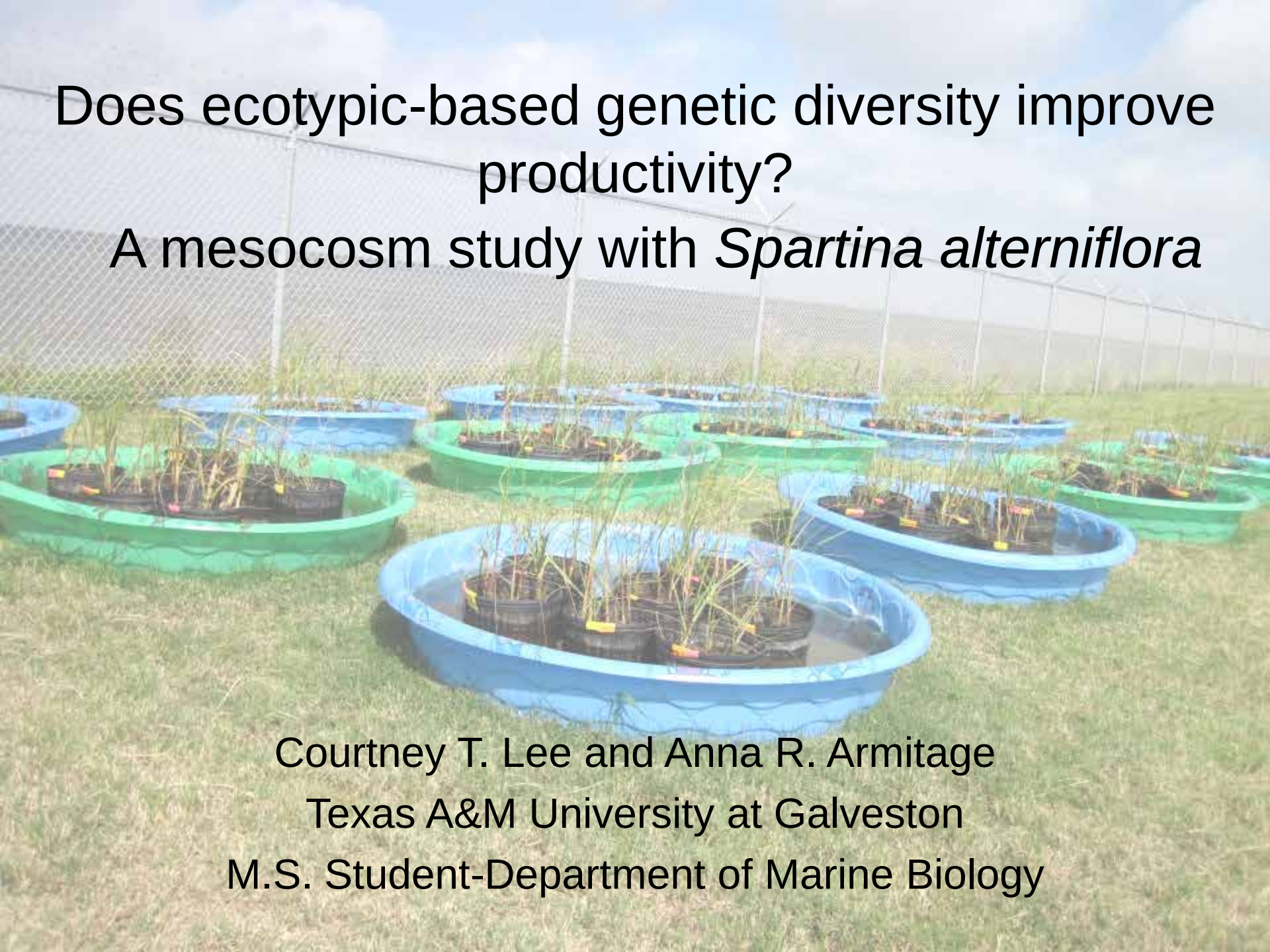
Does ecotypic-based genetic diversity improve productivity?
A mesocosm study with *Spartina alterniflora*



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Background

- Plant species diversity relates to ecosystem characteristics
- Does plant genetic diversity confer the same advantages as plant species diversity?
- Address this to improve restoration?

