Tamarisk Biological Control & Implications for Land Management

Shannon Hatch & Stacy Beaugh
Tamarisk Coalition

March 30th, 2012
Safford, Arizona

Tamarisk Coalition

a non-profit alliance
working to restore riparian lands

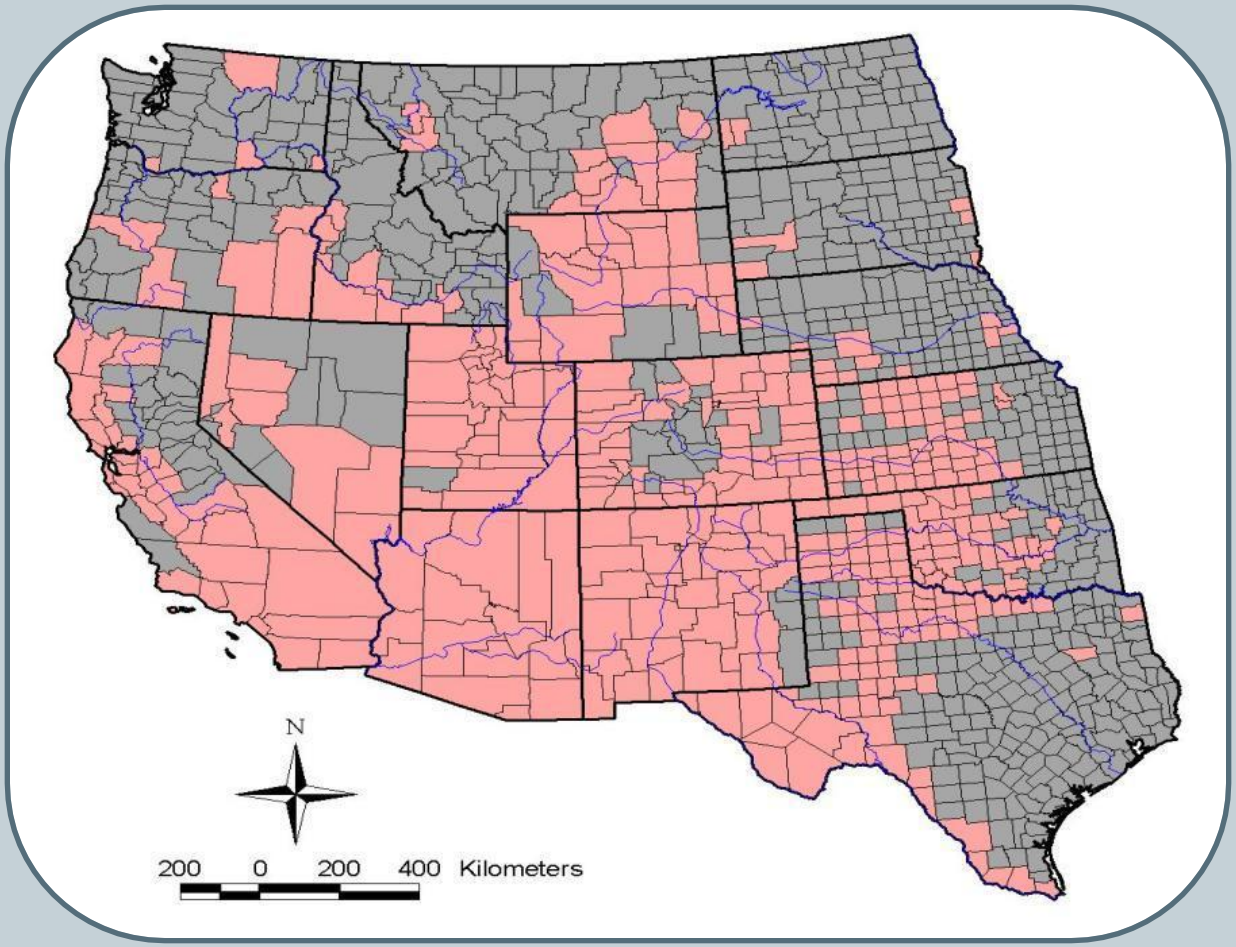
Tamarisk Coalition

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

Distribution



Tamarisk covers millions of acres of riparian lands within the western United States

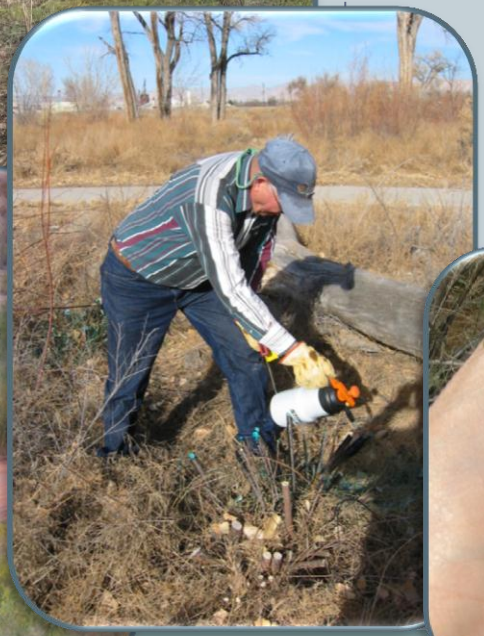
Courtesy of Fred Nibling, Bureau of Reclamation

What's the big deal anyhow?

Can you find the cottonwoods?

