



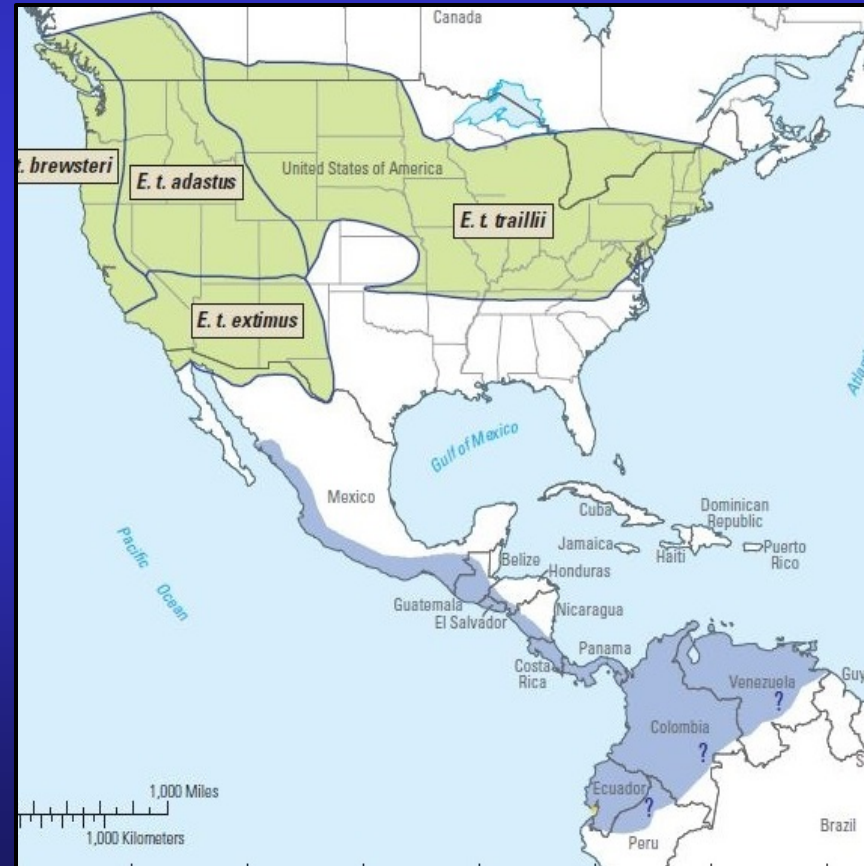
Effects of Tamarisk Defoliation on Southwestern Willow Flycatchers on the Virgin River

SWCA[®]
ENVIRONMENTAL CONSULTANTS

Southwestern willow flycatcher

(*Empidonax traillii extimus*)

- One of 4 subspecies of willow flycatcher
- Breed in AZ, NM, and adjacent portions of neighboring states
- Neotropical migrant; winter in central America; breed May - Aug