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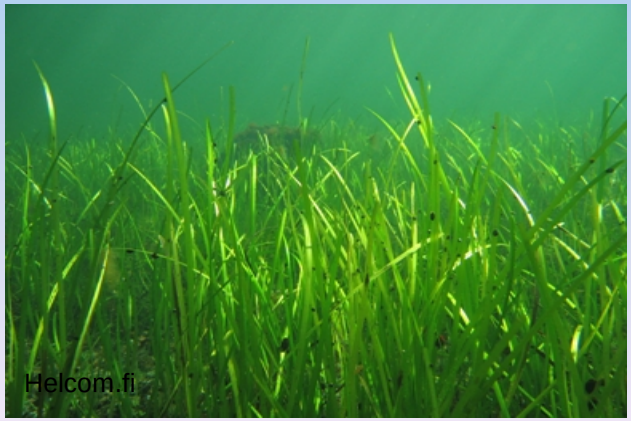
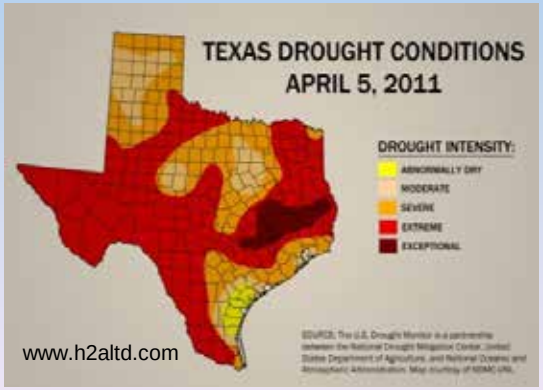
Background

- **Species level**: biomass and resource utilization
- **Community level**: animal response
- **Ecosystem level**: enhanced stability and resilience
- **Climate Stress**: intensity and prevalence





Application

- Salt marsh systems
  - Dominant species: *Spartina alterniflora*
  - Gulf and East coasts
  - Highly productive
  - Restoration

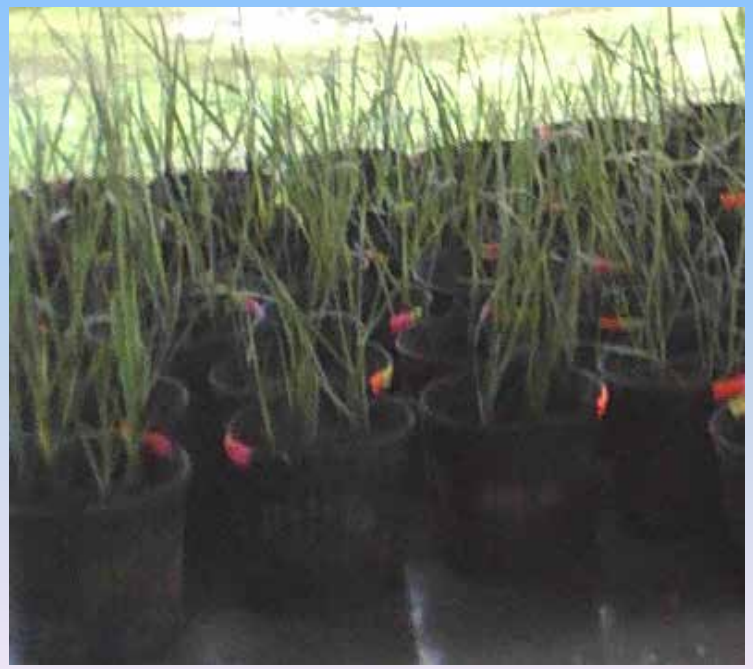
- Genotypes and ecotypes displayed unique differences
  - Plant canopy characteristics
  - Community assemblages

Application

- Not addressed in restoration success or monitoring
- Typically only one donor source is used
  - Limited standing genetic diversity
  - Hinders population fitness
- Creation of new cultivars
- Goal to create seed stock
- Manipulate genetic diversity of restored *S. alterniflora*
  - Productivity
  - Stability