- 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

Photo courtesy of Ed Kosmicki

Photo Sonoran Joint Venture

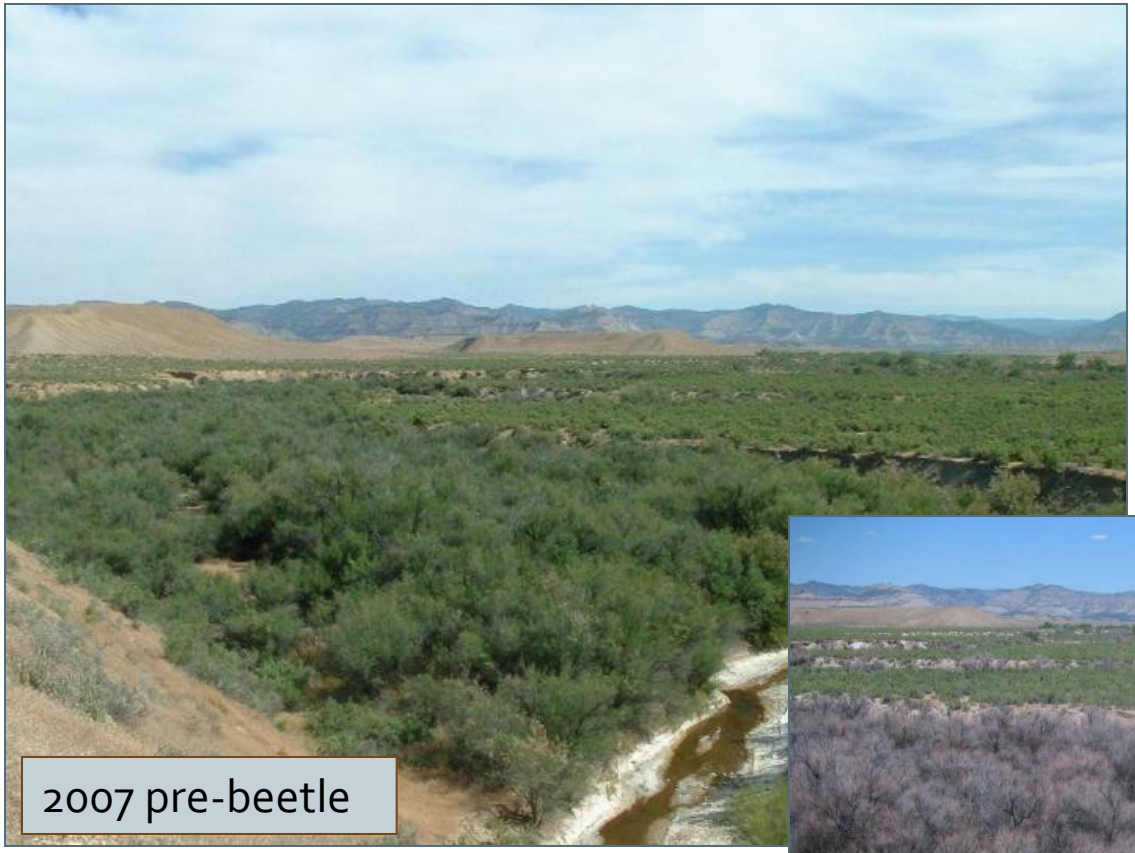
Released in North America in May 2001

Beetles and larvae defoliating tamarisk

Courtesy of Dr. Dan Bean, Palisade Insectary

East Salt Creek - Mesa County, CO

Before & After



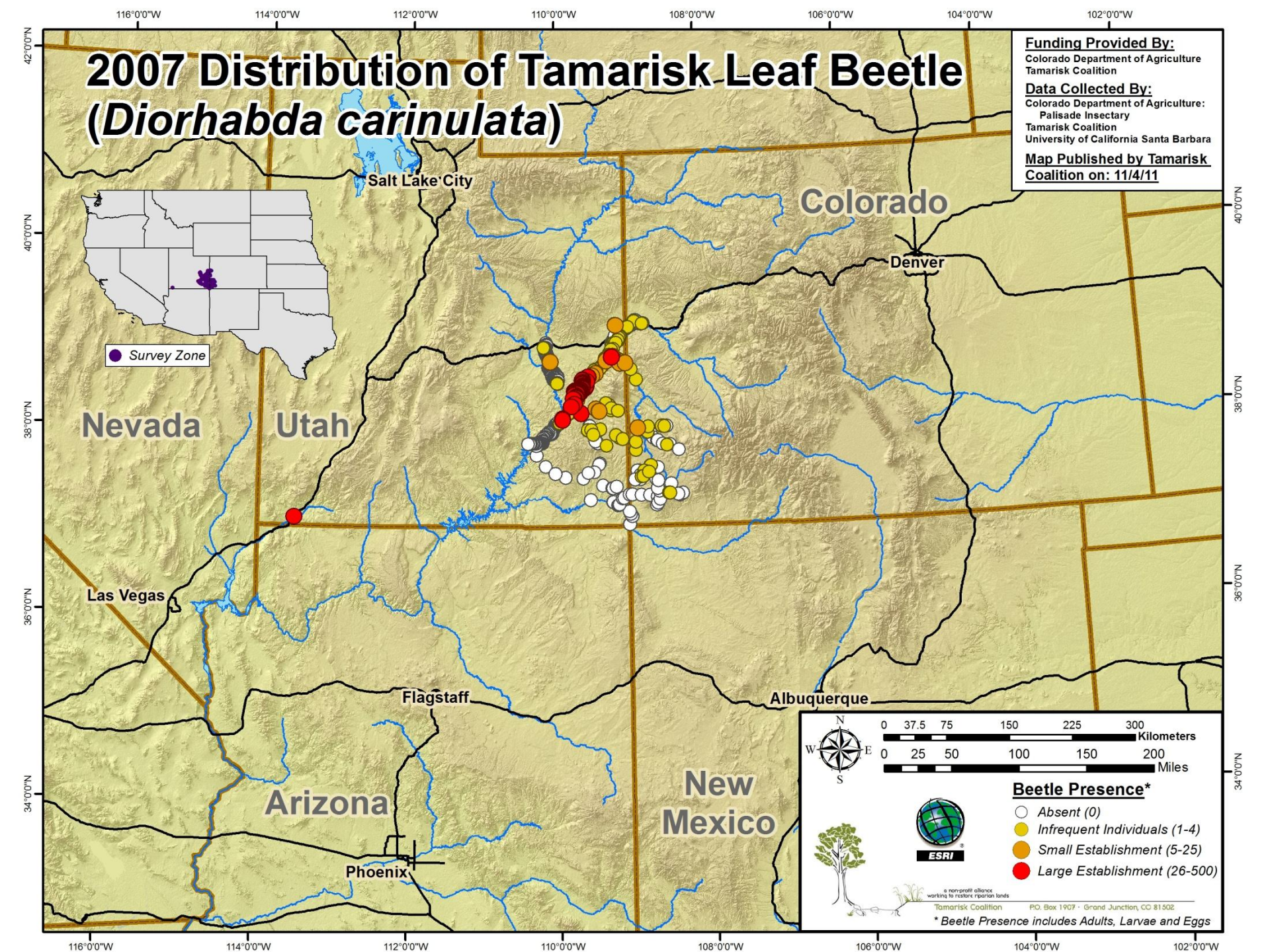
Comprehensive Impacts of Biological Control

- 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?

Date	GPS Point ID	UTM Coordinates	River mi/km		Sweep 1	Sweep 2	Sweep 3	Sweep 4	Sweep 5	Eggs	Coniatus Spp	Defoliation	Re-foliation	Photo	Comments
		Lat:		Adults										ID:	
				Early Larvae											
		Long:		Late Larvae										Direction	


