

# Mitigation Options for the Endangered Tahoe yellow cress (*Rorippa subumbellata*)

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# Tahoe yellow cress (TYC)



- Endangered in CA
- Critically Endangered in NV
- TRPA threshold species
- Candidate for federal protection under ESA

# Habitat and Threats

- Restricted to sandy beach below high water line
- Beach use and trampling
- Water management:  
sustained high lake levels



Reservoir management :  
6,222 – 6,229.1 ft LTD

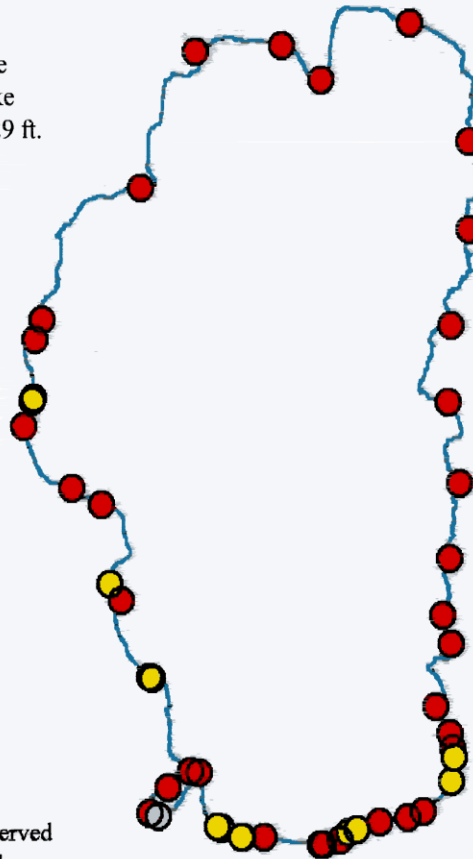
# 9 sites in 1999

## 1998 Tahoe Yellow Cress Survey Results

Third consecutive  
season of high lake  
level. Average lake  
elevation was 6,229 ft.

### Legend

- No TYC Observed
- Not Surveyed
- TYC Present
- Lake Tahoe





# Conservation Strategy

- Adopted in 2002
- Adaptive Management Working Group (AMWG) meets quarterly
- 6 Goals and associated Objectives for recovery
- Collaborative research program started in 2003

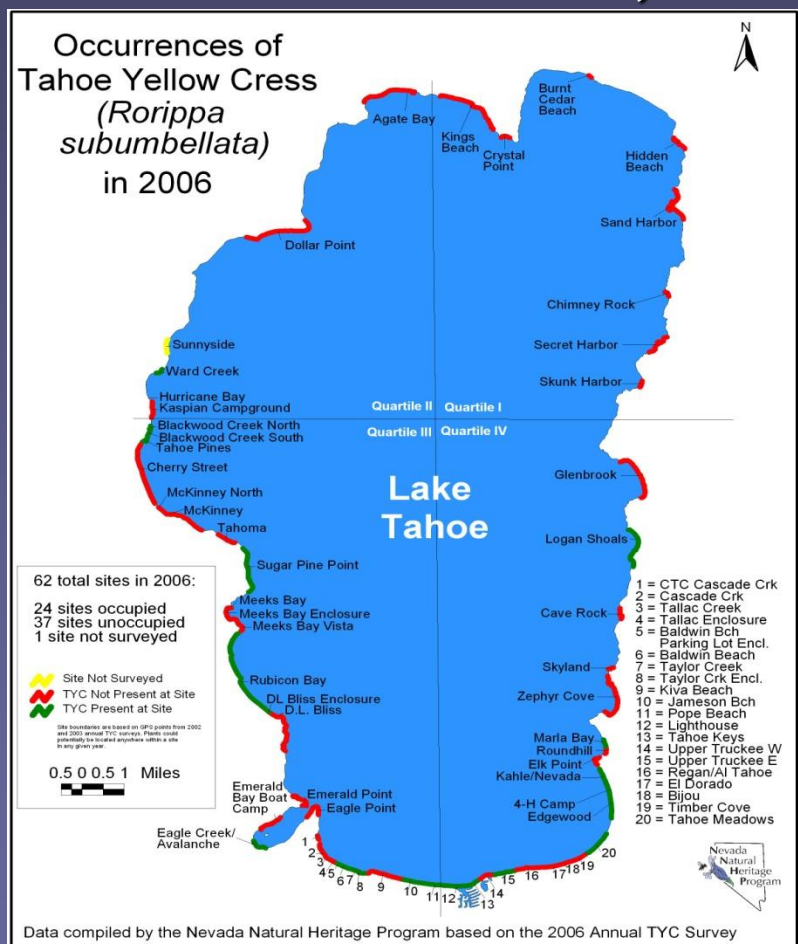
CONSERVATION  
STRATEGY  
FOR  
TAHOE YELLOW CRESS  
(*Rorippa subumbellata*)



