

# **STOP** the spread of non-native dwarf eelgrass, *Zostera japonica*



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# Humboldt Bay Cooperative Eelgrass Project

- Study Pacific eelgrass (*Zostera marina*) habitat



# Discovery of dwarf eelgrass

- June 2002 – shoreline of Indian Island, North Humboldt Bay



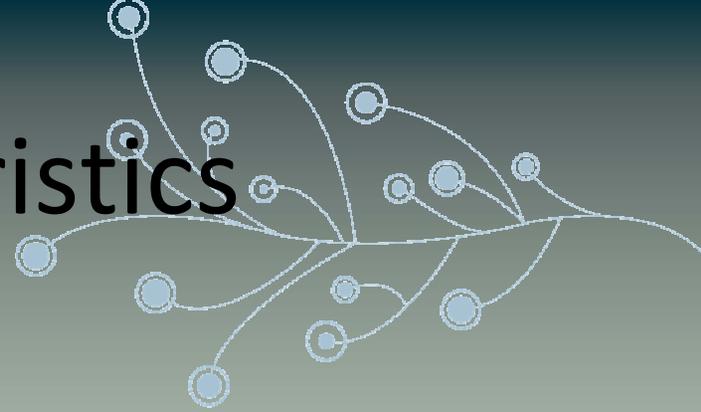


# Species Profile of *Z. japonica*



- Native to Asia
  - Forms dense, monospecific beds
- First collected in Pacific NW in 1957
  - Likely arrived coincident with the introduction of oysters from Japan
- Spread rapidly from BC down to OR
- Two locations in CA
  - Humboldt Bay
  - McNulty Slough, Eel River Estuary

# Plant Characteristics



- Colonizes intertidal mud and sand flats that lack macrophyte cover
- Exhibits exponential growth (Jun-Apr)
- High intertidal compared to *Z. marina*



# *Z. japonica* vs. *Z. marina*

- *Z. japonica* has:
  - Open leaf sheath
  - Narrow blades

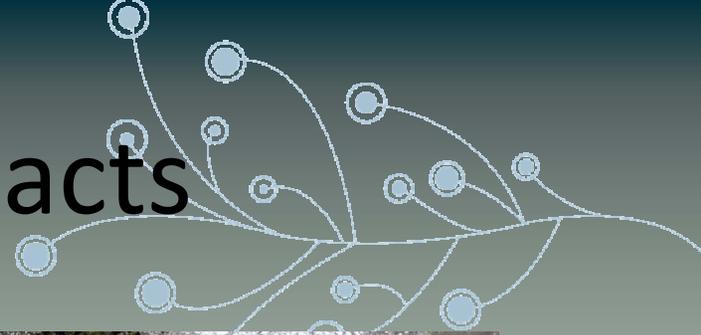


# Seed Differences

- Smooth, brown,  $\leq 2$  mm long = *Z. japonica*
- Ribbed, black, avg. 3.5 mm long = *Z. marina*



# Ecological Impacts



# *Z. japonica* Monitoring & Eradication Program



- Detection/identification of *Z. japonica*
  - Indian Island, 2002
- Consultation
  - Team of scientists (agencies and researchers)
- Decision to eradicate

# Manual Excavation of Dwarf Eelgrass at Indian Island, 2003



# Program Objectives



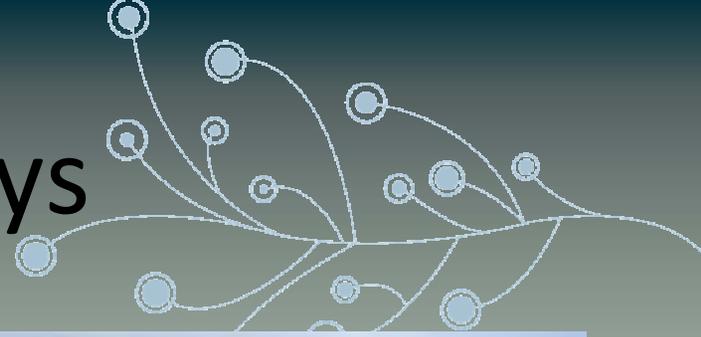
- Eradicate dwarf eelgrass, *Z. japonica* wherever found
  - Early detection
  - Rapid response
- Gather scientific data
- Protect and restore intertidal mudflat habitat

