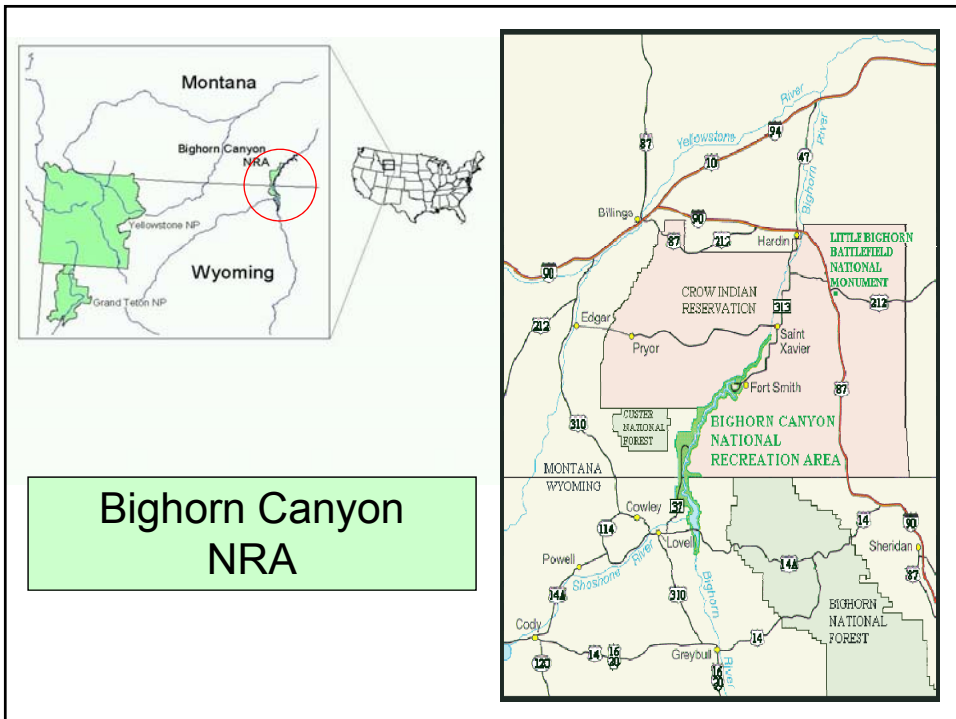
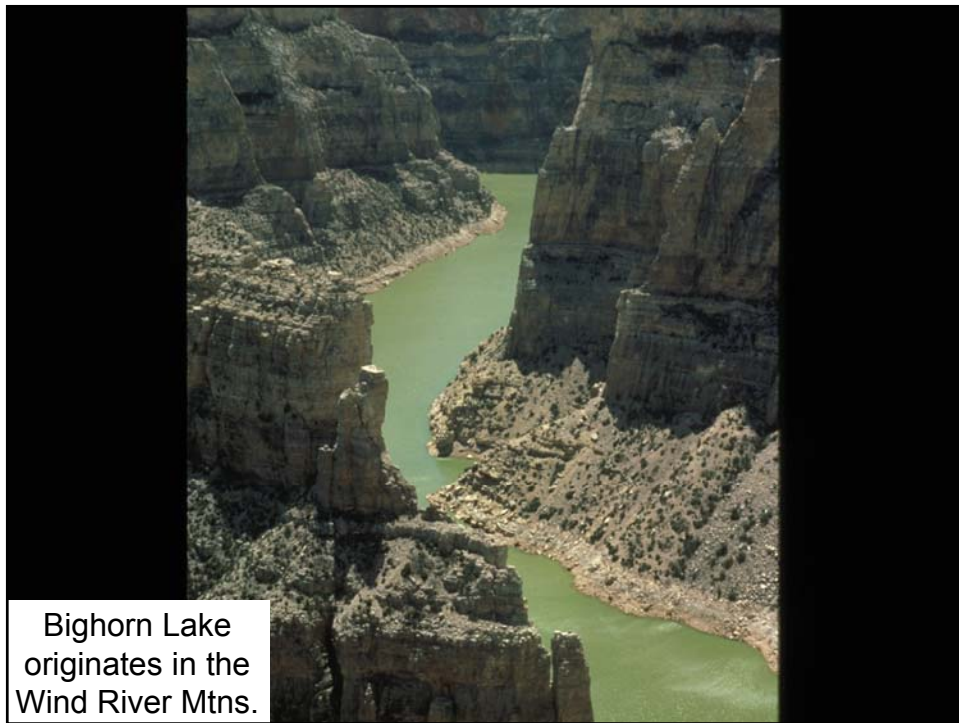