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
Survey Zone
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Utah
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Arizona
New Mexico
Phoenix
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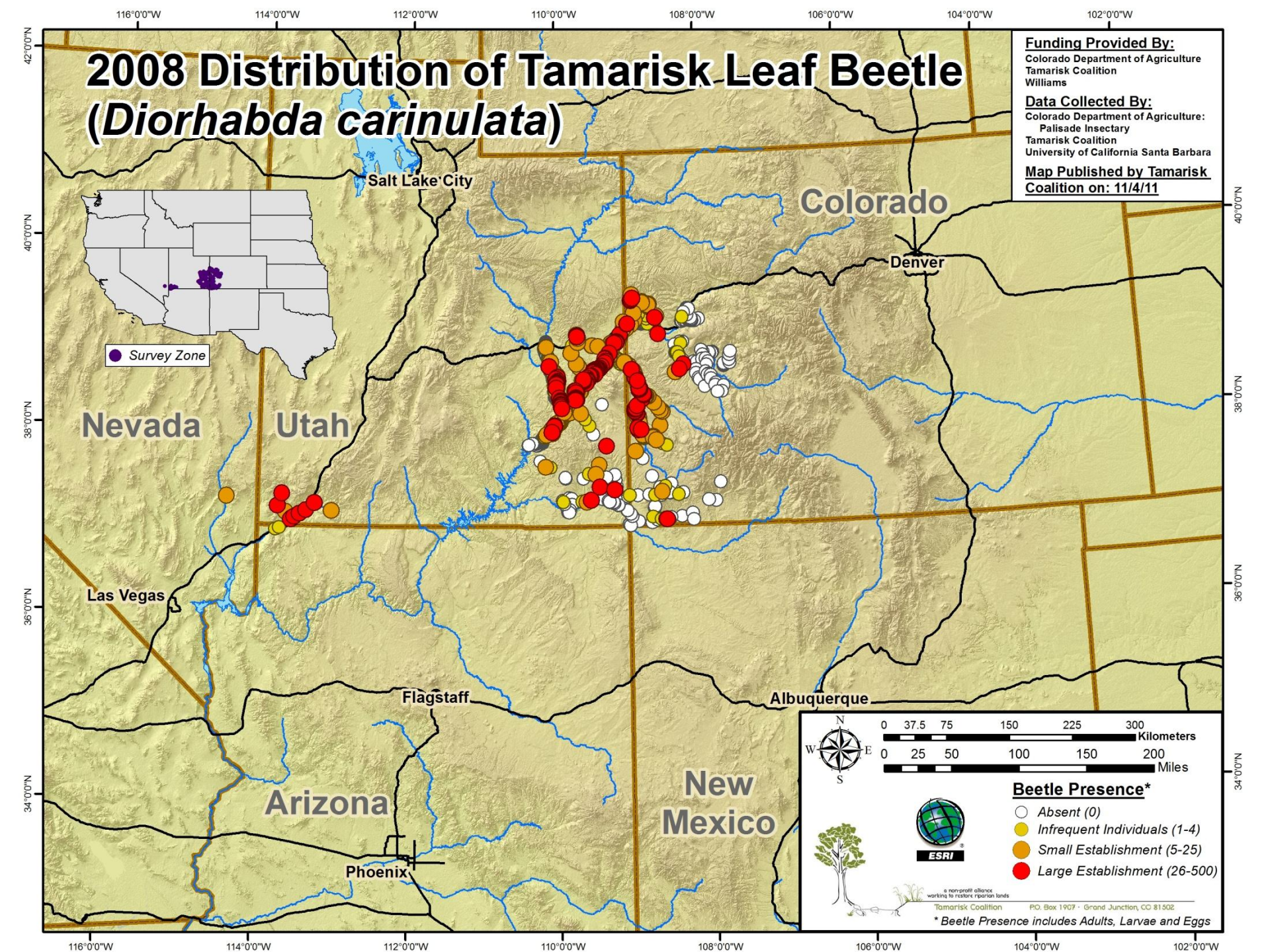
0 37.5 75 150 225 300 Kilometers
0 25 50 100 150 200 Miles
Beetle Presence*
Absent (0)
Infrequent Individuals (1-4)
