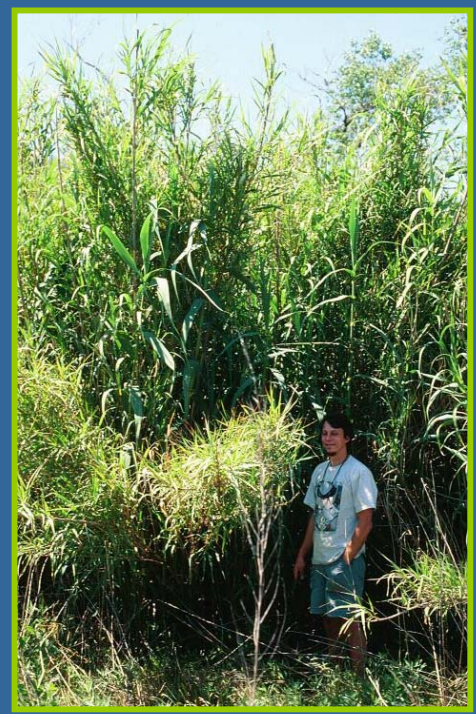
A Watershed Approach to *Arundo donax* Removal and Riparian Restoration

- Landscape level assessment & GIS development
- Research: distribution, community effects and control methods
- Science-based approach to removal and restoration
- Partnerships and collaboration
- Effectiveness monitoring
- Funding

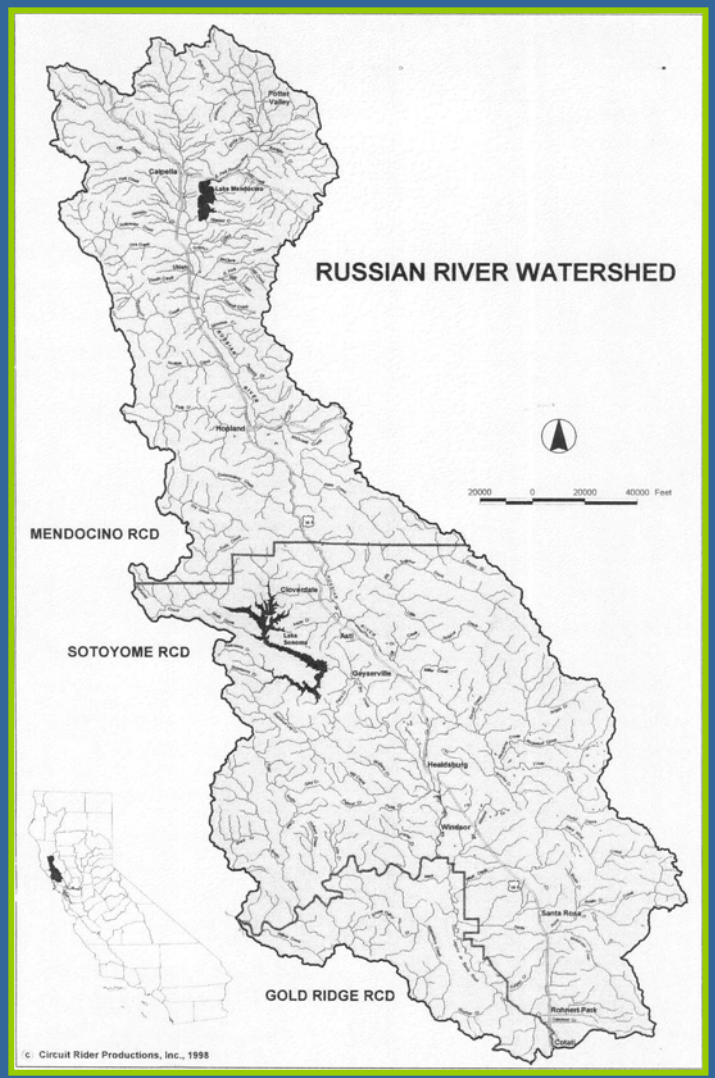
Giant Reed (*Arundo donax;* Poaceae)

- Native to Asia
- Clonal: no viable seed
- Native herbivore = elephant
- Fire adapted
- Water use
- Highly invasive
- Effects on biotic communities
- Limited research
- Large economic costs



Vegetative Reproduction: a blessing and a curse!

