Tamarisk Management and Future Prospects for Riparian Ecosystem Recovery

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Collaborators: Steven Ostoja, Pat Shafroth & Susan Roberts (USGS), Gail Drus, Mike Kuehn & Iwona Kuczynska (UCSB), Kevin Hultine (Desert Botanic Garden/NAU), Kumud Acharya & Ben Conrad (DRI/UNLV), Dan Bean (Colo Dept of Ag), Curt Deuser (NPS), et al.

Virgin River, NV

MSHCP Proj 2005-UCSB-552-P

Why control Tamarisk?

Competes with native plants

Desiccates & salinates soils

High water transpiration

Erosion & sedimentation

Wildfire hazard

Low quality habitat

Two decades of tamarisk control & riparian restoration in Clark County springs and rivers

Co-operator treatments: NPS (Curt Deuser), BLM (Tim Rasch, Nora Caplette)

- Hand & mechanical treatments
- Stump & foliar herbicide applications
- Native re-veg in some locations

Do control efforts reduce tamarisk impacts?
Do native vegetation and wildlife recover?

Effectiveness Monitoring of *Tamarix* Control

Vegetation Lead: Steve Ostoja, USGS-Bishop

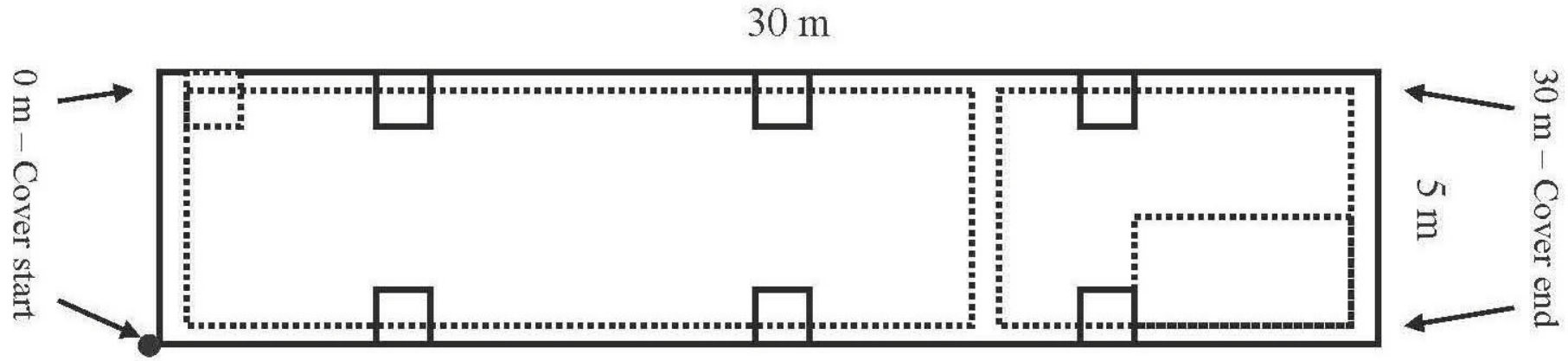
USGS science for a changing world

Virgin River

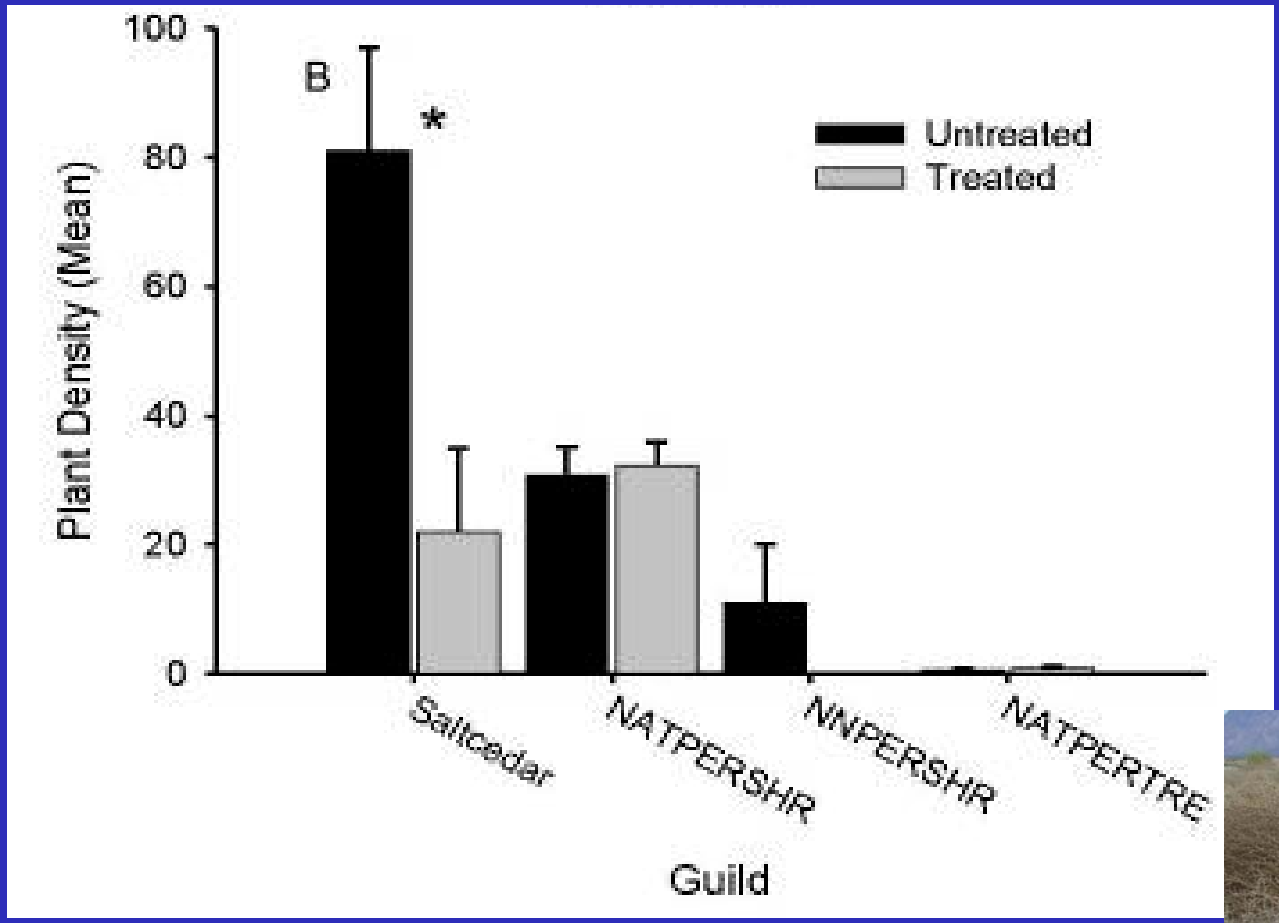
- 61 Control Plots
- 118 Treatment Plots

