



Re-vegetation Methods in the Mojave Desert

Lesley A. DeFalco

Western Ecological Research Center
Henderson, Nevada

Goals of Re-vegetation in the Mojave Desert

- Short-term

 - Erase the visual cue

 - Stabilize soil

 - Inhibit non-natives

- Long-term

 - Establish soil and vegetation structure

 - Enhance habitat for wildlife

Aridland Re-vegetation: **Vehicle Impacts**

Alleviate compaction

Enhance seed retention

Reduce erosion

Replace vegetation structure

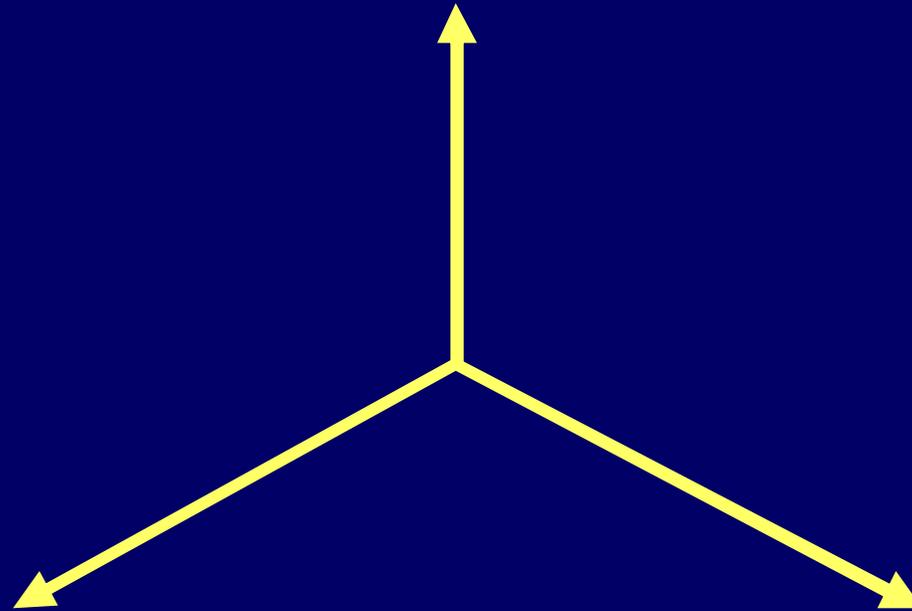