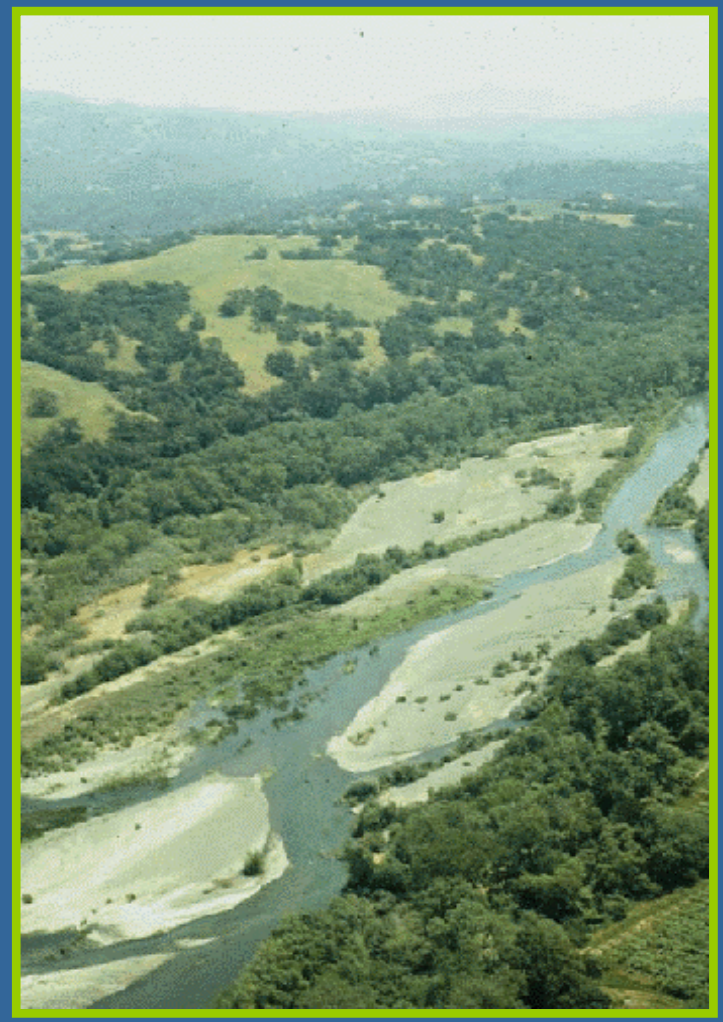
Project Setting: Russian River Watershed



