

Can one invasion lead to another?

Niche space and the future of Southwestern U.S. riparian zones



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3 August 2009

Tamarisk and Russian olive

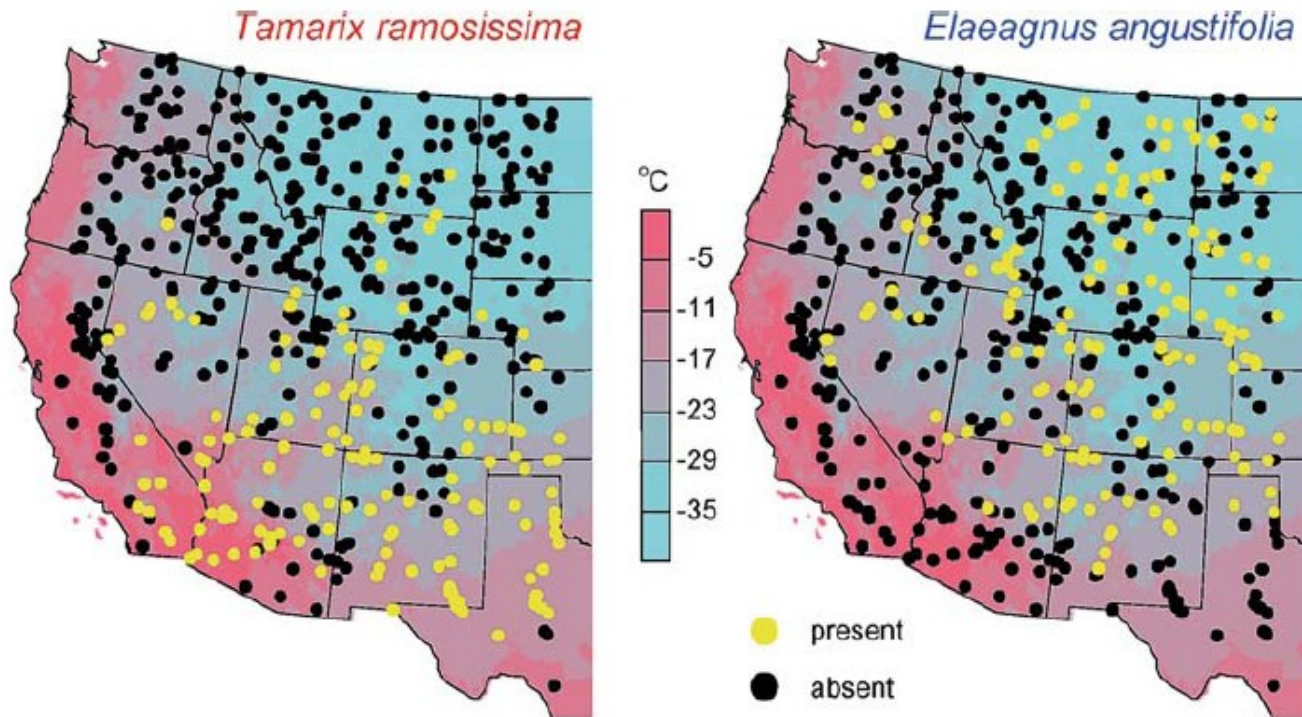


Figure 2. Mean annual minimum temperature and occurrence of *Tamarix ramosissima* and *Elaeagnus angustifolia* across the western USA.