Replenish seed source



Aridland Re-vegetation: **Burned Habitat**

<http://www.wildlife.utah.gov/watersheds/>

Mechanical incorporation of seeds into soil

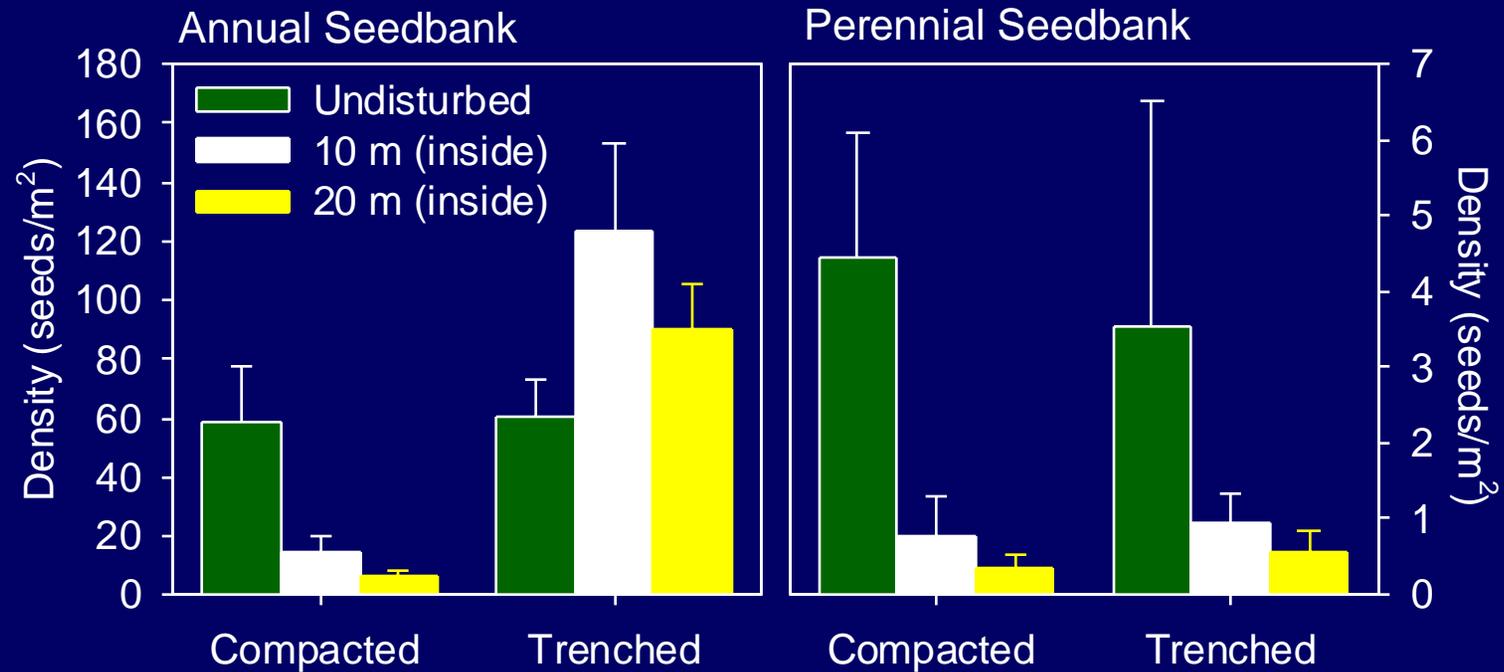


Vehicle Impacts

US Army NTC, CA

Lake Mead NRA, NV

Vehicle Impacts to Seed Banks



Site Characteristics and Seed Bank Abundance

Annual seed bank

Compacted: **litter**, soil roughness and **ant nests**

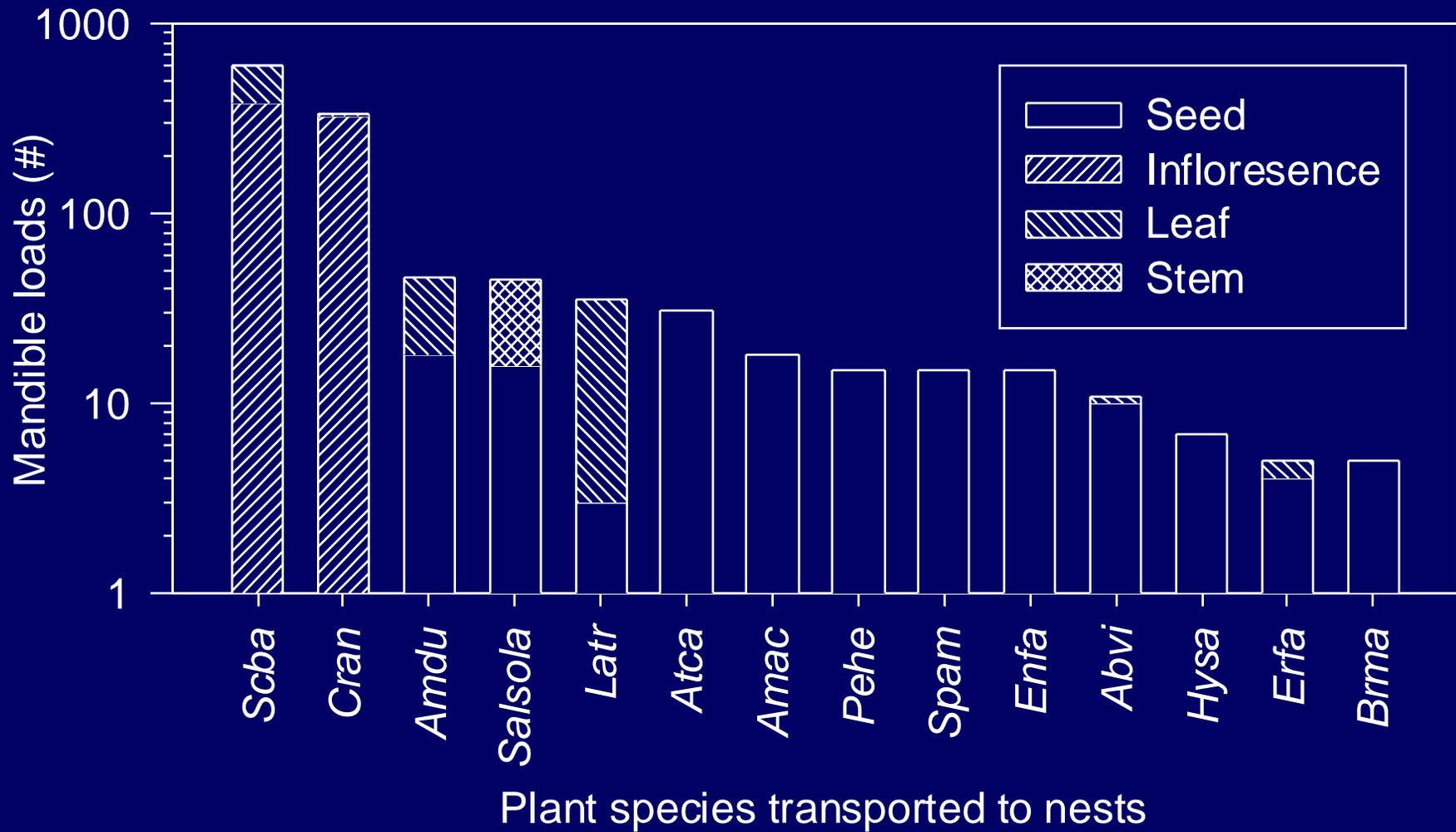
Trenched: **litter** and coarse soil particles