Small Establishment (5-25)
Large Establishment (26-500)
ESRI
a non-profit alliance working to restore riparian lands
Tamarisk Coalition
P.O. Box 1907 · Grand Junction, CO 81502
* Beetle Presence includes Adults, Larvae and Eggs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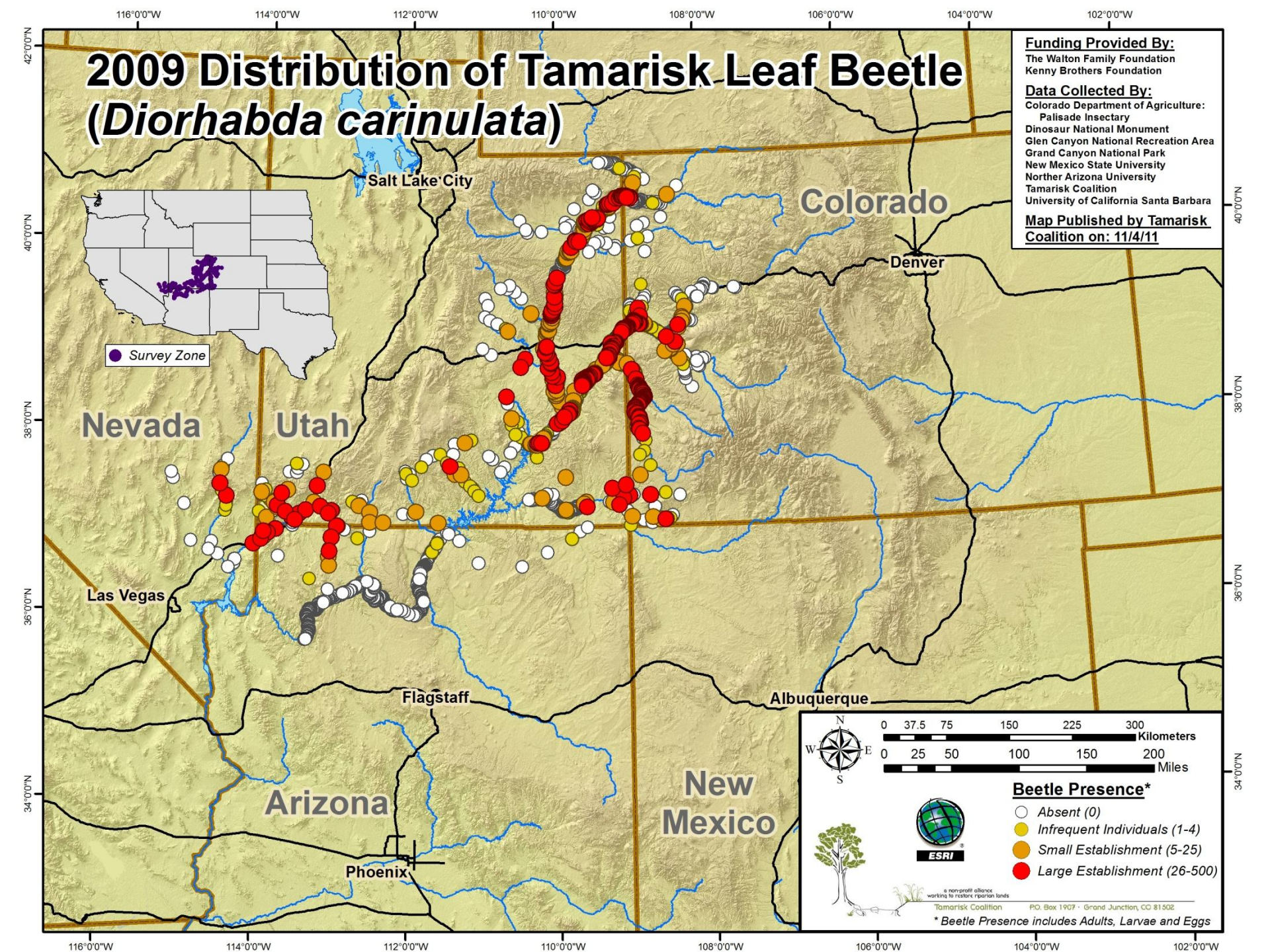
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Grand Canyon National Park