### Climatic and hydrologic effects on establishment of *Tamarix ramossissima* in cold deserts

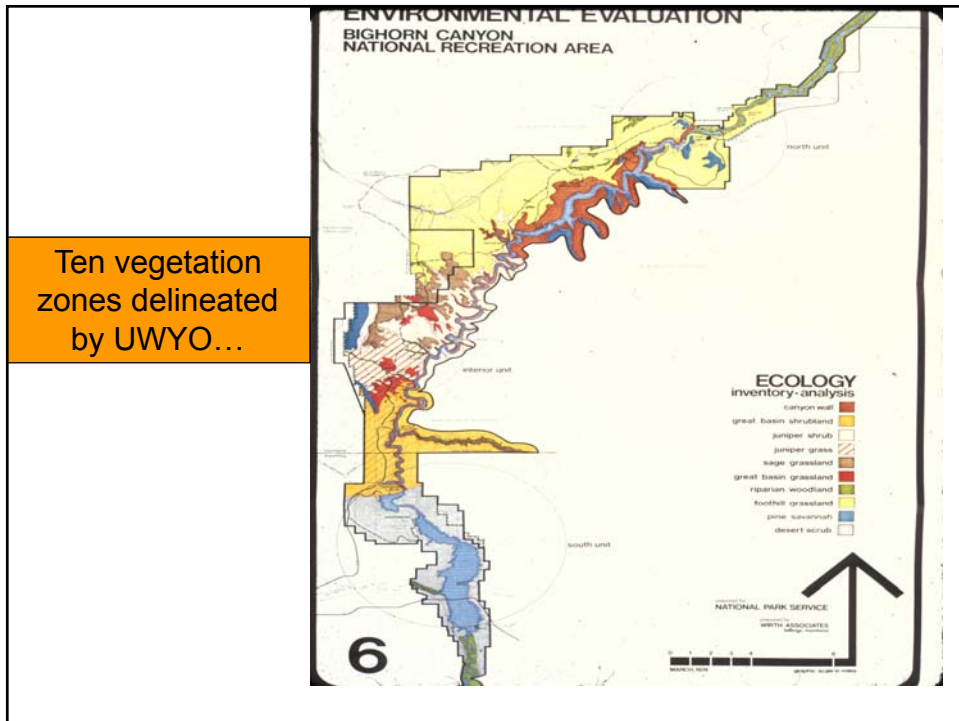
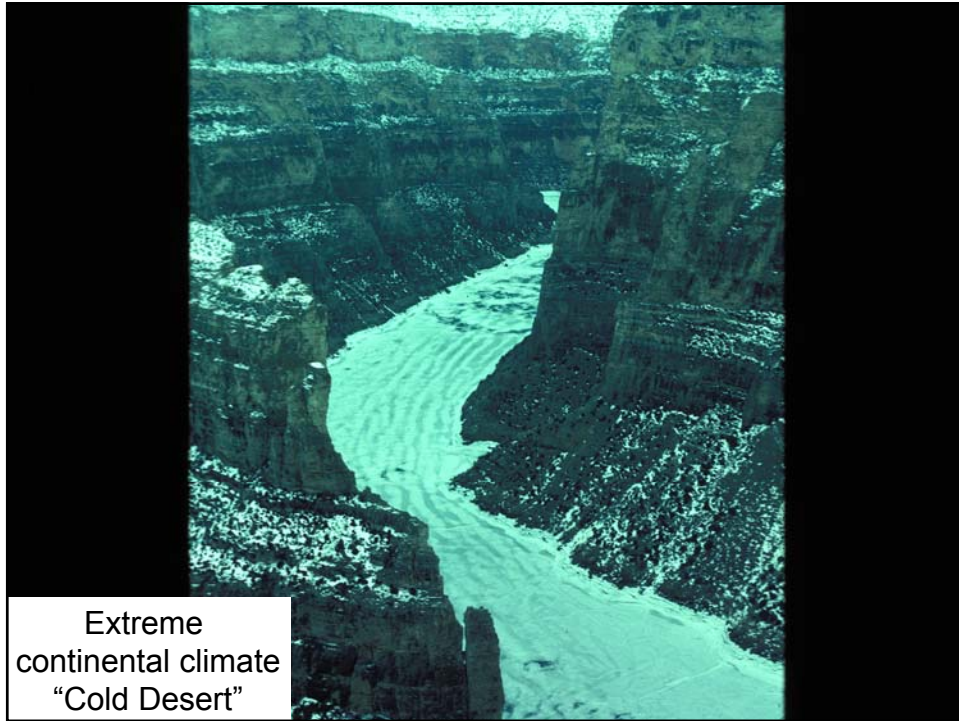