Perennial seed bank

Compacted: **litter** and **ant nests** and soil roughness

Trenched: no relationships

Ant Foraging Activity and Abundance of Common Species in Seed Banks



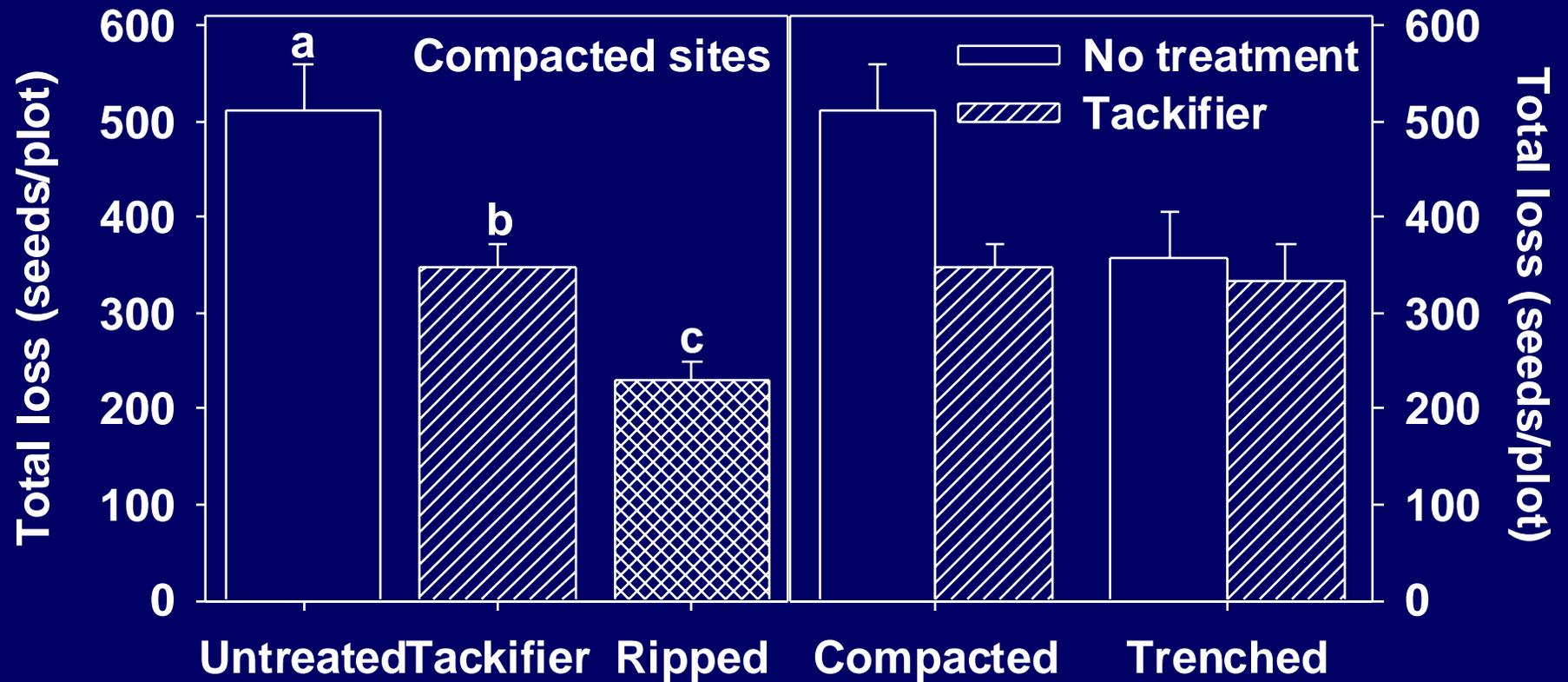
Seeding With Native Perennials

US Army National Training Center, California

Surface harrowing + seed

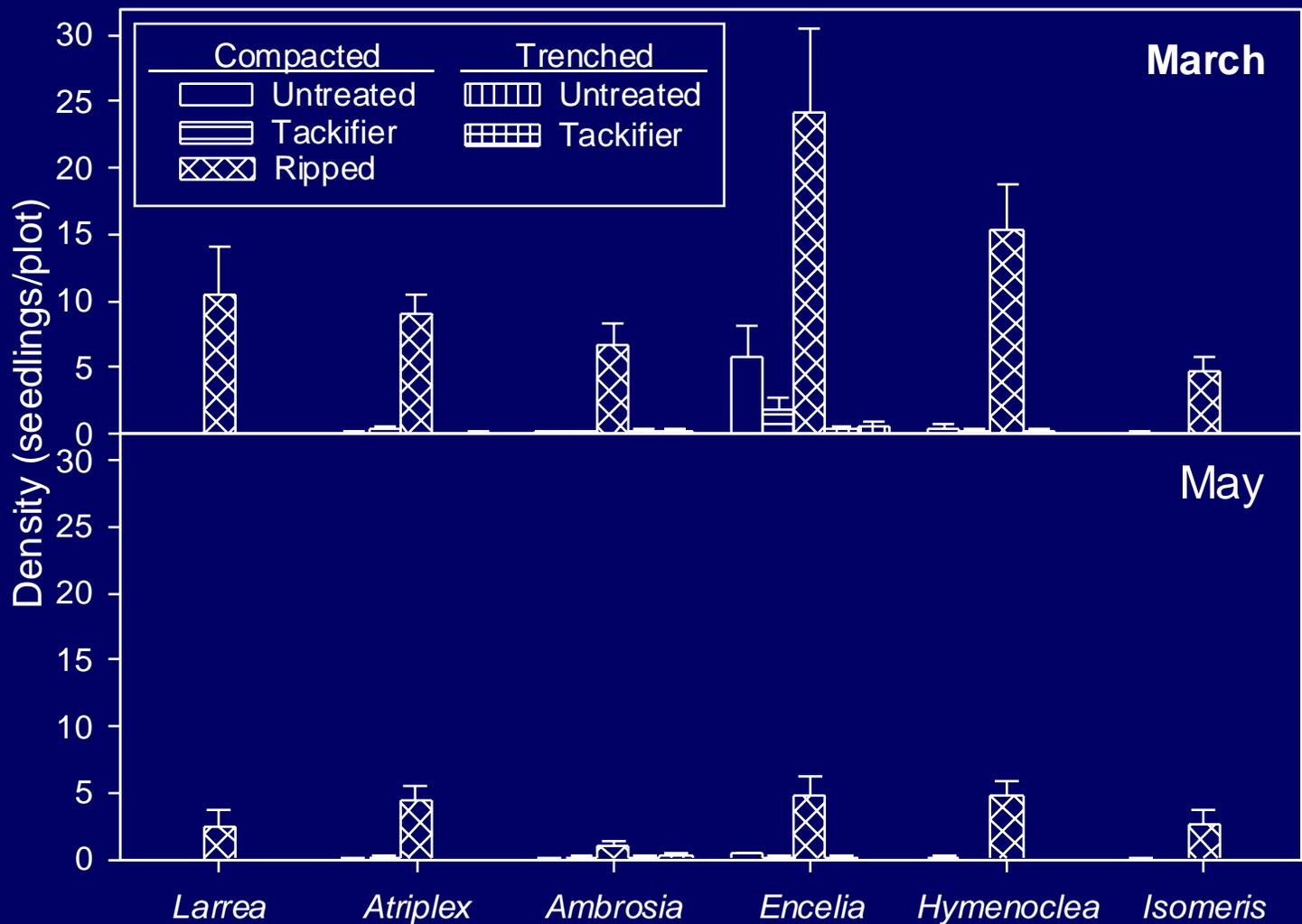
Seed + tackifier

Surface Treatments Minimize Seed Loss



Other Sources of Seed Losses?