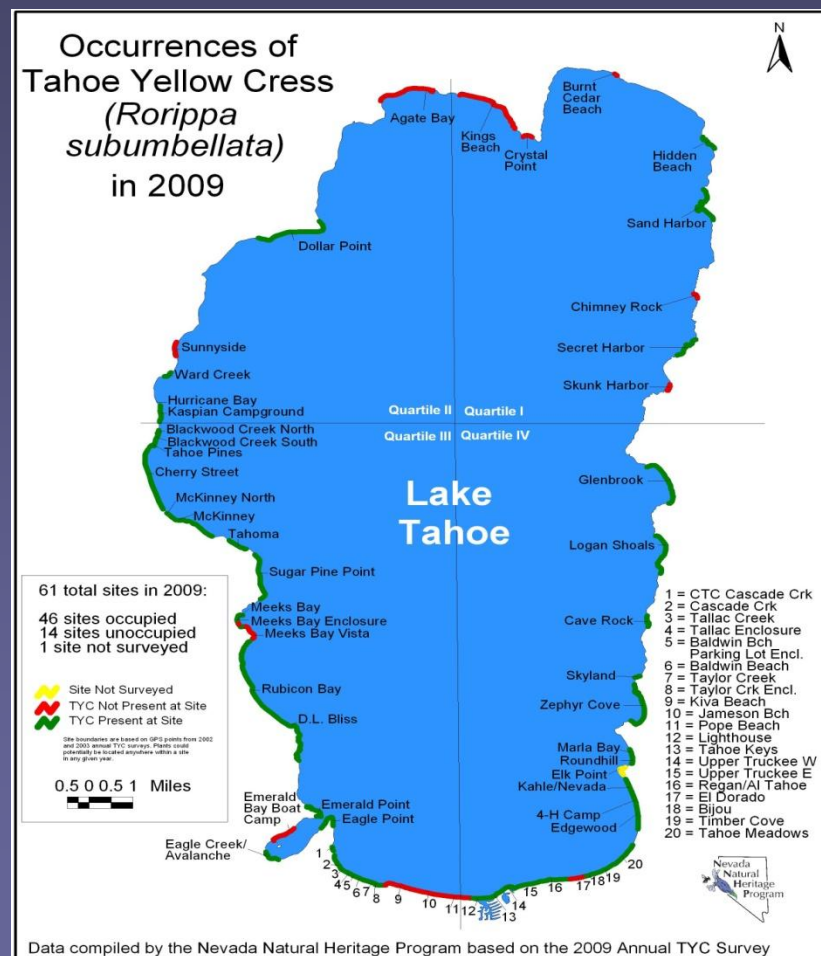
August 2002

# Post CS

24 sites in 2006 6,228 ft



46 sites in 2009 6,223 ft



# Project-related impacts to TYC

- All regulations require full mitigation of actual or potential significant impacts.



## TRPA SHOREZONE CODE

**75.2.A Sensitive Plants:** Projects and activities in the vicinity of sensitive plants or their associated habitat, shall be regulated to preserve sensitive plants and their habitat. All projects or activities that are likely to harm, destroy, or otherwise jeopardize sensitive plants or their habitat, shall fully mitigate their significant adverse effects.