Objective

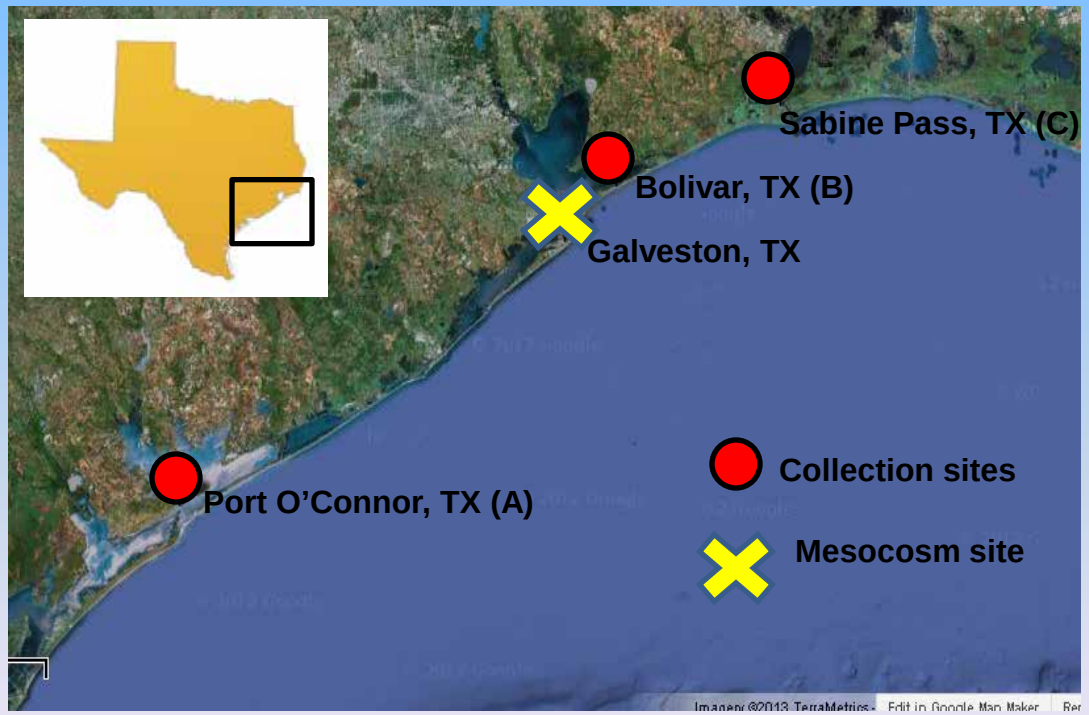
- Understand differences between *Spartina alterniflora* growth and canopy features
  - Low and high genetic diversity
  - Range of natural salinities

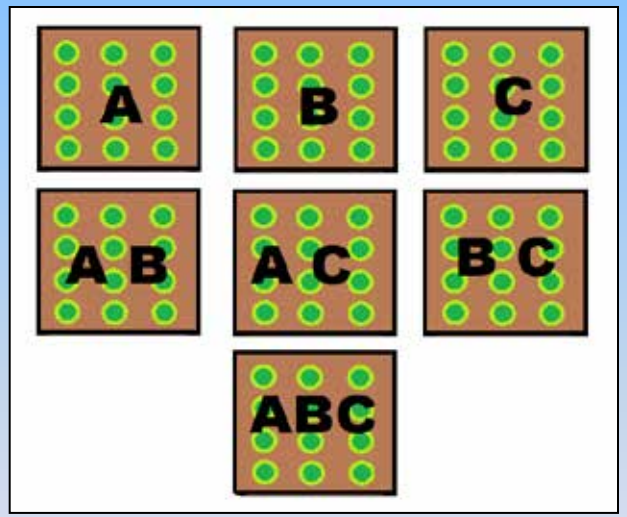


Methods

- Collected sprigs of *Spartina alterniflora*
- Three ecotypes from northeast Texas Coast
- Planted monocultures and polycultures

S. alterniflora sprig





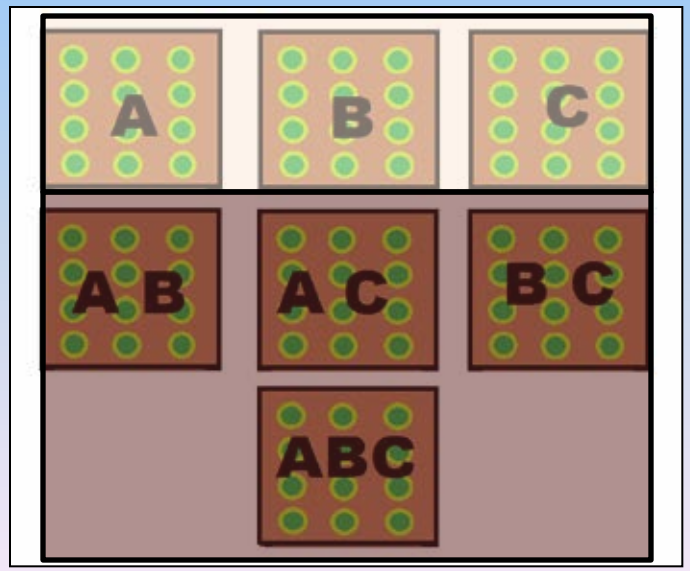
Monoculture and polyculture combinations in a single replicate