Surface Treatments Enhance Establishment



Lake Mead National Recreation Area, Nevada

Natural recovery

Surface treatments

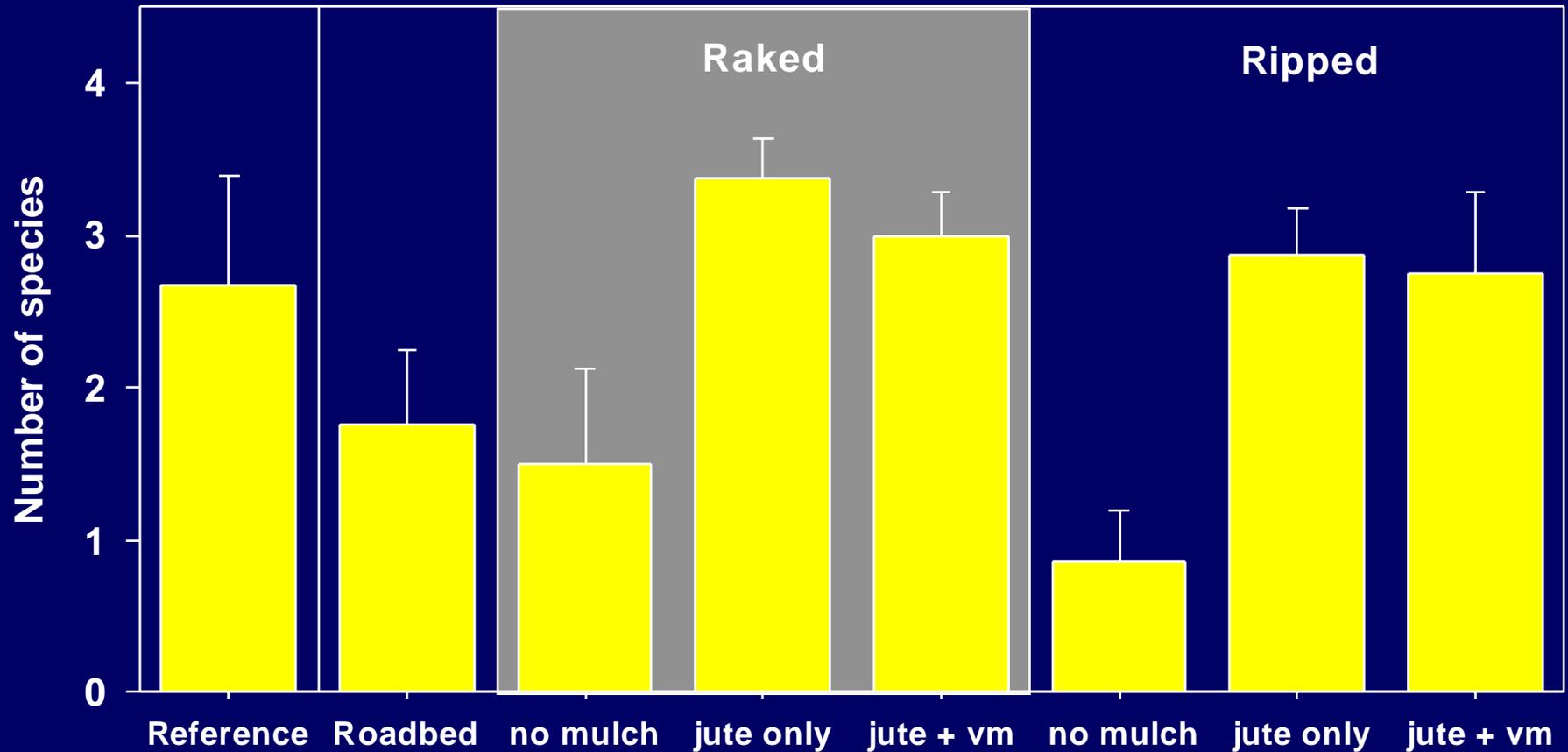
-Ripping vs. raking

-Vertical vs. jute mulch

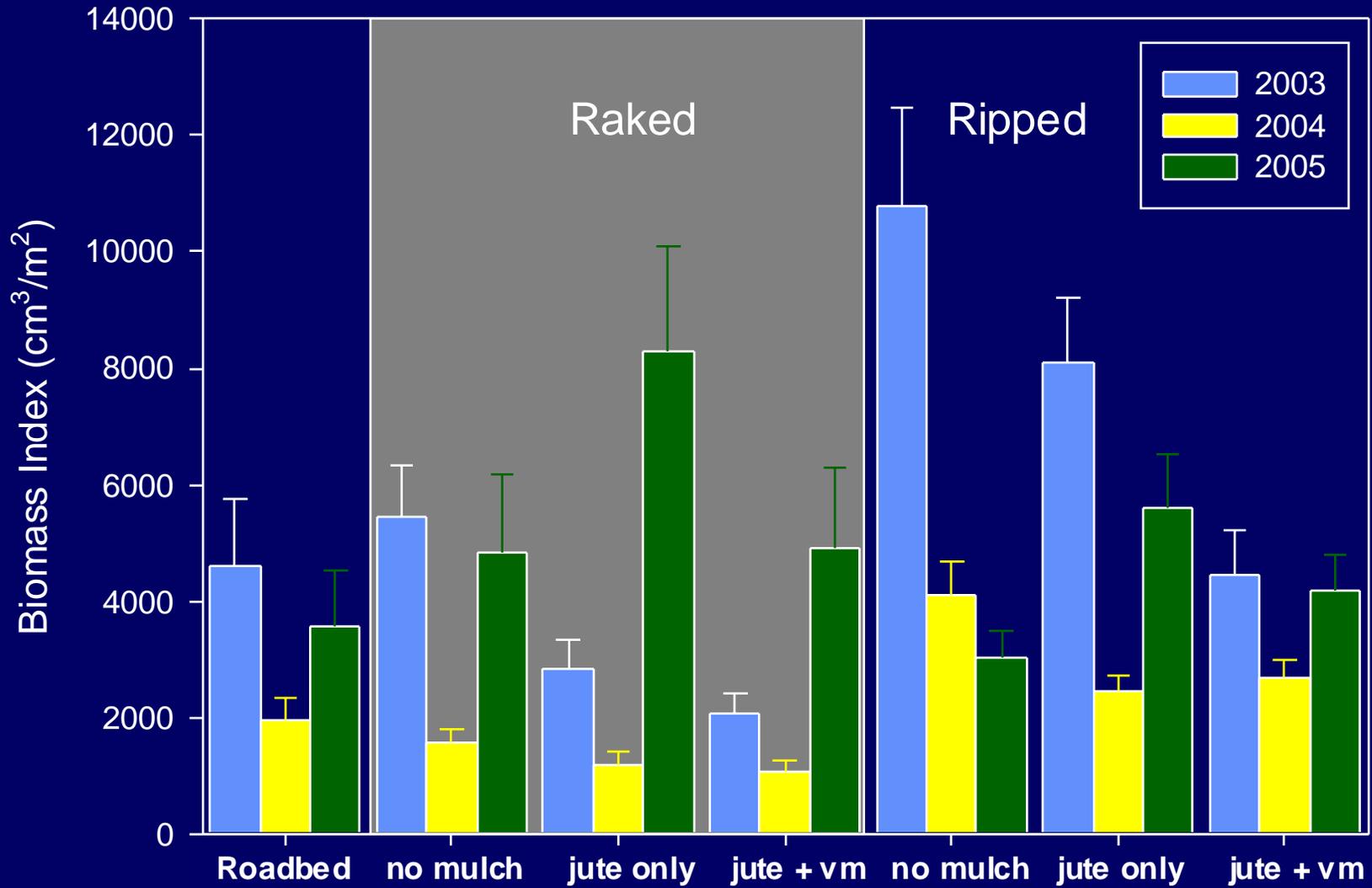
Surface Mulches Capture Seed