# No projects have required any mitigation other than avoidance

## Mitigation Tool box

- Project re-design
- Plant flagging
- Fencing
- Construction personnel education



# AMWG: Experimental plantings from 2003-09

10,000 container-grown plants at 14 sites  
outplanting                      translocation



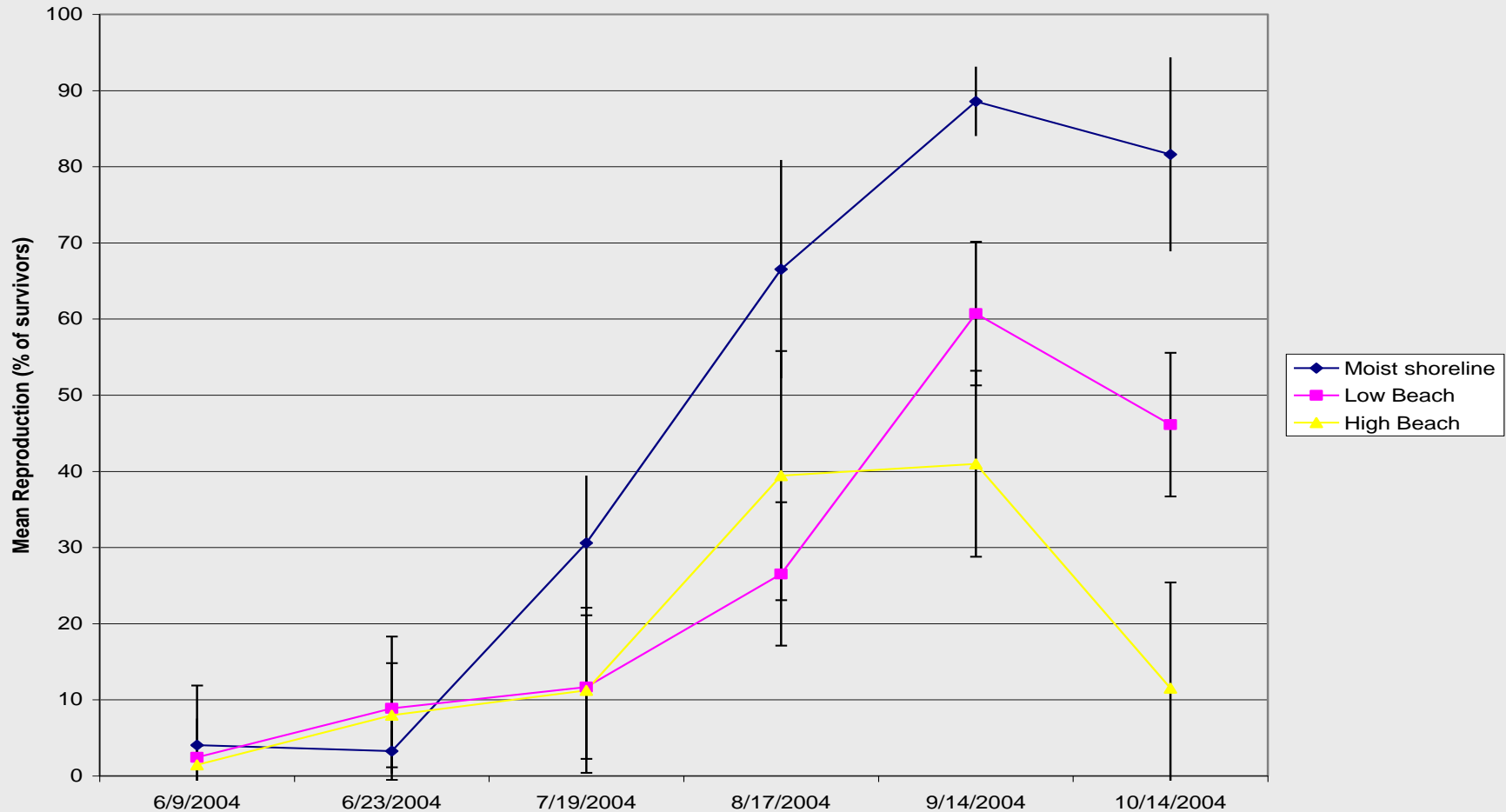