Upland Seeps and Springs

- 256 Plots
- All in NPS EPMT treated sites

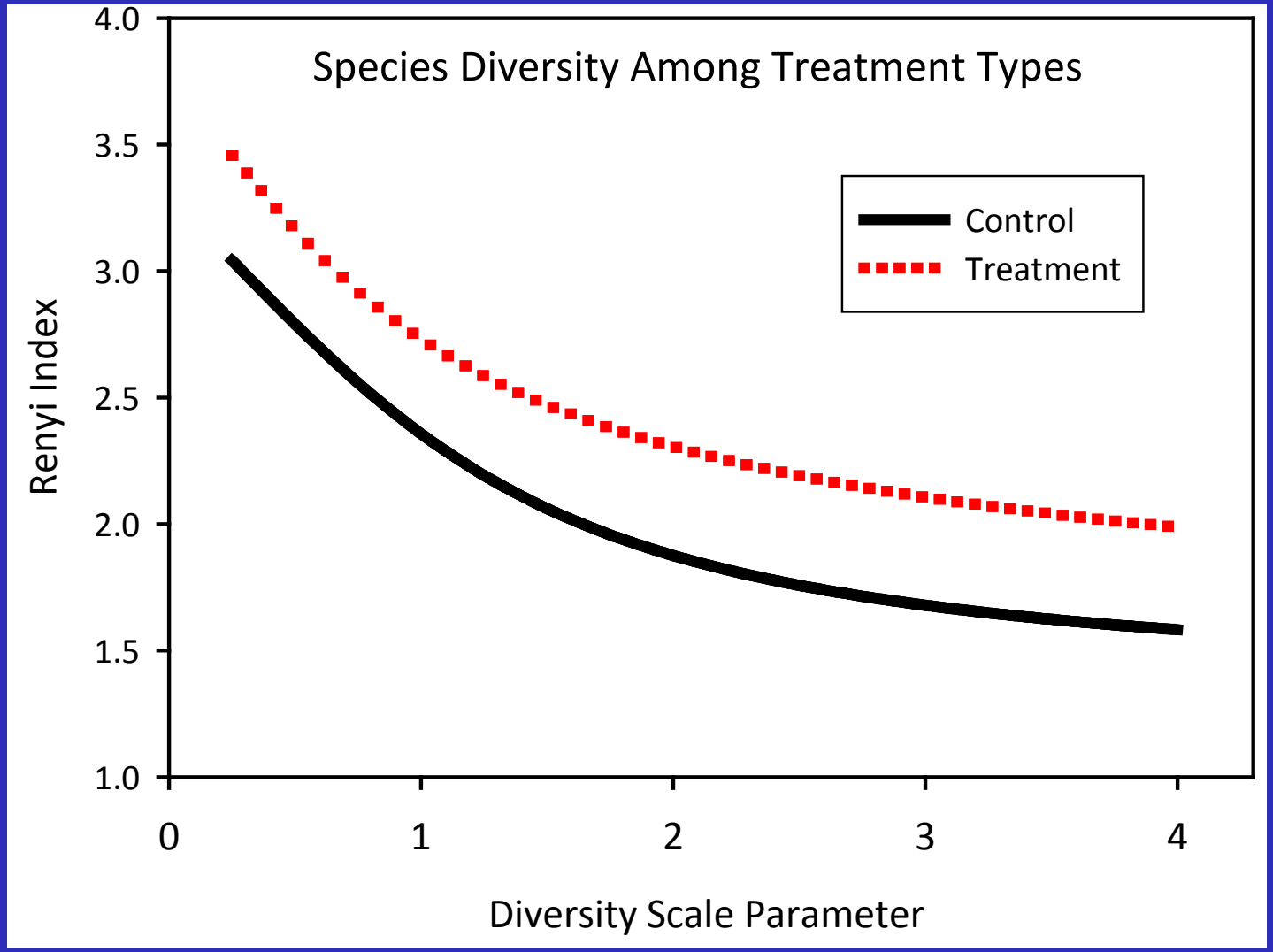


Vegetation Response to Tamarisk Treatments



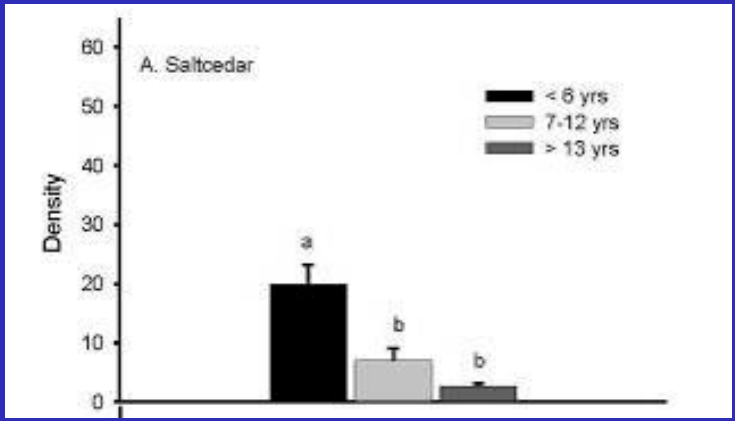
- Tamarix density reduced (& Fire risk lower)
- Native shrubs did not differ, however
- Non-native shrubs *Increased* owing to soil disturbance (esp. Salsola spp. – Russian thistle)

Virgin River: Vegetation Response

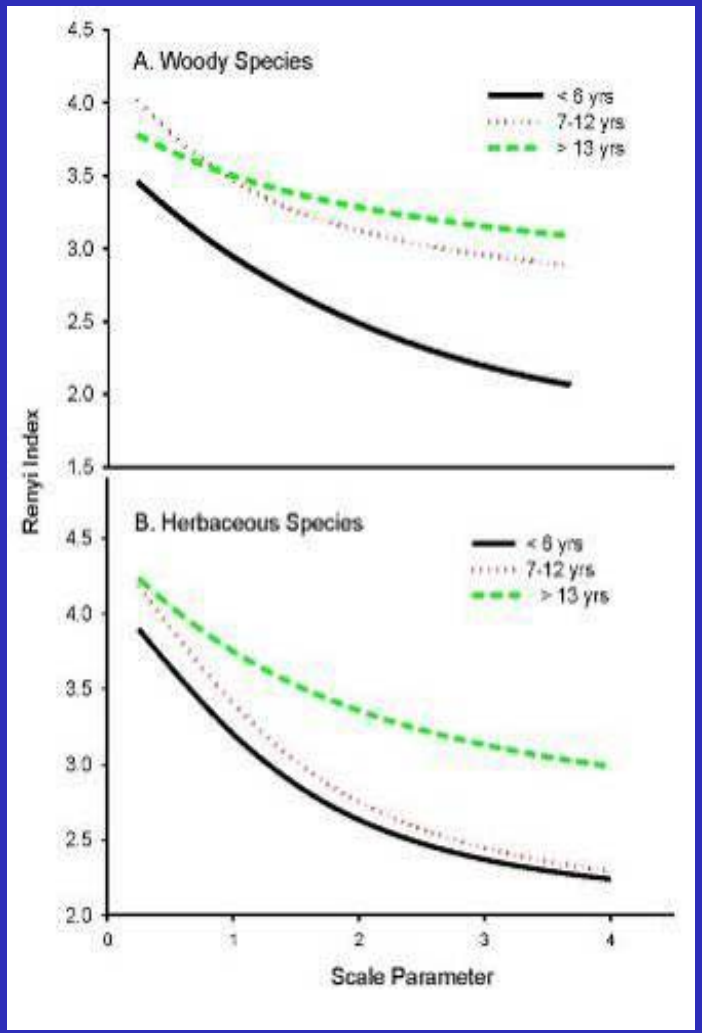


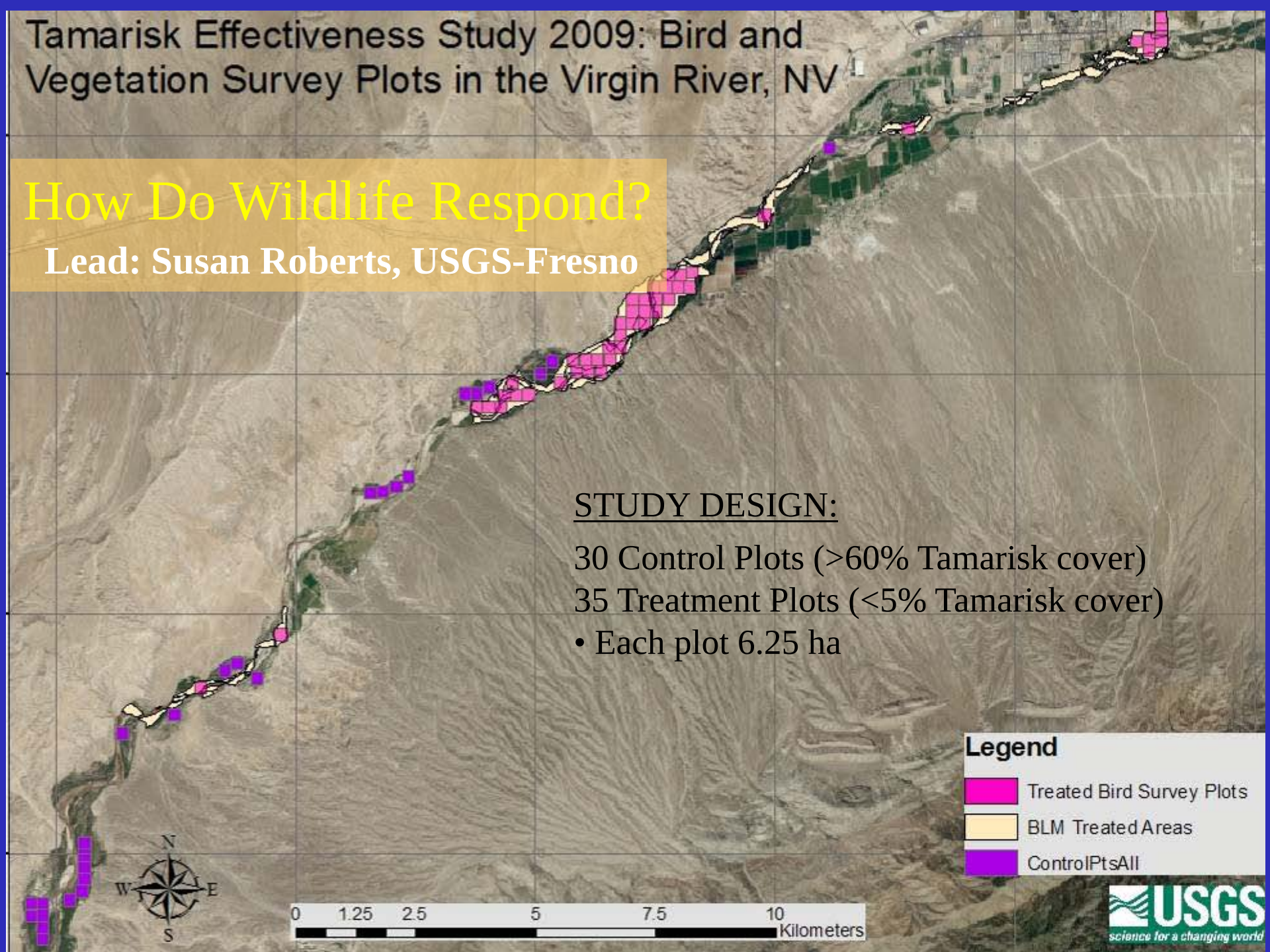
- Species Diversity is significantly greater in the Treated areas