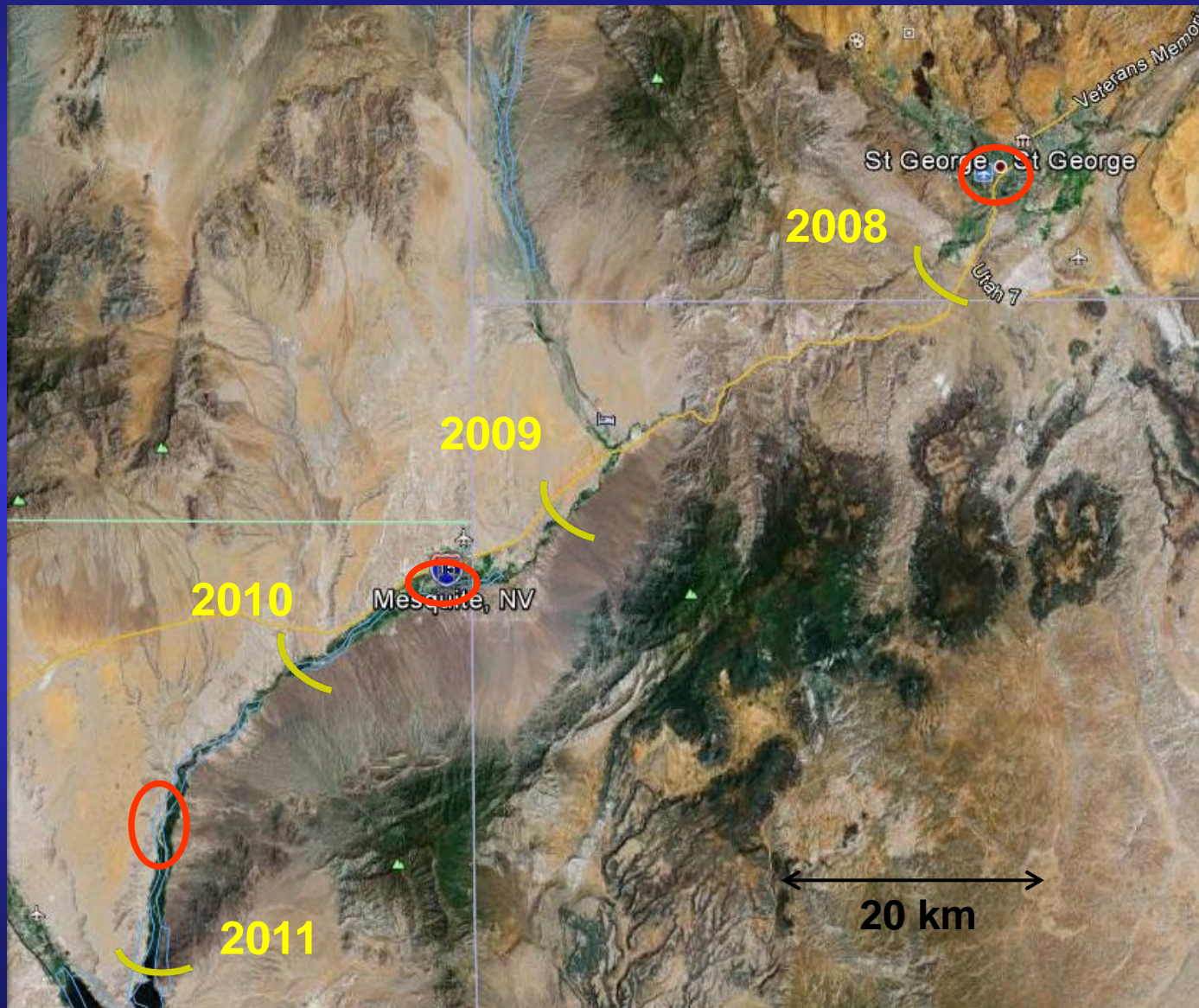


Empidonax traillii extimus

- Breed in dense, wet riparian areas; use both native and tamarisk habitats
- Build open-cup nests
- Listed as endangered in 1995



Flycatcher locations and beetle expansion on the Virgin River



- This is a census, not a subsample!





6-10-10

Effects on tamarisk:
Complete defoliation
Repeated 1-3 times within a season, May-Sept
Repeated over many consecutive years

Reduced foliage volume
Partial mortality
Complete mortality



6-13-12



2010

**This was the healthiest
looking tamarisk
around!**



2013

Aug 2010

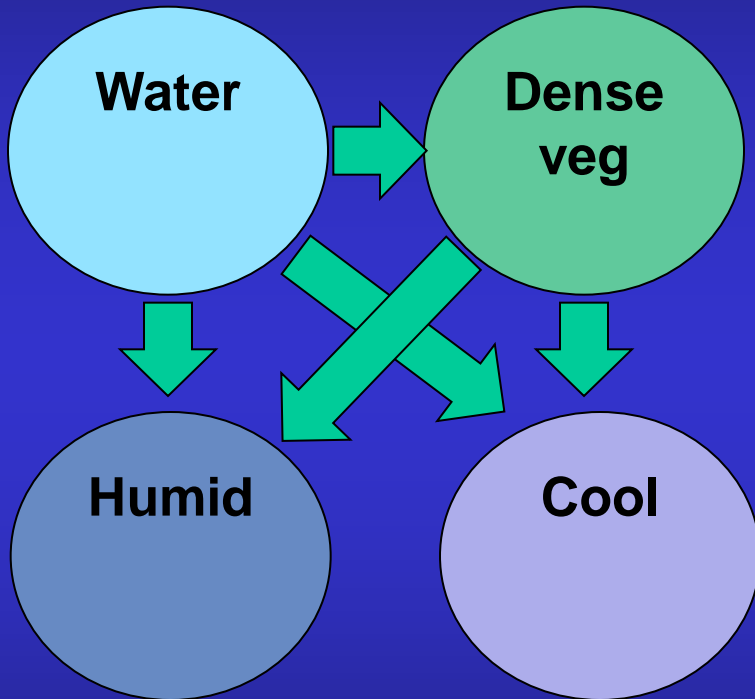


May 2013



Flycatcher Habitat Preferences

Flycatchers are picky!



