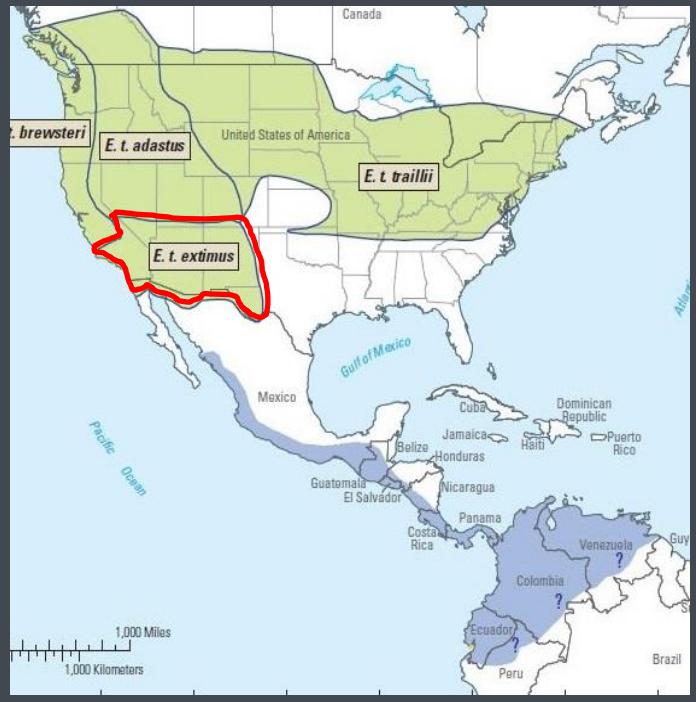
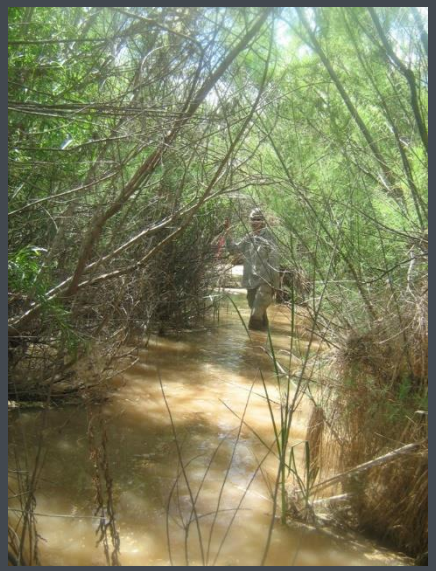
EFFECTS OF TAMARISK DEFOLIATION ON SOUTHWESTERN WILLOW FLYCATCHERS

SOUTHWESTERN WILLOW FLYCATCHER (*Empidonax traillii extimus*)

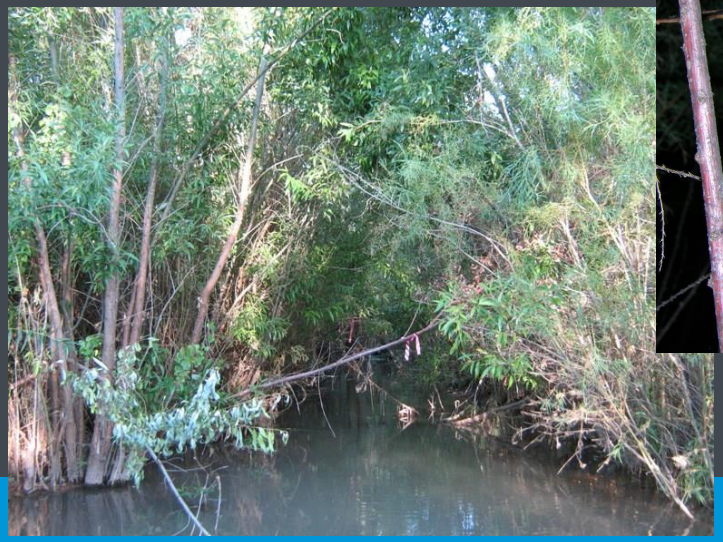
- Endangered subspecies of willow flycatcher
- Breed in AZ, NM, and adjacent portion of neighboring states
- Late migrants; arrive May–June

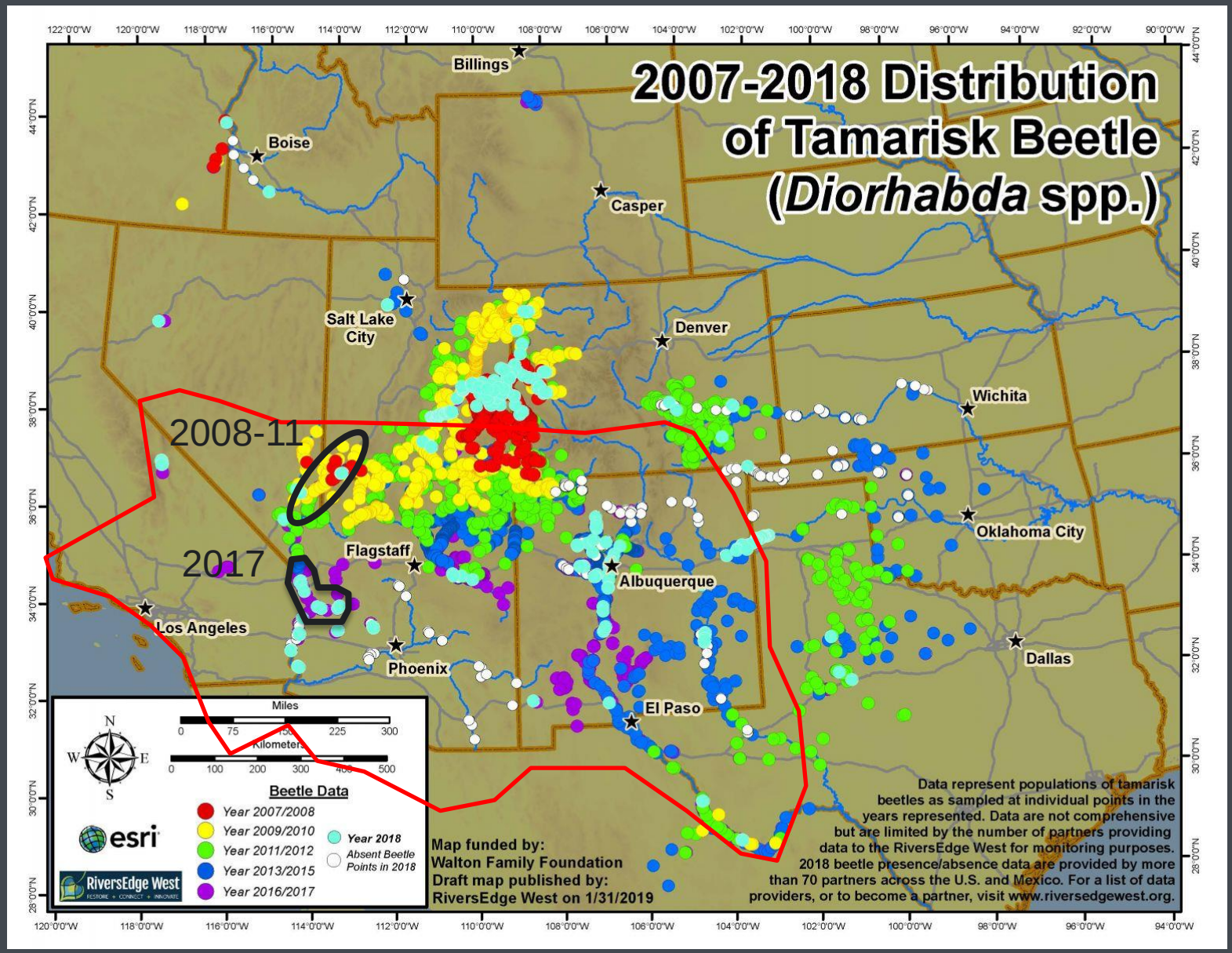


SOUTHWESTERN WILLOW FLYCATCHER



- Breed in dense, wet riparian habitats; strong affinity for surface water
- Select nest sites that are cool, humid, dense
- Use both native vegetation and tamarisk