Methods

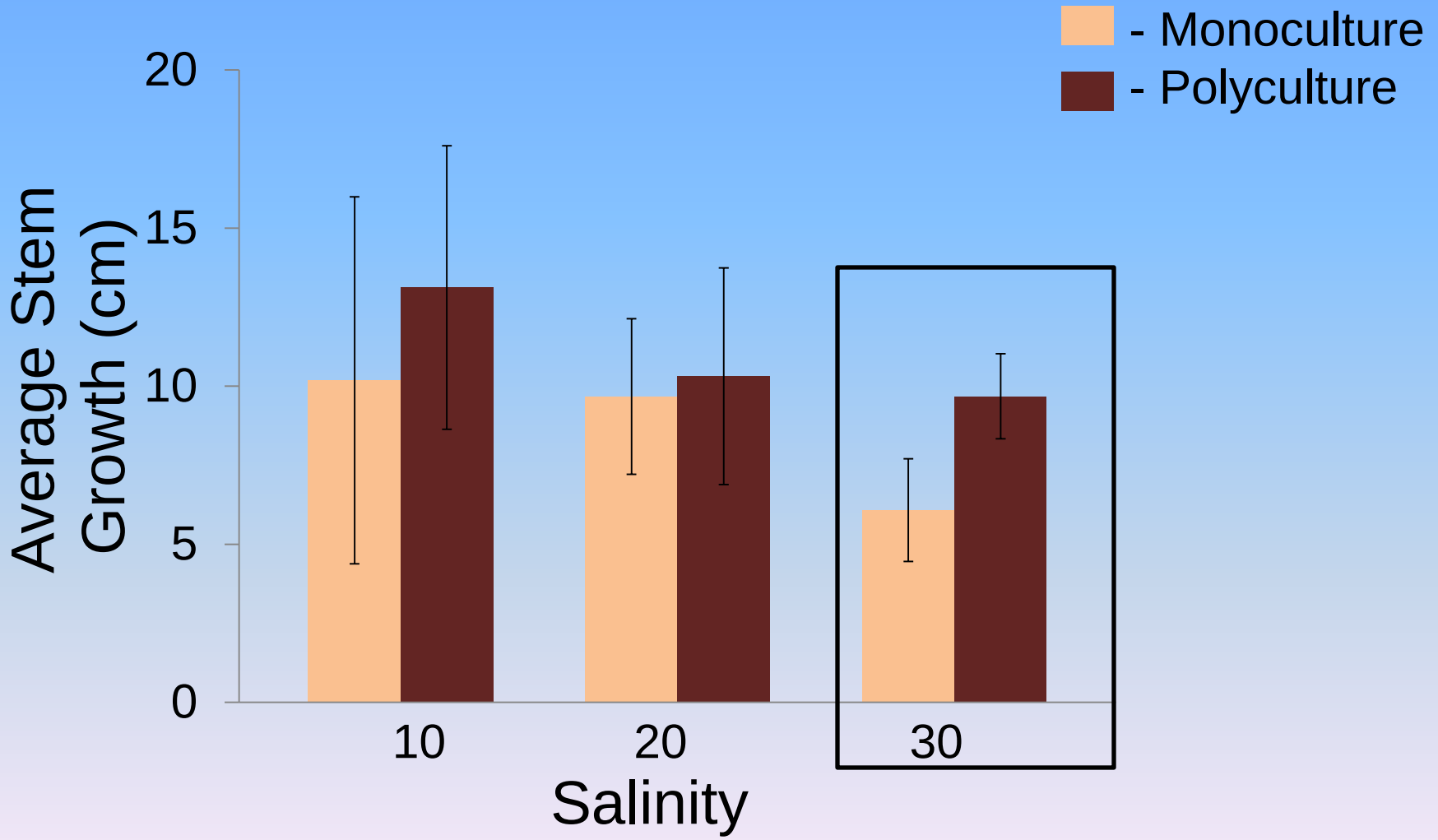
- June-October 2012

- Compared growth patterns
  - Stem density
  - Stem height
  - Stem growth
  - Number of leaves
  - Chlorophyll a production
  - Inflorescence density
  - Root biomass