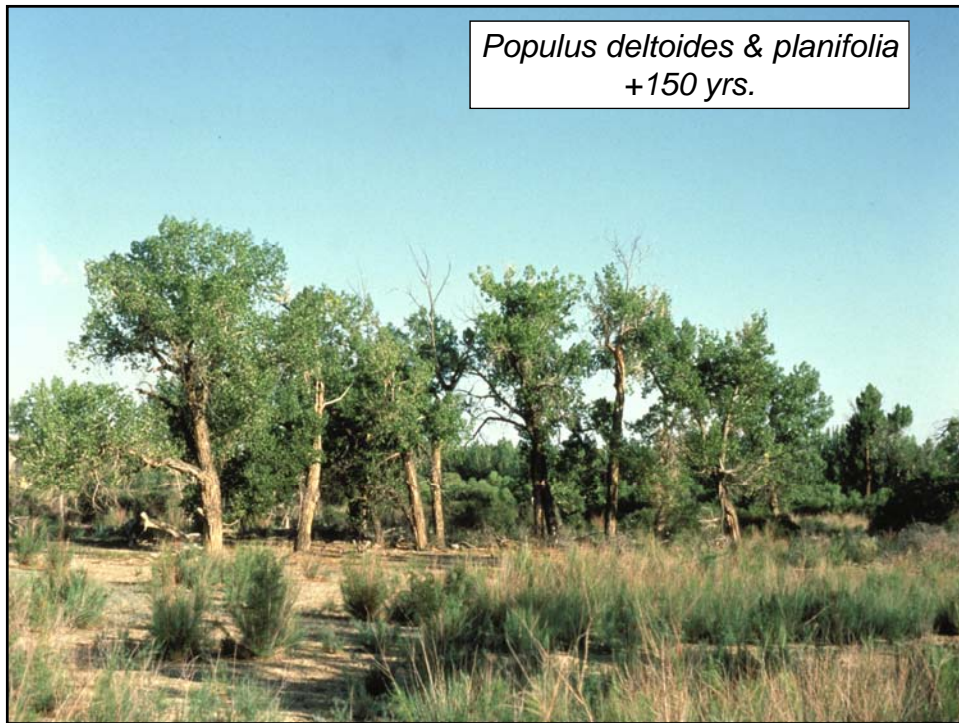
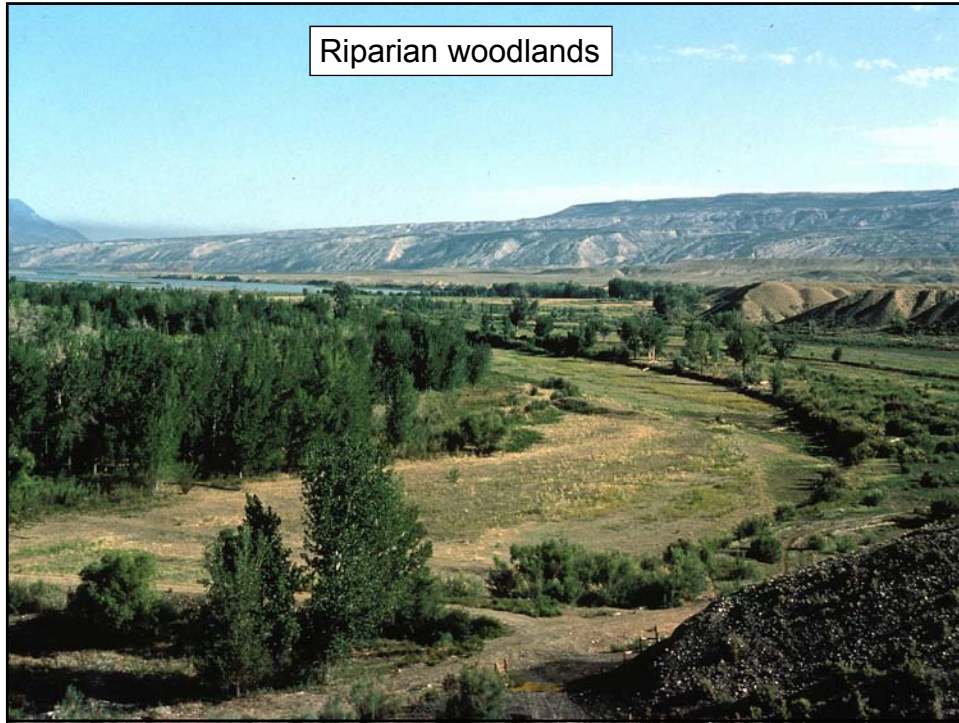
Yellowtail Dam  
Ft. Smith, Montana