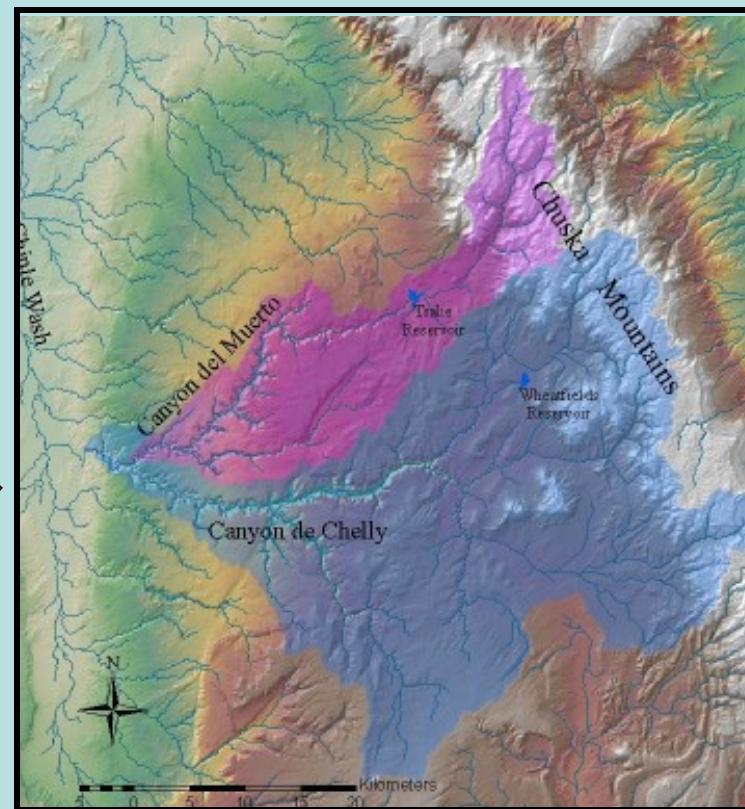
Tamarisk and Russian olive

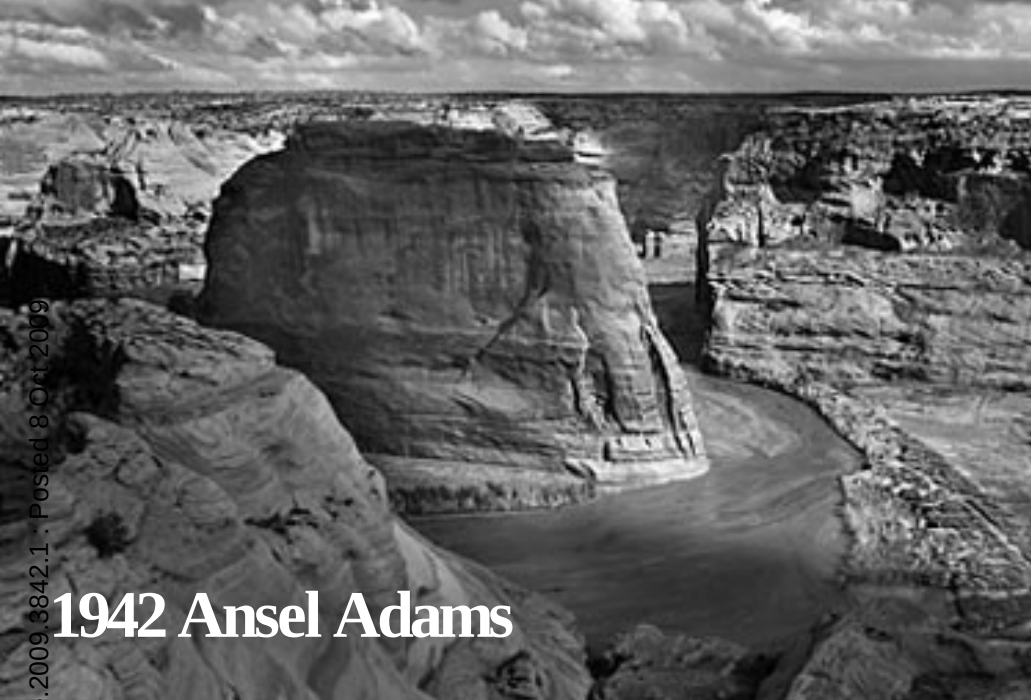
Tamarix ramosissima Ledebour,
T. chinensis Loureiro,
T. pentandra Karst,
and hybrids of these taxa

Elaeagnus angustifolia L.
(Russian olive)