2007-2018 Distribution of Tamarisk Beetle (Diorhabda spp.)
Billings
Boise
Casper
Salt Lake City
Denver
Wichita
Oklahoma City
Albuquerque
Flagstaff
Los Angeles
Phoenix
Dallas
El Paso
2008-11
2017
Miles
0 75 150 225 300
Kilometers
0 100 200 300 400 500
N
W
E
S
Beetle Data
Year 2007/2008
Year 2009/2010
Year 2011/2012
Year 2013/2015
Year 2016/2017
Year 2018
Absent Beetle Points in 2018
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RiversEdge West
RESTORE + CONNECT + INNOVATE
Map funded by:
Walton Family Foundation
Draft map published by:
RiversEdge West on 1/31/2019
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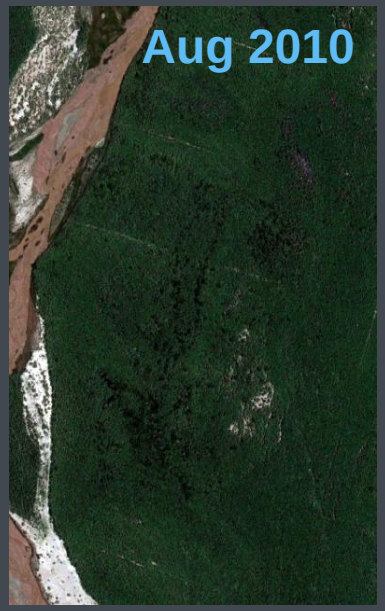
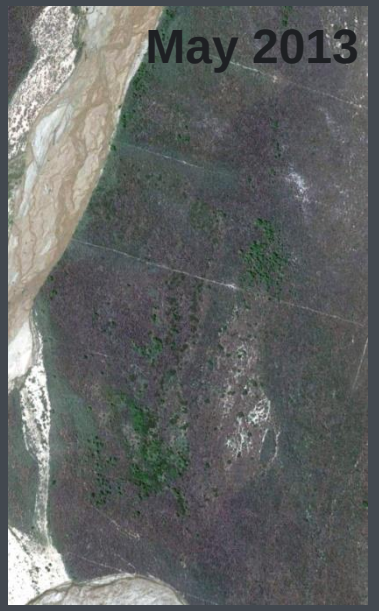
Rapid (1-2 weeks), complete defoliation

Multiple times within a growing season

Repeated over many consecutive years





Long term effects include

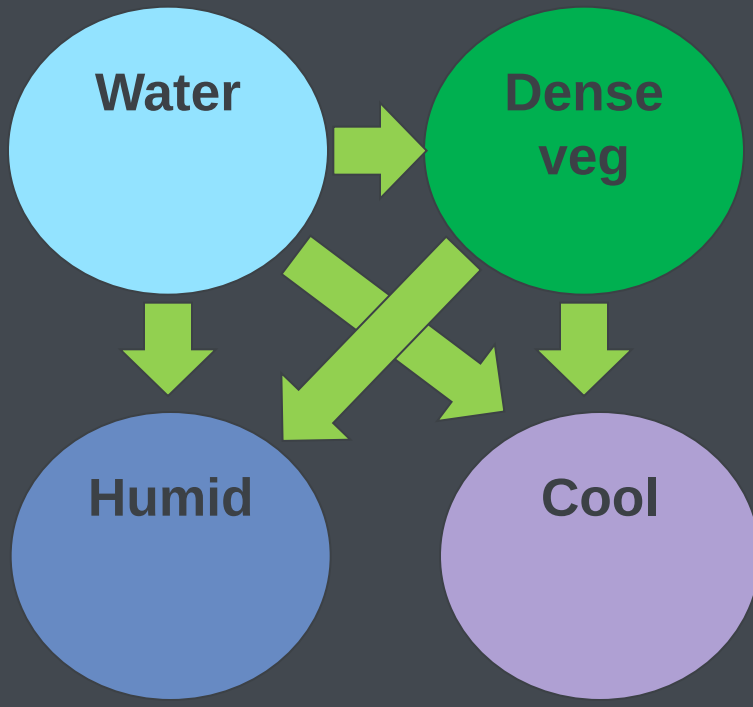
- Reduced foliage volume
- Dieback of terminal branches
- Complete mortality

Effects vary widely between sites (Hultine et al. 2014)