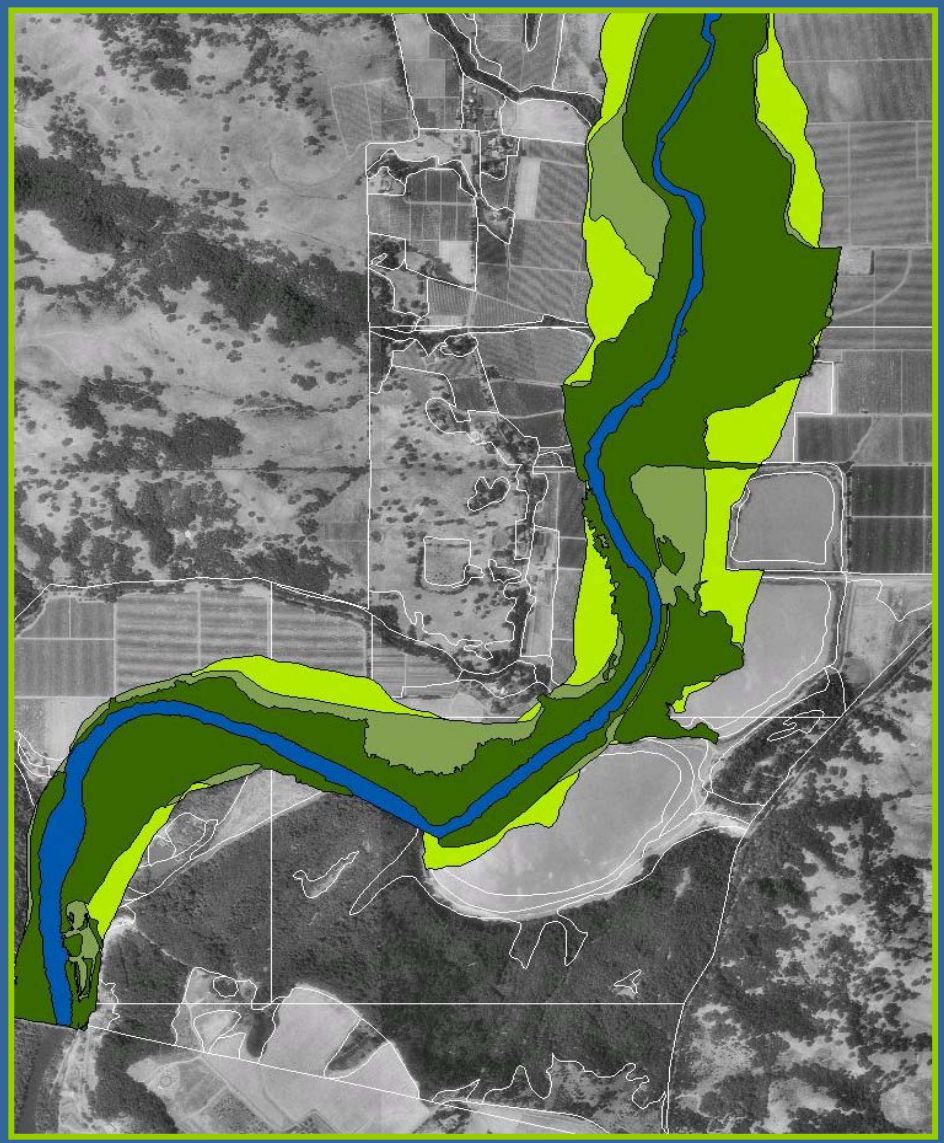
- 3885 square kilometer basin
- Sonoma and Mendocino counties
- 95% of the Russian River watershed is in private ownership
- Streamside landowners increasingly committed to preserving/restoring habitat
- Increased interest in collaboration between agencies, the community and landowners

Russian River Riparian Corridors

- high level of natural and human disturbance
- significant reduction in riparian vegetation
  - agriculture
  - urban development
  - mining
- intact riparian forest
- invasion by exotic plants
- three federally listed salmonids



Riparian Vegetation Loss - Russian River (50% since 1942 – earliest aerial photos)