Newberry Mountains, Lake Mead NRA, NV

Summer, 2001



Ripping Enhances Non-natives

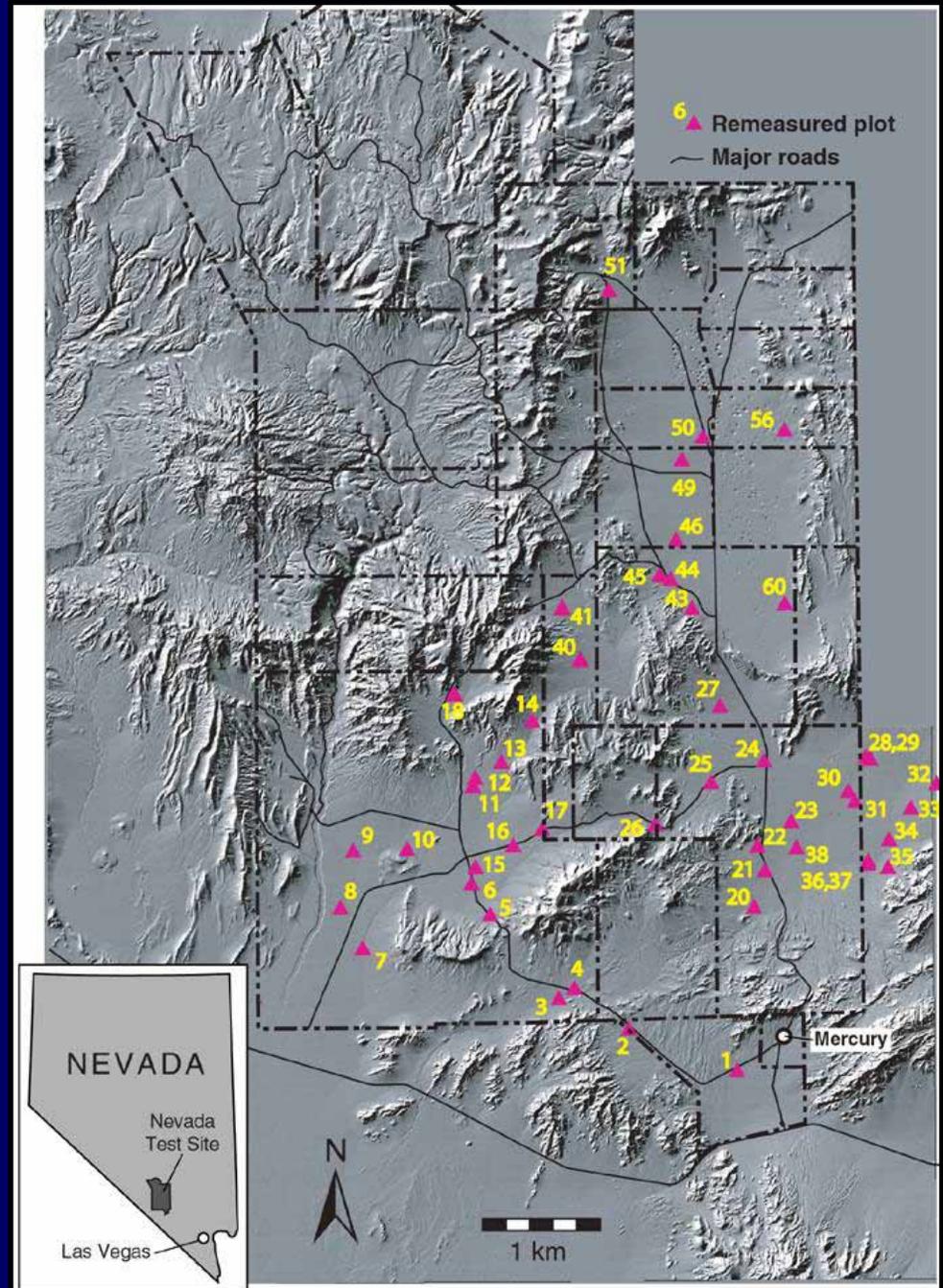


Burned Habitats

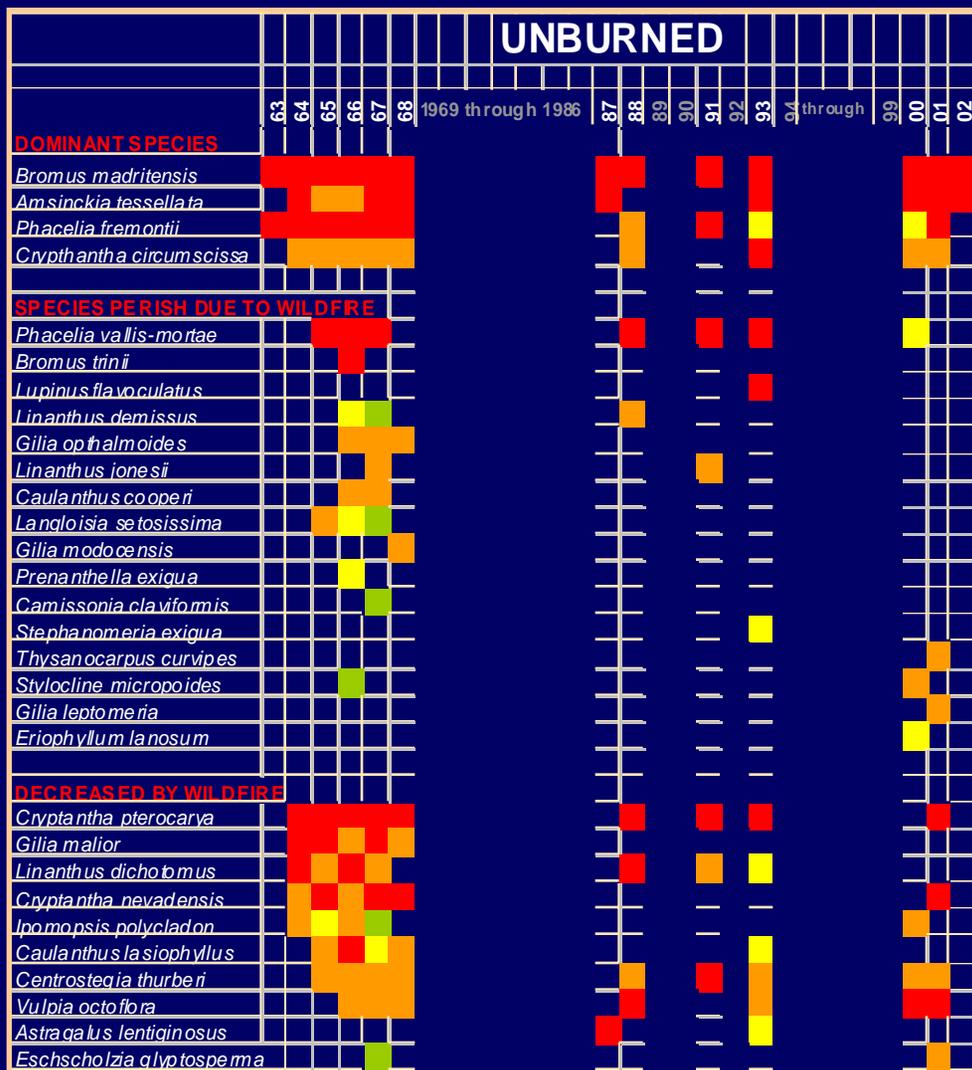
Nevada Test Site, NV

Jump Canyon, AZ

Nevada Test Site 1962-1975



Loss of Winter Annual Species



Rank within the community:

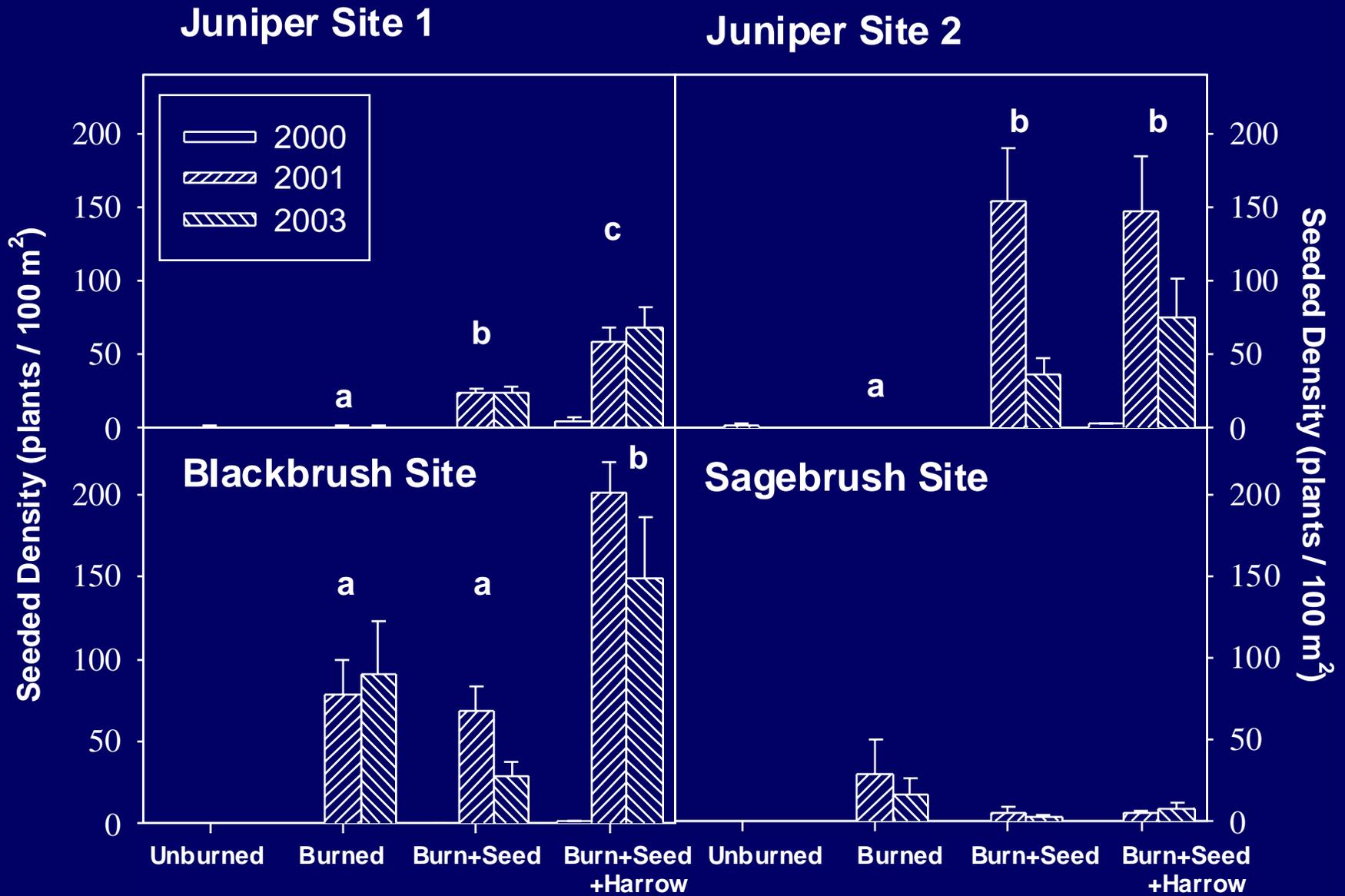
HIGH

MED

LOW

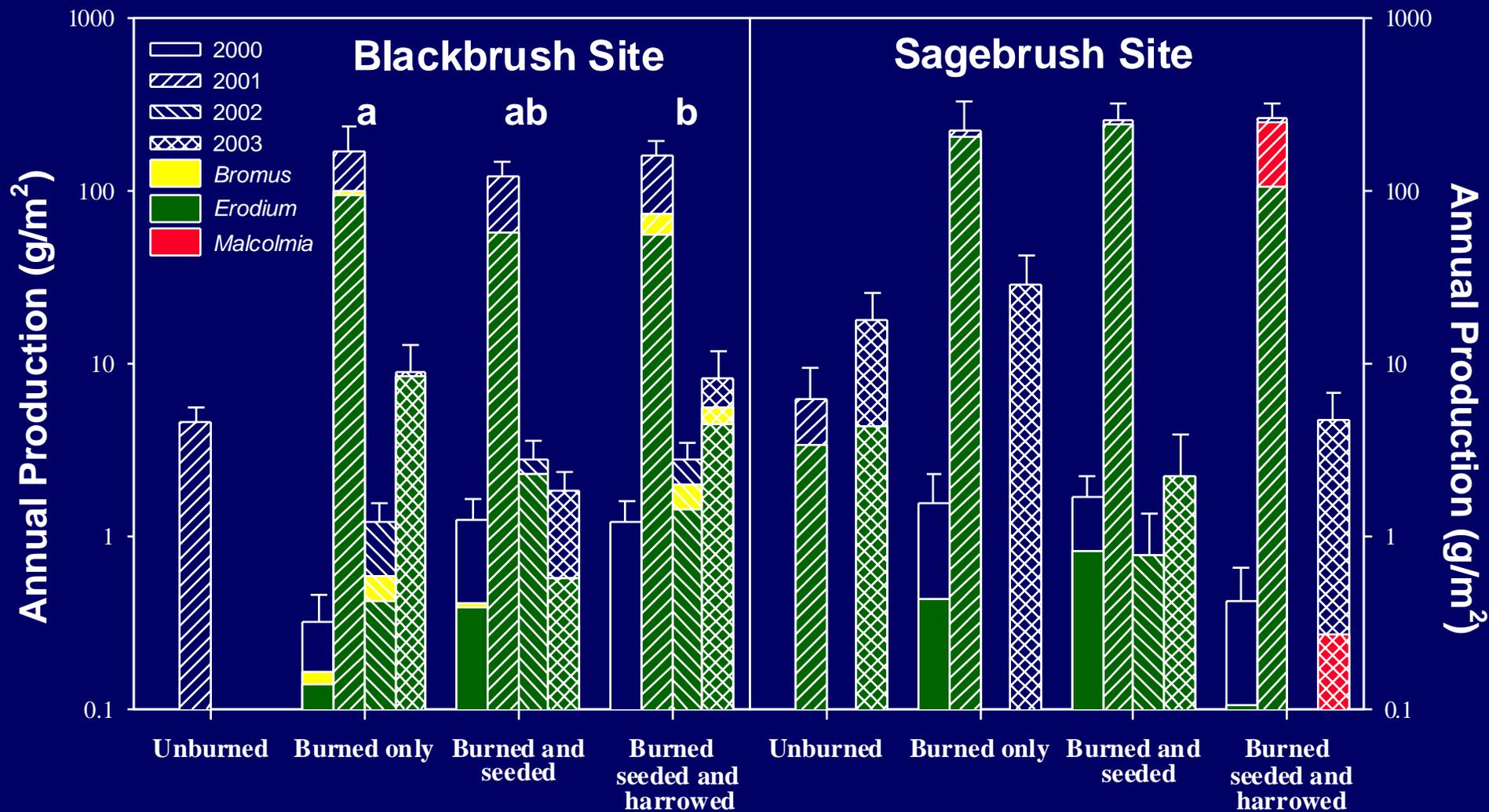
RARE

Jump Canyon, Arizona



Scoles *et al.*

Jump Canyon, Arizona



Other Successful Re-vegetation Efforts in Mojave Desert

- **Seed pre-treatment, mulches and irrigation (Anderson & Ostler 2002)**
- **Establishment of shrubs/perennial grasses with direct seeding and little soil disturbance only in high rainfall years (Grantz et al. 1998)**