St. George: 7 defoliation events → <5% dieback

Mormon Mesa: 2 defoliation events → 90% dieback

Flycatcher Habitat Preferences

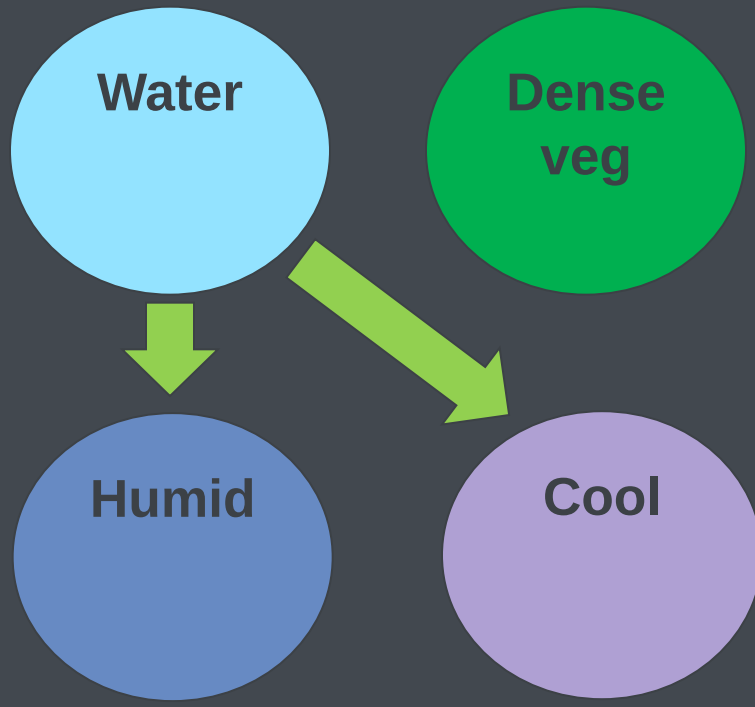


Concealment

Less time & energy on thermoregulation

Eggs less likely to reach lethal temp (41°C = 106°F) Webb 1987

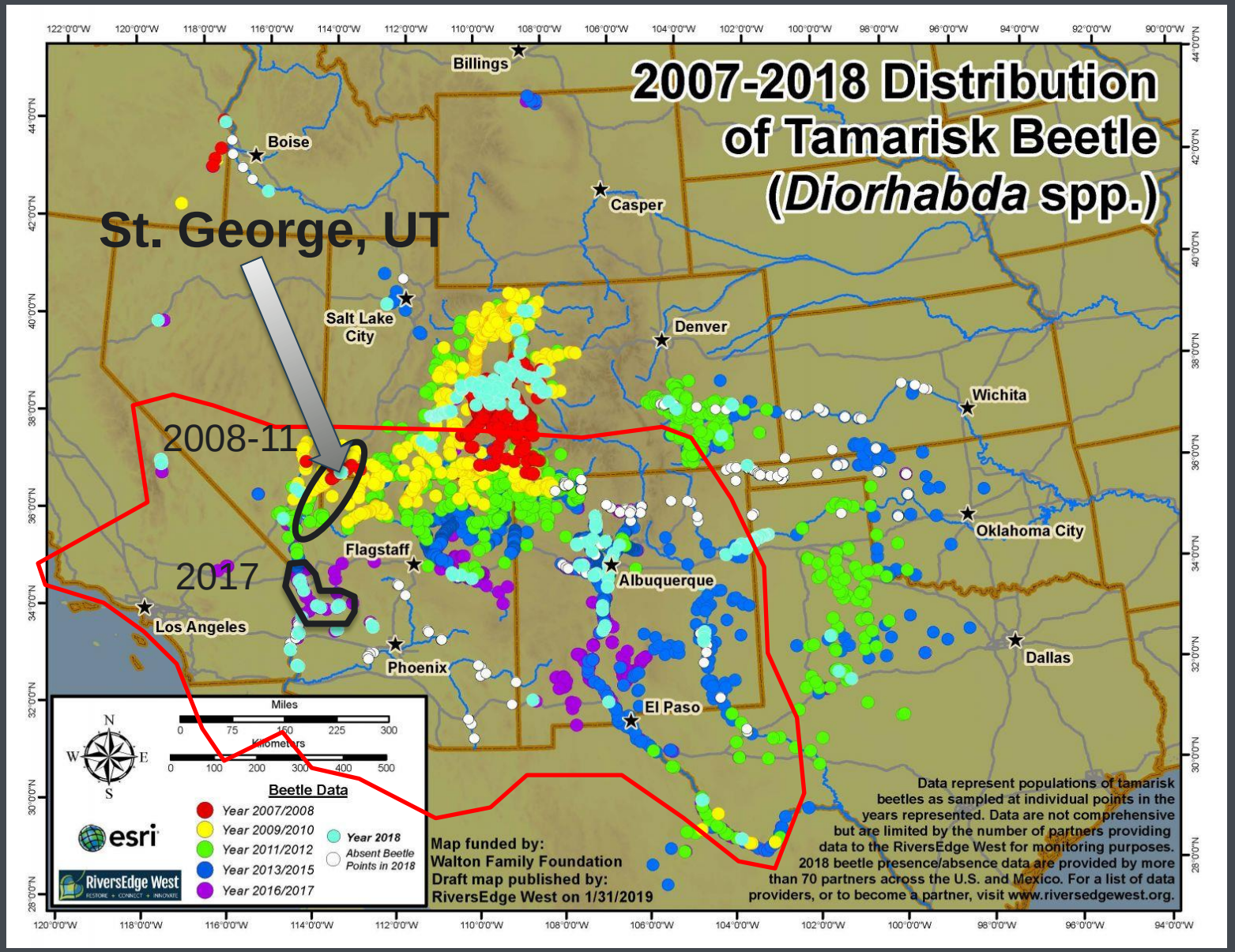
Flycatcher Habitat Preferences - beetle effects



