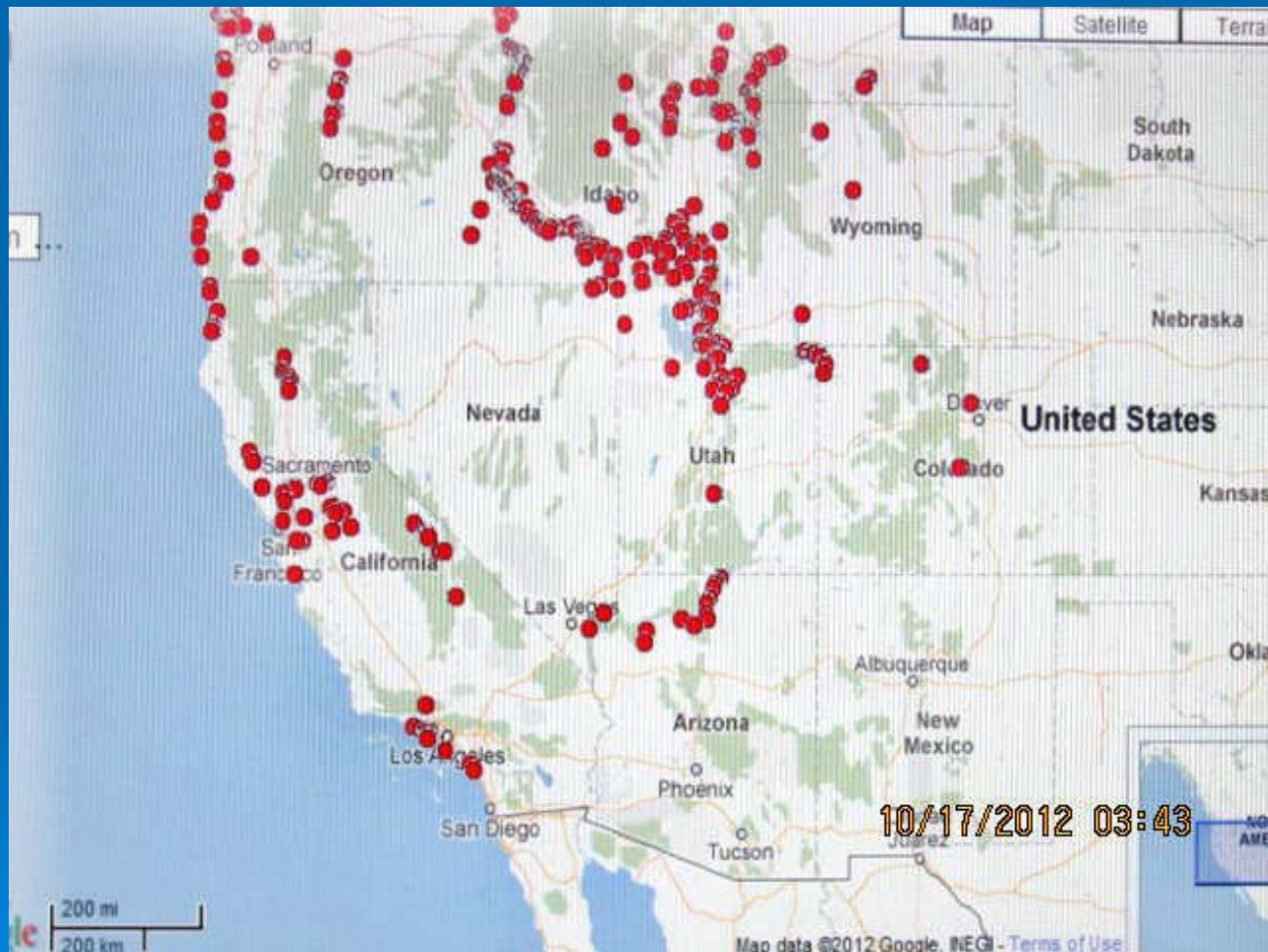


NZMS

Big Lagoon



NZMS (known) Distribution 2012



Invasive Mussels

Dreissena bugensis and *D. polymorpha*



Invasive Mussels



Invasive Mussels

collateral damage





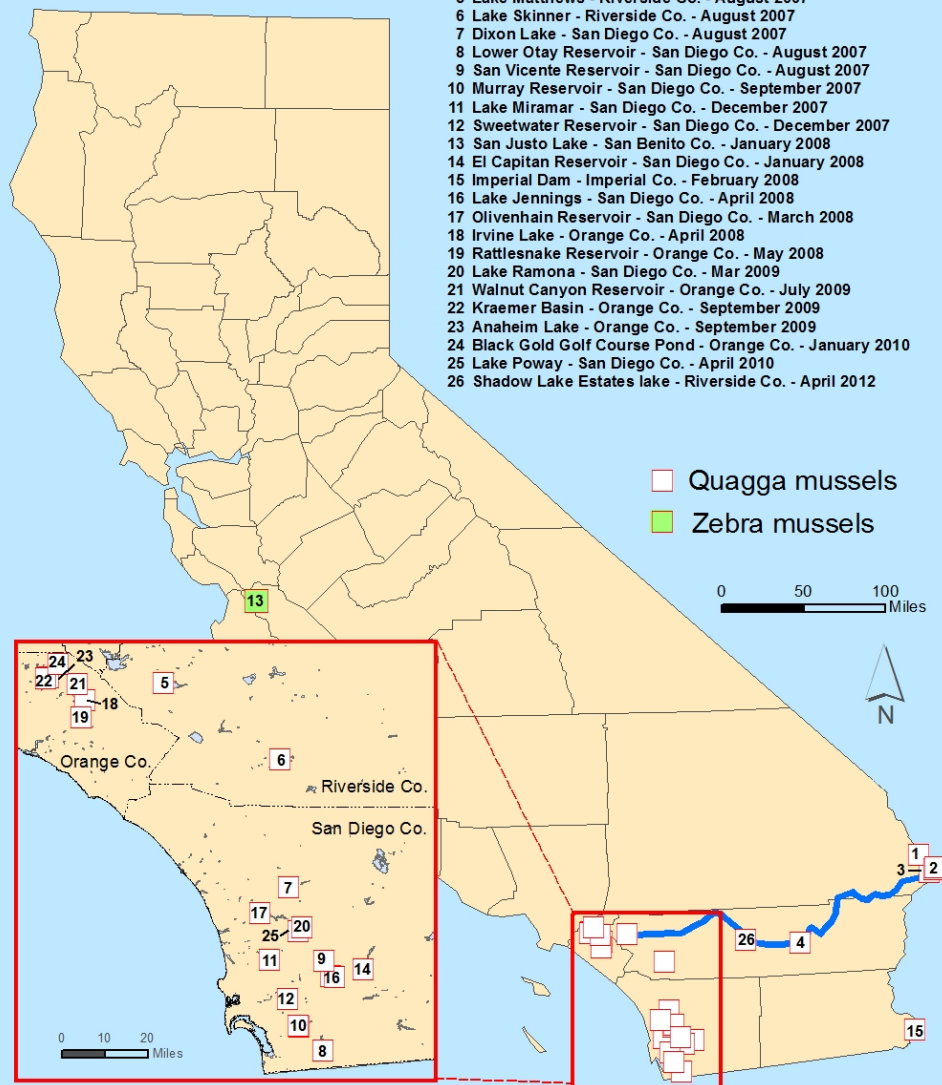
Zebra and Quagga Mussel Sightings Distribution *Dreissena polymorpha* and *D. rostriformis bugensis*



- Zebra mussel occurrences
- Quagga mussel occurrences
- Both species occurrences
- Zebra mussels eradicated

Map produced by the U.S. Geological Survey, Nonindigenous Aquatic Species Database, May 15, 2012.

Quagga and Zebra Mussel Sightings Distribution in California, 2007- 2012



Data Sources: California Dept. of Fish and Game, City of San Diego Water Authority, Imperial Irrigation District, Helix Water District, Irvine Ranch Water District, National Park Service.
 Map produced by the U.S. Geological Survey, May 14, 2012.