Longer time since 1st treatment Enhances plant diversity



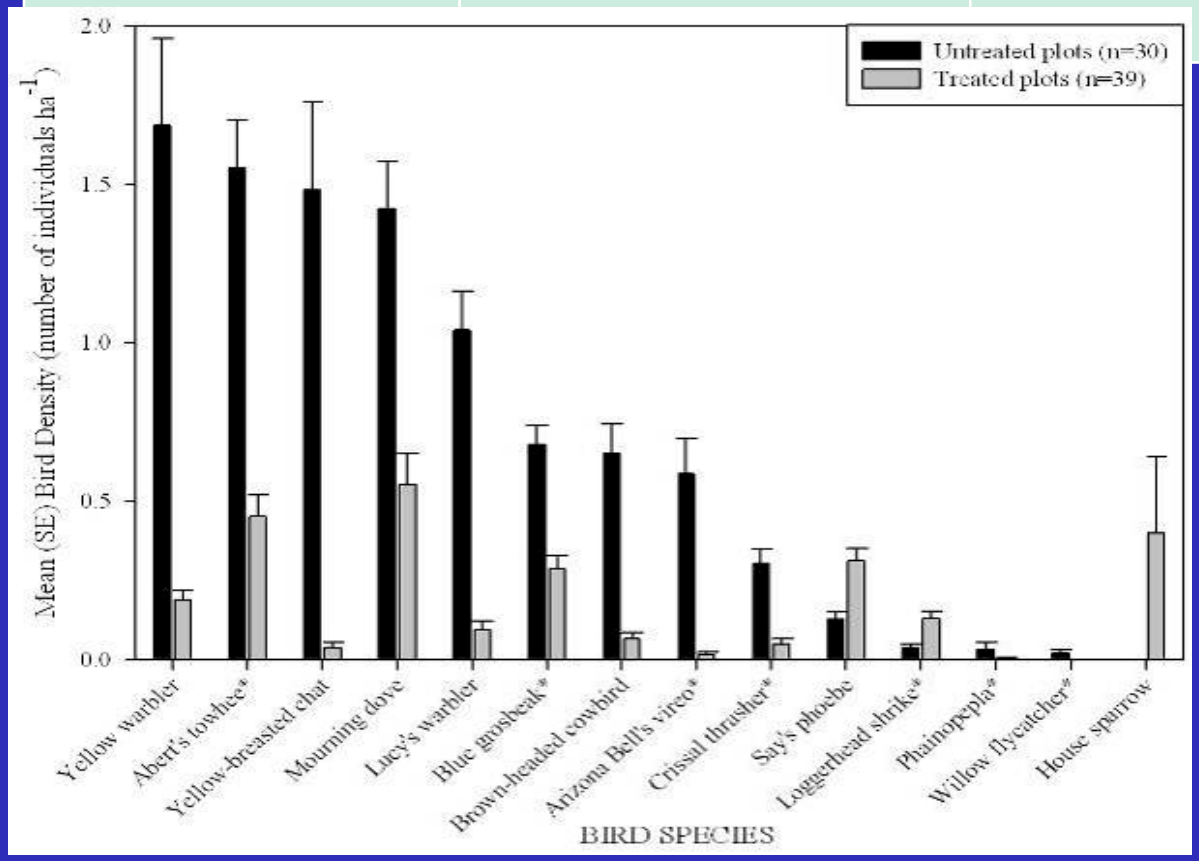
- Re-treatment needed for improvement
- Sustainability is not assured




Tamarisk Effectiveness Study 2009: Bird and Vegetation Survey Plots in the Virgin River, NV
How Do Wildlife Respond?
Lead: Susan Roberts, USGS-Fresno
STUDY DESIGN:
30 Control Plots (>60% Tamarisk cover)
35 Treatment Plots (<5% Tamarisk cover)
• Each plot 6.25 ha
Legend
Treated Bird Survey Plots
BLM Treated Areas
ControlPtsAll
N
W
E
S
0 1.25 2.5 5 7.5 10
Kilometers
USGS
science for a changing world

Tamarisk Control and Bird Communities

Parameter	Control Plots	Treatment Plots
Abundance Index*	27.9 (0.5) birds	5.9 (0.2) birds
Species Richness	79 species (20 unique)	70 species (11 unique)



USGS science for a changing world

Impacts of Tamarisk Control on Bird Communities

Loss of Veg Cover and Dominance by exotic shrubs reduced avian diversity

Tamarisk control with Restoration of native saltbush or screwbean meets Fuel Reduction goals, not Habitat needs

New Player / New Control Method

Biocontrol by *Diorhabda carinulata*
(Tamarisk Leaf Beetle)

Ed Kosmicki

Imported from Asia for BioControl of *Tamarix*
Released after 10+ years specificity testing

Larvae & Adults of *Diorhabda* feed only on Tamarix

Defoliation:

Scrape foliage, cause desiccation

June 11 July 9

Humboldt River, NV

Impact can be Rapid & Dramatic

Re-growth in few weeks
Dieback gradual &
Mortality slow

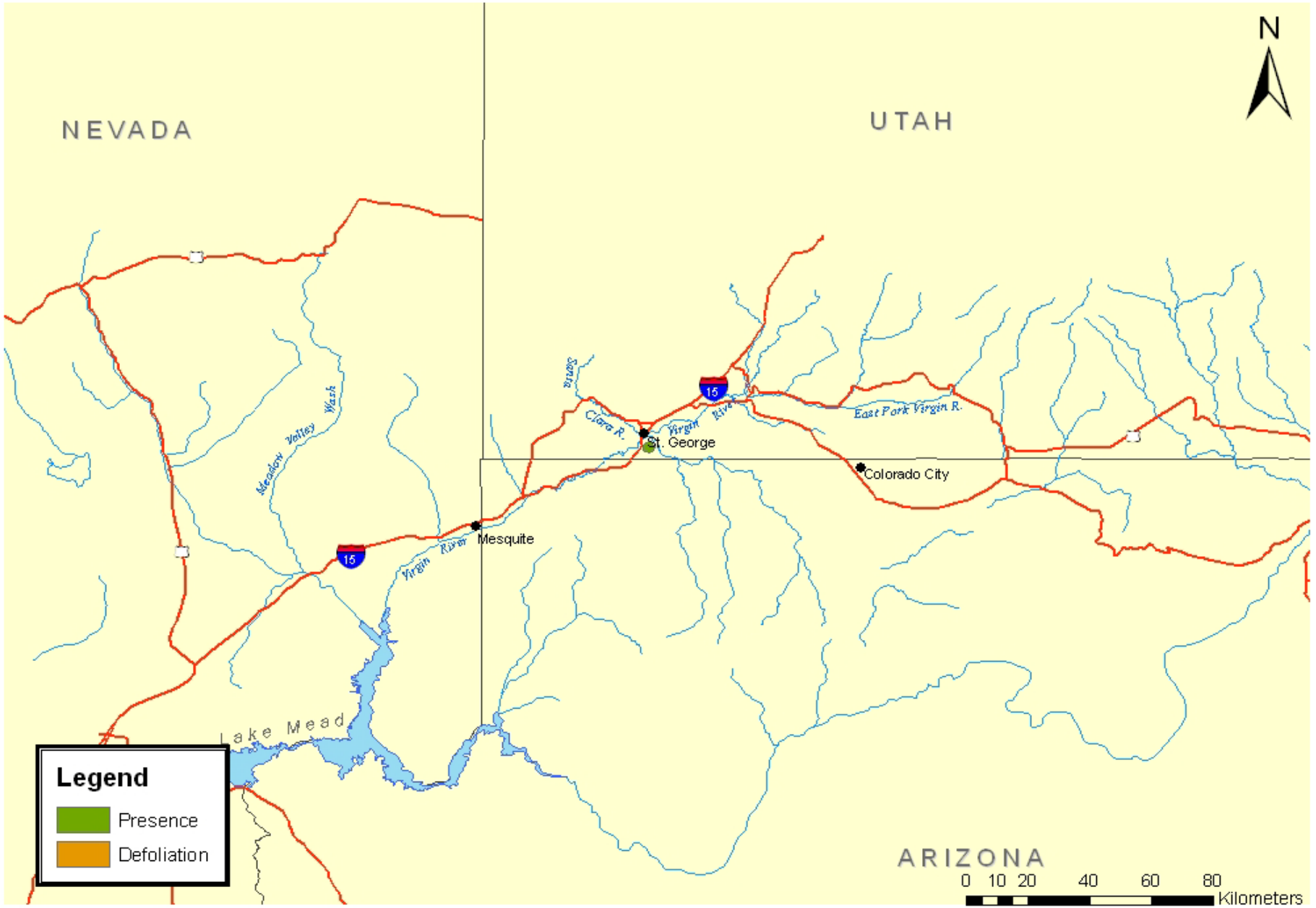
Diorhabda introduced into Virgin system from Sevier River/Delta, UT release site by local agencies in 2006