Increased visibility

More time & energy on thermoregulation

Eggs more likely to reach lethal temp (41°C = 106°F) Webb 1987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St. George, UT
2008-11
2017
Billings
Boise
Casper
Salt Lake City
Denver
Wichita
Oklahoma City
Flagstaff
Albuquerque
Los Angeles
Phoenix
El Paso
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Miles
0 75 150 225 300
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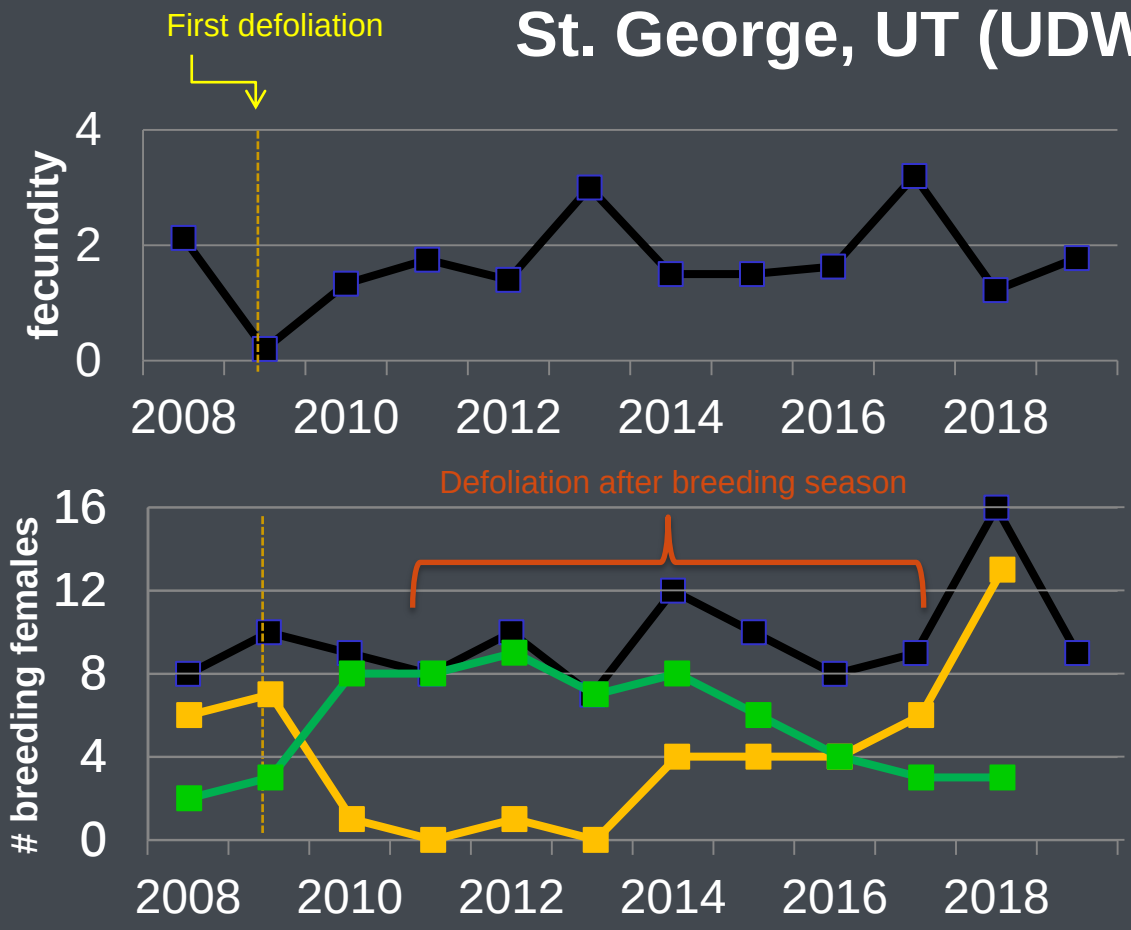
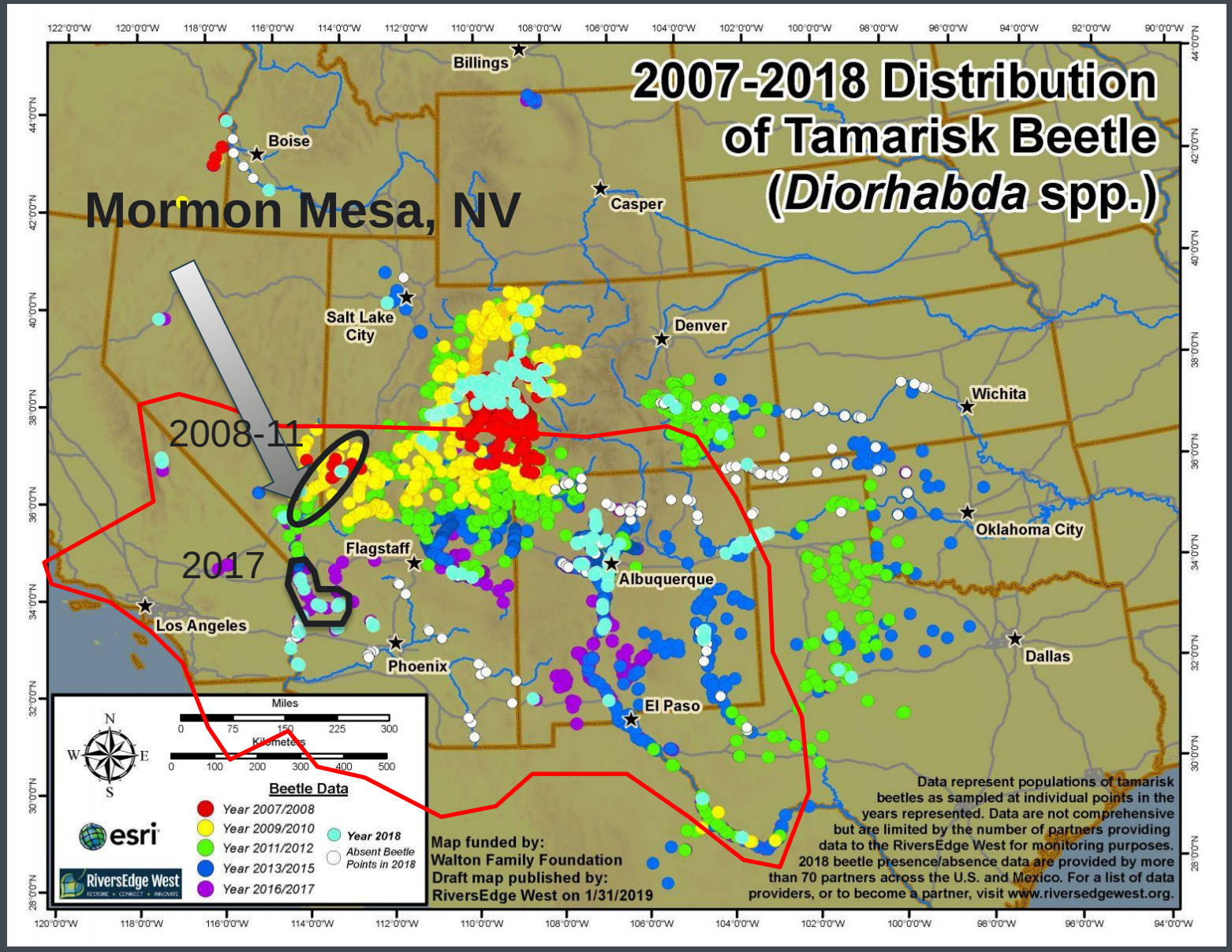
St. George, UT (UDWR)