1942 Riparian Habitat

1990 Riparian Habitat

2000 Riparian Habitat

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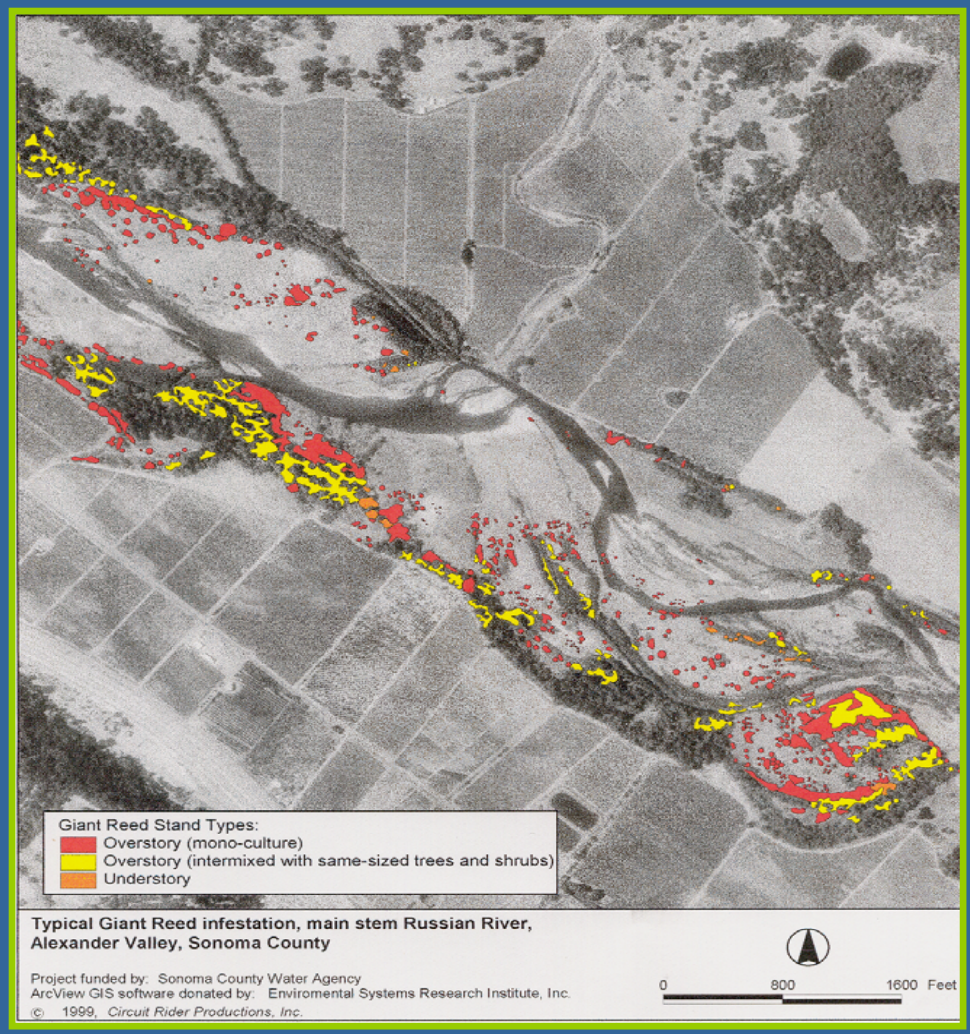
Arundo in the Alexander Valley

Giant Reed (*Arundo donax*) in the Russian River Watershed: infestation extent & type



Arundo locations
Ackerman Creek

Arundo donax Extent
Russian River Watershed

- 250 acres main stem, mostly Sonoma County (60 % in Alexander Valley)
- 44 infested tributaries
- 700 tributary point locations
- Predominantly monoculture or intermixed