Tamarisk defoliation in St. George in 2008

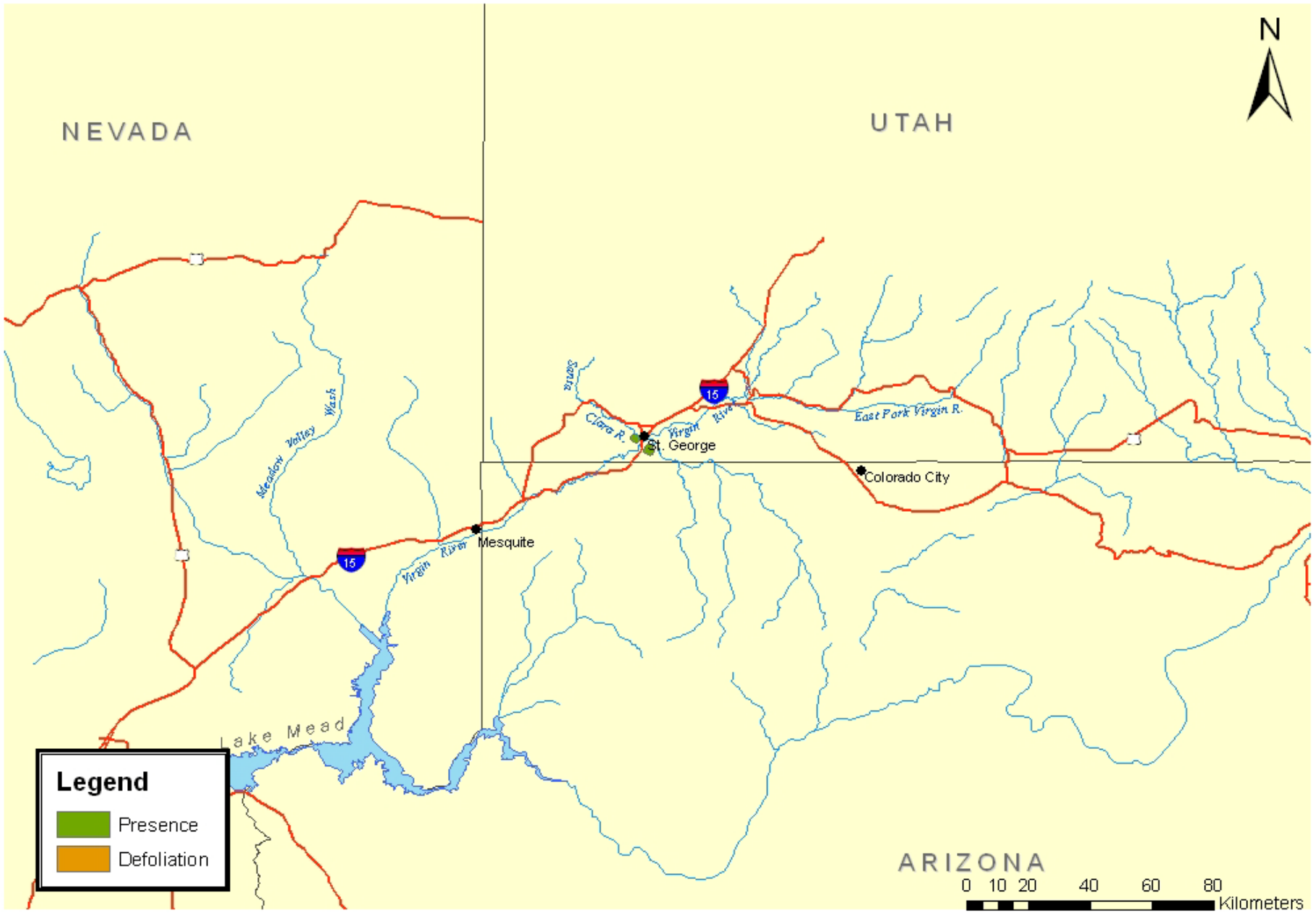
Virgin River *Tamarix* Biocontrol – National focus of conservation concern & controversy

- Defoliation alters habitat structure for wildlife
- Lawsuit by Center for Biological Diversity over possible risk to Southwestern Willow Flycatcher

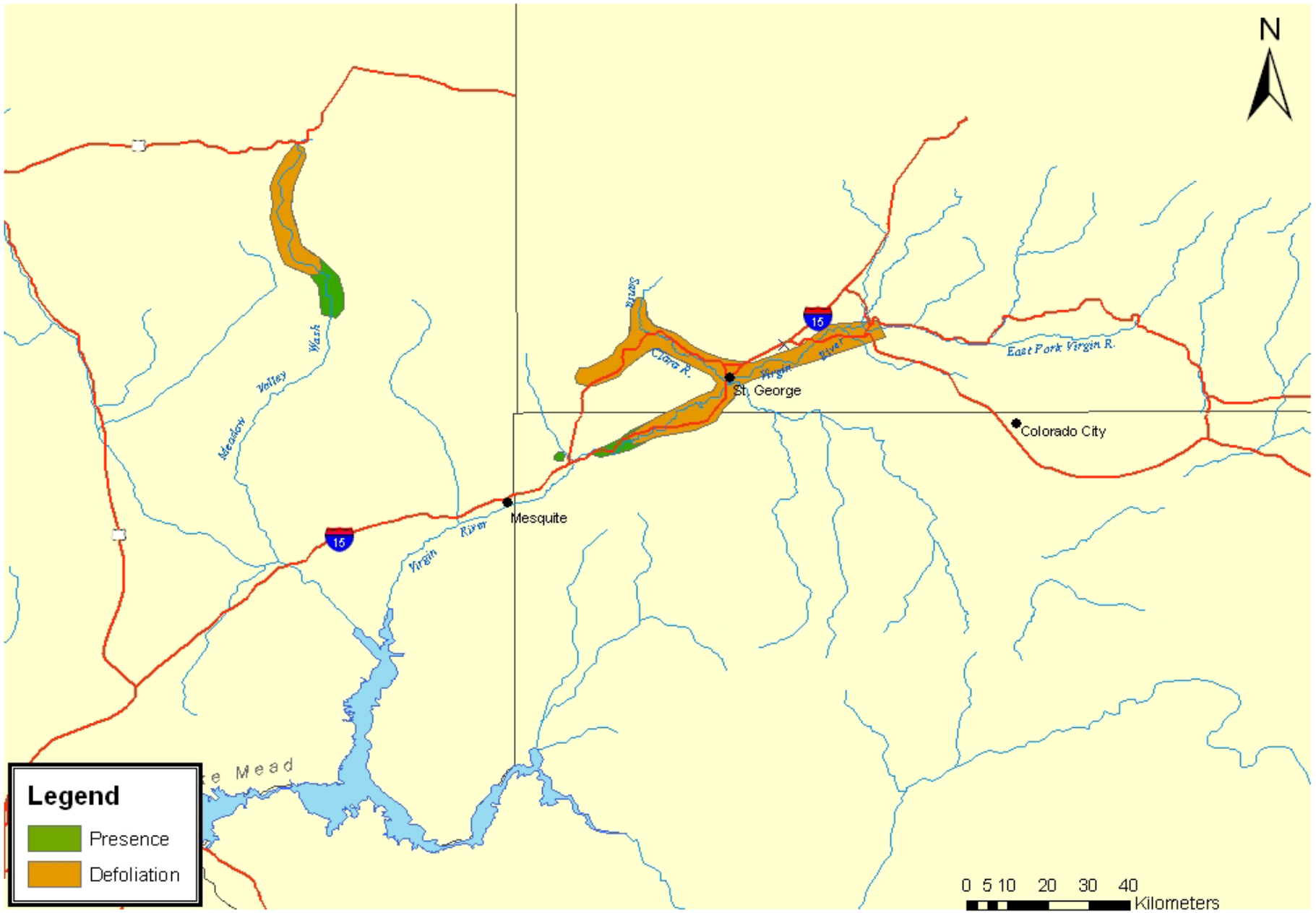
2006 Distribution of Diorhabda carinulata