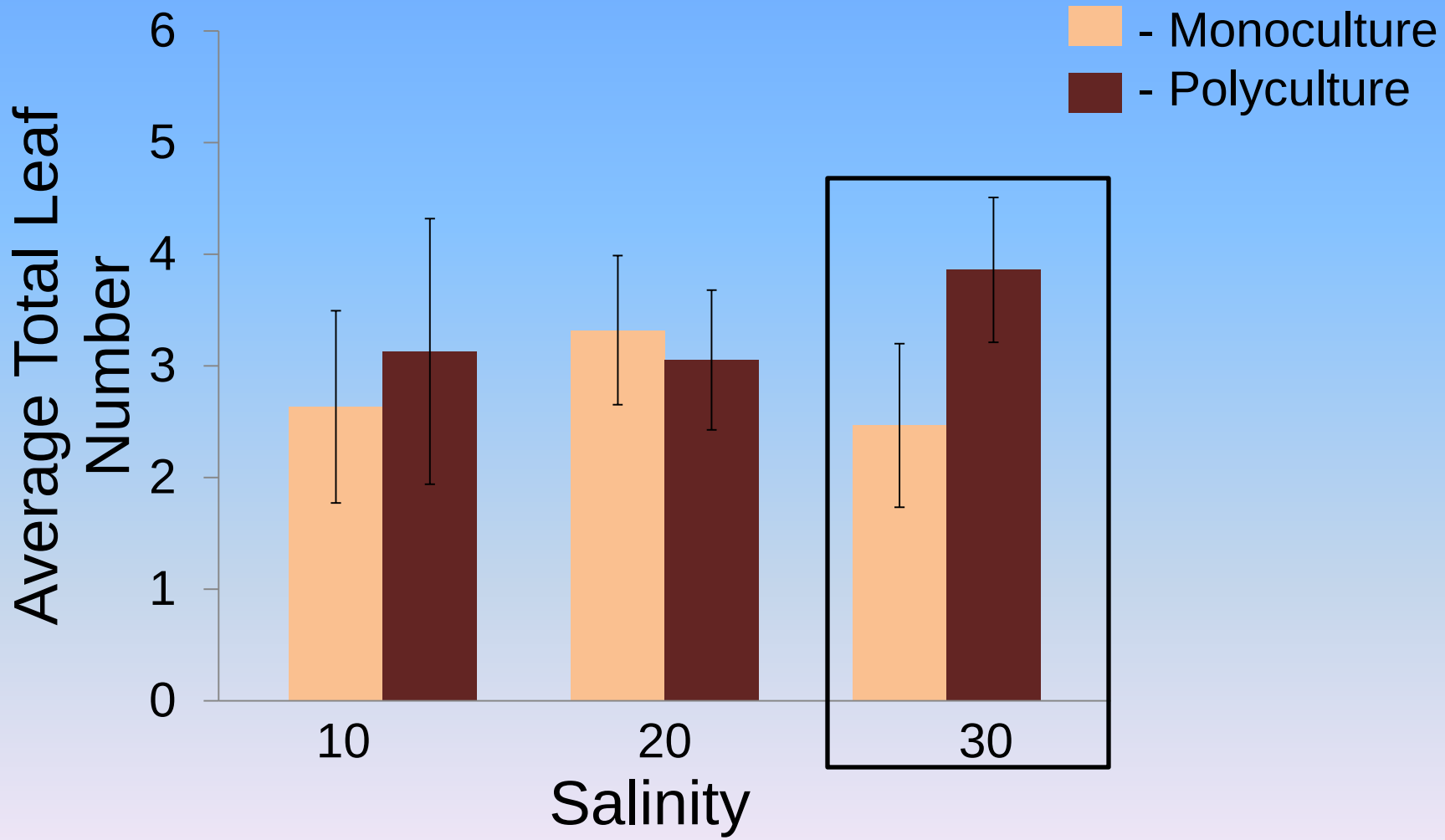
- Averaged monocultures and polycultures at each salinity