Canyon de Chelly National Monument, Arizona



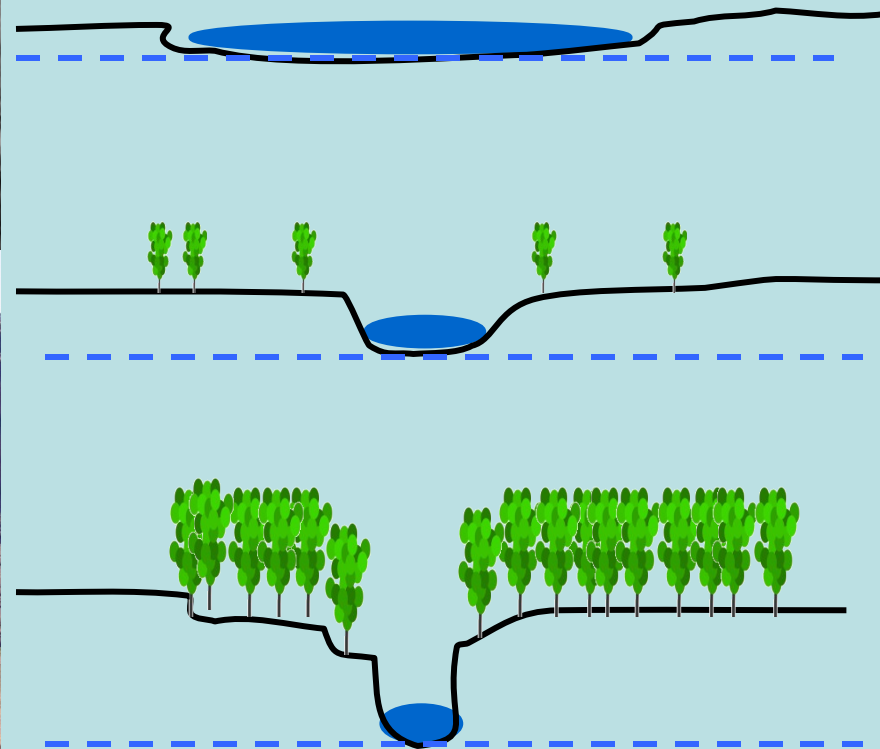


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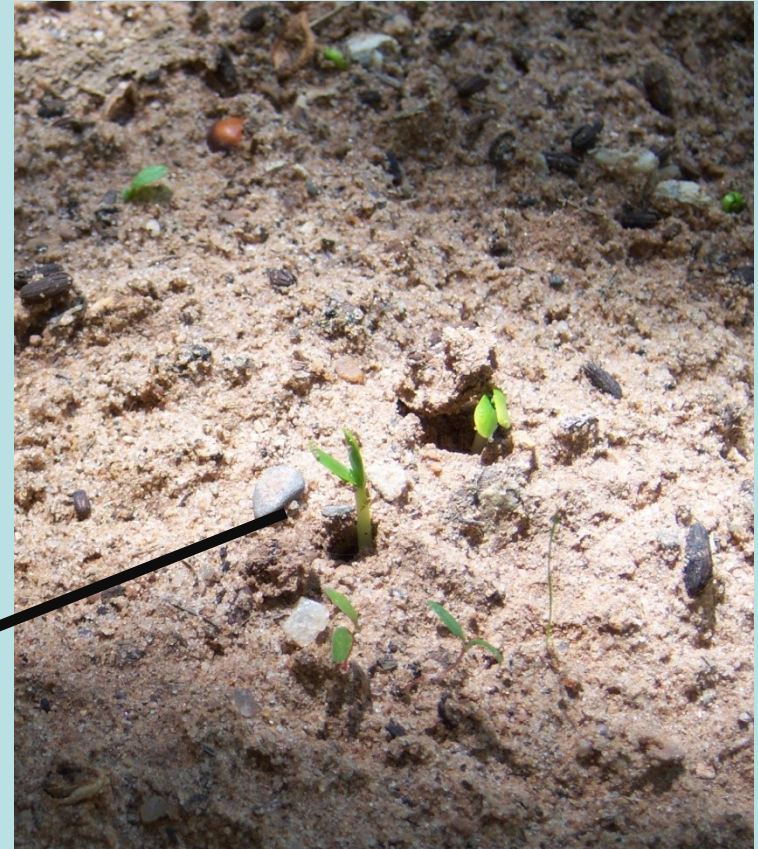
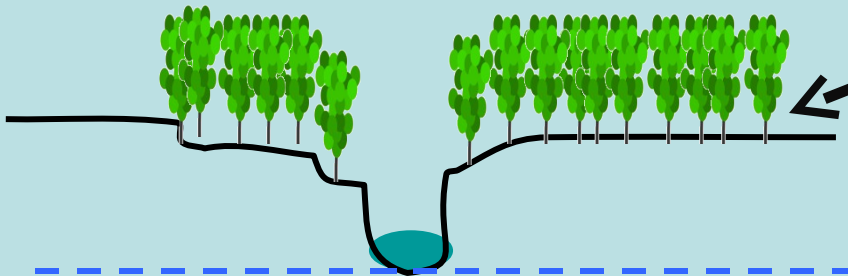
Flood plain changes 1930s-2007



*Native cottonwood, exotic tamarisk
and Russian olive riparian forest

Research goals: mechanisms of invasion

- (1) Empty niche exploitation? Does Russian olive have a broader niche than cottonwood and tamarisk?
- (3) Facilitation? Can cottonwood and tamarisk facilitate Russian olive invasion by providing shaded habitat?



Methods

- Test light and water requirements for tamarisk, Russian olive and cottonwood
 - Fine scale: Controlled experiment
 - Landscape scale: Canyon de Chelly field survey
 - Regional scale: Regional survey