The New Mojave Landscape

Shrubland-annual grassland conversion

Potential loss of connectivity among
tortoise populations

Altered Tortoise Habitat

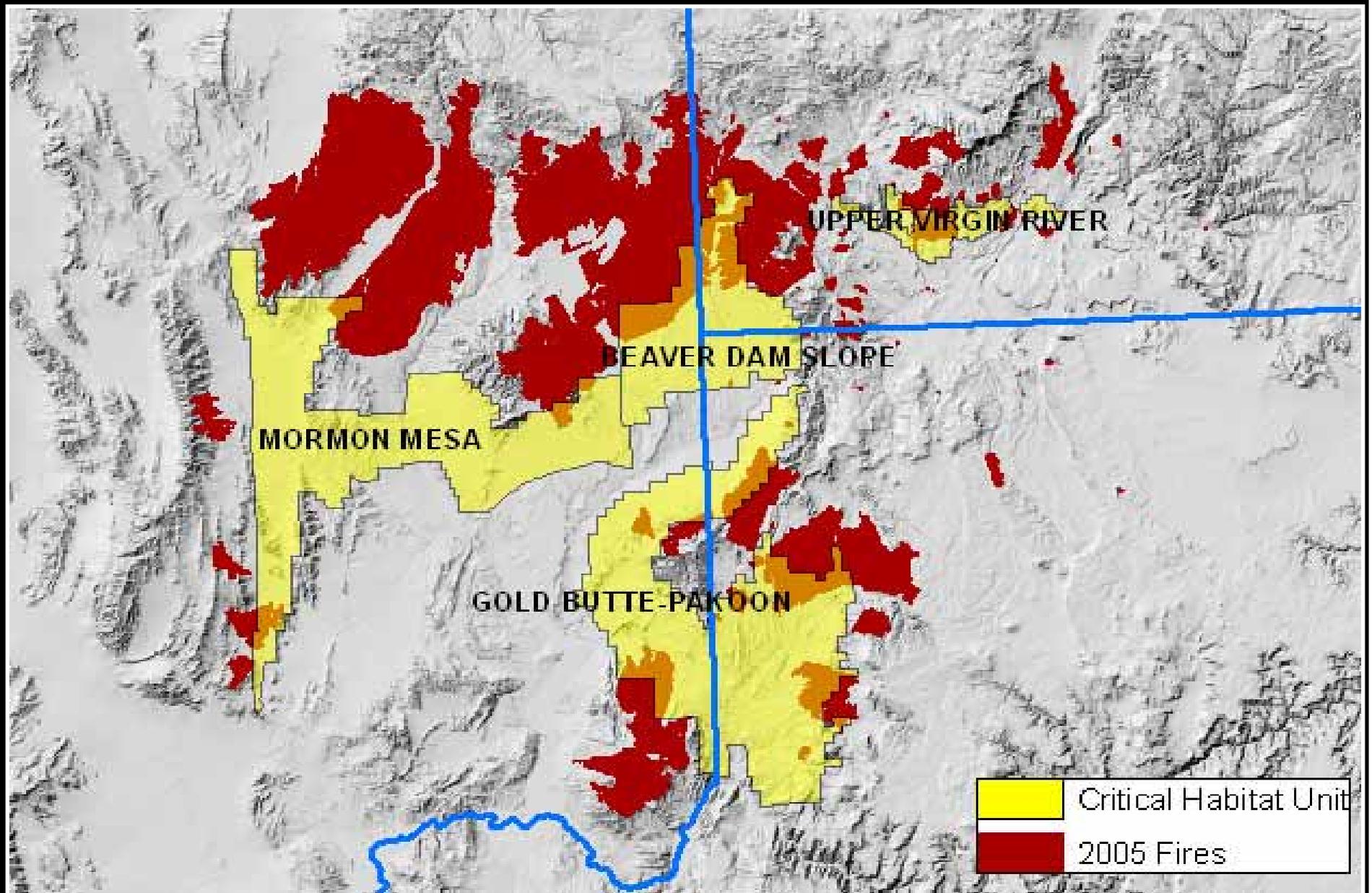
- Loss of thermal cover
 - Incineration of shrubs
 - Collapse of burrows
- Loss of forage
 - Incineration of herbaceous plants
 - Replacement of natives with exotics