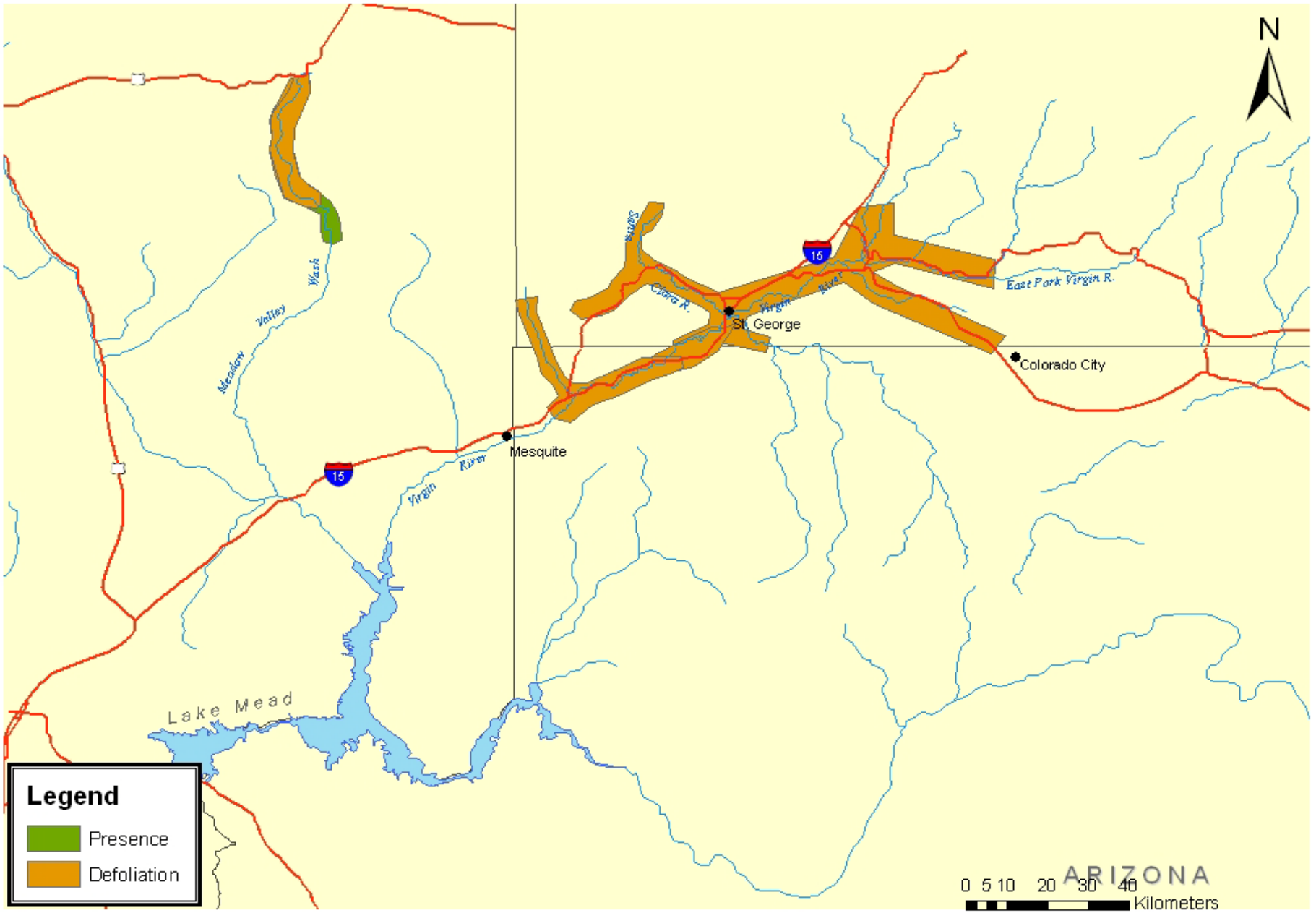
2007 Distribution of Diorhabda carinulata



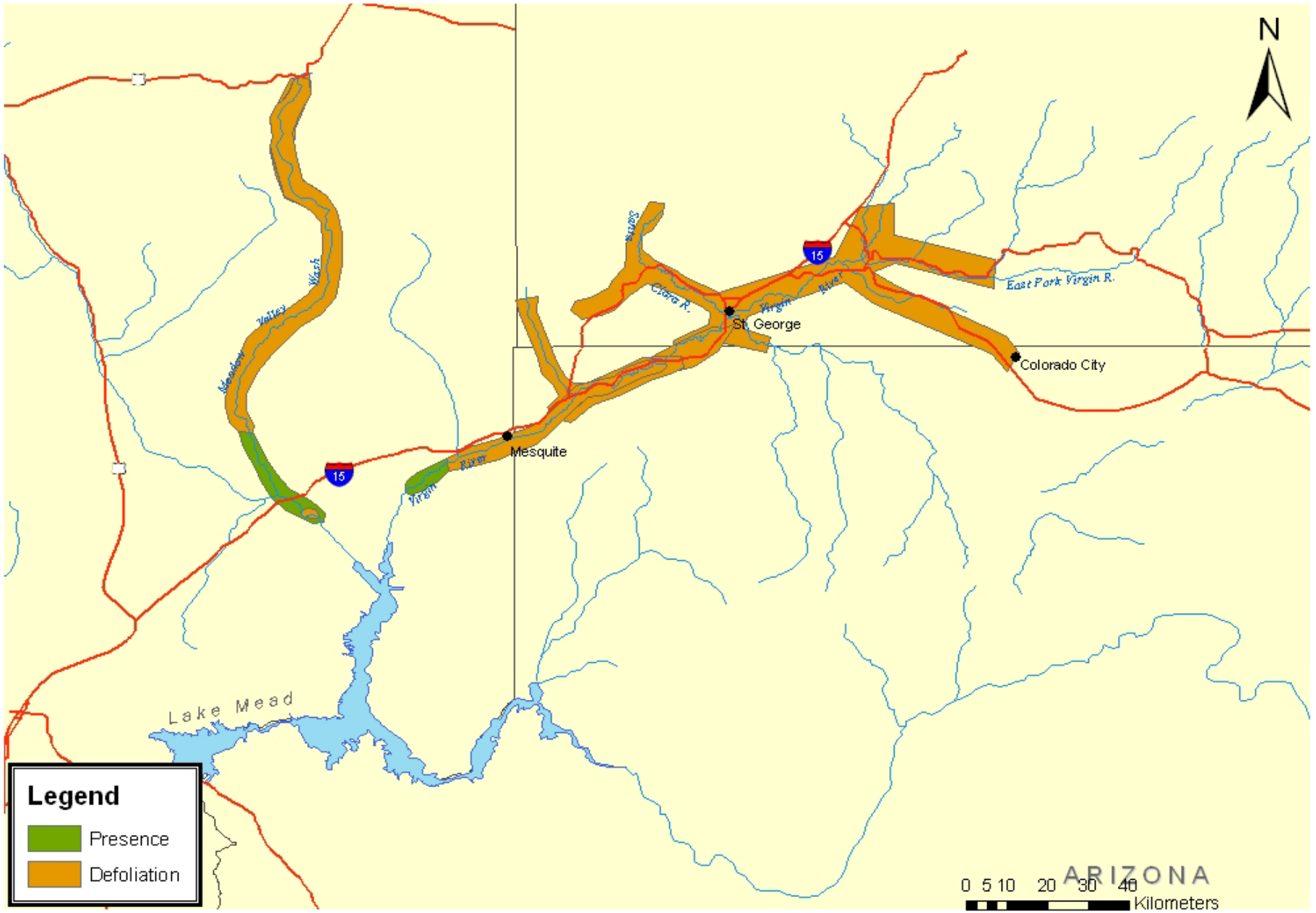
2008 Fall Distribution of Diorhabda carinulata