Some invasive plants in the West

not comprehensive

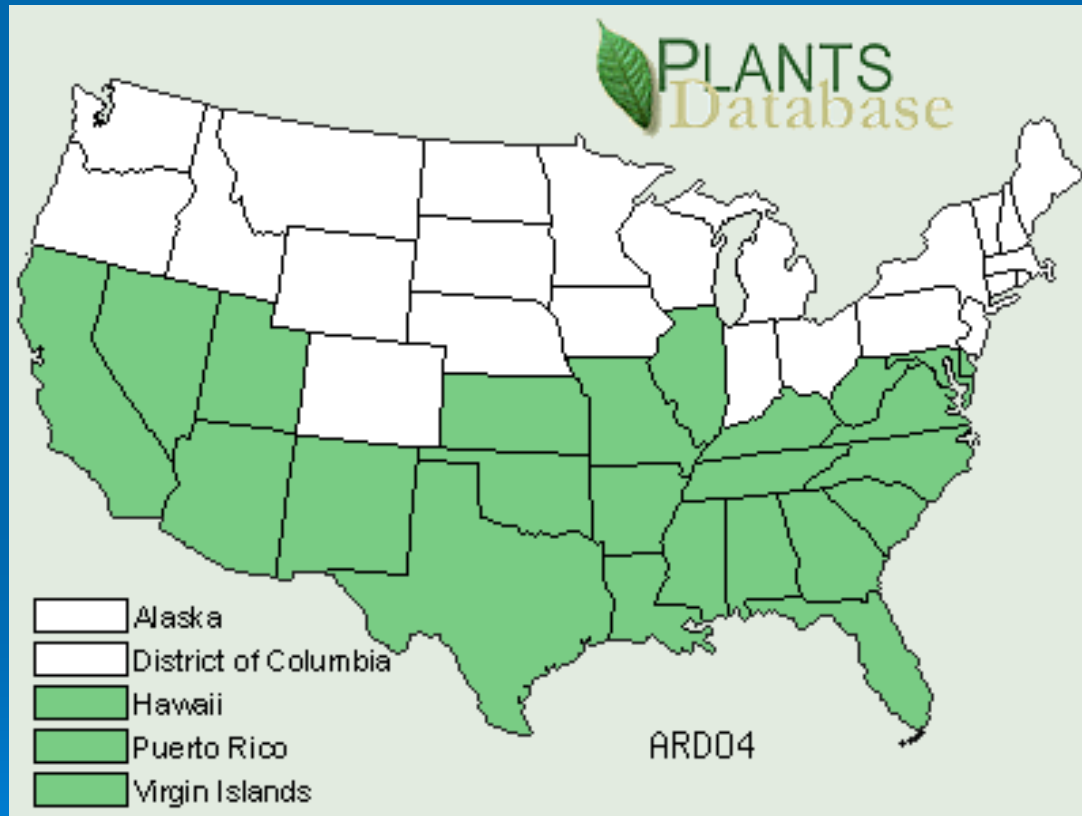


Giant Reed

Arundo donax



Arundo donax

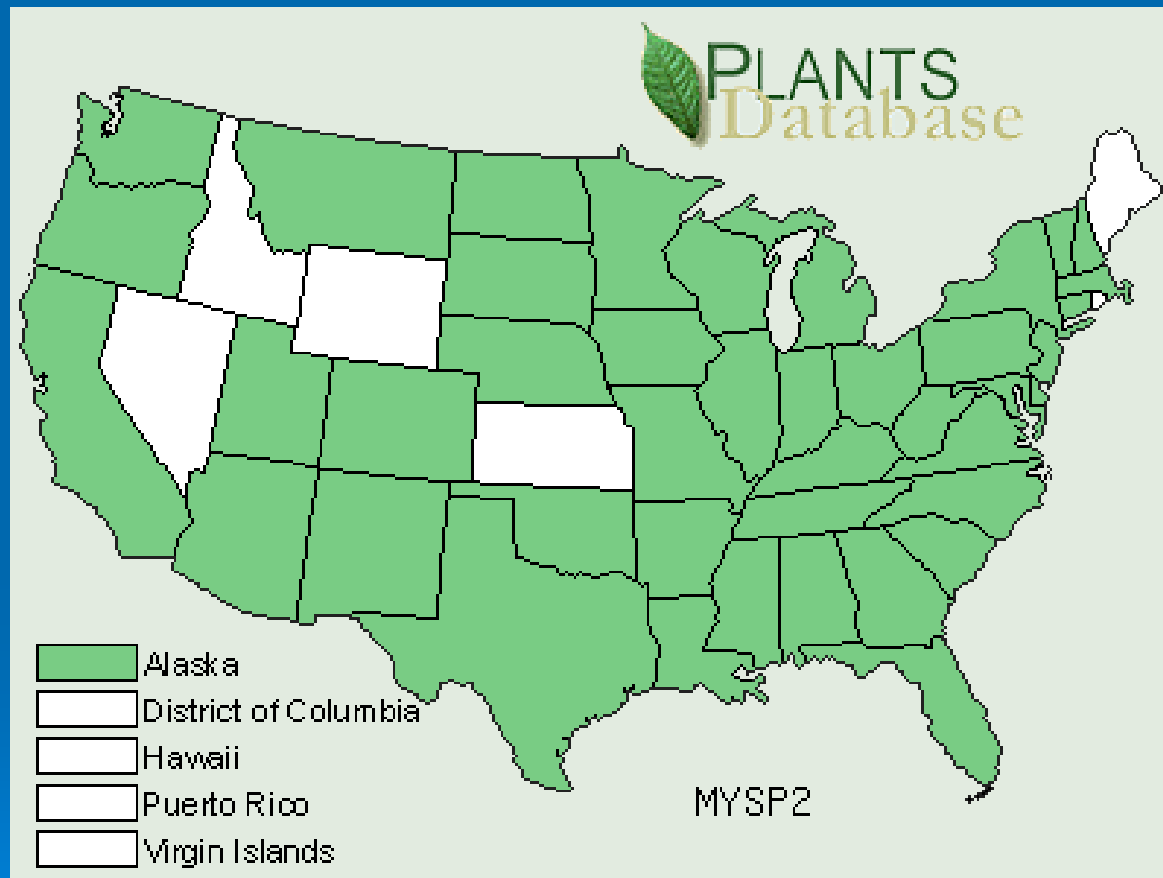


European Milfoil

Myrophilum spicatum



Myriophyllum spicatum



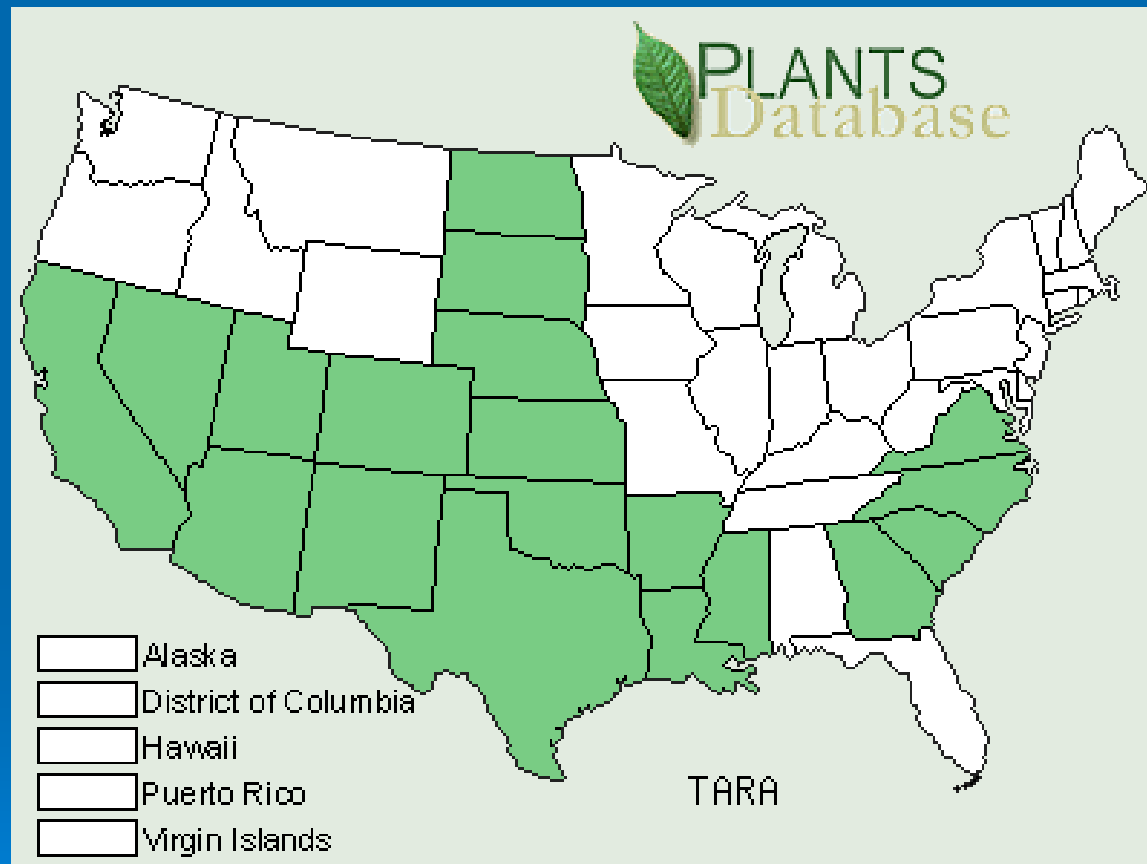
Salt cedar

Tamarisk ramosissima



Photos: John Randall / Nature Conservancy

Tamarisk rammosisima