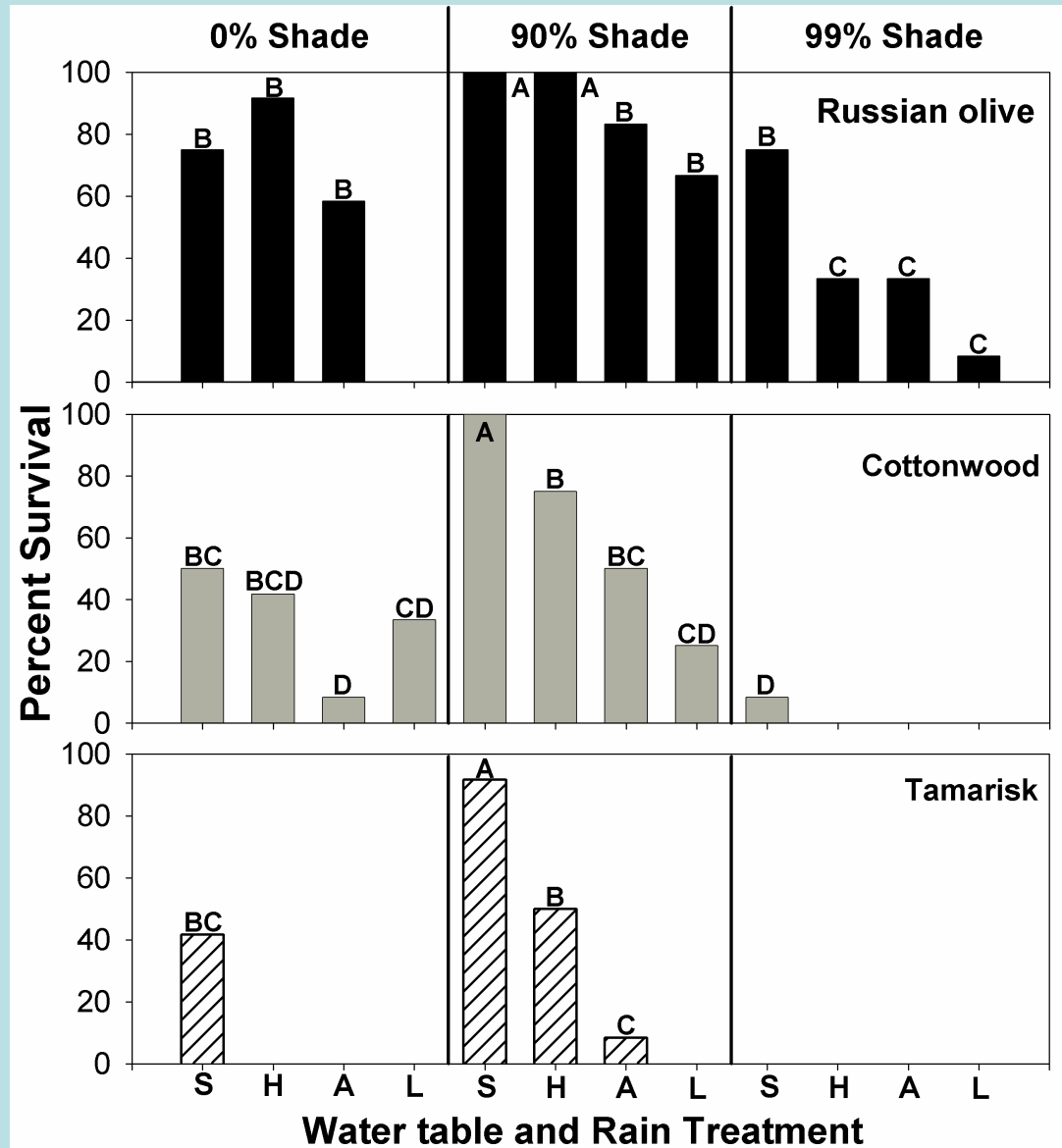


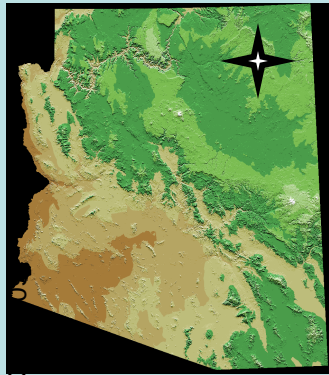
Fine scale: Methods

- Controlled experiment
 - Shade
 - 0%, 90%, 99%
 - Water
 - Saturated soil (flooded)
 - High monsoon rain
 - Average rain
 - Low rain
 - Species
 - Russian olive, tamarisk, cottonwood