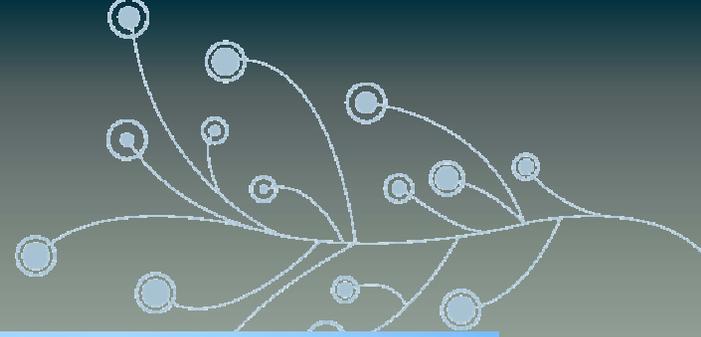
# Study Area

- Humboldt Bay
  - Perimeter and islands
- Eel River Estuary
  - McNulty Slough



# Shore Surveys





# Z. japonica Discovered in Eel River Estuary

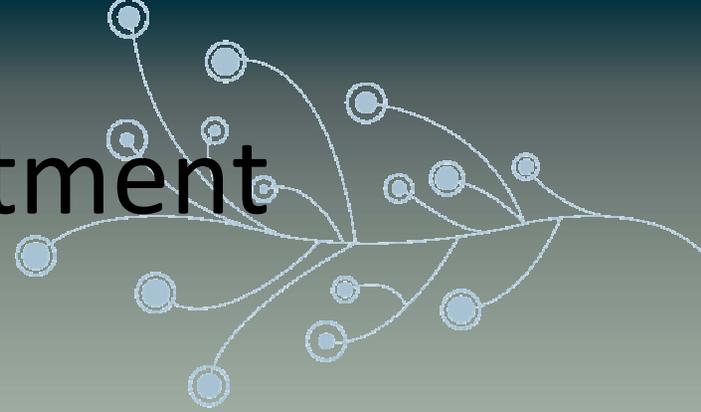




# Experimental Treatments to Control *Z. japonica*



# Hot Water Treatment



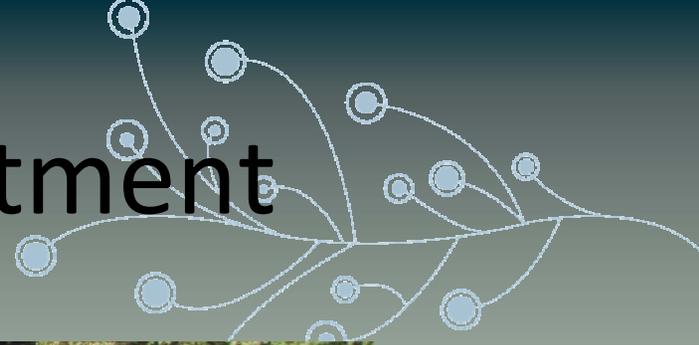
