Tamarisk Biological Control & Implications for Land Management

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Tamarisk Coalition
March 30th, 2012
Safford, Arizona
The Tamarisk Coalition’s mission is to provide education and technical assistance in the restoration of riparian lands.

- Watershed planning and restoration efforts
- Tamarisk Symposium and Research Conference
  - Volunteer program
- Complete inventory & mapping
- Biological control monitoring
- Native plant materials program
Non-native phreatophyte that can dominate riparian lands
Tamarisk covers millions of acres of riparian lands within the western United States.

Courtesy of Fred Nibling, Bureau of Reclamation
What’s the big deal anyhow?

- Competes w/ & displaces native vegetation
- Can provide poor habitat for wildlife
- Altered fire regimes
- Changes in channel morphology
- Water usage?...
Tamarisk control options

- Mechanical
- Chemical
- Prescribed fire
- Biological control
Tamarisk (Diorhabda spp.) leaf beetle

Released in North America in May 2001

Photo courtesy of Ed Kosmicki

Photo Sonoran Joint Venture
Beetles and larvae defoliating tamarisk

Courtesy of Dr. Dan Bean, Palisade Insectary
East Salt Creek - Mesa County, CO

Before & After

2007 pre-beetle

2010 post-beetle
Comprehensive Impacts of Biological Control

- Herptiles and small mammal monitoring
- Long term vegetation monitoring
- Migratory birds
- Tamarisk mortality
- Evapotranspiration
- Other contributing studies and researchers
  - UCSB
  - Desert Botanic Garden
  - NAU
  - ASU
  - Stillwater Sciences
  - UNLV
  - USU
  - Western Foundation for Vertebrate Zoology
  - USGS
  - Desert Research Institute
  - Colorado Dept. Of Ag
  - TNC
How are beetles tracked?

<table>
<thead>
<tr>
<th>Date</th>
<th>UtM Coordinates</th>
<th>River section</th>
<th>Sweep 1</th>
<th>Sweep 2</th>
<th>Sweep 3</th>
<th>Sweep 4</th>
<th>Sweep 5</th>
<th>EPG</th>
<th>Conulates Stop</th>
<th>ID</th>
<th>Direction</th>
<th>Photo</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lat</td>
<td>Early Larvae</td>
<td></td>
<td></td>
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<td></td>
<td>Long</td>
<td>Late Larvae</td>
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[Images of people collecting beetles and equipment used for sampling.]
2007 Distribution of Tamarisk Leaf Beetle (Diorhabda carinulata)

Funding Provided By:
Colorado Department of Agriculture
Tamarisk Coalition

Data Collected By:
Colorado Department of Agriculture:
Palisade Insectary
Tamarisk Coalition
University of California Santa Barbara

Map Published by Tamarisk Coalition on: 11/4/11

Beetle Presence*
- Absent (0)
- Infrequent Individuals (1-4)
- Small Establishment (5-25)
- Large Establishment (26-500)

*Beetle Presence includes Adults, Larvae and Eggs
2008 Distribution of Tamarisk Leaf Beetle (Diorhabda carinulata)

Funding Provided By:
Colorado Department of Agriculture
Tamarisk Coalition
Williams

Data Collected By:
Colorado Department of Agriculture
Palisade Insectary
Tamarisk Coalition
University of California Santa Barbara

Map Published by Tamarisk Coalition on: 11/4/11

Beetle Presence:
- Absent (0)
- Infrequent Individuals (1-4)
- Small Establishment (5-25)
- Large Establishment (26-500)

*Beetle Presence includes Adults, Larvae and Eggs
2011 Distribution of Tamarisk Leaf Beetle (Diorhabda carinulata)

Funding Provided By:
The Walton Family Foundation
Colorado Water Conservation Board
Bureau of Indian Affairs

Data Collected By:
Bureau of Indian Affairs:
Western & Northern Navajo Agency
Canyon de Chelly National Monument
Colorado Department of Agriculture:
Palisade Insectary
Dinosaur National Monument
Glen Canyon National Recreation Area
Grand Canyon National Park
Grand Canyon Youth
Natural Resources Conservation Service
Southern Nevada Water Authority
Tamarisk Coalition
University of Arizona
University of California Santa Barbara
US Geological Survey