NRA  
120,000 acres  
Bighorn Lake  
71 miles

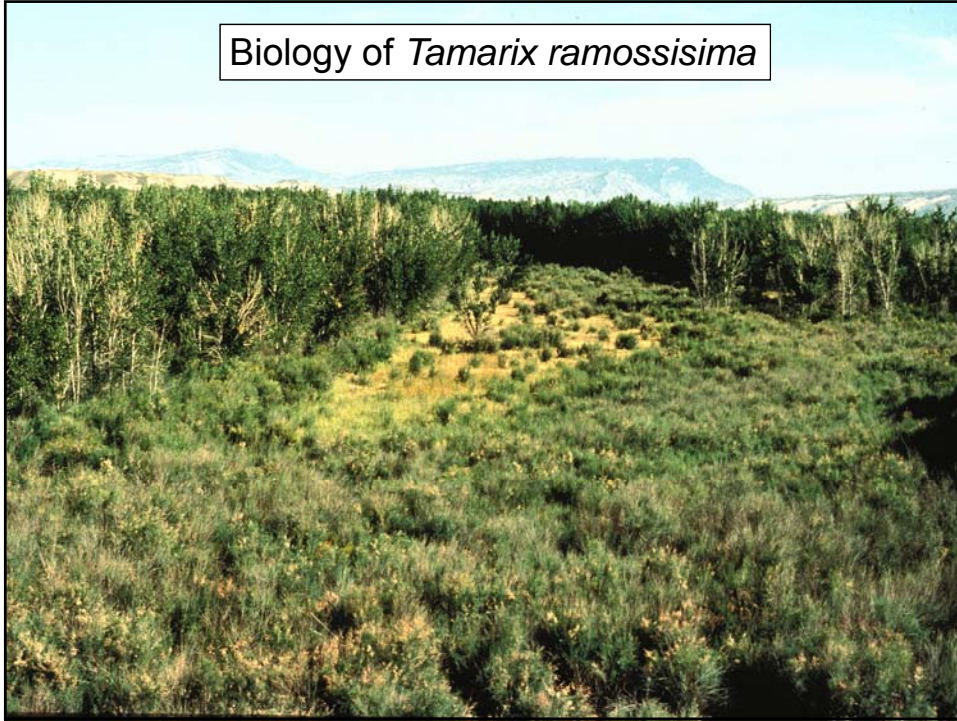


Bighorn Lake  
originates in the  
Wind River Mtns.





Biology of *Tamarix ramossissima*



Similarities ...