Prey base

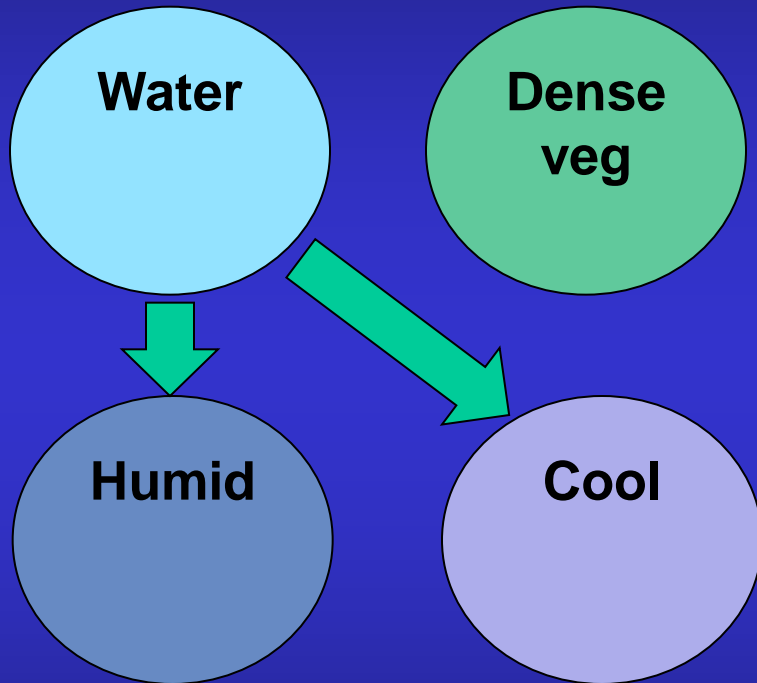
Concealment

Less time & energy on
thermoregulation

Eggs less likely to reach
lethal temp (**41°C = 106°F**)

Flycatcher Habitat Preferences

Flycatchers are picky!



- Missing environmental cues that attract flycatchers



Photo credit: Pam Wheeler UDWR

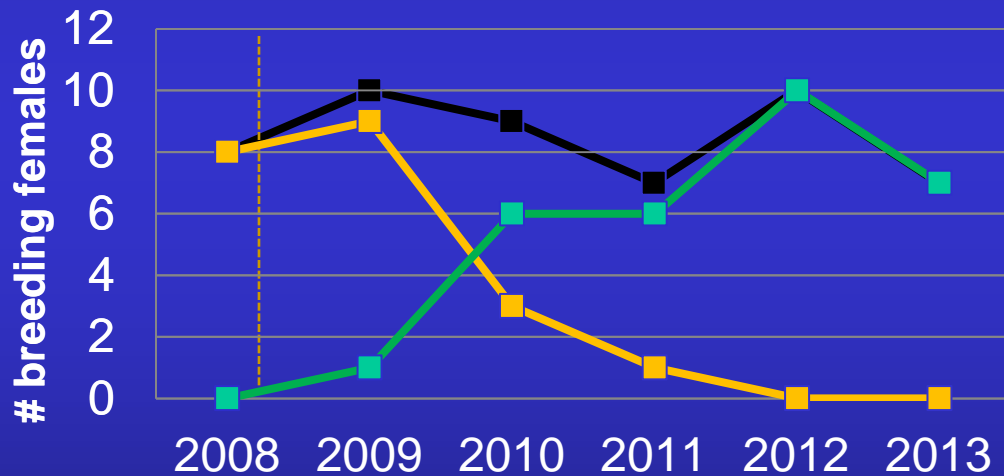
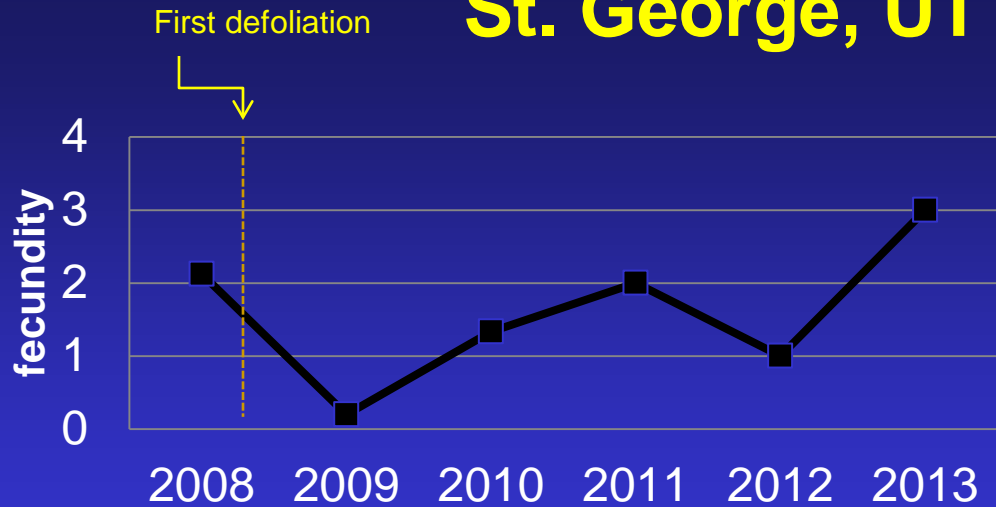
Prey base