Map Published by Tamarisk Coalition on: 11/4/11

- **Survey Zone**
- **Absent (0)**
- **Infrequent Individuals (1-4)**
- **Small Establishment (5-25)**
- **Large Establishment (26-500)**

*Beetle Presence includes Adults, Larvae, and Eggs*
Yearly Distribution (2007 - 2011) of Tamarisk Leaf Beetle (Diorhabda carinulata)
Southwestern Willow Flycatcher
(Empidonax traillii extimus)

- Neotropical migrant; winters in Central America
- Listed as Endangered in 1995

Photo complements SWCA

Adapted from Unitt (1987), Browning (1993), and Sogge et al. (1997)
Virgin River Valley 2010 – Before Biocontrol (June 1) and After (June 20)
Nest chronology and timing of defoliation

This cycle may happen repeatedly over many years
- Tamarisk beetles are likely to affect habitat conditions in ways that are detrimental to flycatcher reproduction
- Beetles likely to affect entire drainages at one time; several years of poor reproduction would lead to sharp decline in local flycatcher population
- Dispersal data suggest that recolonization by flycatchers from other drainages would be slow
<table>
<thead>
<tr>
<th>River</th>
<th>High Priority Reach</th>
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<tbody>
<tr>
<td>Virgin/Muddy/Pahranagat</td>
<td>Zion NP down to Virgin Gorge (encompasses St. George)</td>
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<td></td>
<td>Virgin Gorge to Gold Butte</td>
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<td></td>
<td>Gold Butte to Lake Mead</td>
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<tr>
<td></td>
<td>Muddy River from Overton WMA to Lake Mead</td>
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<tr>
<td>San Pedro</td>
<td>Narrows to Gila River confluence</td>
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<tr>
<td>Gila</td>
<td>Dripping Springs to Kelvin Bridge (includes San Pedro confluence)</td>
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<td></td>
<td>San Carlos Lake – Coolige Dam to Bonita Creek</td>
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<tr>
<td></td>
<td>Duncan, AZ to Mogollon Creek, NM</td>
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<tr>
<td>Bill Williams</td>
<td>Alamo Lake margin - confluence of Big Sandy and Santa Maria</td>
</tr>
</tbody>
</table>
Participants in the Virgin River SWFL Collaborative include:

- Bureau of Land Management
- City of Mesquite
- Clark County Desert Conservation Program
- Fred Phillips Consulting
- Great Basin Institute - Nevada Conservation Corps
- National Park Service
- Natural Resources Conservation Service
- Nevada Department of Wildlife
- Northern Arizona University
- Outside Las Vegas Foundation
- Partners In Conservation
- Southern Nevada Water Authority
- Southwest Conservation Corps
- Stillwater Sciences
- SWCA Environmental Consultants
- The Nature Conservancy
- University of California - Santa Barbara
- US Bureau of Reclamation
- US Fish & Wildlife Service
- Utah Division of Wildlife Resources
- Virgin River Program
- Virgin Valley Water District
- Walton Family Foundation
Shared Goals & Strategies

Shared Goals:
- Maintain, enhance, and/or create flycatcher habitat that is most ecologically and economically beneficial
- Create a healthy riparian corridor that provides connectivity between flycatcher sites
- Meet flycatcher population goals for the Virgin River as established in the Recovery Plan

Shared Strategies:
- Maintenance or creation of native vegetation stands in series of successional stages
- Work out wards, on a priority basis, from currently occupied flycatcher sites
- Improvement or creation of habitat in advance of *Diorhabda* spp., where applicable
- Minimization of substrate disturbance except where necessary to provide a seedbed for germination and seedling establishment
- Early implementation/continuation of flycatcher and vegetation monitoring to gauge success/failure and to inform other projects
- Establishment of local native plant nurseries to supply revegetation efforts
What Scale?

- Landscape-scale
- Guided by recommendations in Flycatcher Recovery Plan
- Restore currently unoccupied river reaches to facilitate the redevelopment of meta-population structures
Integrate Science into Restoration Planning

- Ecohydrological assessment
- Develop monitoring and adaptive management process
- Continue monitoring the tamarisk leaf beetle expansion and ecosystem effects
Gila & San Pedro Rivers

- Hosted field trip Nov. 2011 to assess restoration potential
  - Stressor mitigation could be beneficial near confluence, however, greater benefit could potentially be achieved above Coolidge Dam in the Safford Valley
- Willing landowners