# What we know about outplanting with container-grown TYC

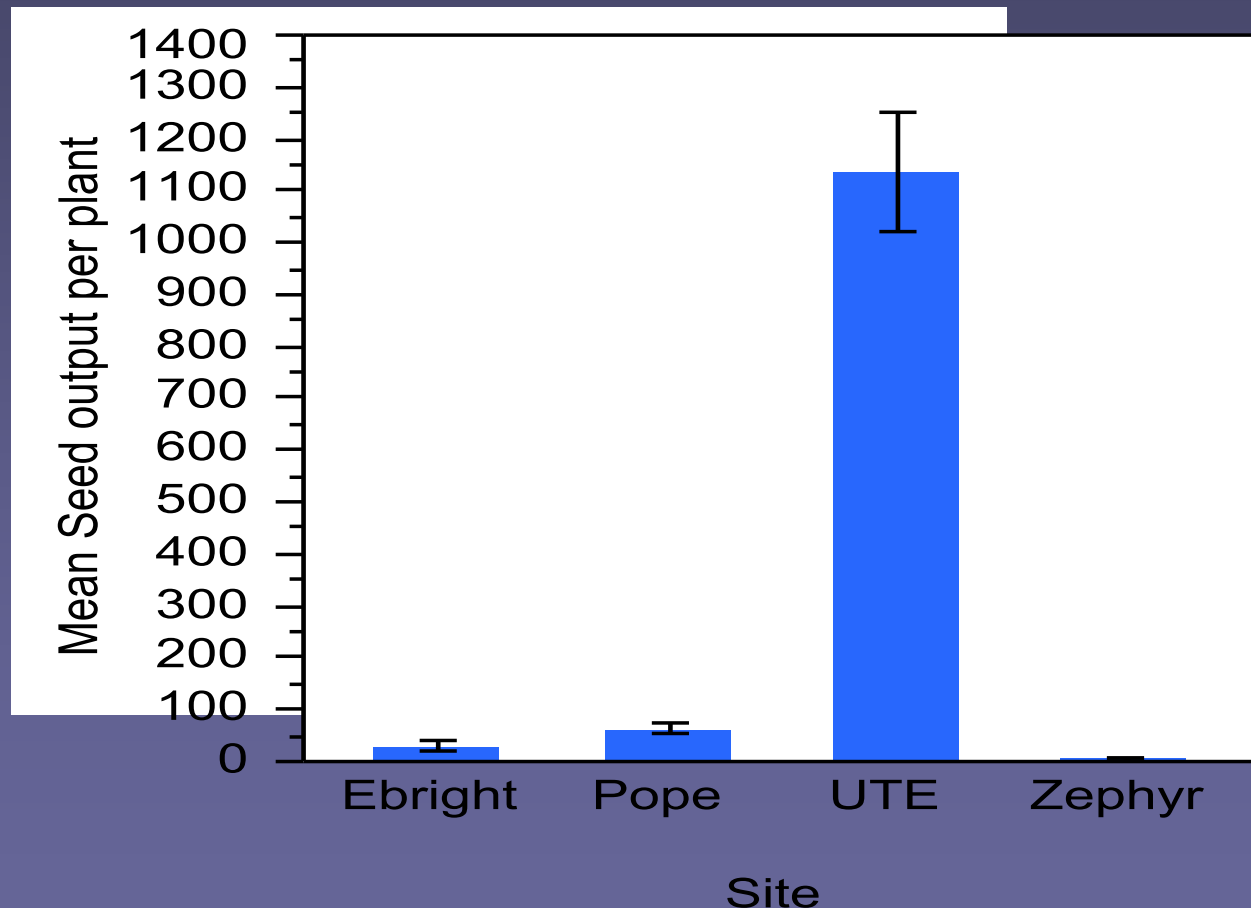
- **What** types of container-grown plants to use (good roots, mixed seed sources)
- **How** to propagate quality container-grown plants
- **When** to plant (optimal lake elevation and seasonality factors)
- The **Where** is more problematic