Applied Research Objectives

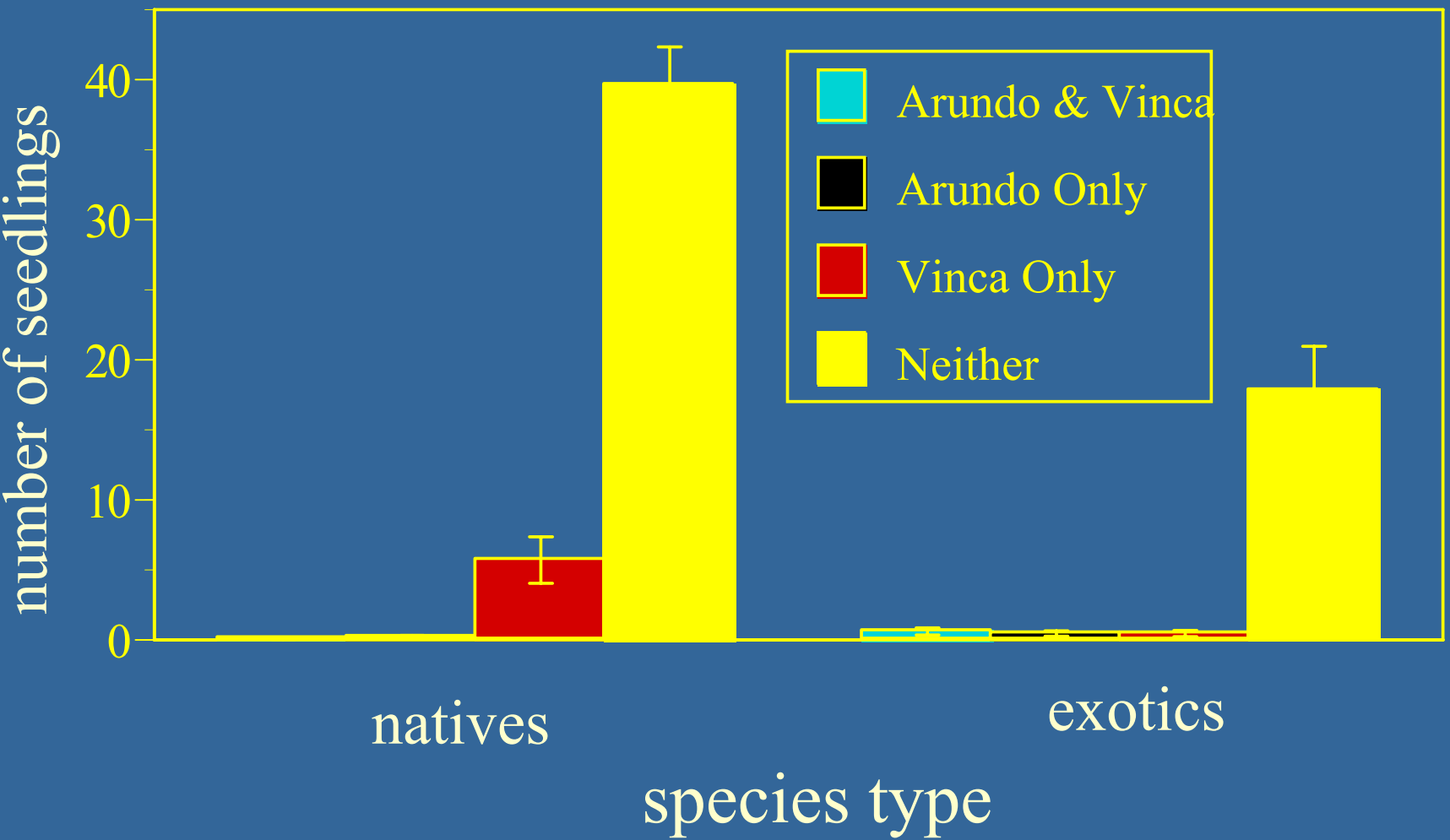
1. distribution of *Arundo* across a riparian corridor cross section/elevational gradient
2. effects of *Arundo* and *Vinca* on plant communities