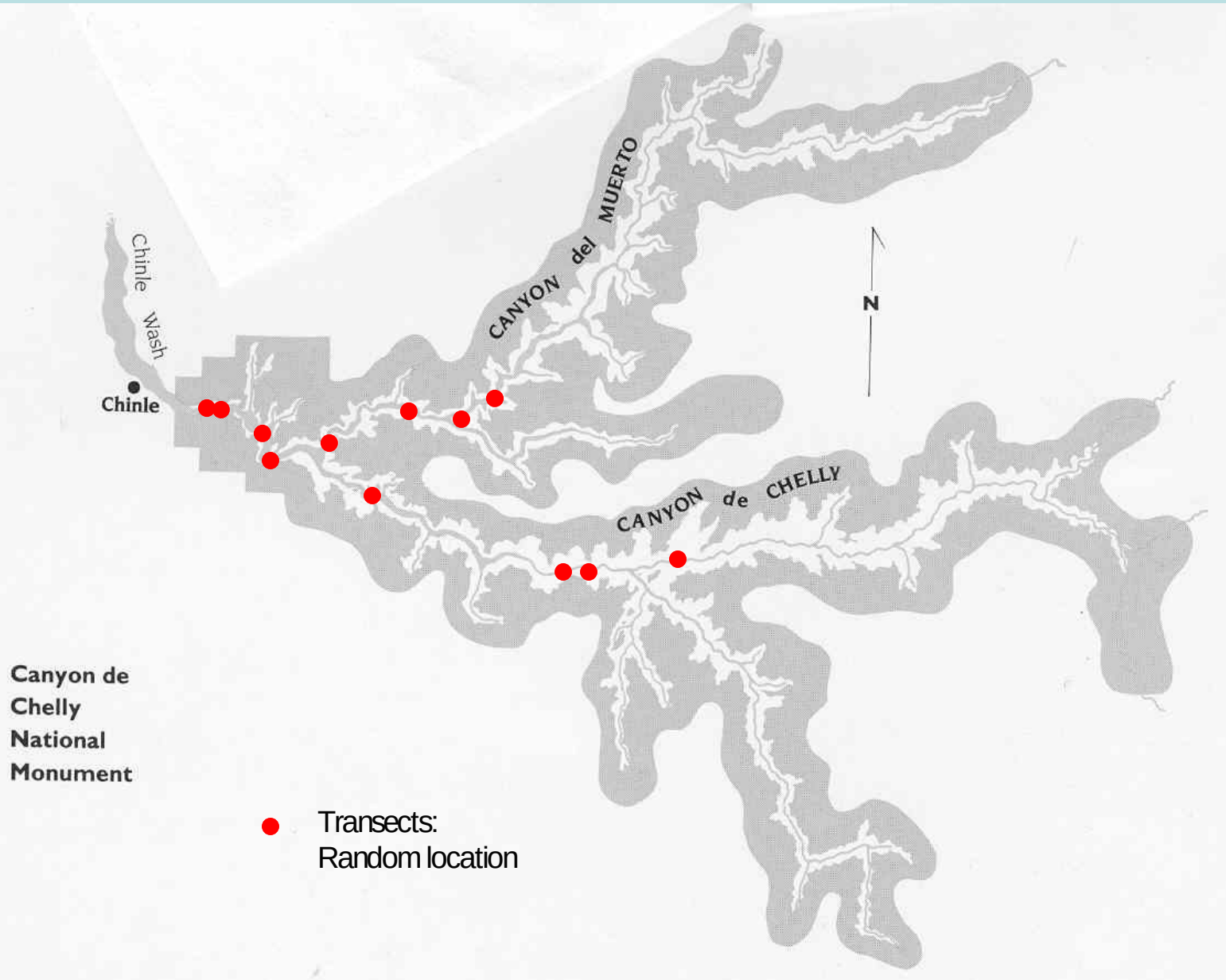


Fine scale: results

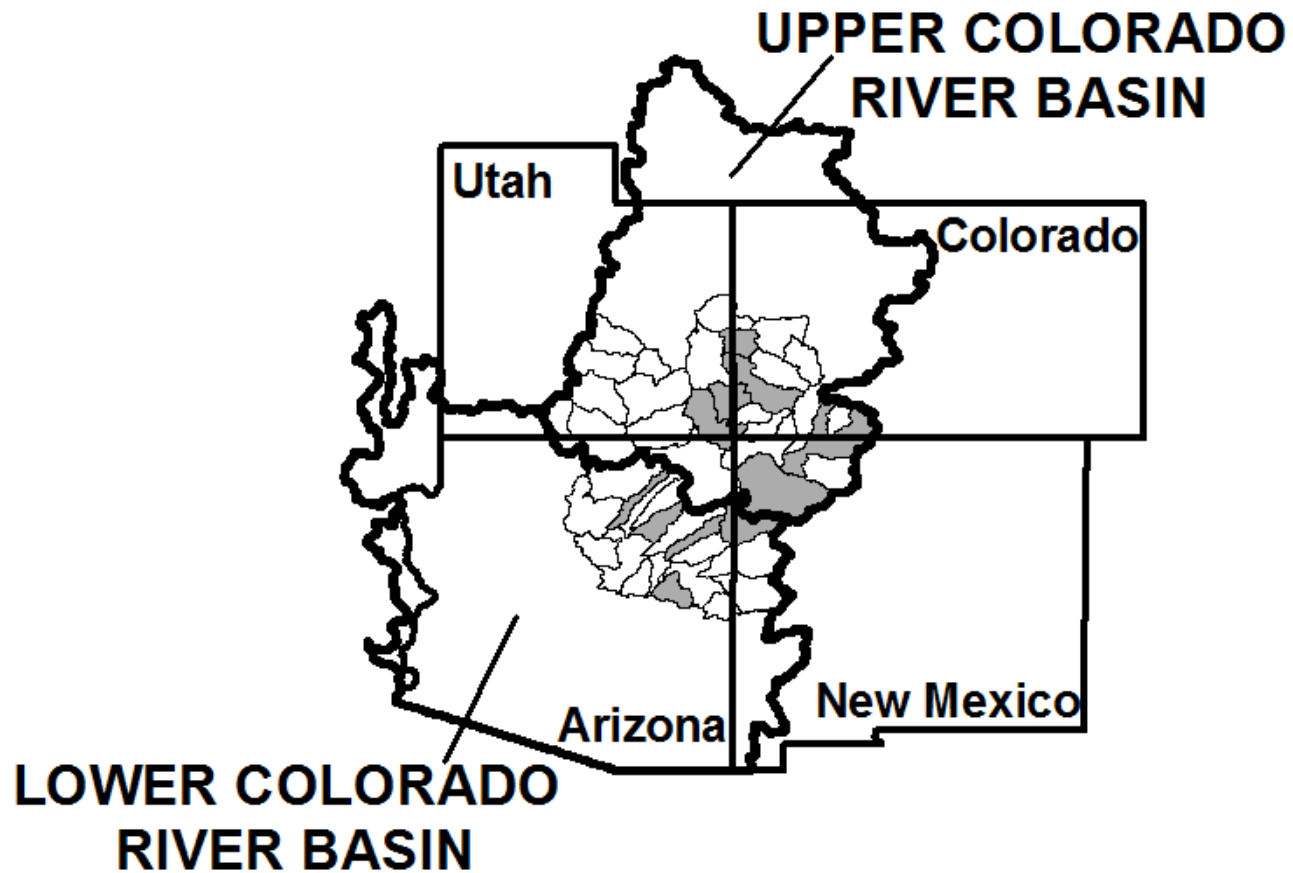