# Where (within a site): plant performance improves with decreasing depth to the water table

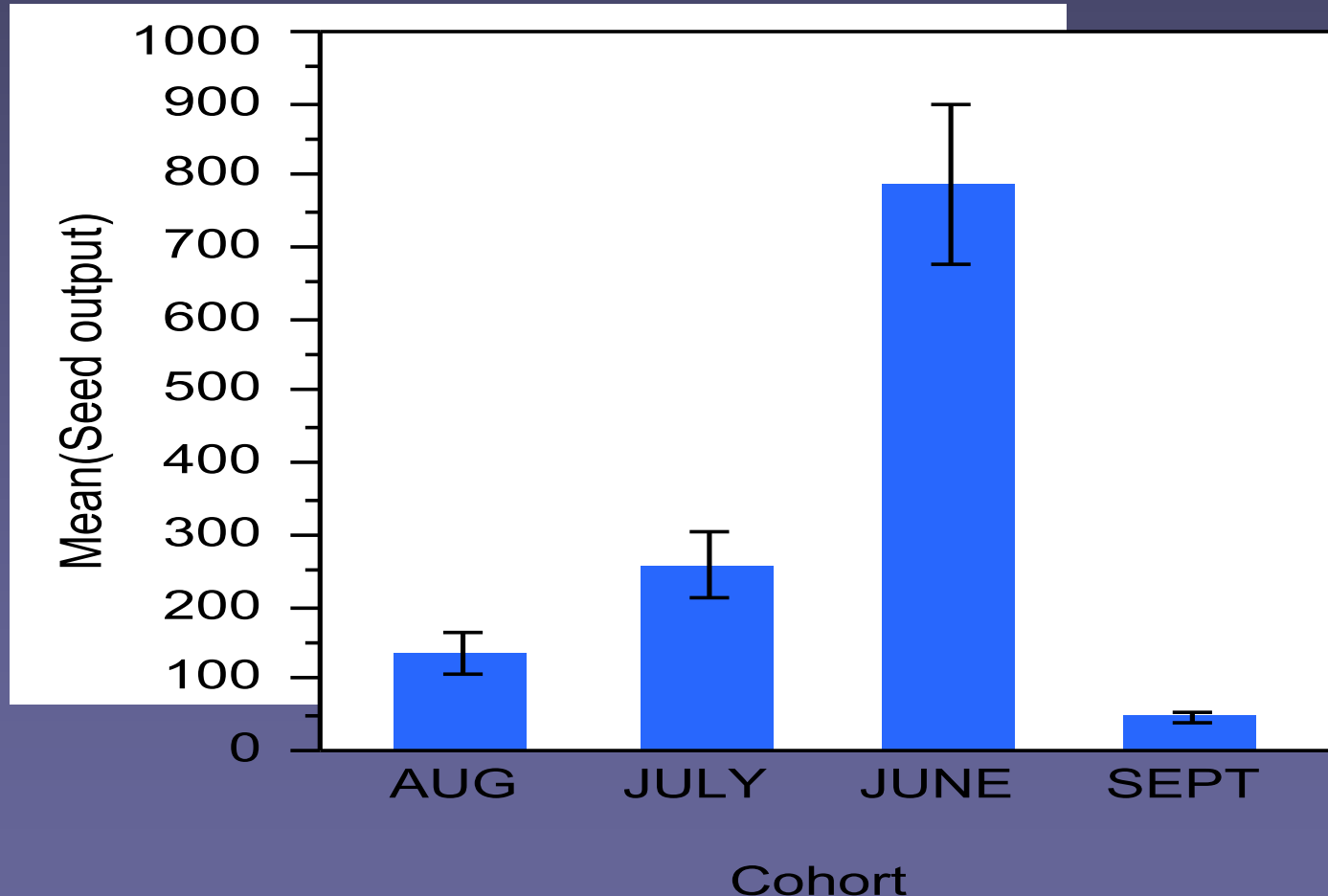




Where (among sites) : Survivorship and reproduction highly variable among sites