# Infrared Heat Treatment



# Flame Heat Treatment



# Excavation Treatment



# Covering Treatment

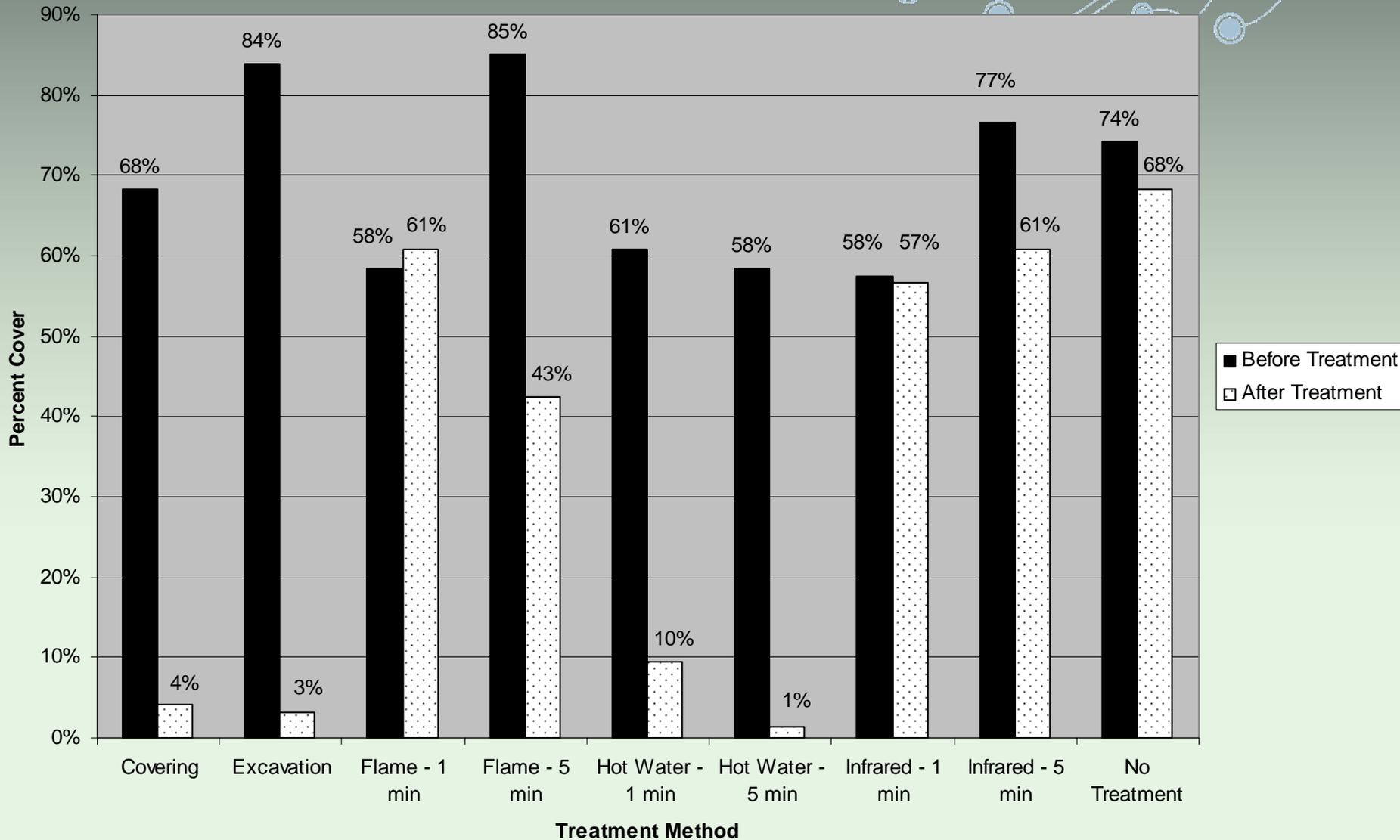


# Control: No Treatment

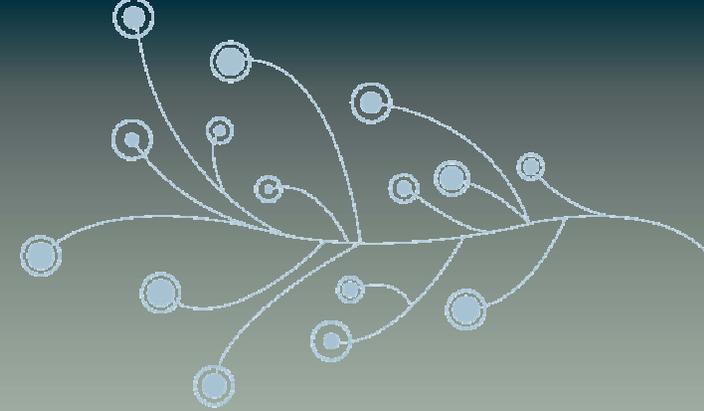


# Results of Experiment

Effectiveness of Eradication Methods on *Z. japonica* After a Two-Month Period