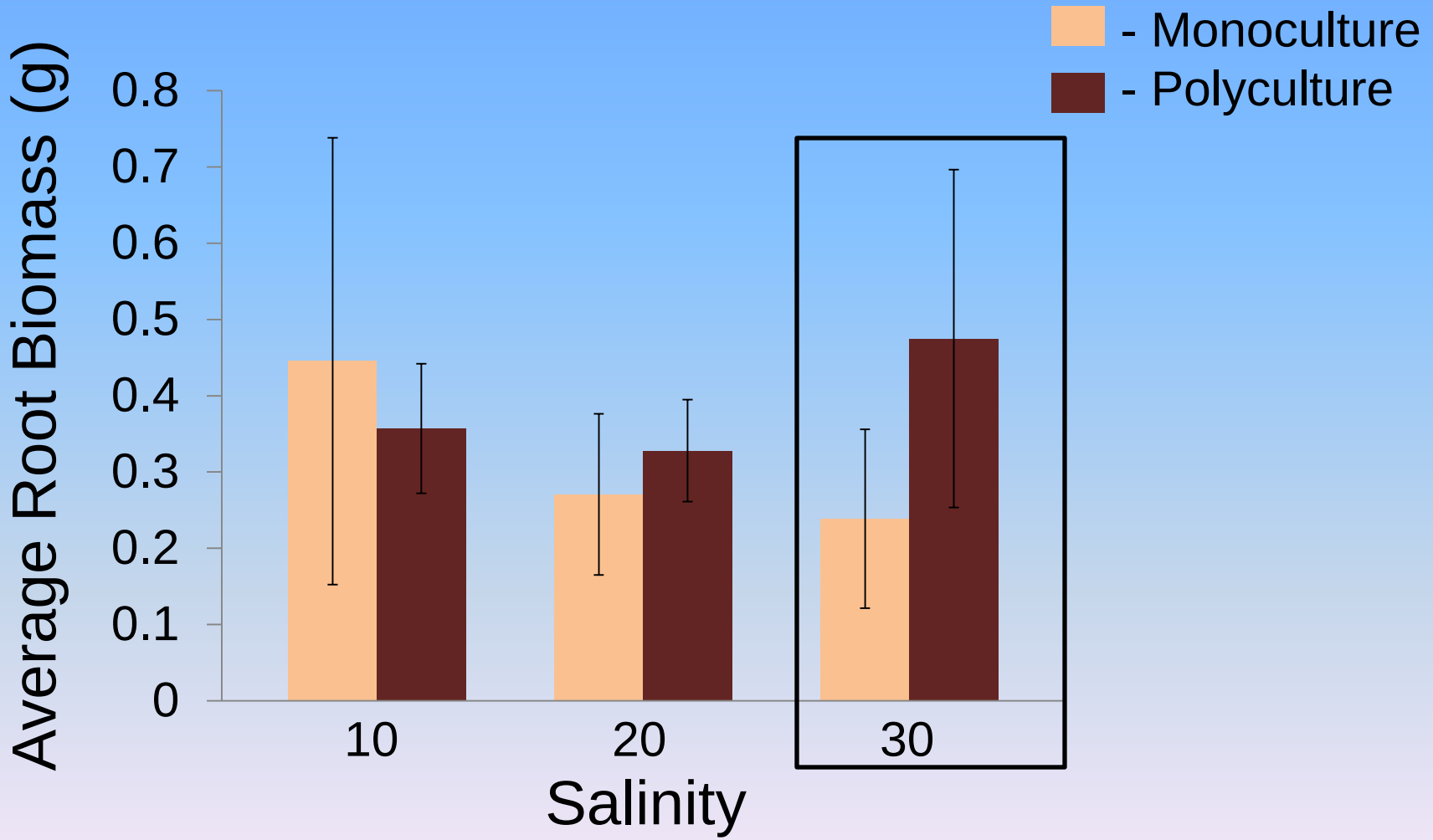
Polycultures grew more than monocultures, but as salinity increased, stem growth decreased



Polycultures outperformed monocultures at 10 & 30 ppt; as salinities increased, leaf number increased



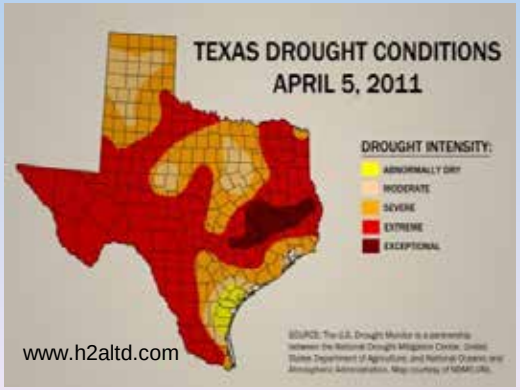
Polycultures outperformed monocultures at 20 & 30 ppt; as salinities increased, root biomass increased



Discussion

- Polyculture had better performance at highest salinity:
  - Augmented leaf level processes
  - Greater belowground biomass
  - Limited aboveground production

- Increasing genetic diversity at the ecotype level
  - Might be an efficient way to improve restored plant success
  - Might be a proactive method in restoration to tolerate stresses



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Questions