2009 Fall Distribution of Diorhabda carinulata



2010 Fall Distribution of Diorhabda carinulata

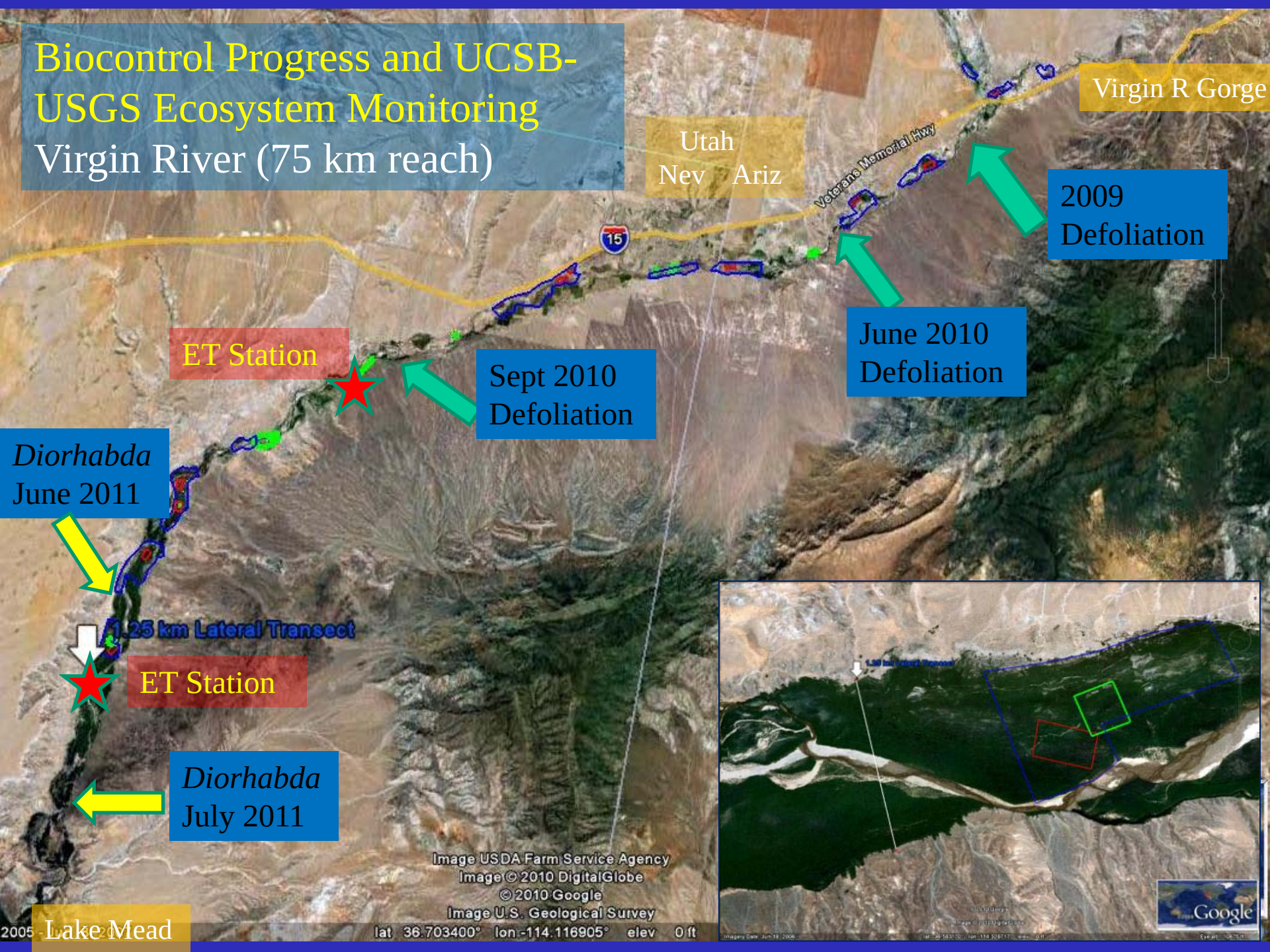


Virgin River 2010

Before Biocontrol (June 1)

After (July1)

Biocontrol reaches Lake Mead NRA

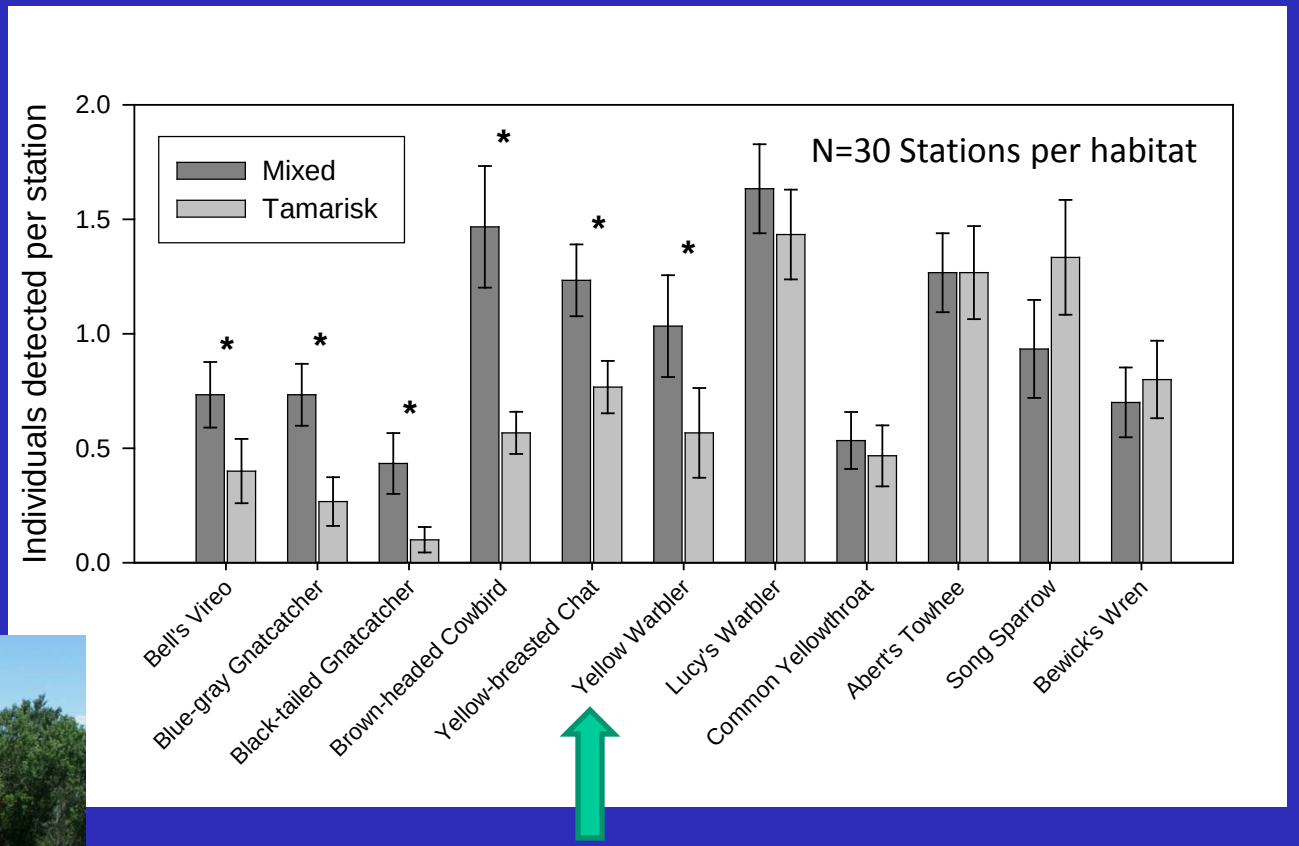

Biocontrol Progress and UCSB-USGS Ecosystem Monitoring
Virgin River (75 km reach)
Utah
Nev Ariz
Virgin R Gorge
Veterans Memorial Hwy
15
2009 Defoliation
June 2010 Defoliation
ET Station
Sept 2010 Defoliation
Diorhabda June 2011
1.25 km Lateral Transect
ET Station
Diorhabda July 2011
Lake Mead
Image USDA Farm Service Agency
Image © 2010 DigitalGlobe
© 2010 Google
Image U.S. Geological Survey
lat 36.703400° lon -114.116905° elev 0 ft
Google

Hypothesis: Gradual decline of *Tamarix* will lead to recovery of native plants & wildlife

Ideally structural habitat retained while weed reduction proceeds, unlike mechan-chemical treatments