Increased visibility

More time & energy on thermoregulation

Eggs more likely to reach lethal temp ($41^{\circ}\text{C} = 106^{\circ}\text{F}$)

St. George, UT (UDWR)



- Active revegetation of riparian areas prior to beetles
- Continuing restoration at old flycatcher sites

Flycatcher site fidelity

- Adult flycatchers typically show high site fidelity
 - Median distance moved between years is 70m
- Fidelity is affected by
 - nest success
 - habitat conditions
- Adapted to dynamic river systems
 - specialize in early successional habitats
- Flycatchers show *local* plasticity in site selection
 - 95% of movements within 30 km
 - ~1% of detected movements are to a different drainage
- Juveniles more likely to disperse than adults
 - ~10% of movements are outside the natal drainage



Mesquite

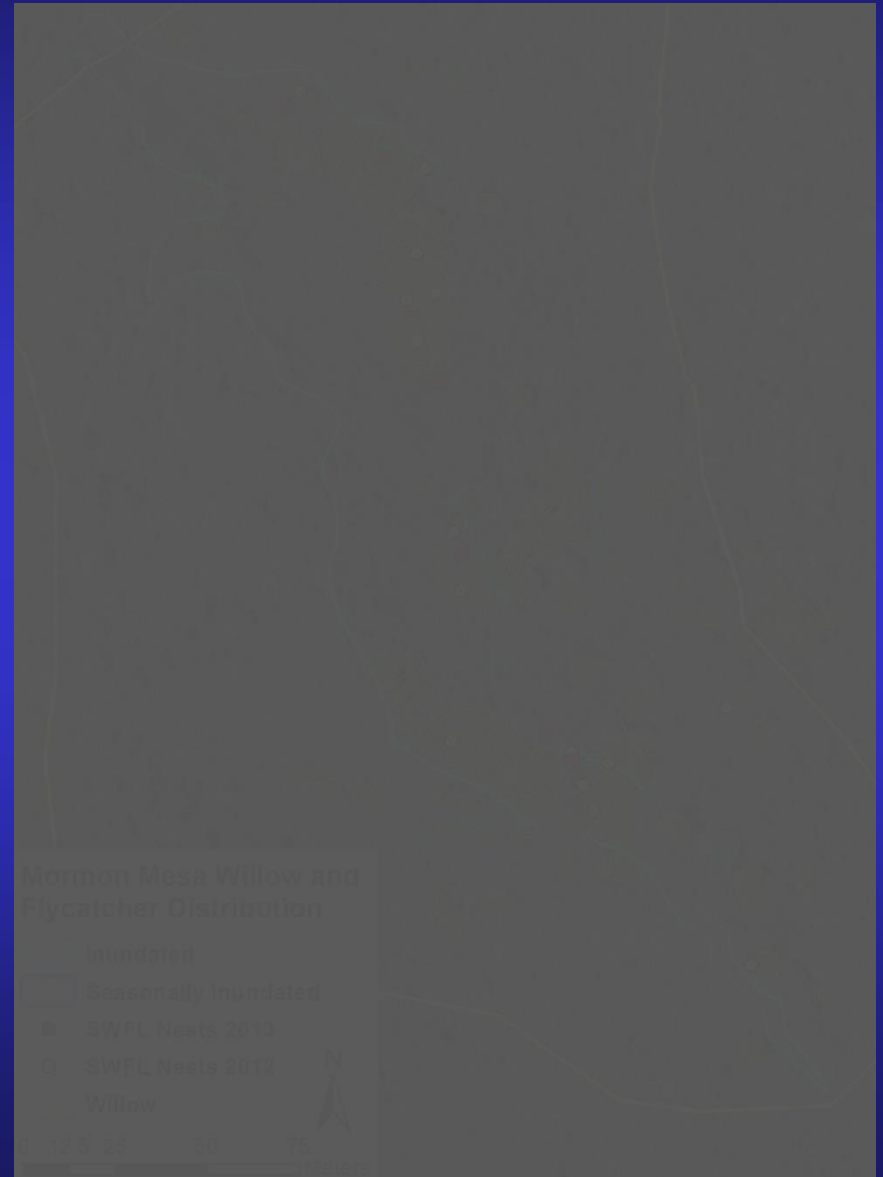


- Primarily coyote willow

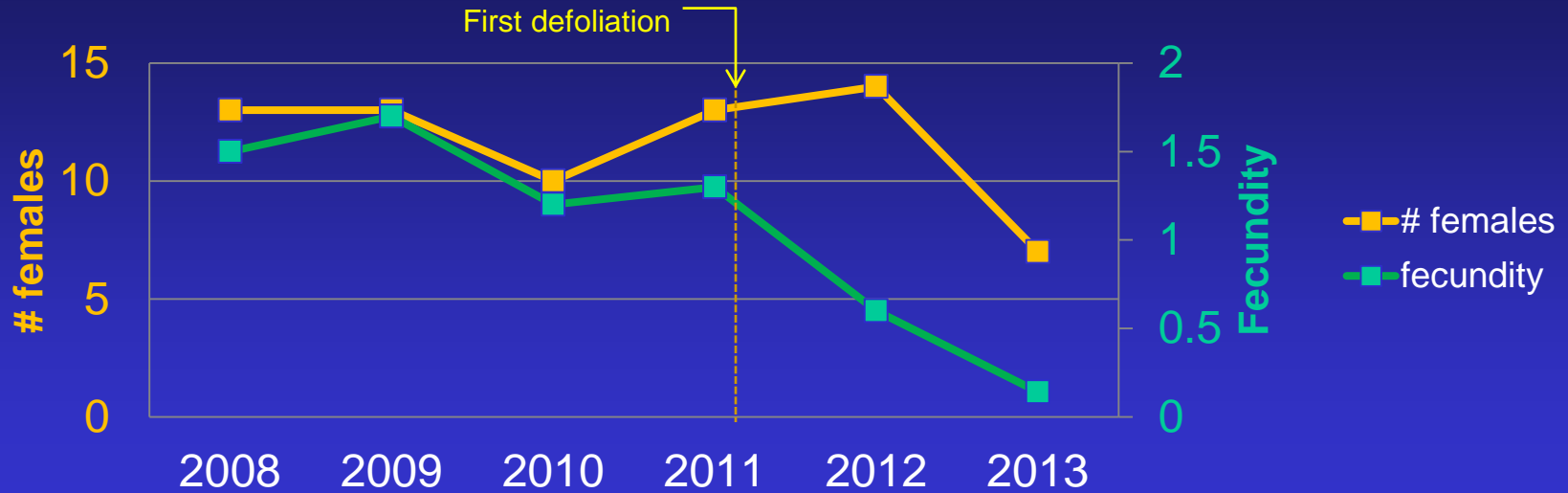
- Water source is irrigation return; unreliable in past few years
- Patches of willow dying; flycatcher population in decline; 1 pair in 2013

Mormon Mesa, NV

- mixed willow & tamarisk
- defoliated through most of 2012
- no defoliation events in 2013, but high levels of partial mortality
- 2012 and 2013 nests clustered in willow areas

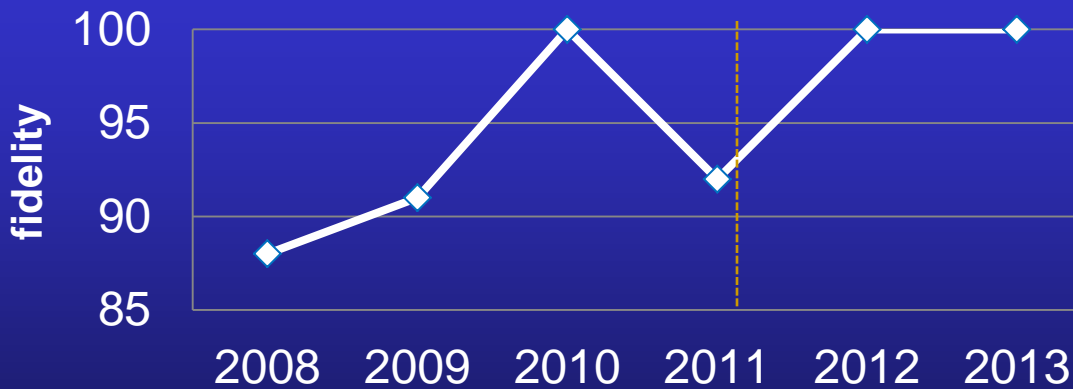


Mormon Mesa, NV



Abandonment
Nest desertion during laying

Fewer renests
Parasitism (2013)