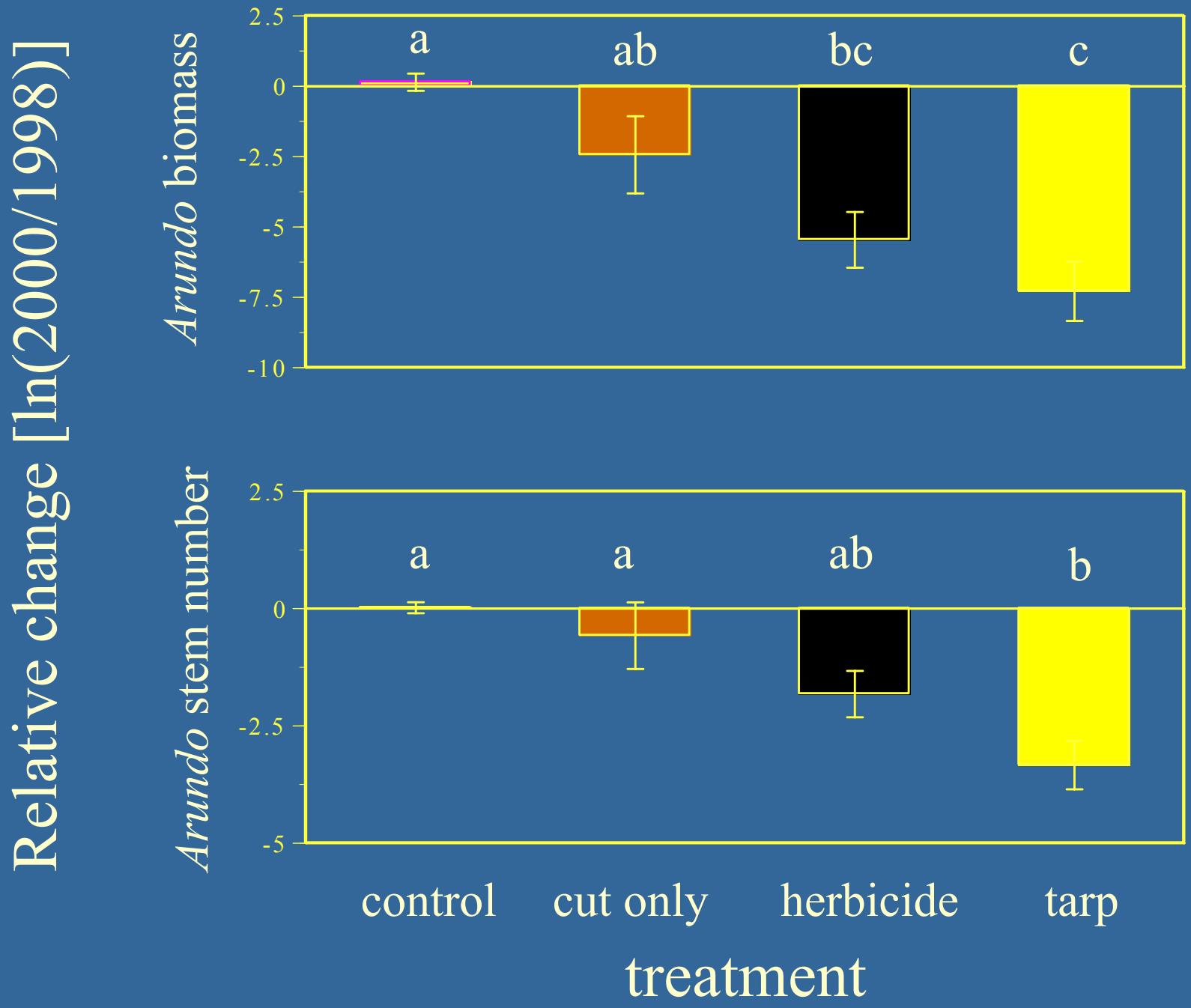
   -abundance (seedlings & established plants)

   -species richness
4. effective control methods for *Arundo*

   (including non-toxic techniques)
5. natural regeneration & revegetation following *Arundo* control
6. viability of stem nodes

Number of Seedlings in *Arundo* and *Vinca* Invaded Habitats




Relative change [ln(2000/1998)]
Arundo biomass
2.5
0
-2.5
-5
-7.5
-10
a
ab
bc
c
Arundo stem number
2.5
0
-2.5
-5
a
a
ab
b
control
cut only
herbicide
tarp
treatment

Restoration and Monitoring of *Arundo*-Invaded Habitats

- large public resource investment – importance of science-based approach
- applying experimental data to the watershed – better potential for control of riparian invaders
- landscape-level documentation of effects of removal and revegetation via GIS

Removal Techniques

- Tarping
- Hand removal
- Equipment removal
- Herbicide: cut and paint
- Wildlife!

Biomass and lots of it!!!

- Disposal at facility
- Burning
- Composting

Restoration Approach

- Size of clump
- Location of clump
- Bank erosion
- Removal method
- Natural regeneration or active revegetation
- Other invasives
- Permits

Partnerships and Collaboration

- Public agencies (funding, advice, regulatory)
- Academic Institutions (SSU, UCB, UCE)
- Landowners and industry groups
- Foundations
- Community: volunteers and students

Arundo donax: Challenges

- Lack of understanding regarding impacts of invasives (eg, invasives and salmonids, “plant fascism”)
- Concerns about herbicides
- Rate of spread versus rate of funding for removal
- Unwilling landowners and key parcels
- Permitting issues – site by site or basin-wide permit

Acknowledgements

- California Department of Fish and Game
- California State Coastal Conservancy
- State Water Resources Control Board
- Sonoma County Water Agency
- Sonoma County Community Foundation
- Switzer Foundation