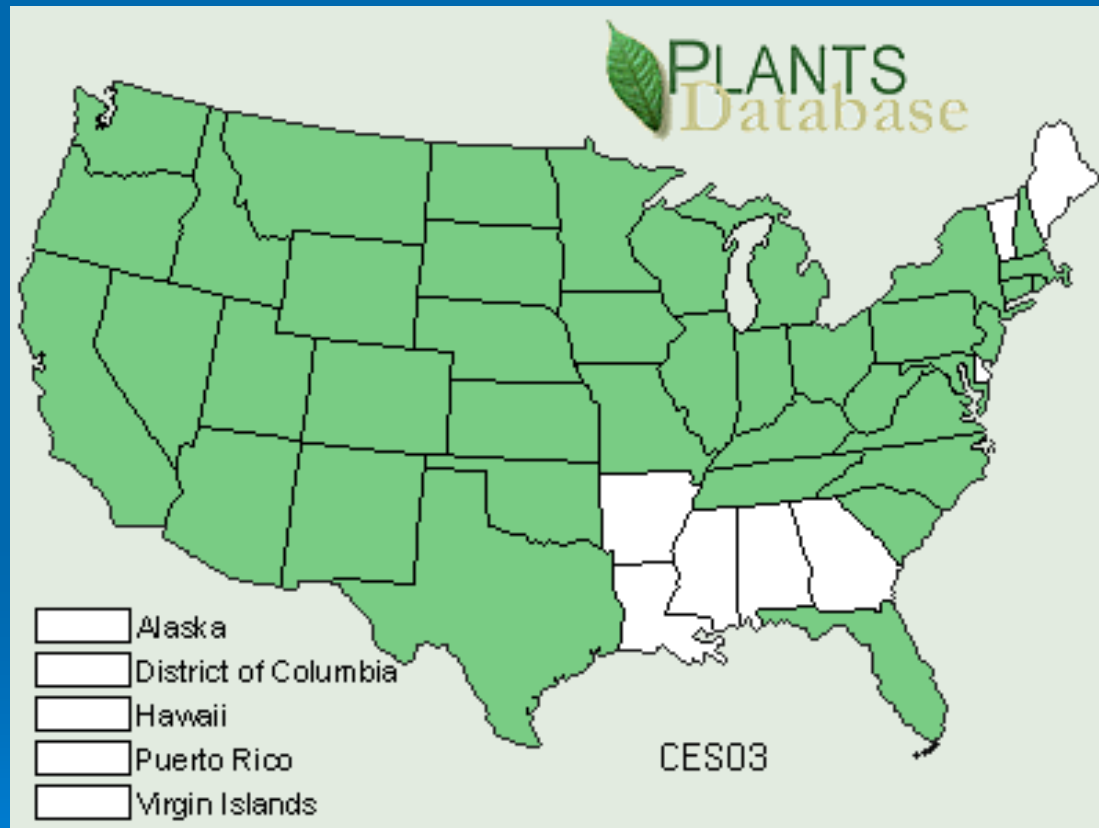
Star thistle

Centaurea solstitialis



Star Thistle

Centaurea solstitialis



Caulerpa spp.



Healthy ecosystem



Tools to manage invasives once they are naturalized



➤ Mechanical

➤ Chemical

➤ Biological

➤ Ignore

- rely on Luck
or
Fate

Operations within aquatic environs



Best Management Practices Goals



Equipment should be
decontaminated/cleaned before
moved to a new location

so that they do not act as vectors of dispersal for
invasives during transit and to the next working
area



Pressure wash equipment



➤ Pressure wash for plant propagules



➤ Hot-pressure wash for aquatic invasives



BMP Cleaning manual

<http://www.usbr.gov/mussels/prevention/docs/EquipmentInspectionandCleaningManual2012.pdf>