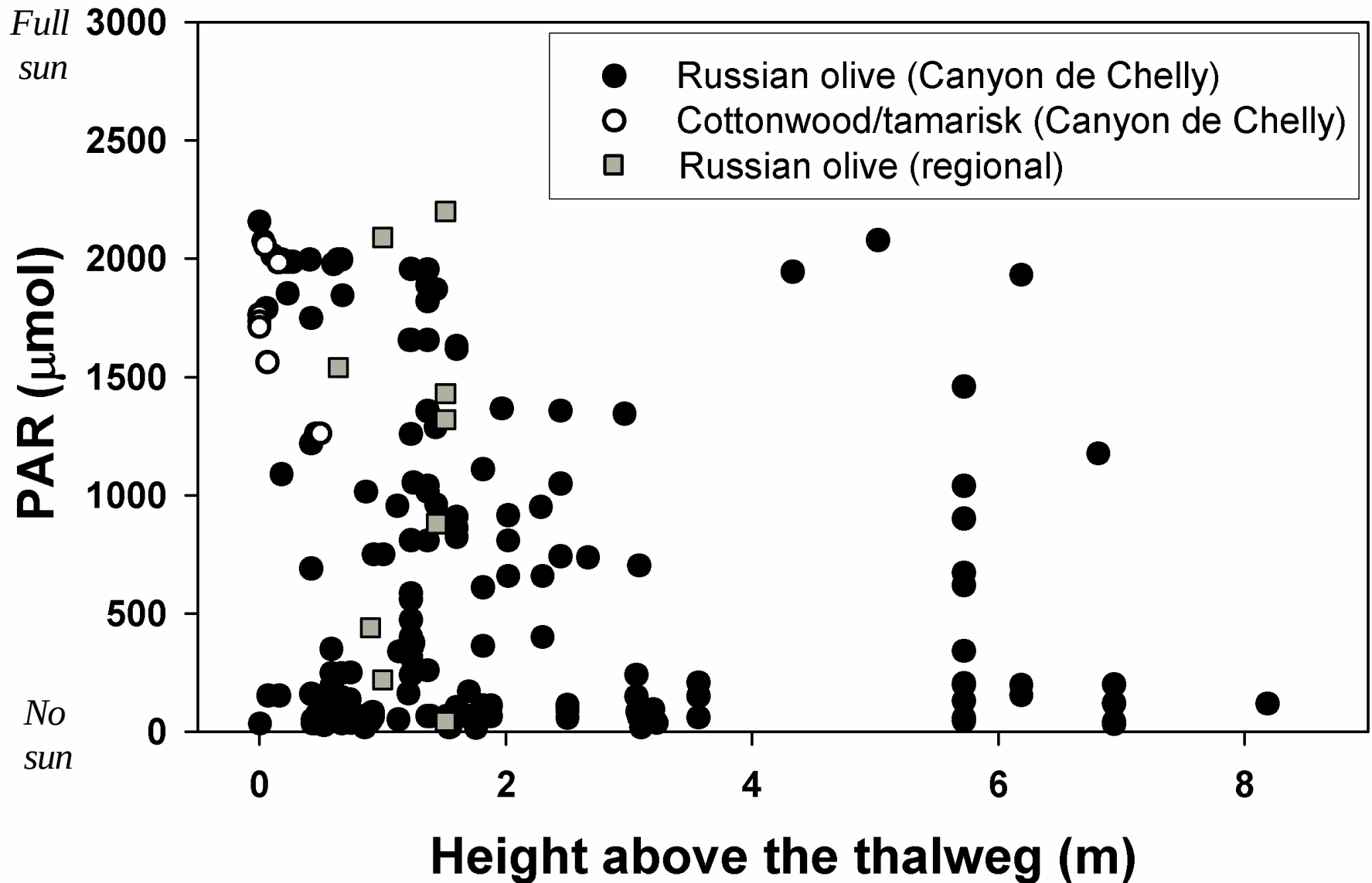
Landscape scale: Canyon de Chelly



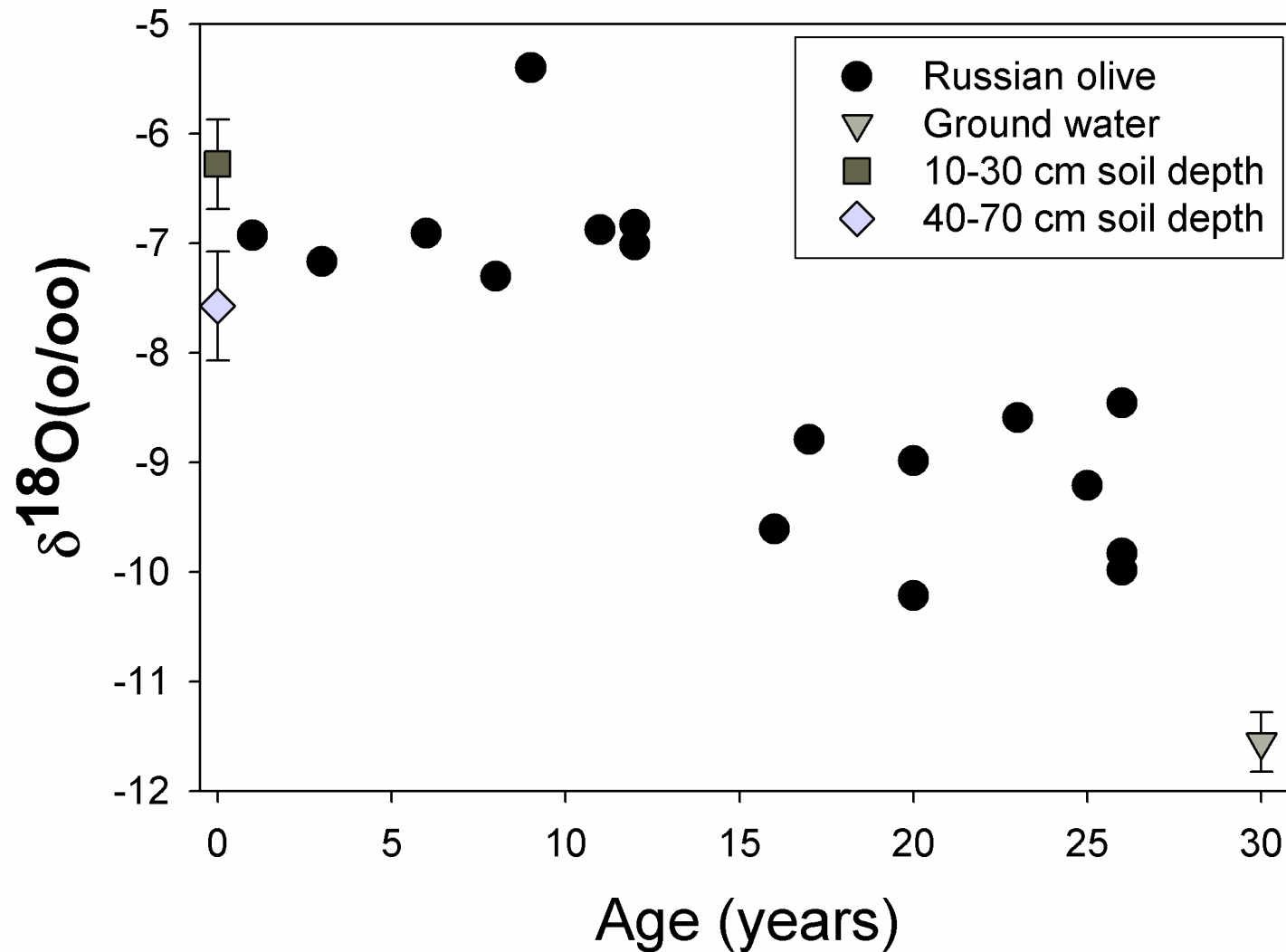