**When:** early planting in June is better than later planting in August or Sept





# How does translocation compare with outplanting?

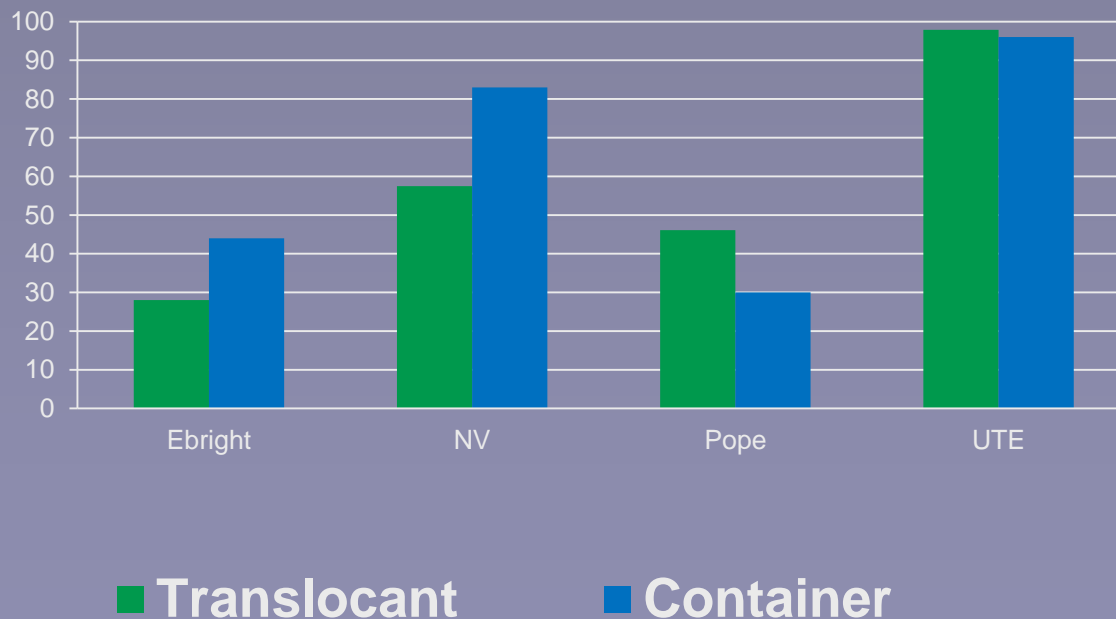
Paired design:  
50 container-grown  
50 translocants