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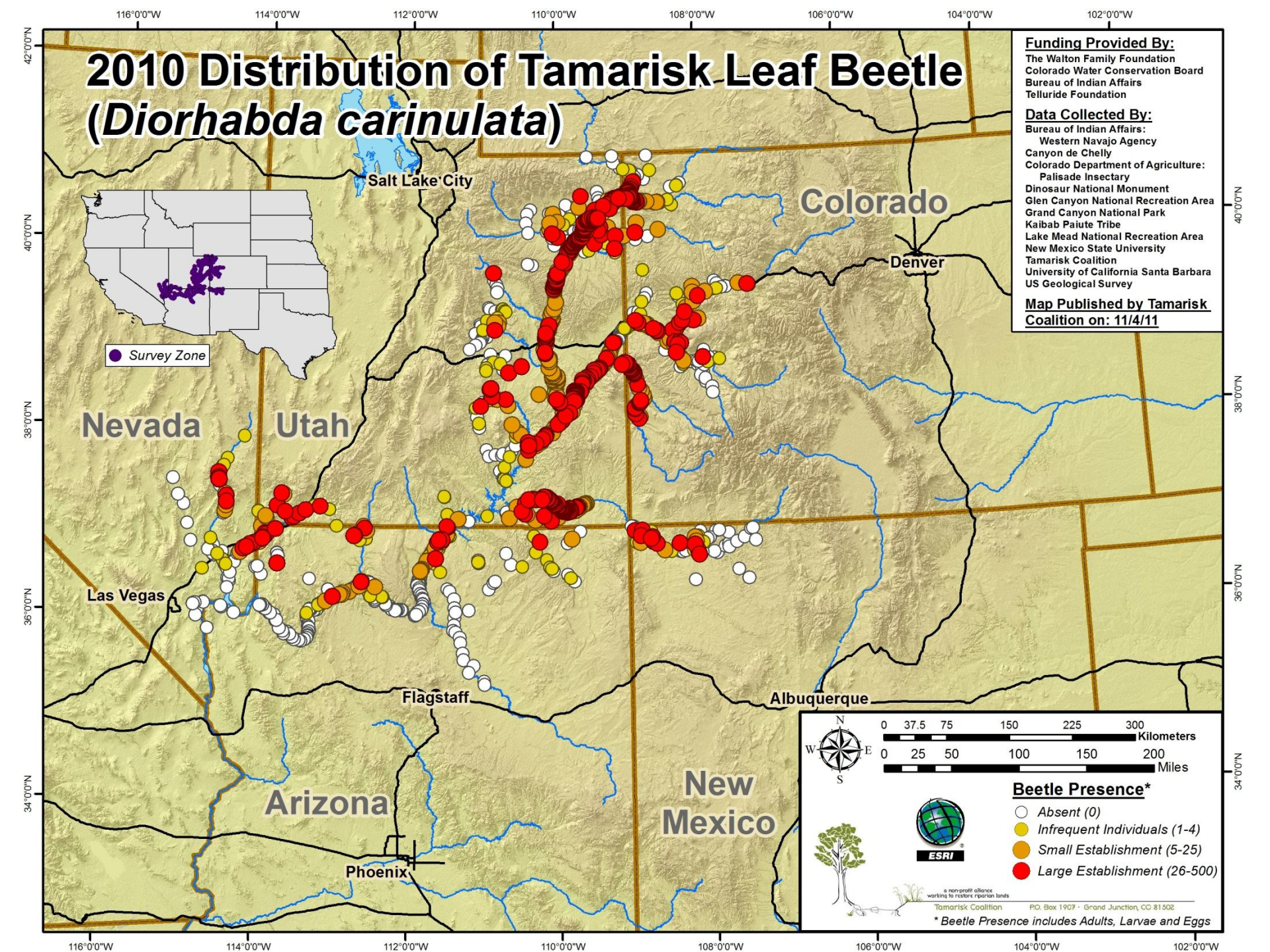
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Telluride Foundation
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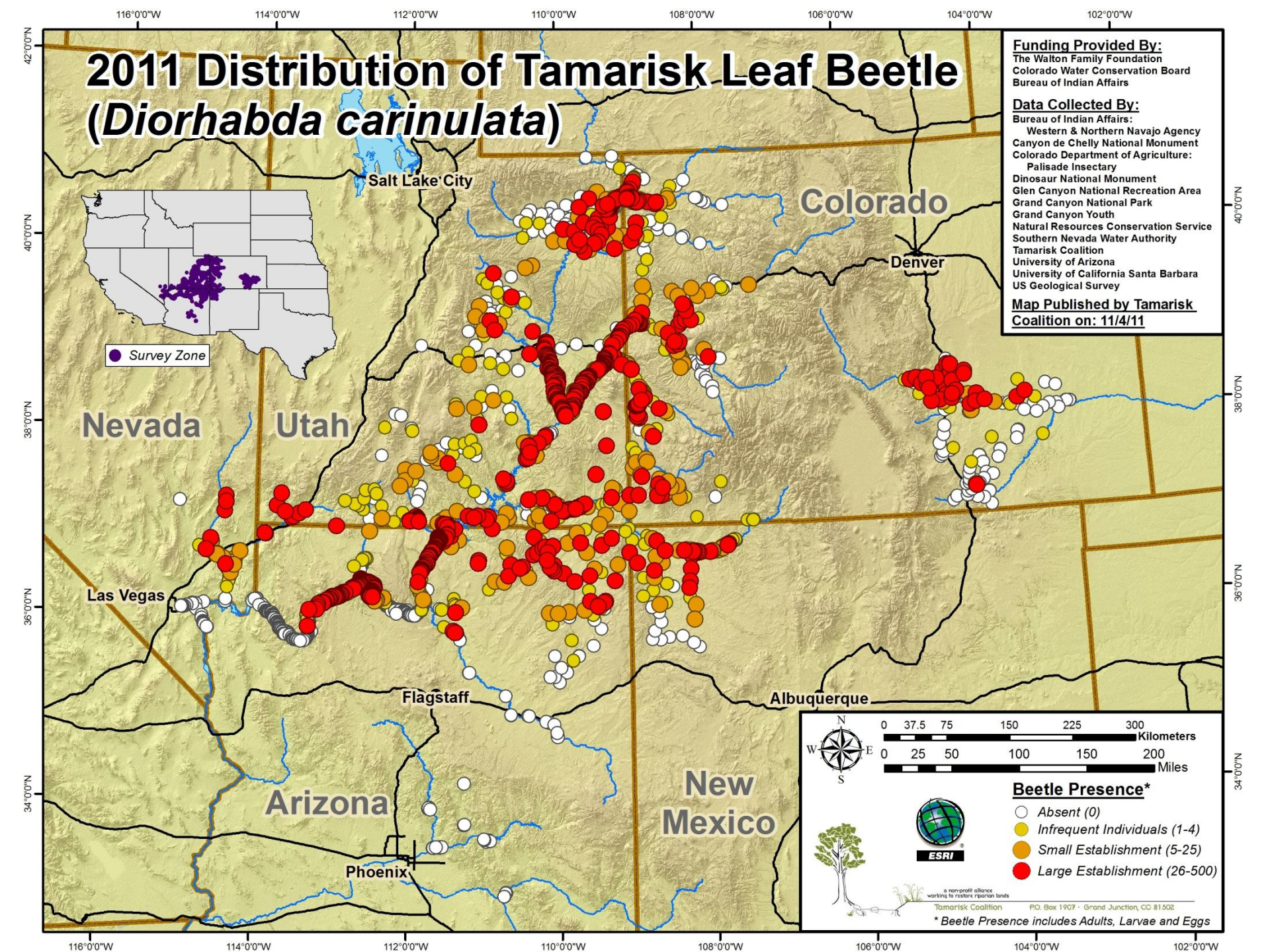
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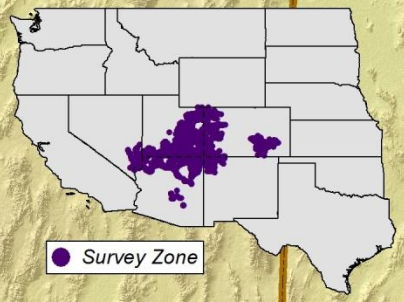
Yearly Distribution (2007 - 2011) of Tamarisk Leaf Beetle (*Diorhabda carinulata*)