1. Thousands of tiny, windblown seeds

2. Moist, scoured surface for establishment.



*Differences...*

1. Halophytic – salt tolerant

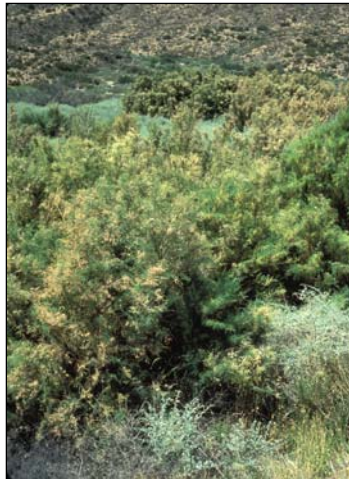


2. Length of inundation



3. Facultative phreatophyte

Xeric - dry



Hydric - wet



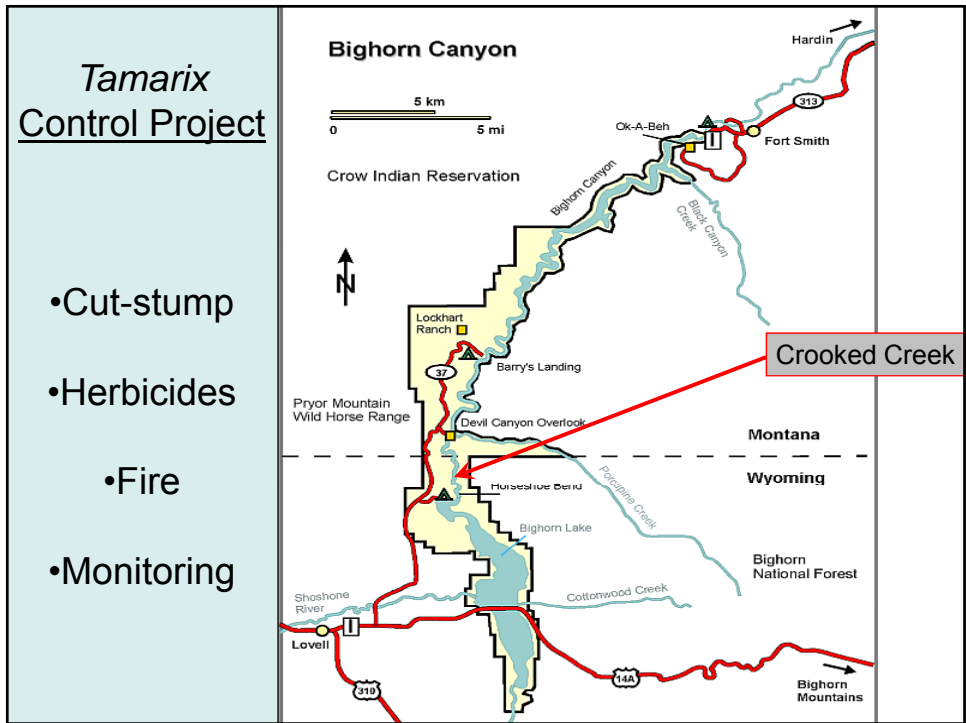
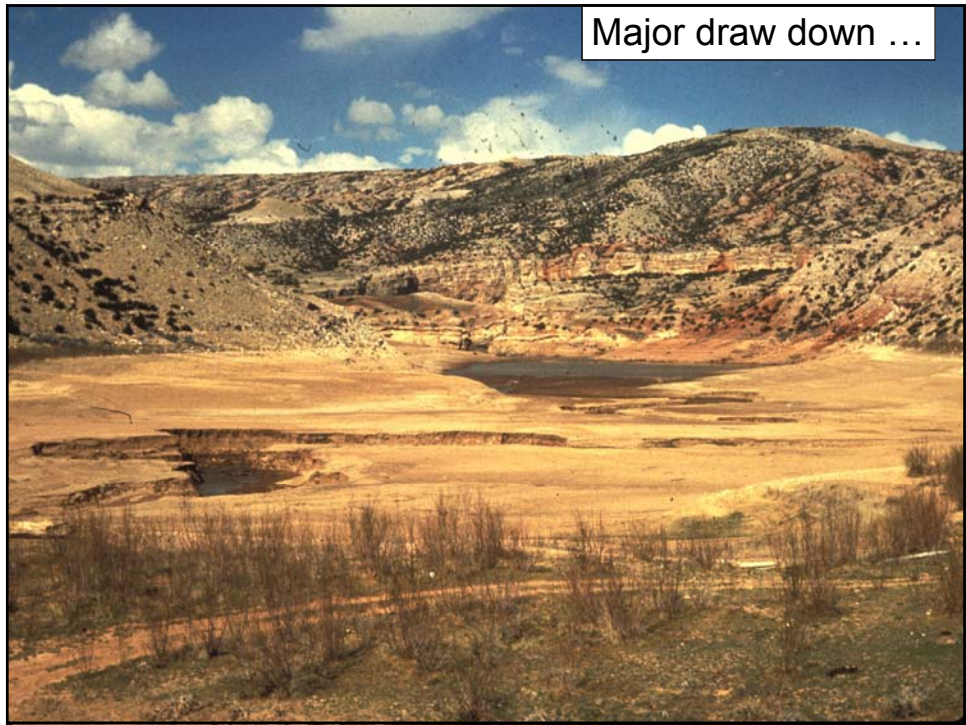
4. Long flowering and seeding time