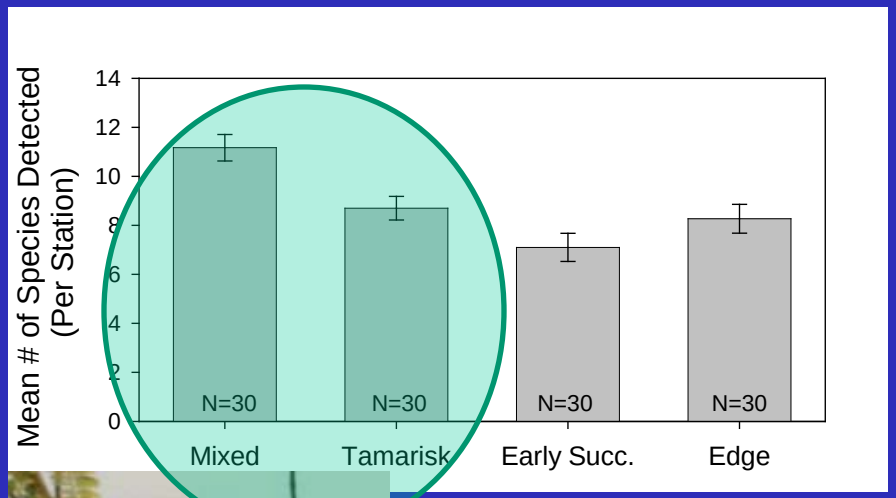
Virgin River Point Counts: Tamarisk Monoculture vs. Mixed Vegetation (M. Kuehn)

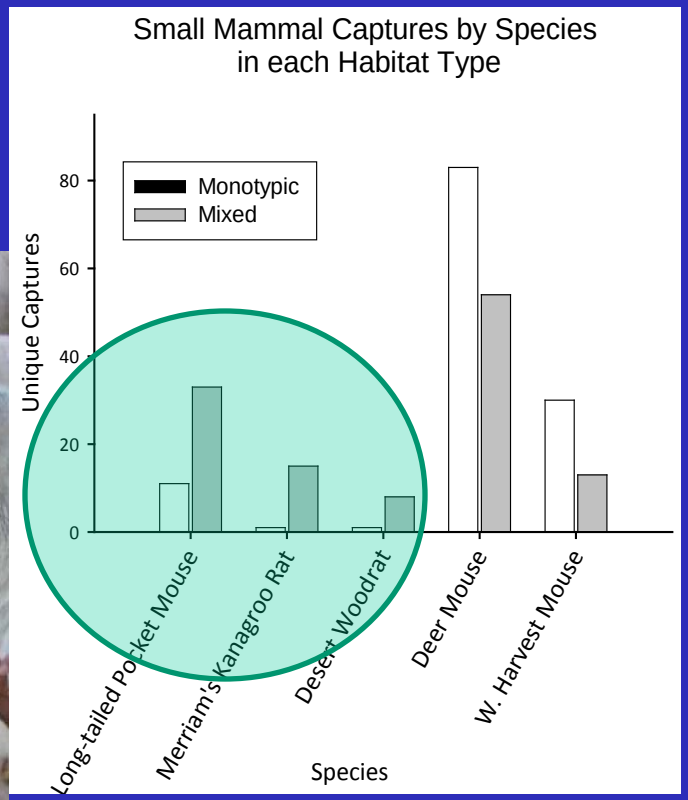
- 6 of 11 species lower in *Tamarix*, including Yellow Warbler (SWFL proxy)

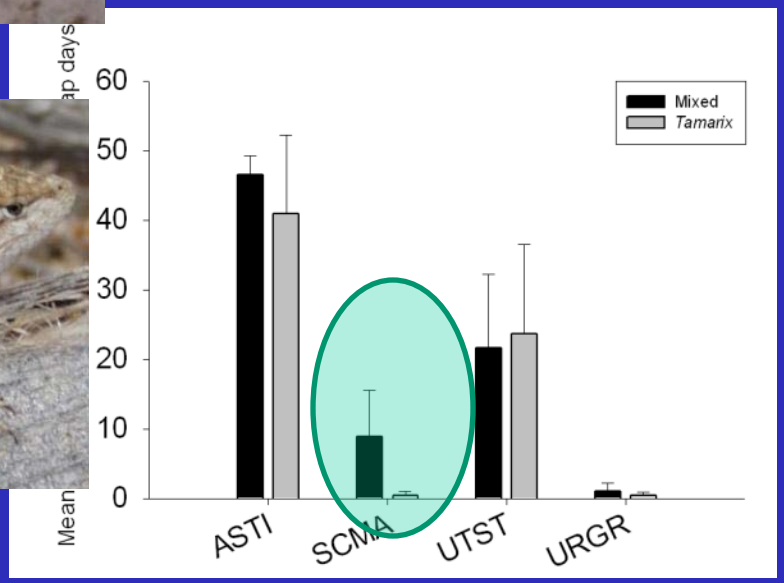


Willow flycatcher also may respond positively

Key: Tamarisk is OK if Native Veg retained or restored

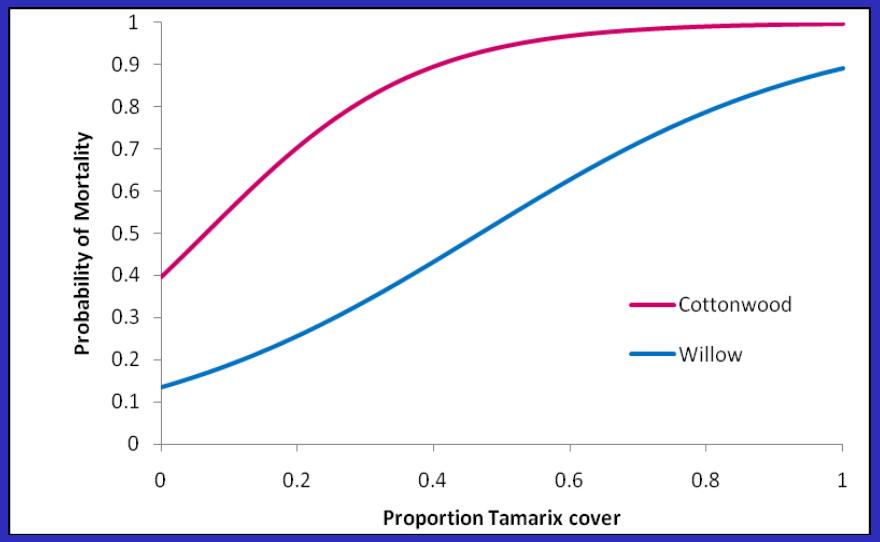






UCSB / USGS Monitoring 2009-2010

Tamarisk Dominance increases fire threat to native riparian vegetation




San Pedro R, AZ 2009


Warm Springs NWR, July 2010

…and to wildlife, e.g. SWFL: unfledged nests destroyed

Enhance relative abundance of native riparian plants

1. Reduces wildfire risk & ecological impacts
2. Improves wildlife abundance & diversity
3. Improves ecosystem function & services (likely)

By BioControl and/or Restoration

Will Re-vegetation lead to Willow Flycatcher use?

Restoration projects in Virgin River Watershed: 2008 – 2010 (*Diorhabda* present)

Virgin River: St. George, UT
With Willow Re-vegetation

(Utah Dept of Wildlife, M. McLoed)

2009 - 10 females (one in Native, 9 in tamarisk-dominated sites)

13% of nests fledged; 40% failed

2010 - 9 females (shifted to native-dominated sites)

30% fledged

Restoration must consider Hydrology

December 2010 Flood -Mesquite

Restoration Strategy

- Good hydrologic potential for growth
- Low probability of scouring
- Good access for wildlife migration

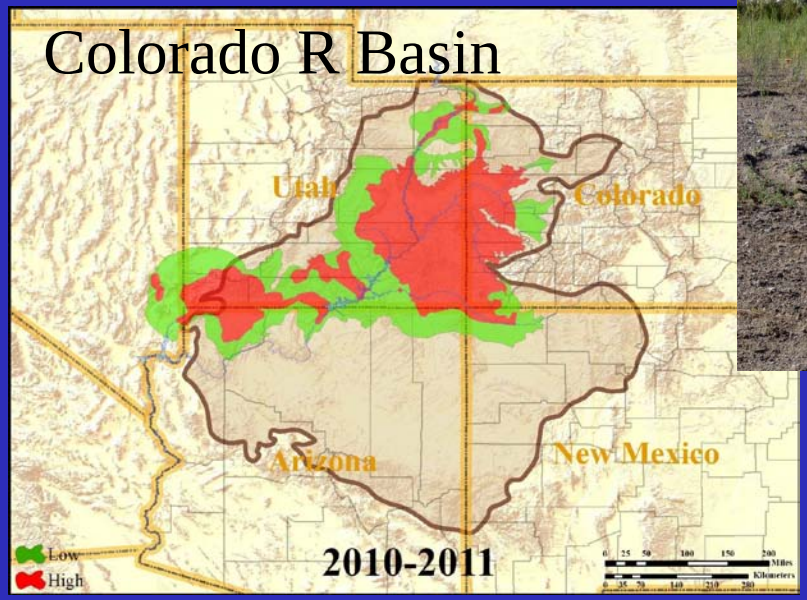
- Minimize disturbance, even avoiding removal of tamarisk biomass
- Prescribed fire can enhance tamarisk mortality, reduce biomass