Site fidelity affected by breeding success


2007-2018 Distribution of Tamarisk Beetle (Diorhabda spp.)
Mormon Mesa, NV
2008-11
2017
Billings
Boise
Casper
Salt Lake City
Denver
Wichita
Oklahoma City
Flagstaff
Albuquerque
Los Angeles
Phoenix
Dallas
El Paso
Miles
0 75 150 225 300
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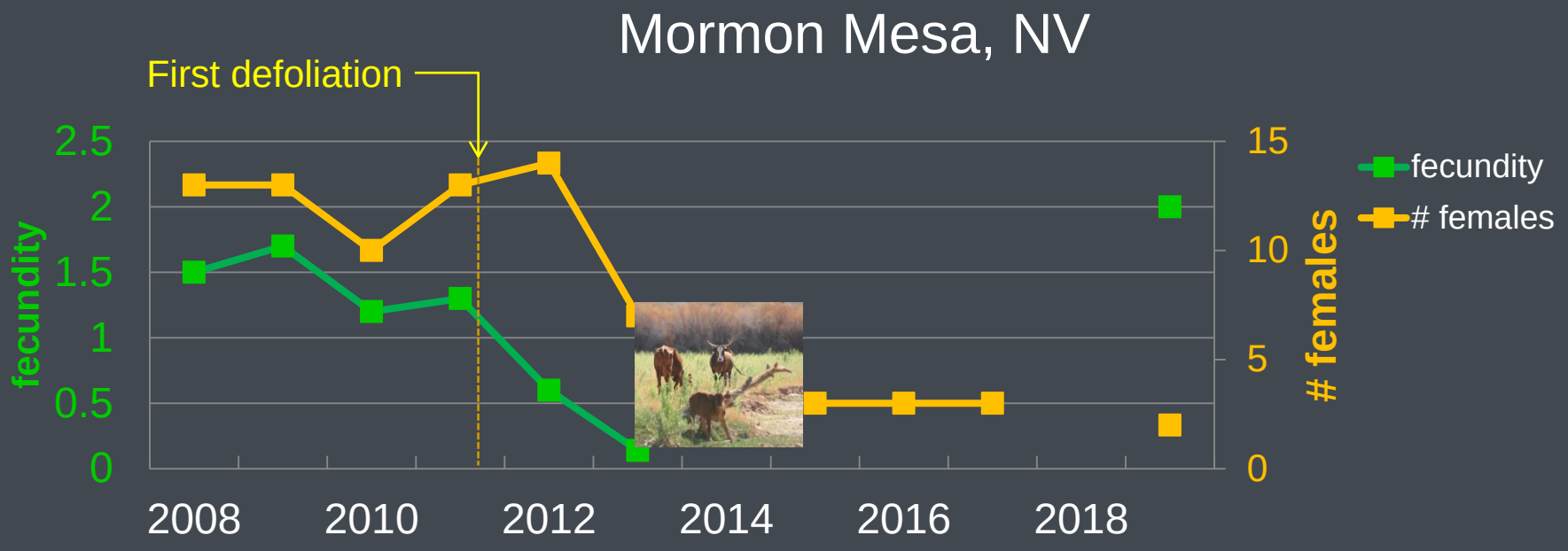
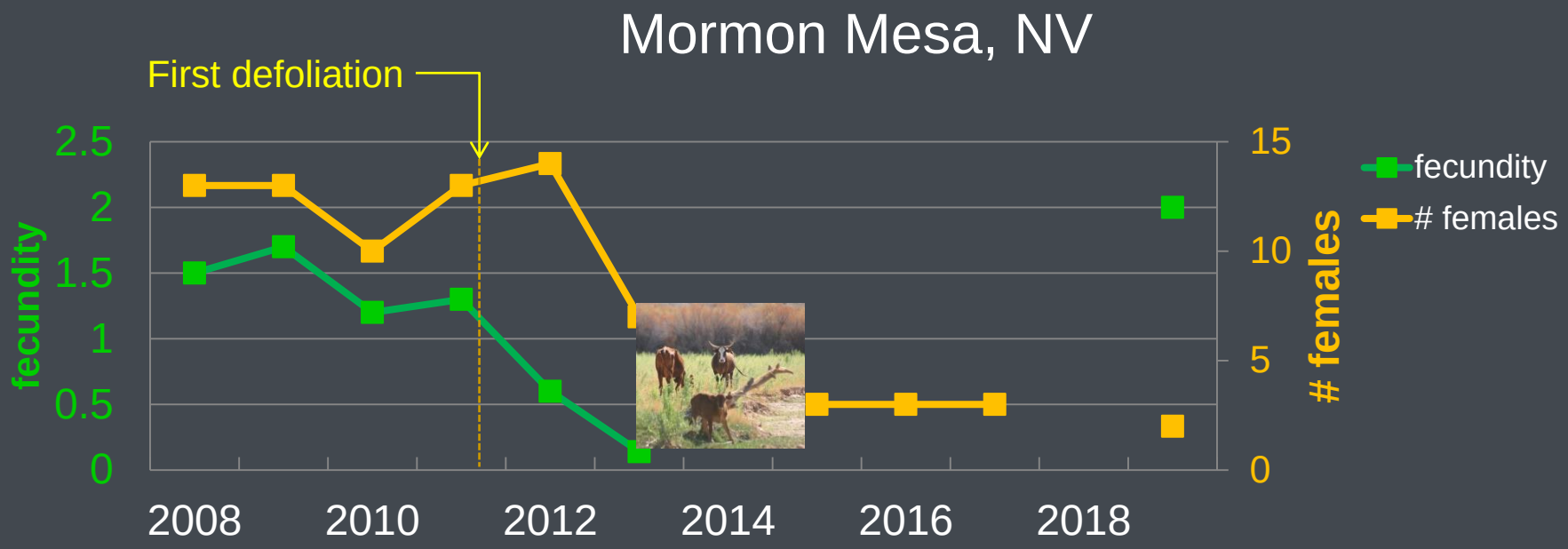

Mormon Mesa, NV
First defoliation
fecundity
females
2.5
2
1.5
1
0.5
0
15
10
5
0
2008
2010
2012
2014
2016
2018
fecundity
females



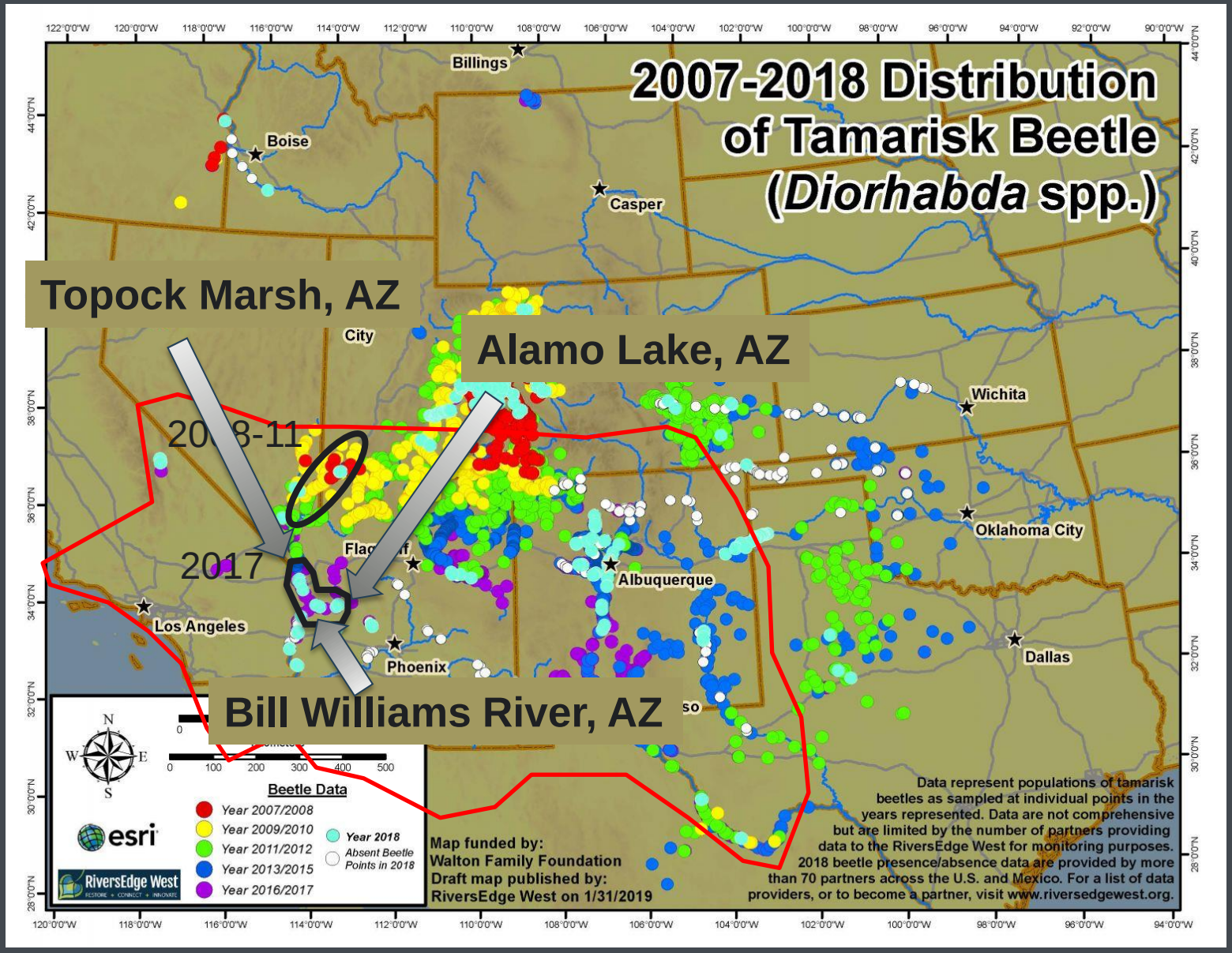
Abandonment
Nest desertion during laying

Fewer renests
Parasitism

Maybe the Mormon Mesa flycatchers went somewhere else?