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Monitoring Years
- Year 2007
- Year 2008
- Year 2009
- Year 2010
- Year 2011

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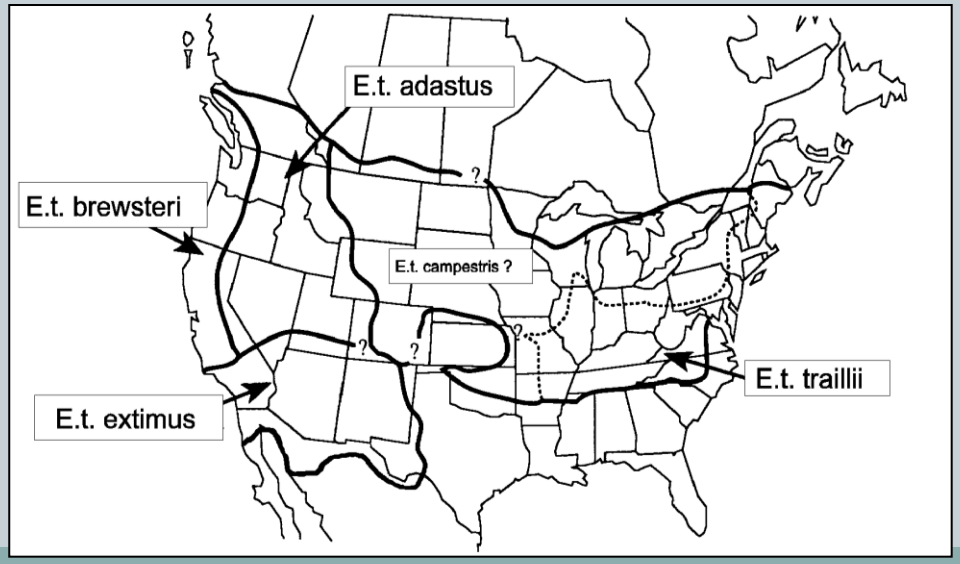
Southwestern Willow Flycatcher
(*Empidonax traillii extimus*)