Goals:

- **Enhance production and diversity of winter annuals**
- **Enhance establishment of perennial shrubs, grasses and herbs**

If We Plant It, Will They Come?

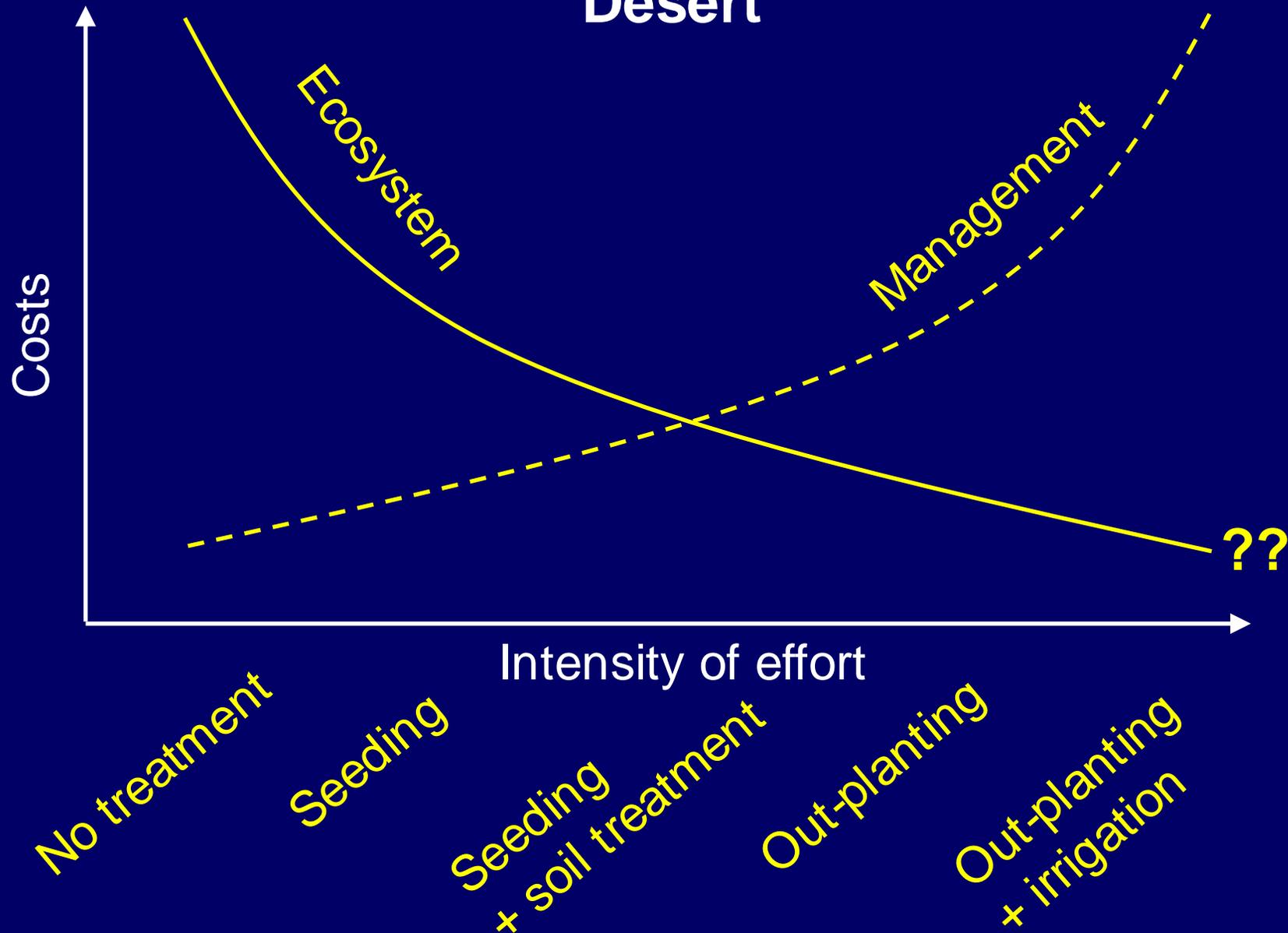
Implementation and Effectiveness Monitoring



Pros and Cons of Prescriptions for Re-vegetating Desert Tortoise Habitat

<u>Prescription</u>	<u>Considerations</u>
Surface roughening (harrow, rip, rake, pit)	Potential damage to burrows May enhance exotic annuals Is surface roughness already sufficient?
Surface tackifier	Diminished effect with heavy rain
Irrigation	Requires extensive infrastructure Effort may be necessary for extended periods
Greenhouse out-planting	Large investment of time and resources Availability of local genotypes
Broadcast seeding	Availability and cost of seed Availability of local genotypes
Herbicides	Specificity to exotics / native annuals unclear Soil texture/pH required for effectiveness

Challenges of Re-vegetating Degraded Mojave Desert



Considerations for Plant Materials Development & Research

- **Great costs of re-establishing plants across expansive areas**
- **Local dispersal may be an important factor structuring plant assemblages but potentially limited by granivore-dispersal mechanisms – Kirkman et al. 2004**
- **Weather forecast information may help longer term re-vegetation planning where plant establishment and weed control actions can coincide with a favorable microclimatic forecast – Hardegree & Van Vactor 2004**

Considerations for Plant Materials Development & Research (cont.)

- **Costs/benefits of immediate establishment of non-native seed for long-term plant community stability**
- **Local vs. regional sources of seed**

The End

... and the Beginning!