In 2013

- Mormon Mesa had highest adult return rate of 5 areas in southern NV
- 100% site fidelity
- No new recruits


2007-2018 Distribution of Tamarisk Beetle (Diorhabda spp.)
Topock Marsh, AZ
Alamo Lake, AZ
Bill Williams River, AZ
2017
Billings
Boise
Casper
Wichita
Oklahoma City
Albuquerque
Los Angeles
Phoenix
Dallas
Beetle Data
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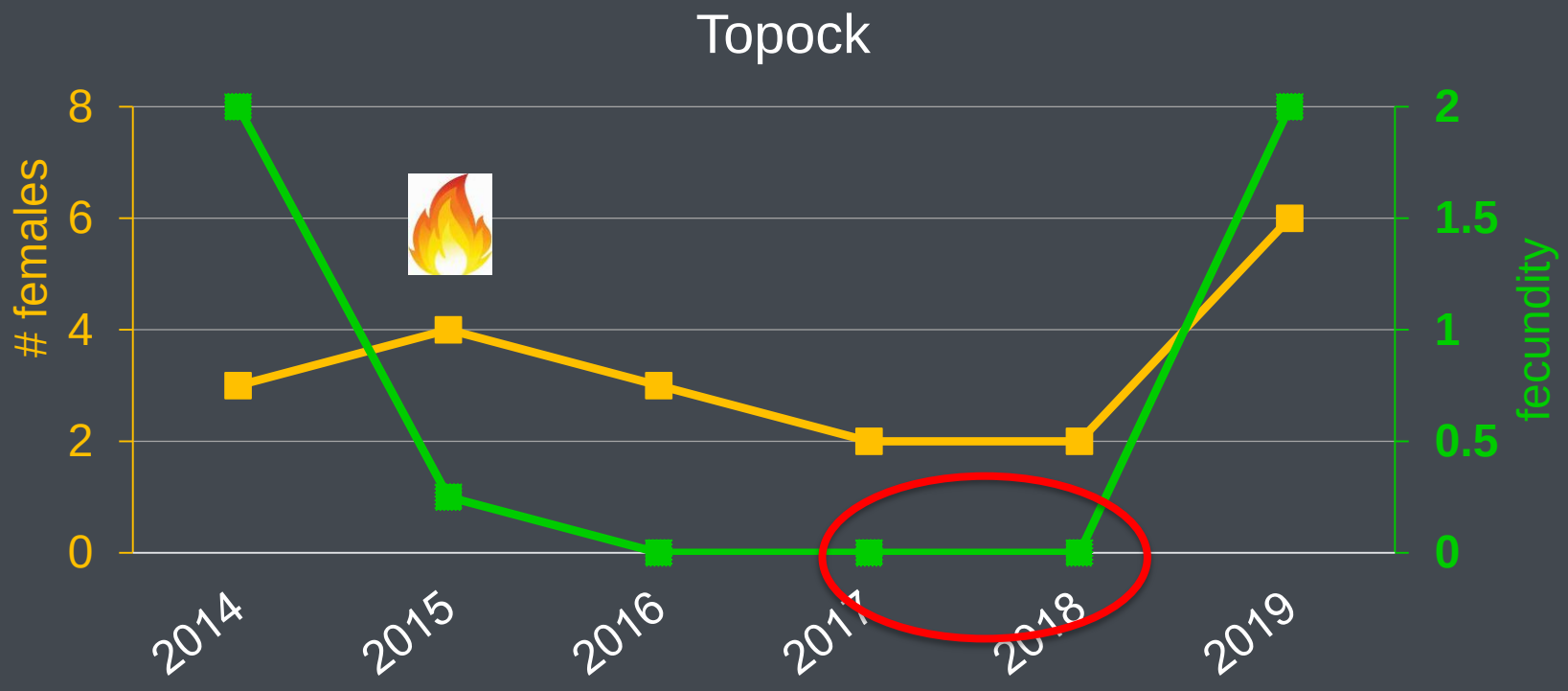
- Topock Marsh