Photo complements SWCA

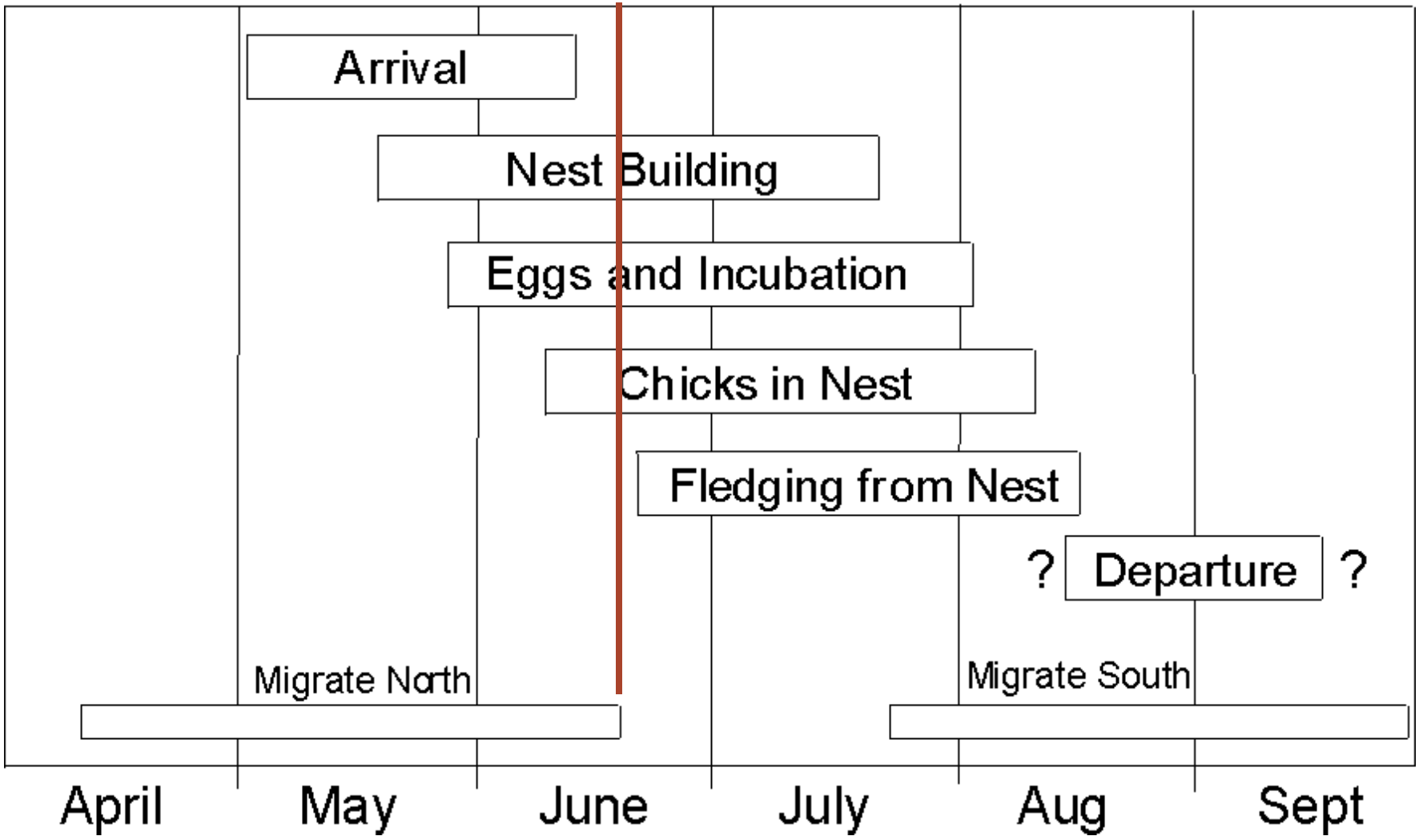
- Neotropical migrant; winters in Central America
- Listed as Endangered in 1995