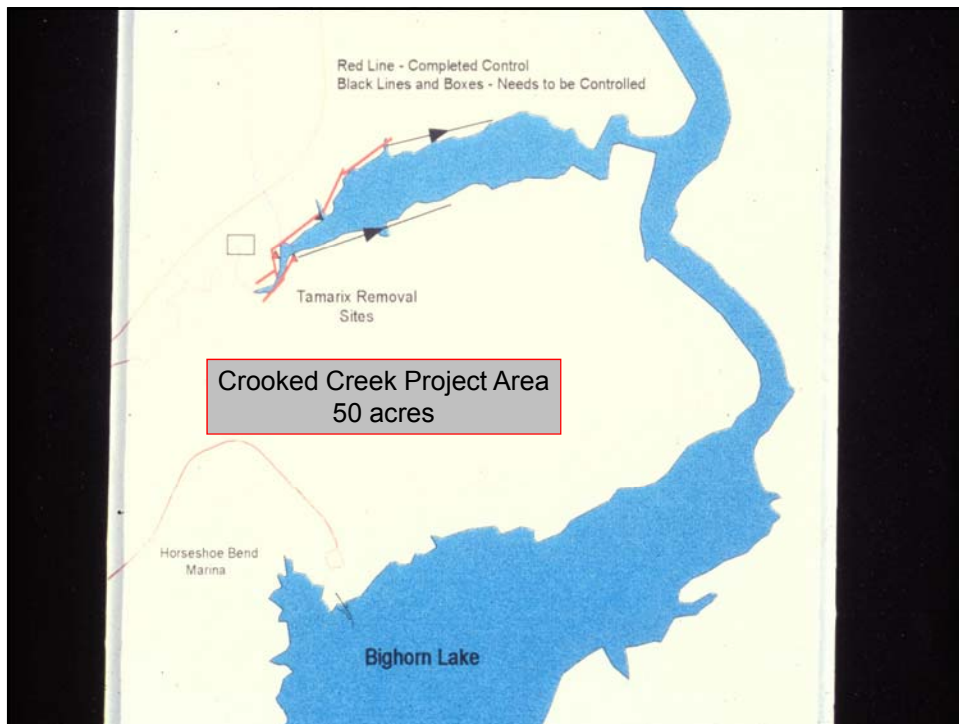


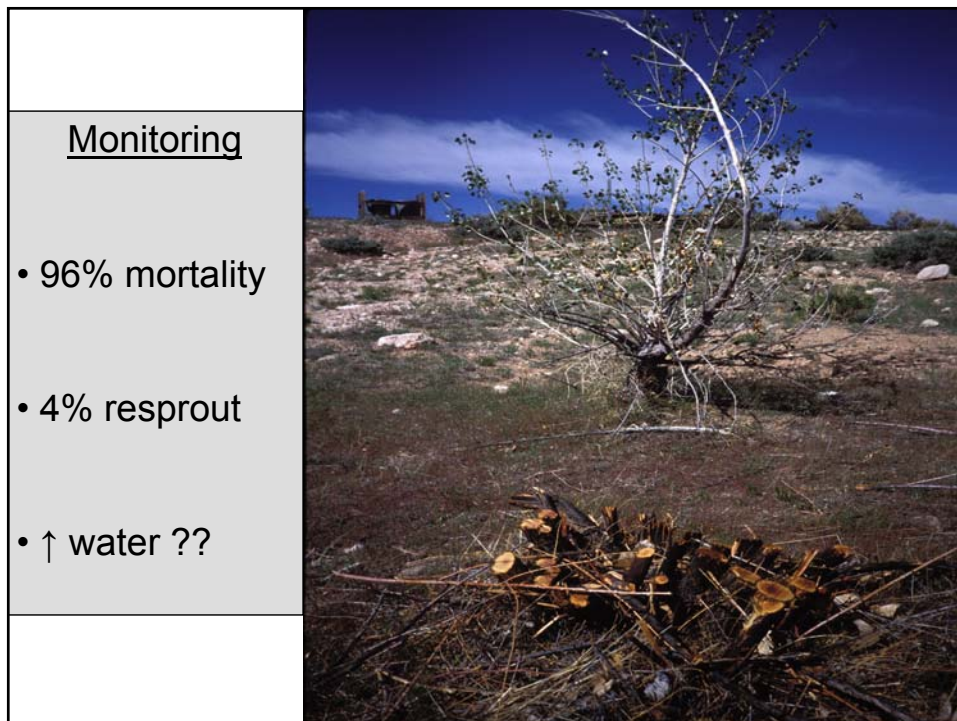
“Controlled” Reservoir













Record high water &  
“bathtub rings”...