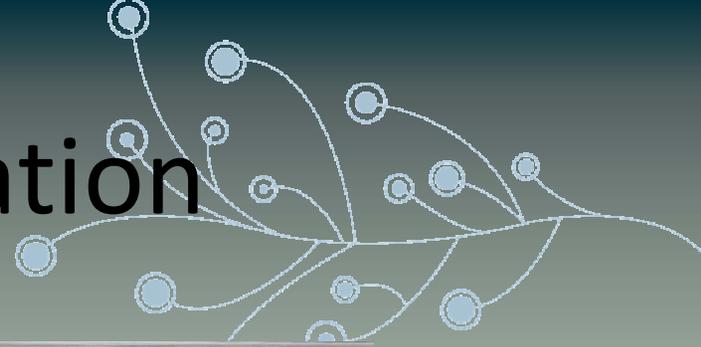


# Humboldt Bay *Zostera japonica* Sites

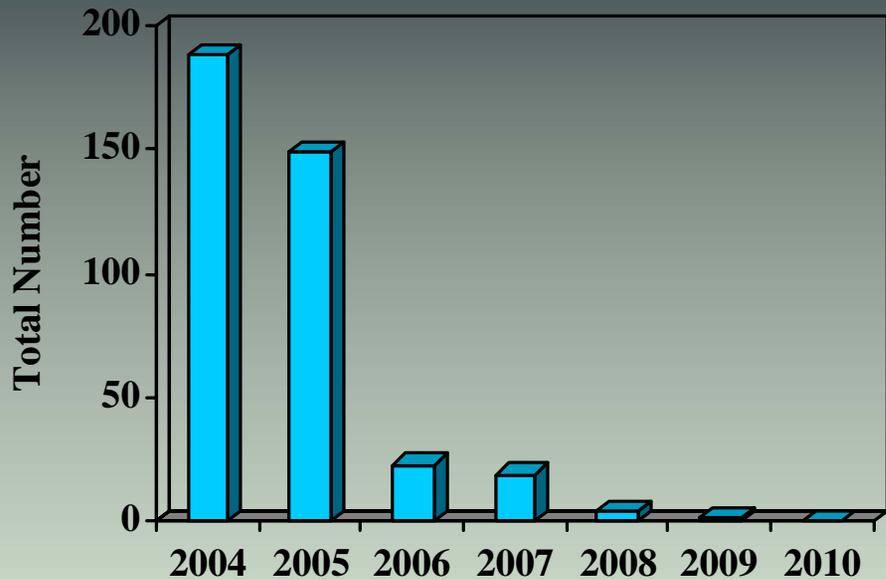


*Z. japonica*  
Locations in  
2010

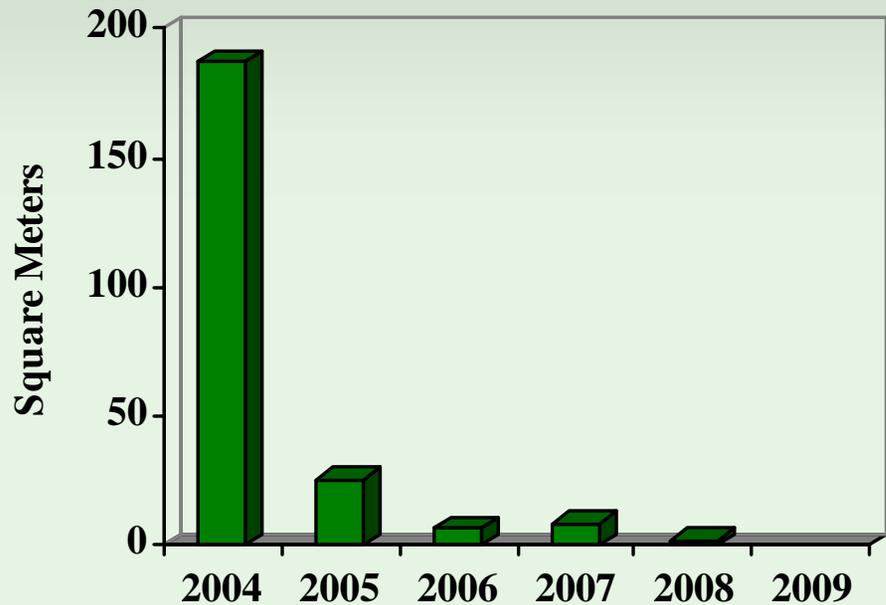
# Manual Excavation



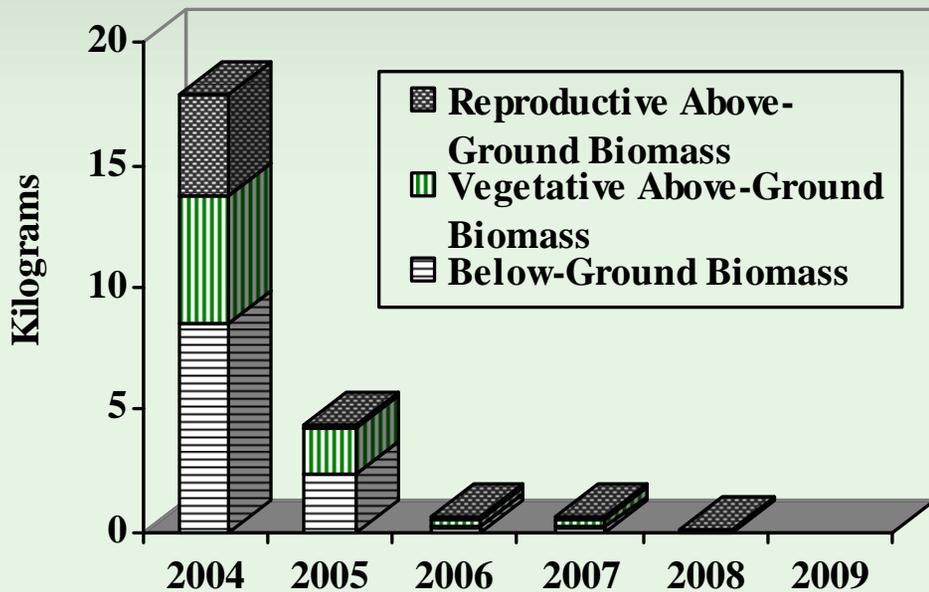
Number of Patches