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

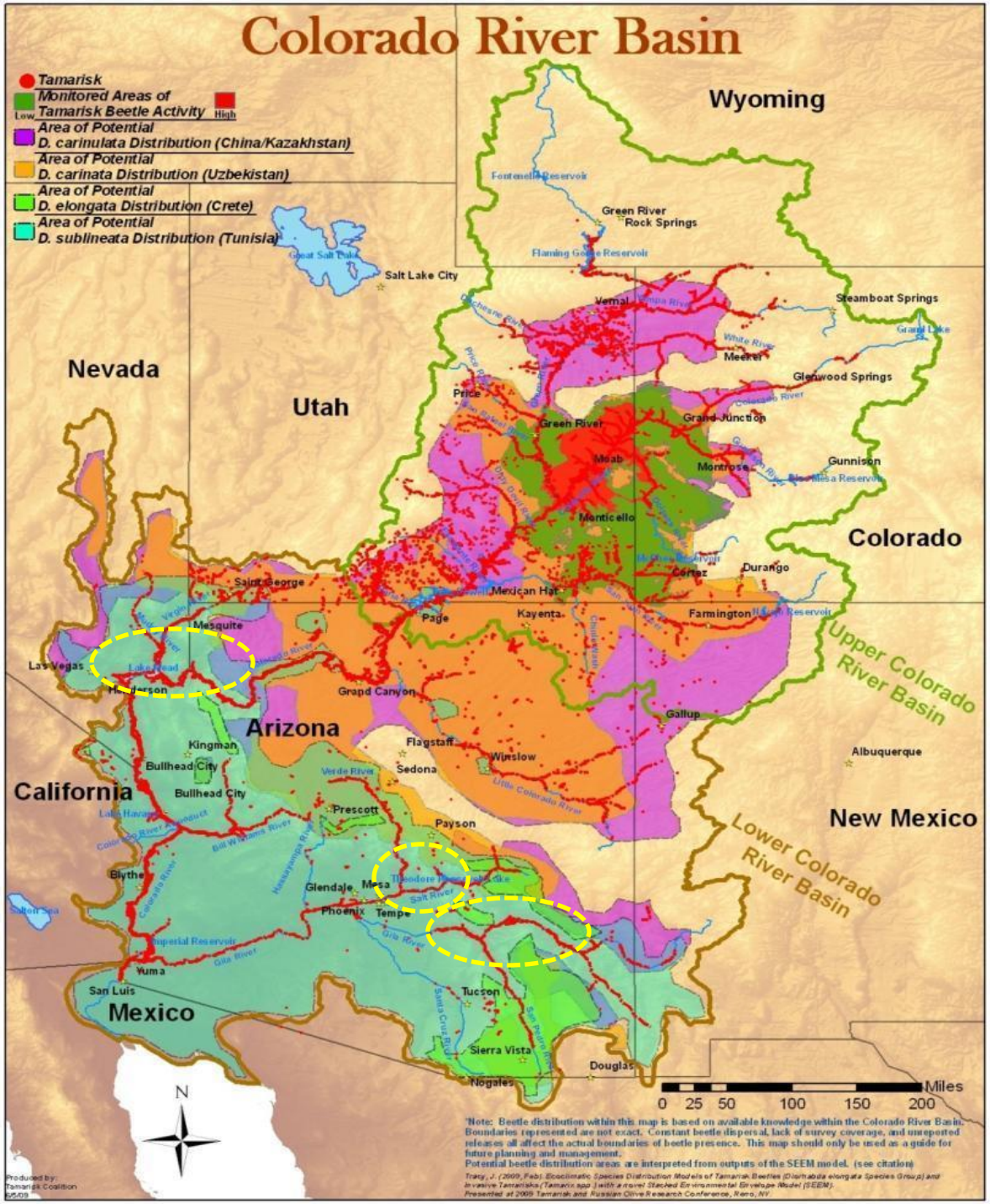


This cycle may happen repeatedly over many years

Southwestern Willow Flycatcher

- 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

Photos and text complements SWCA


Colorado River Basin
Tamarisk
Monitored Areas of Tamarisk Beetle Activity
Low
High
Area of Potential D. carinulata Distribution (China/Kazakhstan)
Area of Potential D. carinata Distribution (Uzbekistan)
Area of Potential D. elongata Distribution (Crete)
Area of Potential D. sublineata Distribution (Tunisia)
Wyoming
Nevada
Utah
Colorado
Arizona
California
New Mexico
Mexico
Upper Colorado River Basin
Lower Colorado River Basin
Fontenelle Reservoir
Green River
Rock Springs
Flaming Gorge Reservoir
Great Salt Lake
Salt Lake City
Vernal
Steamboat Springs
Grand Lake
White River
Meeker
Glenwood Springs
Price
Green River
Grand Junction
Moab
Montrose
Gunnison
Blue Mesa Reservoir
Monticello
Durango
Cortez
Mexican Hat
Page
Kayenta
Farmington
Navajo Reservoir
Saint George
Mesquite
Las Vegas
Lake Mead
Henderson
Grand Canyon
Gallup
Albuquerque
Kingman
Bullhead City
Flagstaff
Winslow
Sedona
Verde River
Little Colorado River
Prescott
Payson
Lake Havasu
Colorado River Aqueduct
Bill Williams River
Blythe
Colorado River
Glendale
Mesa
Theodore Roosevelt Lake
Salton Sea
Phoenix
Tempe
Salt River
Gila River
Imperial Reservoir
Yuma
San Luis
Tucson
Santa Cruz River
San Pedro River
Sierra Vista
Douglas
Nogales
N
0 25 50 100 150 200
Miles
*Note: Beetle distribution within this map is based on available knowledge within the Colorado River Basin. Boundaries represented are not exact. Constant beetle dispersal, lack of survey coverage, and unreported releases all affect the actual boundaries of beetle presence. This map should only be used as a guide for future planning and management.
Potential beetle distribution areas are interpreted from outputs of the SEEM model. (see citation)
Tracy, J. (2009, Feb). Ecoclimatic Species Distribution Models of Tamarisk Beetles (Diorhabda elongata Species Group) and Invasive Tamarisks (Tamarix spp.) with a novel Stacked Environmental Envelope Model (SEEM).
Presented at 2009 Tamarisk and Russian Olive Research Conference, Reno, NV.
Produced by:
Tamarisk Coalition
6/5/09

Site Prioritization for Colorado River Basin

River	High Priority Reach
Virgin/Muddy/ Pahranagat	Zion NP down to Virgin Gorge (encompasses St. George)
	Virgin Gorge to Gold Butte
	Gold Butte to Lake Mead
	Muddy River from Overton WMA to Lake Mead
San Pedro	Narrows to Gila River confluence
Gila	Dripping Springs to Kelvin Bridge (includes San Pedro confluence)
	San Carlos Lake – Coolige Dam to Bonita Creek
	Duncan, AZ to Mogollon Creek, NM
Bill Williams	Alamo Lake margin - confluence of Big Sandy and Santa Maria

Virgin River Flycatcher Collaborative

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
Stillwater Sciences
Tamarisk Coalition
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

Questions?