- Topock Marsh

- Topock Marsh

- Topock Marsh


Topock
females
8
6
4
2
0
2
1.5
1
0.5
0
fecundity
2014
2015
2016
2017
2018
2019

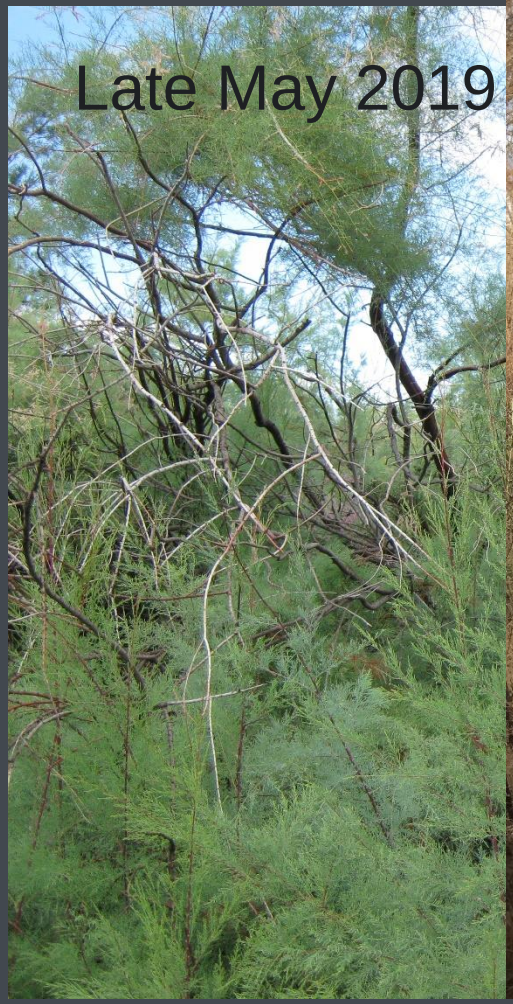
- Bill Williams

- Bill Williams

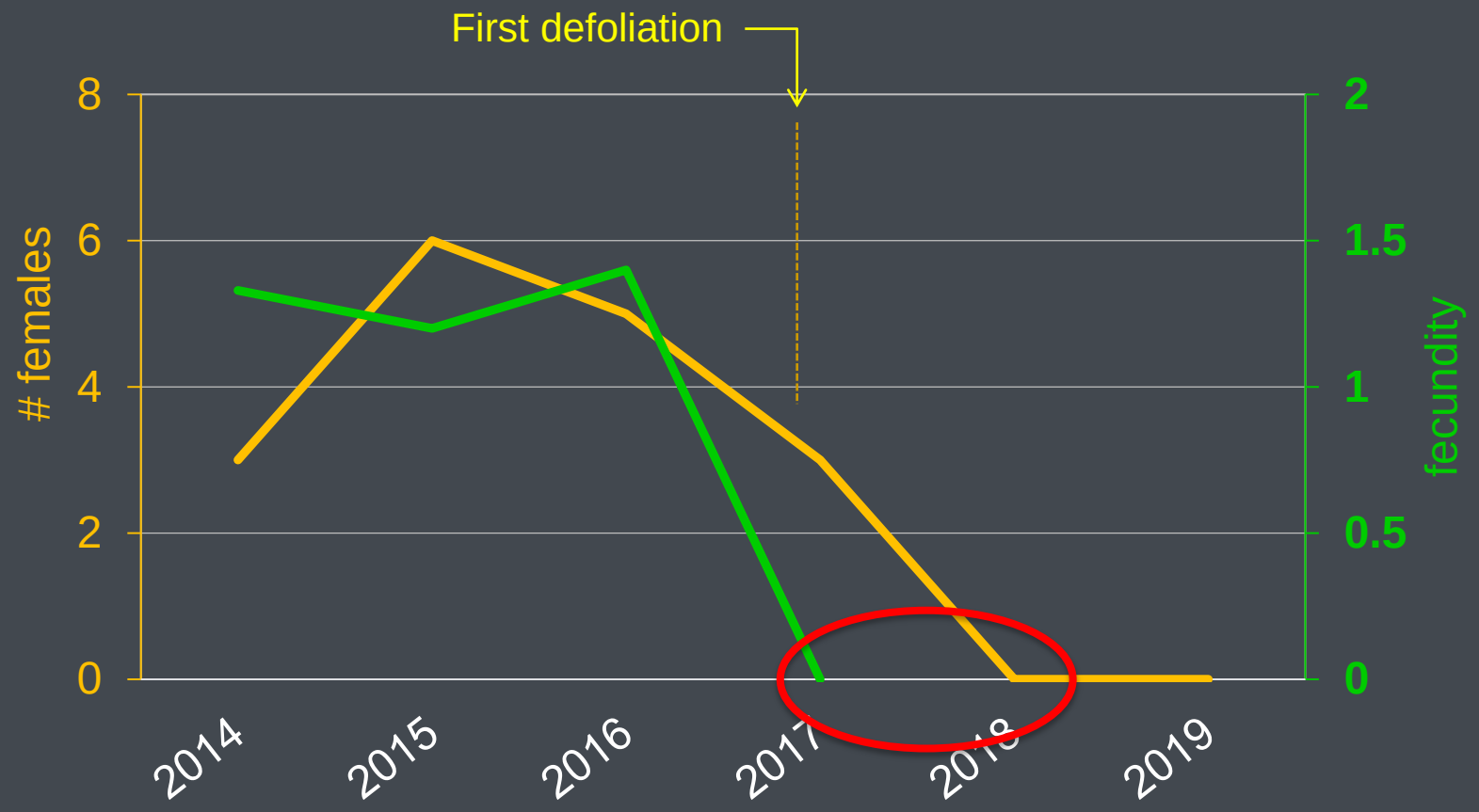
- Bill Williams

- Bill Williams

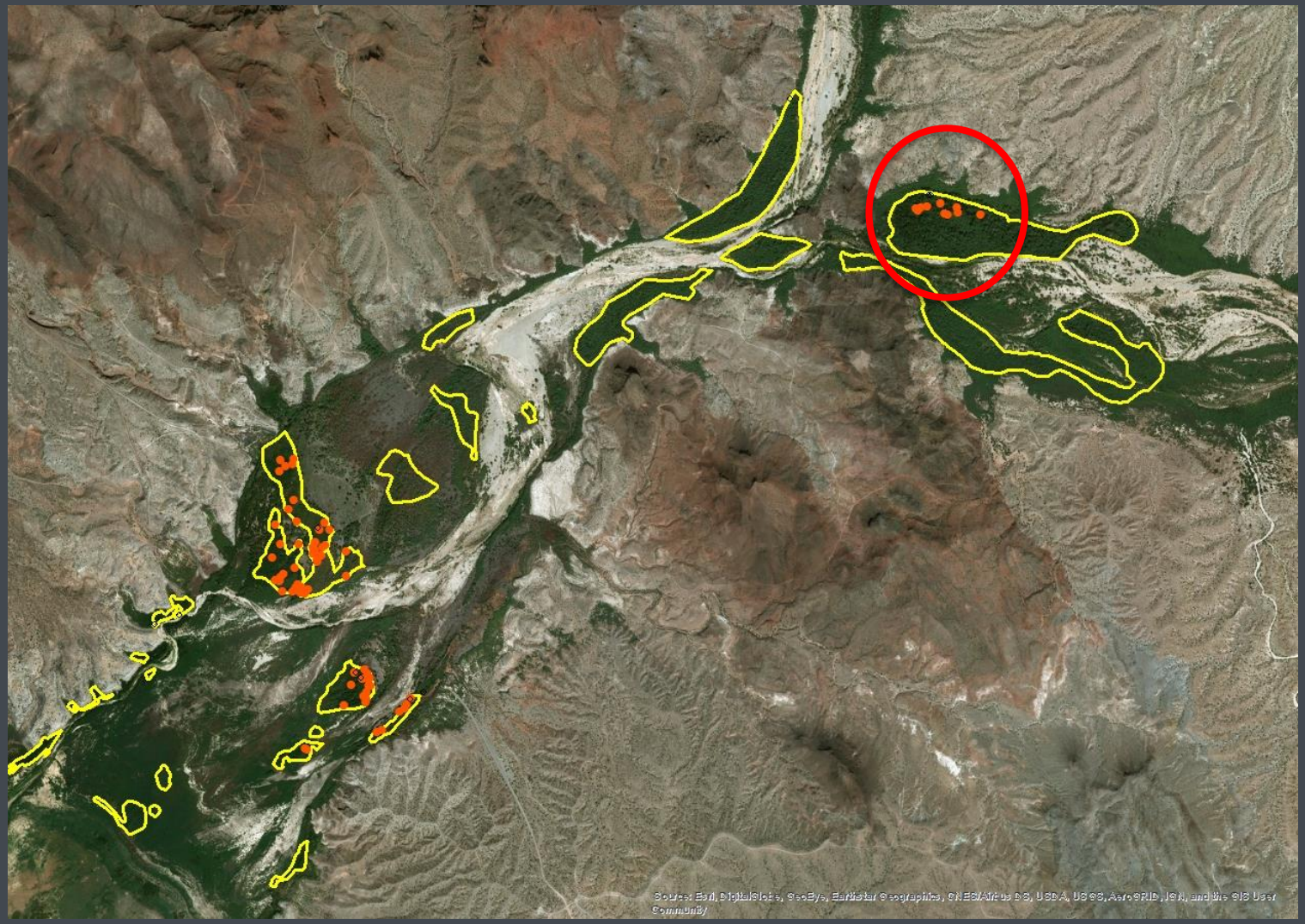