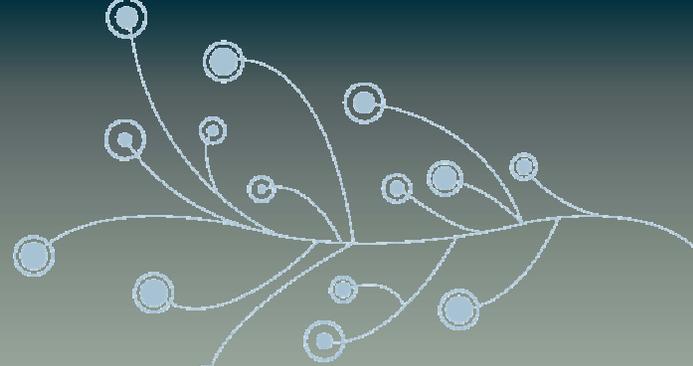
Area



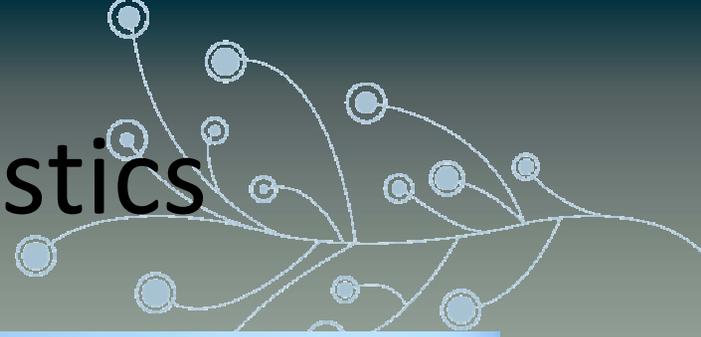
Biomass



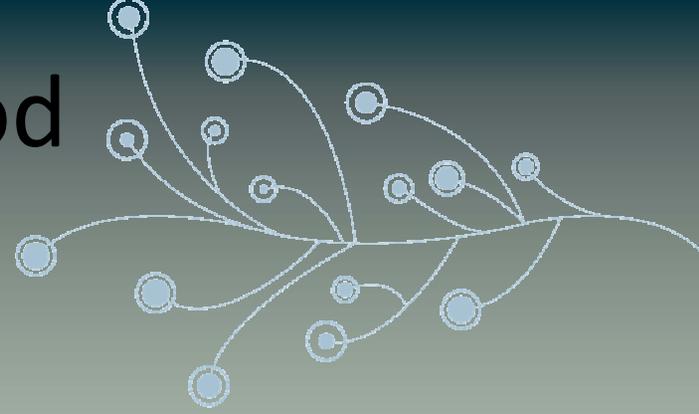
# Effectiveness of Manual Excavation



# Site Characteristics



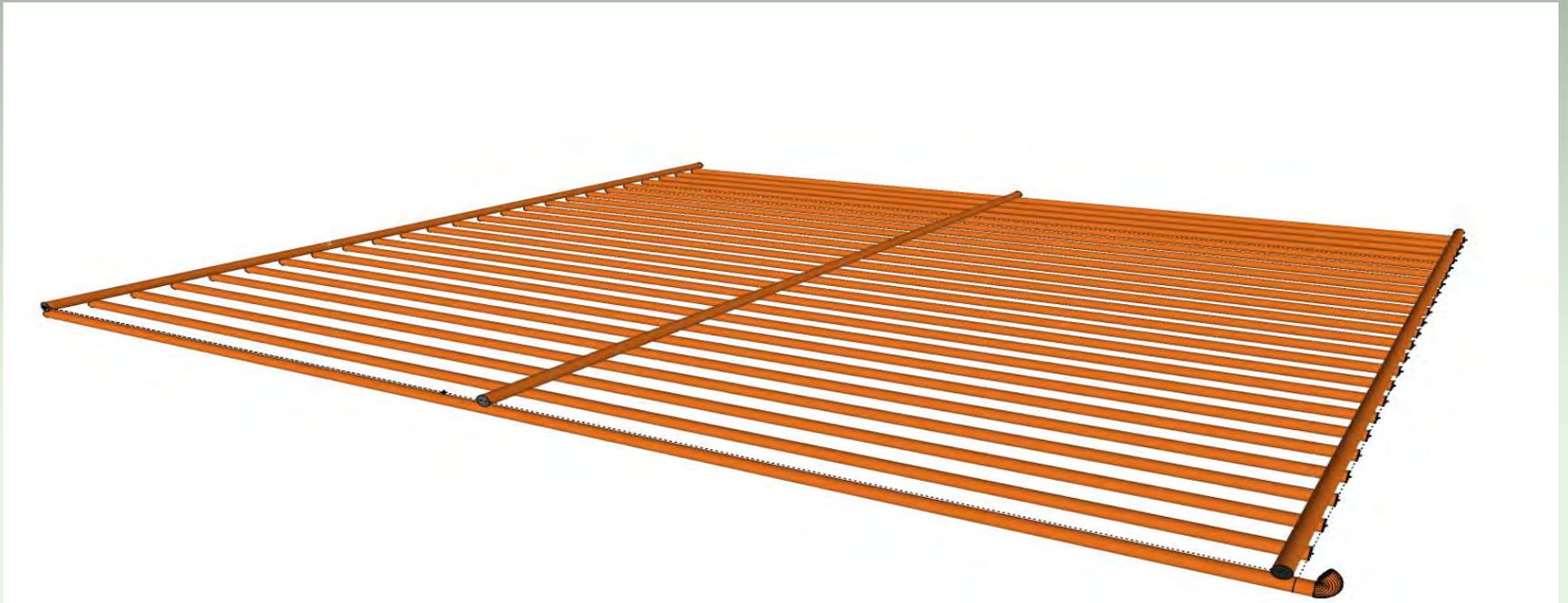
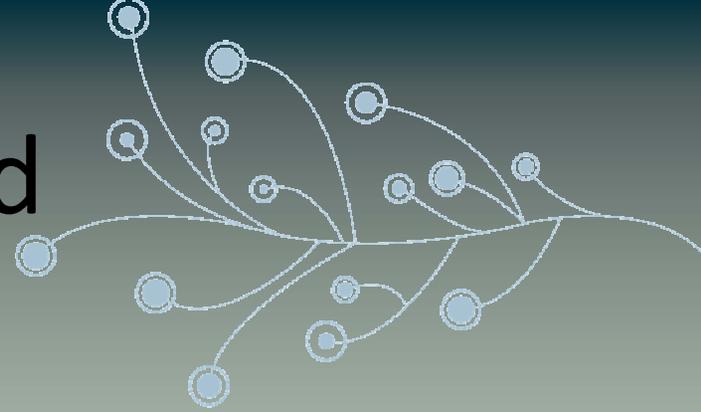
# Burial Method 2010



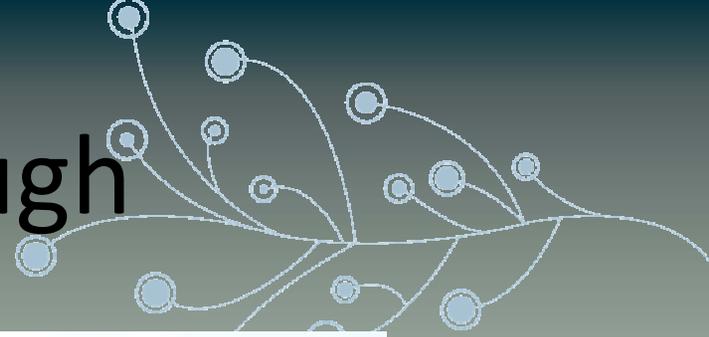
# Below Ground Heaters



# Copper Grid



# McNulty Slough



# Invertebrate Impact Study



# Summary



- Continue to survey all suitable habitat
  - Intensely monitor all previous sites
- Continue to gather data on this species
- Remove all *Z. japonica* found
- Evaluate new eradication methods

# Collaborators