Regional scale: Sites



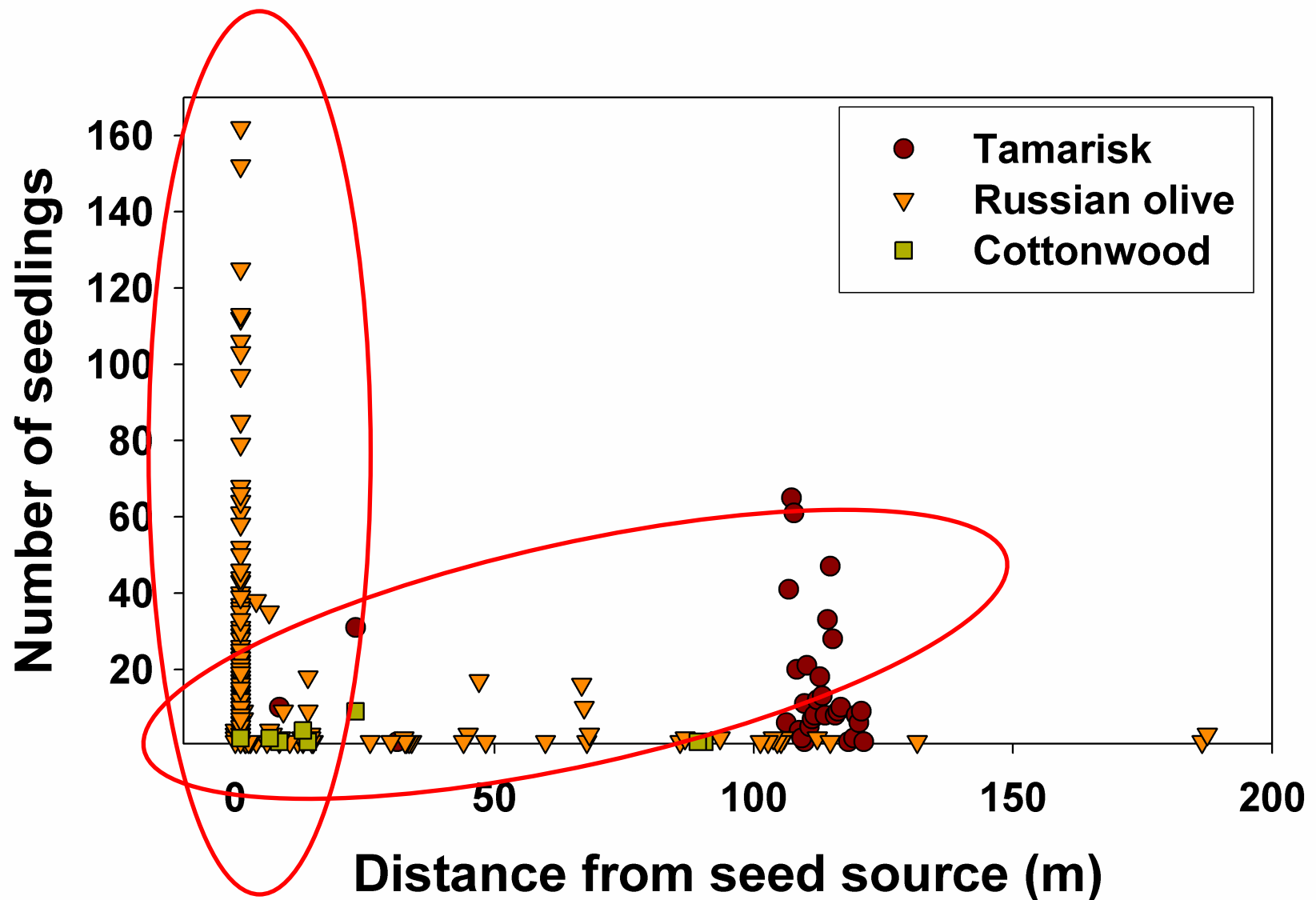
Canyon de Chelly and regional field surveys