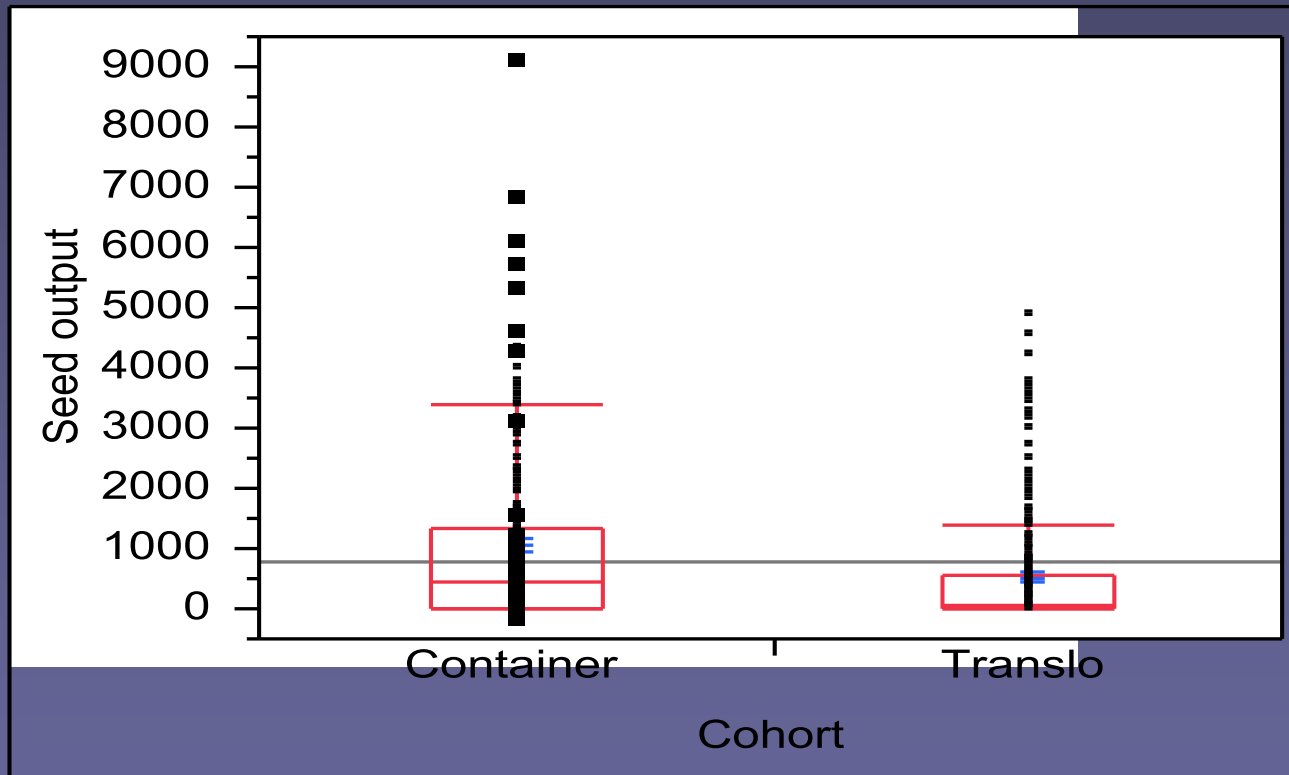
# Pattern of differential survivorship among sites is inconclusive

survivorship (% of cohort)

2009 cohort year 2



# Container-grown plants perform greater than translocated plants



## Container-grown



## Translocation





# Mitigation Toolbox NOW

- Avoidance
- Population enhancement or creation
  - Outplanting of container-grown plants
  - Translocation



# Current and future projects will require mitigation

- Storm water quality improvements
- Erosion control
- River and stream restoration
- Lake shore development
- Pier and boating facilities

# Mitigation: what are the options?

- On-site plantings: if habitat is available
- Off-site plantings: if no suitable habitat
- Need for a reference site to assess planting success
- Attempt translocation or use container-stock?

# Choosing a planting site

TYC performance is highly microsite-specific: absence of TYC may equal unsuitable habitat











**EXPERIMENT IN PROGRESS**

We are investigating  
different conservation  
methods for the oak and  
juniper. This area  
is a grassy area and is  
the site of the study  
of the effects of the  
effects of the study.

**PLEASE AVOID THIS AREA**

THANK YOU FOR YOUR RESPECT

09/10/2008



# Moving plants to a public enclosure

Transfers responsibility and sets an undesirable precedent

Lacks conservation value because those sites are already “saturated” with TYC



# TYC is not like typical rare plants

- Little genetic variation or evidence of population architecture
- Vigorous clonal growth and prolific seed production
- Metapopulation dynamic: presence and absence linked to lake levels



# Standard regulations are difficult to apply

- Assessing impact may be difficult
- “perpetuity” requirements for protection of plants or habitat are not biologically feasible



# So what do we do?

- Utilize an Adaptive Management approach and the knowledge of the AMWG to assess project impacts and specify mitigation
- Update Conservation Strategy with research results
- Re-new the MOU to implement the CS

# Acknowledgements

- AMWG members
- Funding
  - CA Dept of Fish and Game Section 6
  - SNPLMA – contract administration through the USFS LTBMU