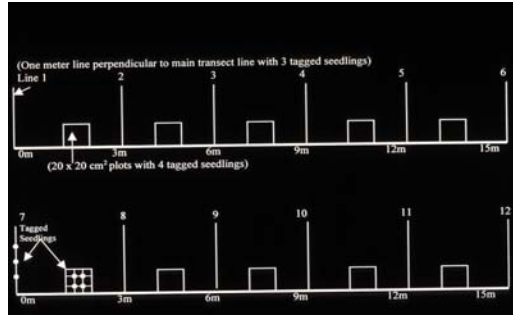


### Previous Research

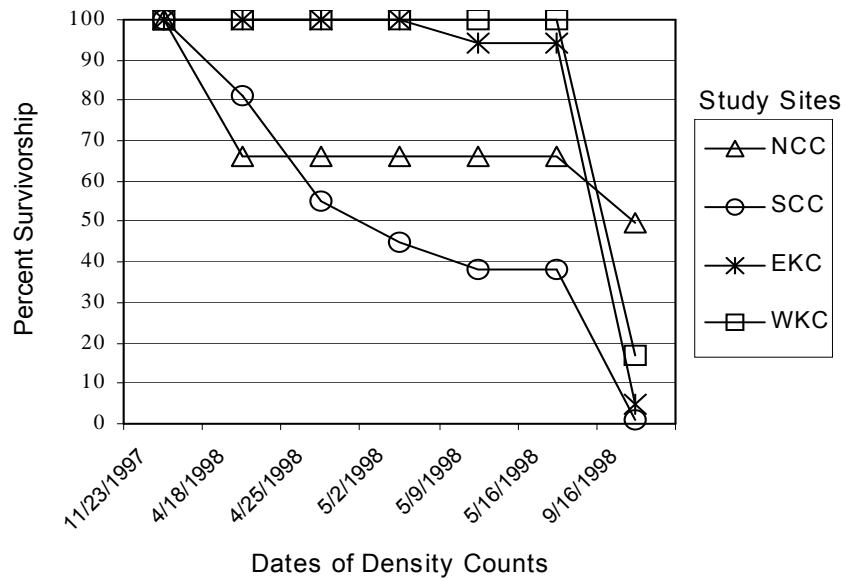
- No data this far north
- No seedling field work
- Main emphasis on control
- Anecdotal information



## Seedling growth, density, & survivorship



- Sample size = **304** seedlings
- Highest density 1<sup>st</sup> yr. = **179** seedlings
- Tallest 1<sup>st</sup> yr. seedling = **19cm**
- Growth = **5cm** to **14cm**
- Density = **224/m<sup>2</sup>** to **15/m<sup>2</sup>**
- Survivorship = **100%** to **18%**



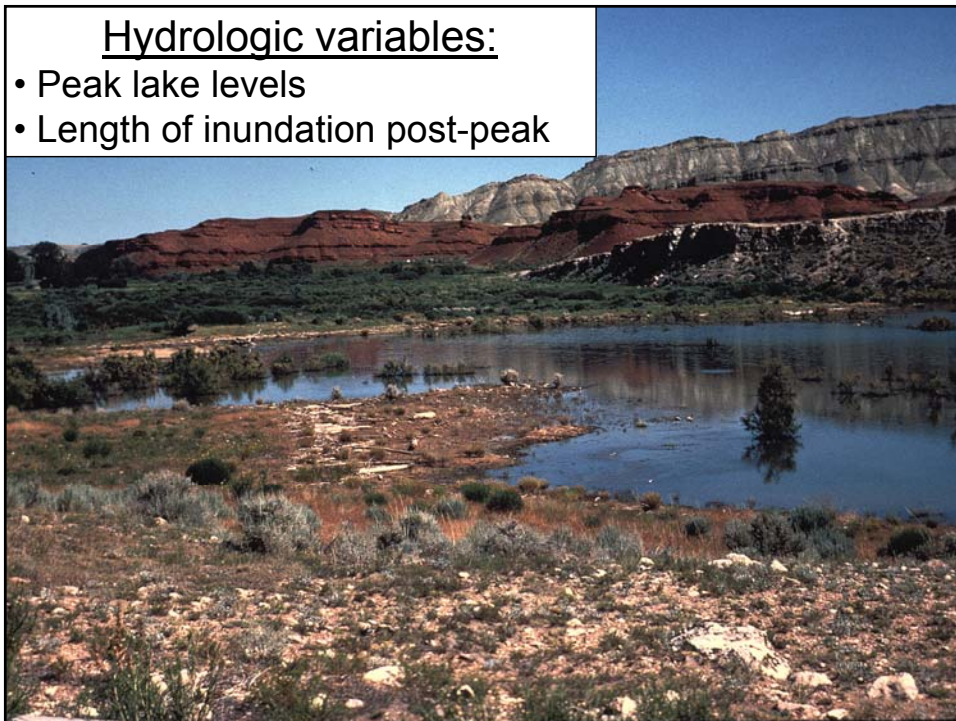
### Climatic variables:

- Precipitation
- Potential Evapotranspiration
- Growing Degree Days

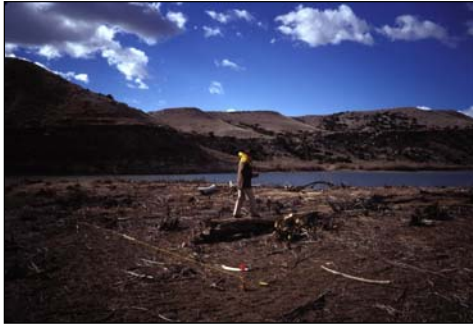


### Hydrologic variables:

- Peak lake levels
- Length of inundation post-peak



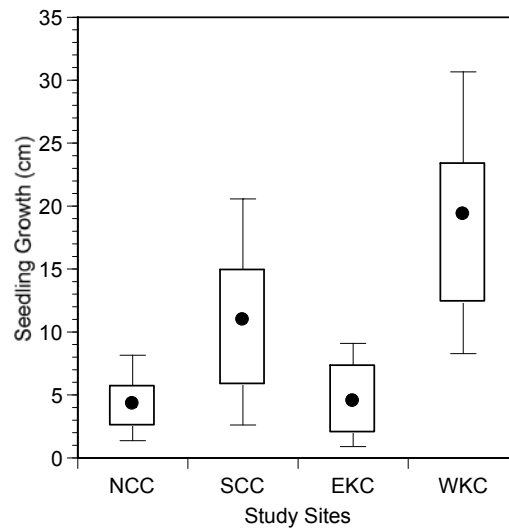
## Mature shrub age distribution & stand density



- Samples size = **178** shrubs
- 4 - elevations (*distinct bathtub rings ?*)
- 4 - aspects
- **NO** site differences for age distribution or stand density.



## Seedling growth

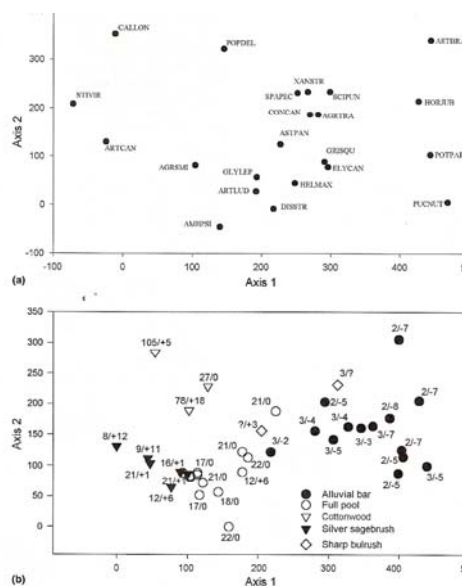




## RESEARCH RESULTS

- Low annual peak lake levels appear to promote successful establishment of *Tamarix ramossisima*.
- Warmer years with higher PET also appear to promote successful establishment of *Tamarix ramossisima*.

### CM Russell NWR, MT (see pdf, Lesica & Miles 2004, in Data folder)



- DCA axis 1 correlated with age of woody plants and elevation; interpreted as succession
- Axis 2 separated silver sagebrush from mature cottonwoods
- Tamarisk recruited during drawdowns following high water
- They could have improved their visual presentation!

L&M suggest strategic management considering geomorphology, vegetation diversity and critical wildlife habitat; controlling cattle and beavers is important for cottonwood and willow regeneration