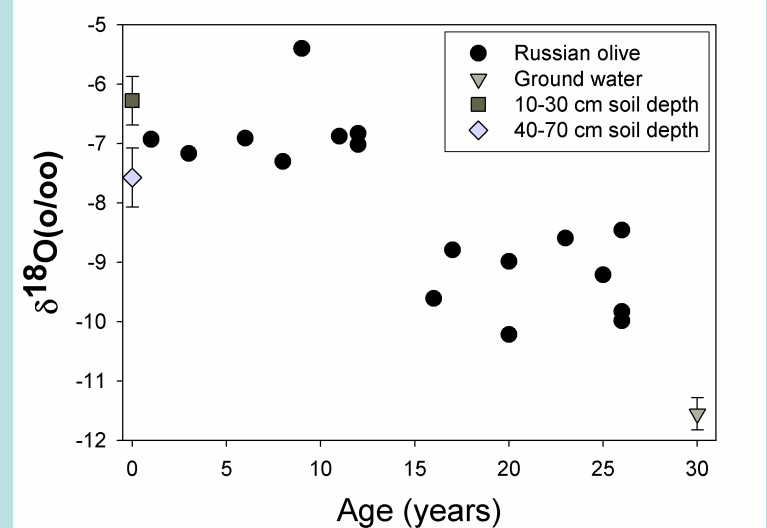
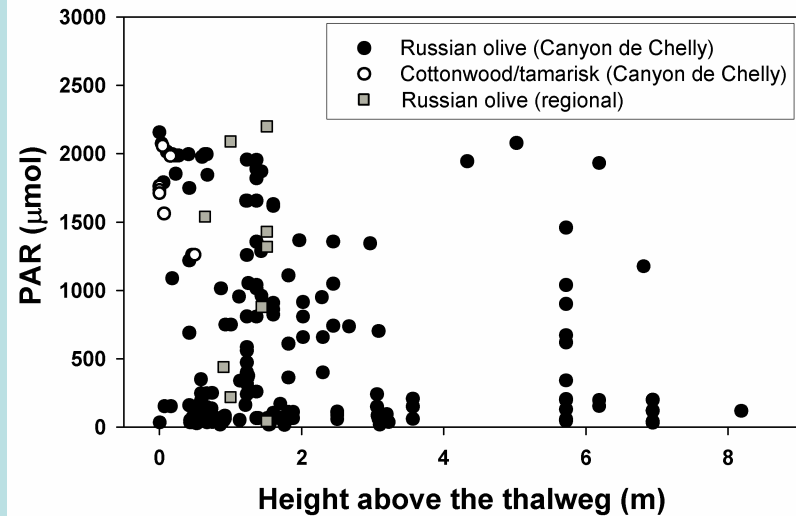
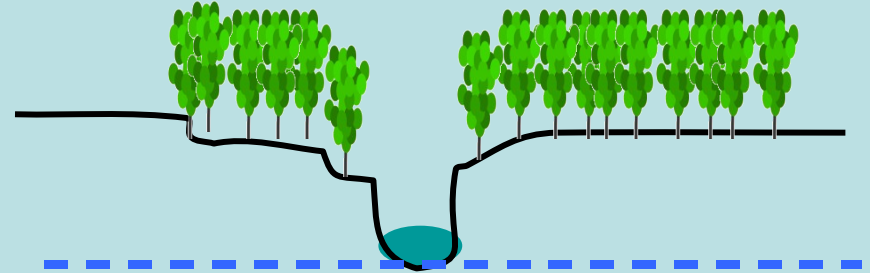
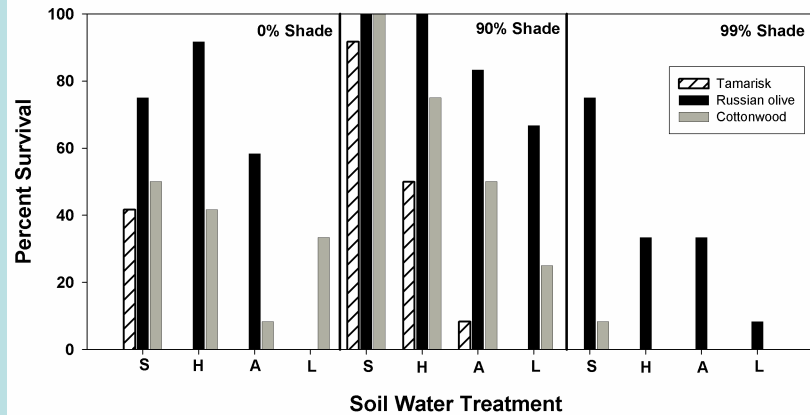
Stable oxygen isotope analysis



II – Canyon de Chelly results



Continued invasion of Russian olive



Summary

1) Empty niche exploitation?

- Yes - Russian olive has a broader niche than tamarisk and cottonwood

2) Facilitation?

- No.



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