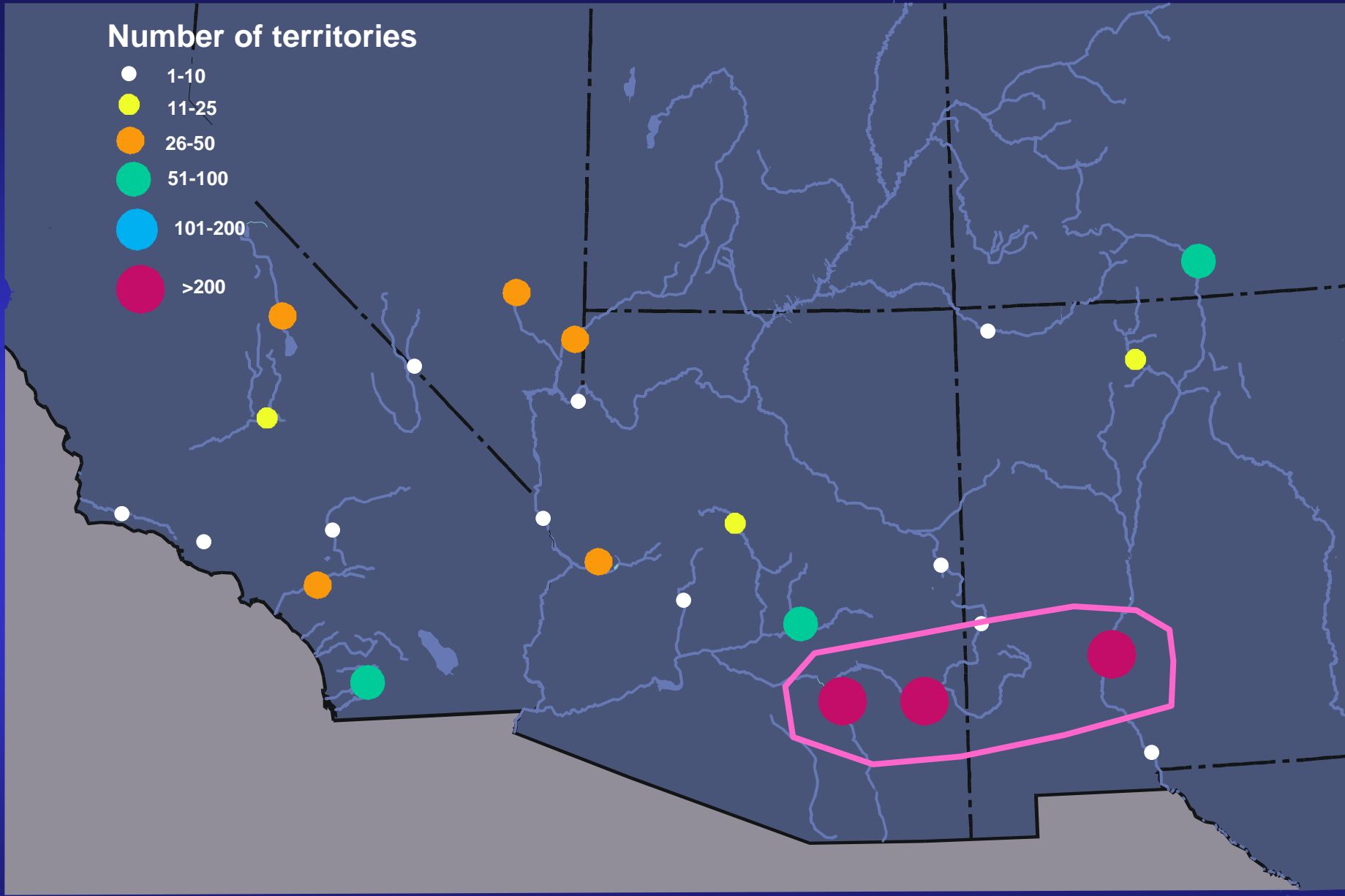


No new recruits



Number of territories

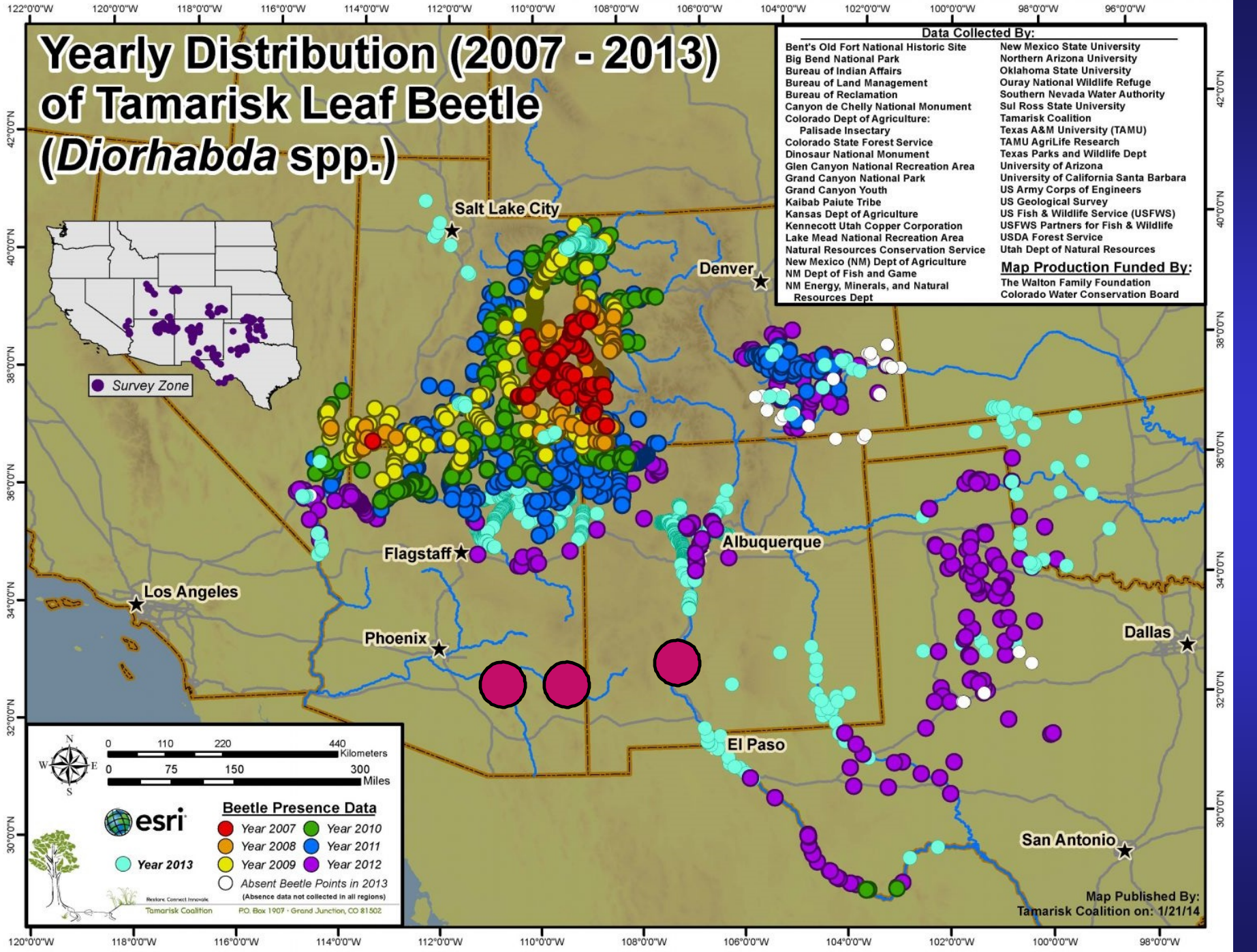
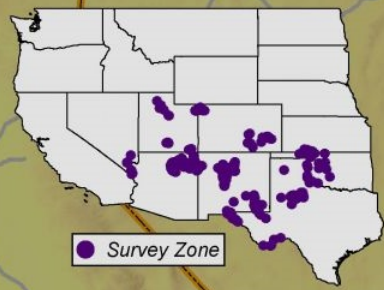
- 1-10
- 11-25
- 26-50
- 51-100
- 101-200
- >200



SW Willow Flycatcher Distribution

Yearly Distribution (2007 - 2013) of Tamarisk Leaf Beetle (*Diorhabda* spp.)

- Data Collected By:**
- Bent's Old Fort National Historic Site
 - Big Bend National Park
 - Bureau of Indian Affairs
 - Bureau of Land Management
 - Bureau of Reclamation
 - Canyon de Chelly National Monument
 - Colorado Dept of Agriculture:
 - Palisade Insectary
 - Colorado State Forest Service
 - Dinosaur National Monument
 - Glen Canyon National Recreation Area
 - Grand Canyon National Park
 - Grand Canyon Youth
 - Kaibab Paiute Tribe
 - Kansas Dept of Agriculture
 - Kennecott Utah Copper Corporation
 - Lake Mead National Recreation Area
 - Natural Resources Conservation Service
 - New Mexico (NM) Dept of Agriculture
 - NM Dept of Fish and Game
 - NM Energy, Minerals, and Natural Resources Dept
 - New Mexico State University
 - Northern Arizona University
 - Oklahoma State University
 - Ourray National Wildlife Refuge
 - Southern Nevada Water Authority
 - Sul Ross State University
 - Tamarisk Coalition
 - Texas A&M University (TAMU)
 - TAMU AgriLife Research
 - Texas Parks and Wildlife Dept
 - University of Arizona
 - University of California Santa Barbara
 - US Army Corps of Engineers
 - US Geological Survey
 - US Fish & Wildlife Service (USFWS)
 - USFWS Partners for Fish & Wildlife
 - USDA Forest Service
 - Utah Dept of Natural Resources
- Map Production Funded By:**
- The Walton Family Foundation
 - Colorado Water Conservation Board