Tamarisk Coalition

The WALTON FAMILY FOUNDATION

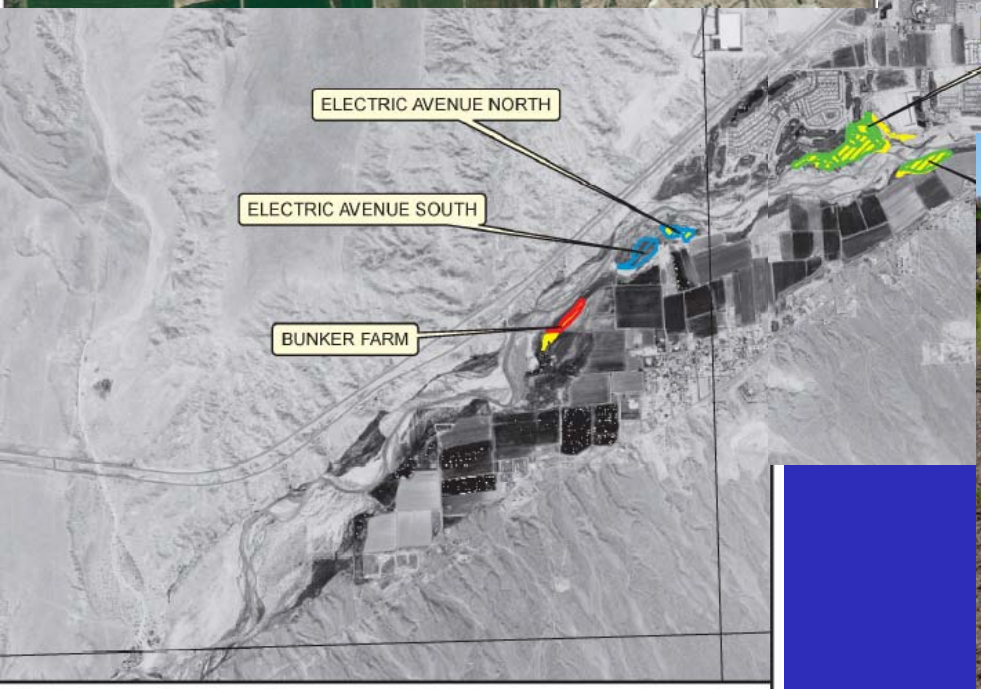
a non-profit alliance working to restore riparian lands

SWFL Habitat Enhancement Program – Top Priority: Virgin Watershed



Participants: US-FWS, Tamarisk Coalition, UCSB, USGS, SWCA, Stillwater Sciences, Desert Botanic Gardent, TNC, CC-MSHCP, VR-HCRP, Virgin R Program, SNWA et al.

City of Mesquite Restoration & Willow Flycatcher Sites

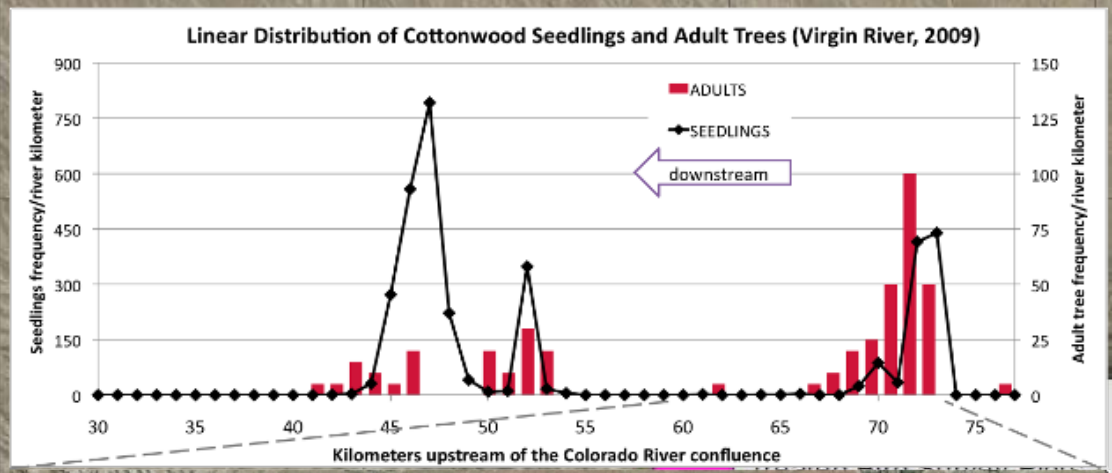


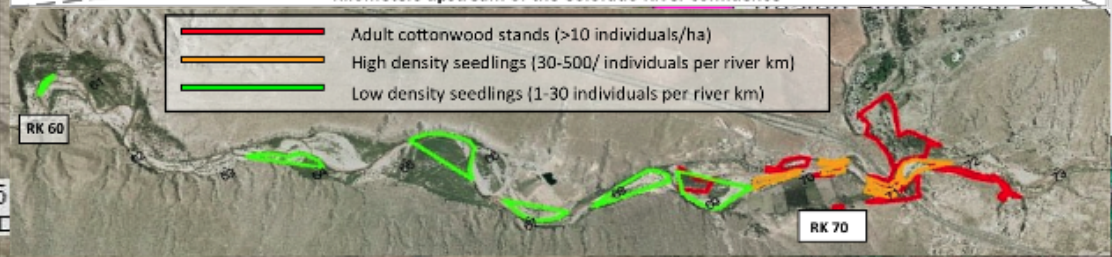
Restoration Opportunities - Gold Butte
(hypothetical)

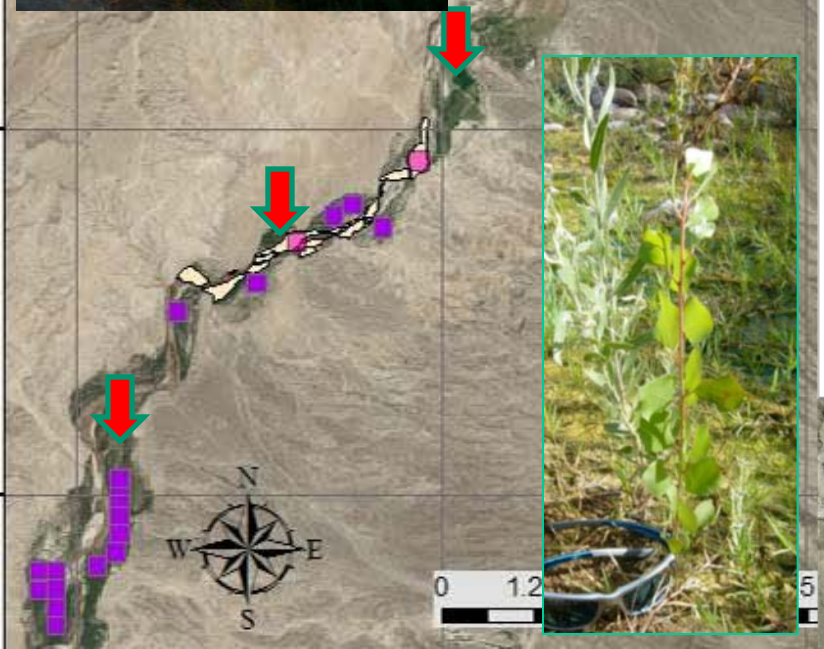
Current
Re-veg trials

Proposed Fish Barrier pool &

Propagule Islands Restoration Strategy





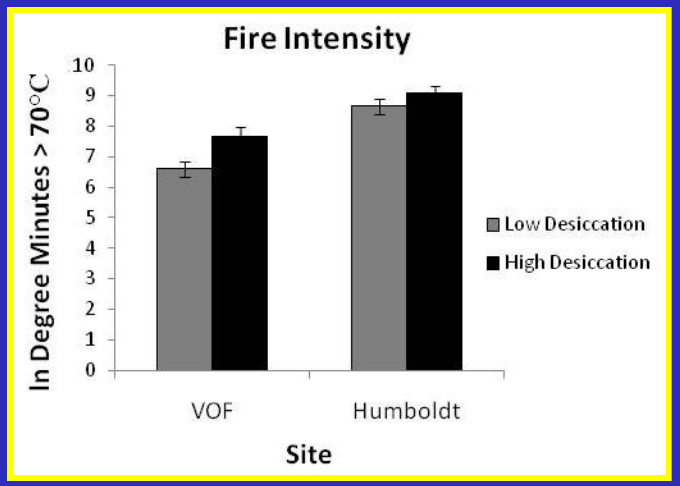


Biocontrol and Fire

Valley of Fire, Lake Mead NRA

‘Defoliation’ by beetles or herbicide

Experimental fire showed minor increase in fire intensity



Fire hazard when ‘green’ or ‘brown’

Biocontrol effect slight & temporary