0 110 220 440 Kilometers
0 75 150 300 Miles

esri

Beetle Presence Data

- Year 2007
- Year 2008
- Year 2009
- Year 2010
- Year 2011
- Year 2012
- Year 2013
- Absent Beetle Points in 2013
(Absence data not collected in all regions)

Restore. Connect. Innovate.
Tamarisk Coalition
P.O. Box 1907 - Grand Junction, CO 81502

Map Published By:
Tamarisk Coalition on: 1/21/14

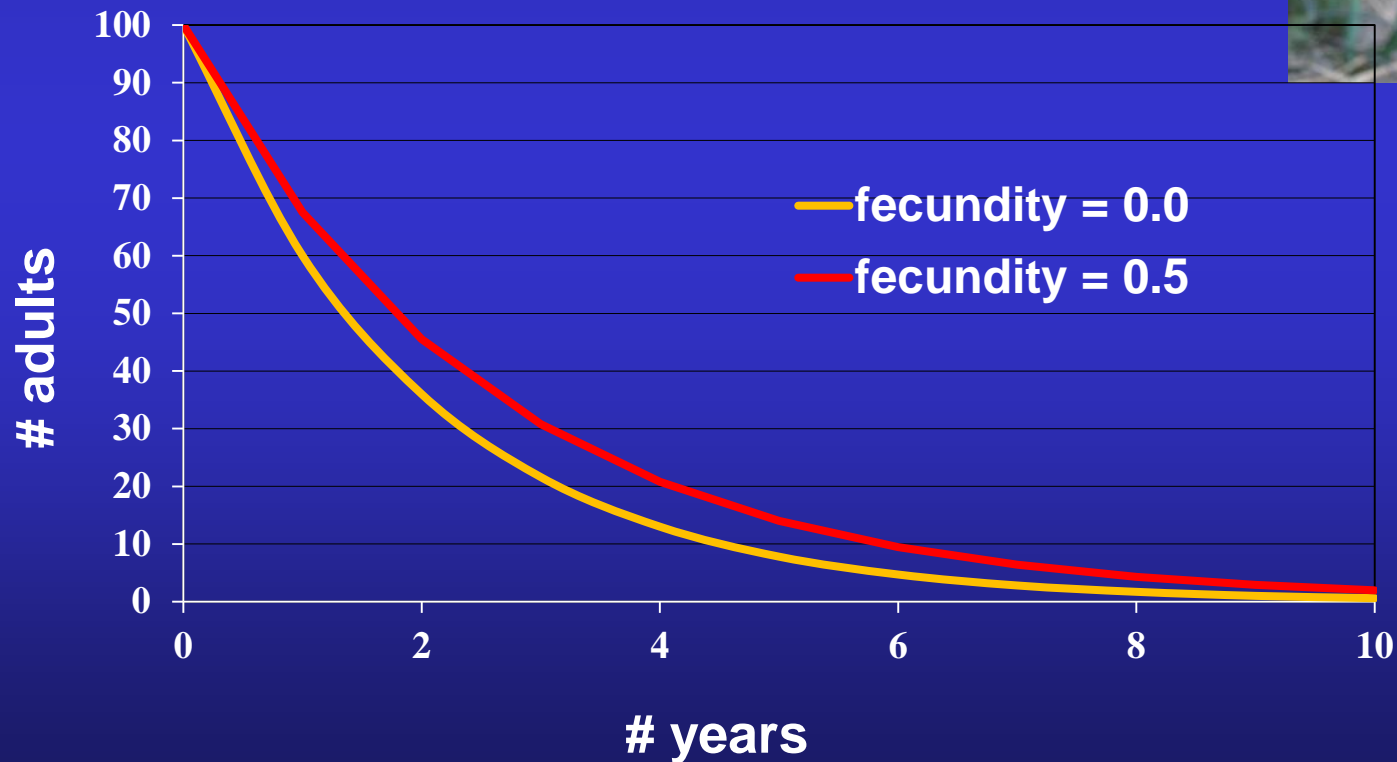
Why Can't They Adapt Back?

- They can, and they will...
 - ... if they can make it through the interim
- Time scale is problematic
 - Several years for tamarisk to die
 - Several years (minimum 2-3 under ideal conditions) for natives to reach suitable size



In the Meantime...

- Annual adult survivorship ~60%
- Annual juvenile survivorship ~30%
- ~10% of population remaining after 5 years



Restoration Challenges

- Before beetles arrive
- Alternative nesting sites until natives can recover – take advantage of flycatcher's ability to move!
- Altered hydrology
- Saline soils
- \$\$\$\$
- Careful site selection – flycatchers are picky!
- It is possible to restore habitats that flycatchers will use
- Long-term prospects will be decided in the next few years