- Bill Williams



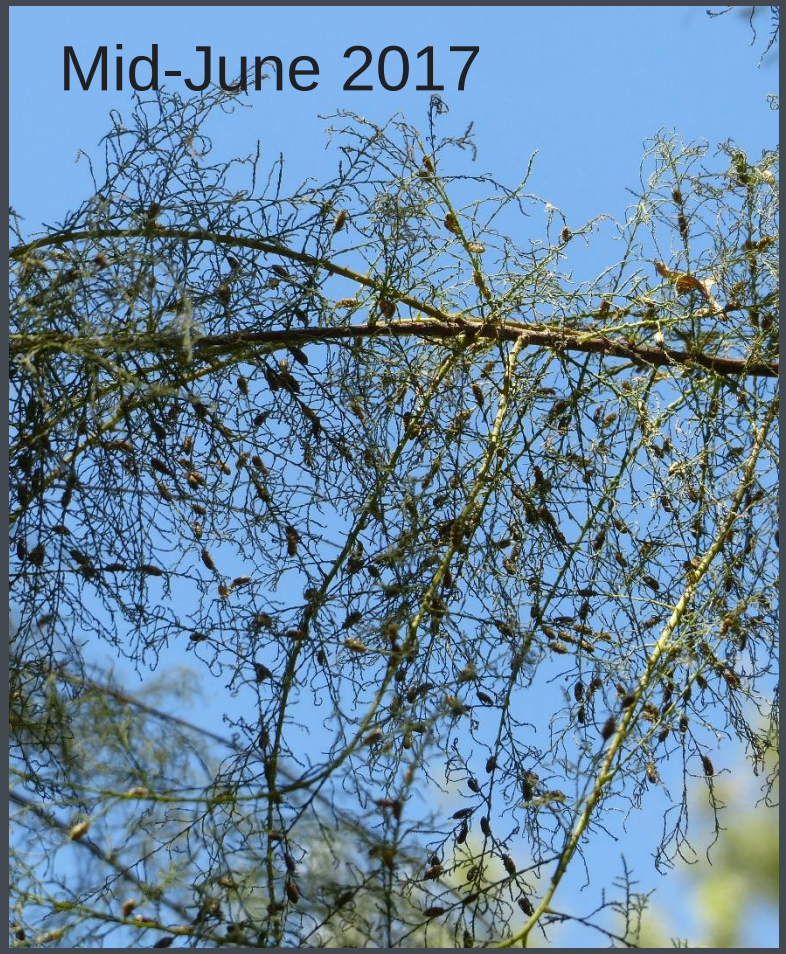
- Bill Williams – mix of tamarisk and coyote willow

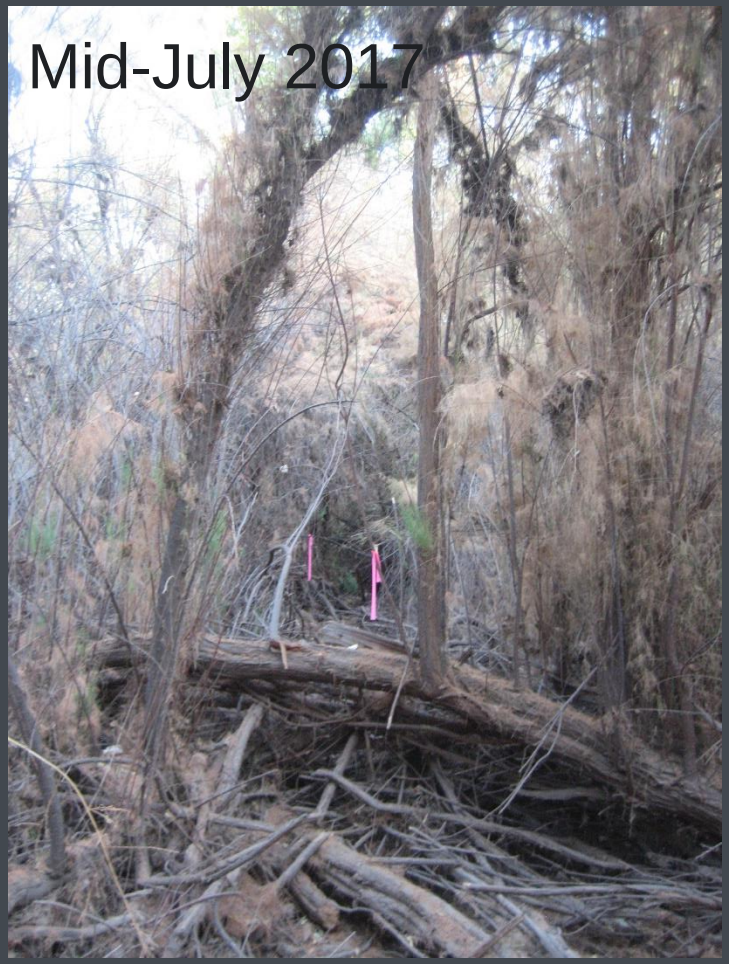


- Alamo Lake



- Alamo Lake





- Alamo Lake

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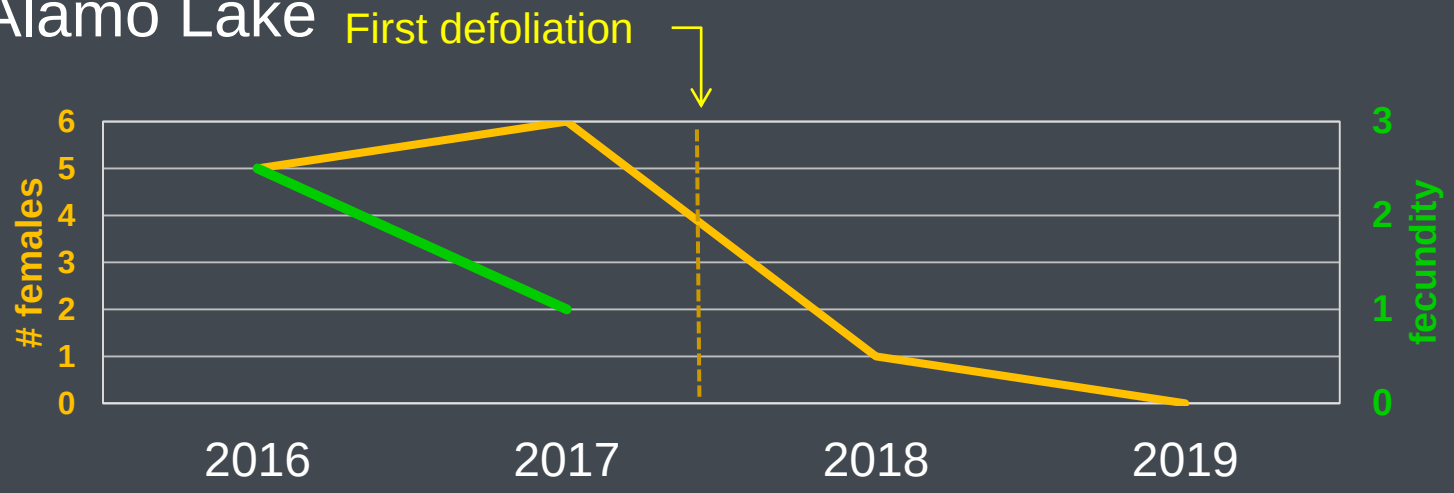
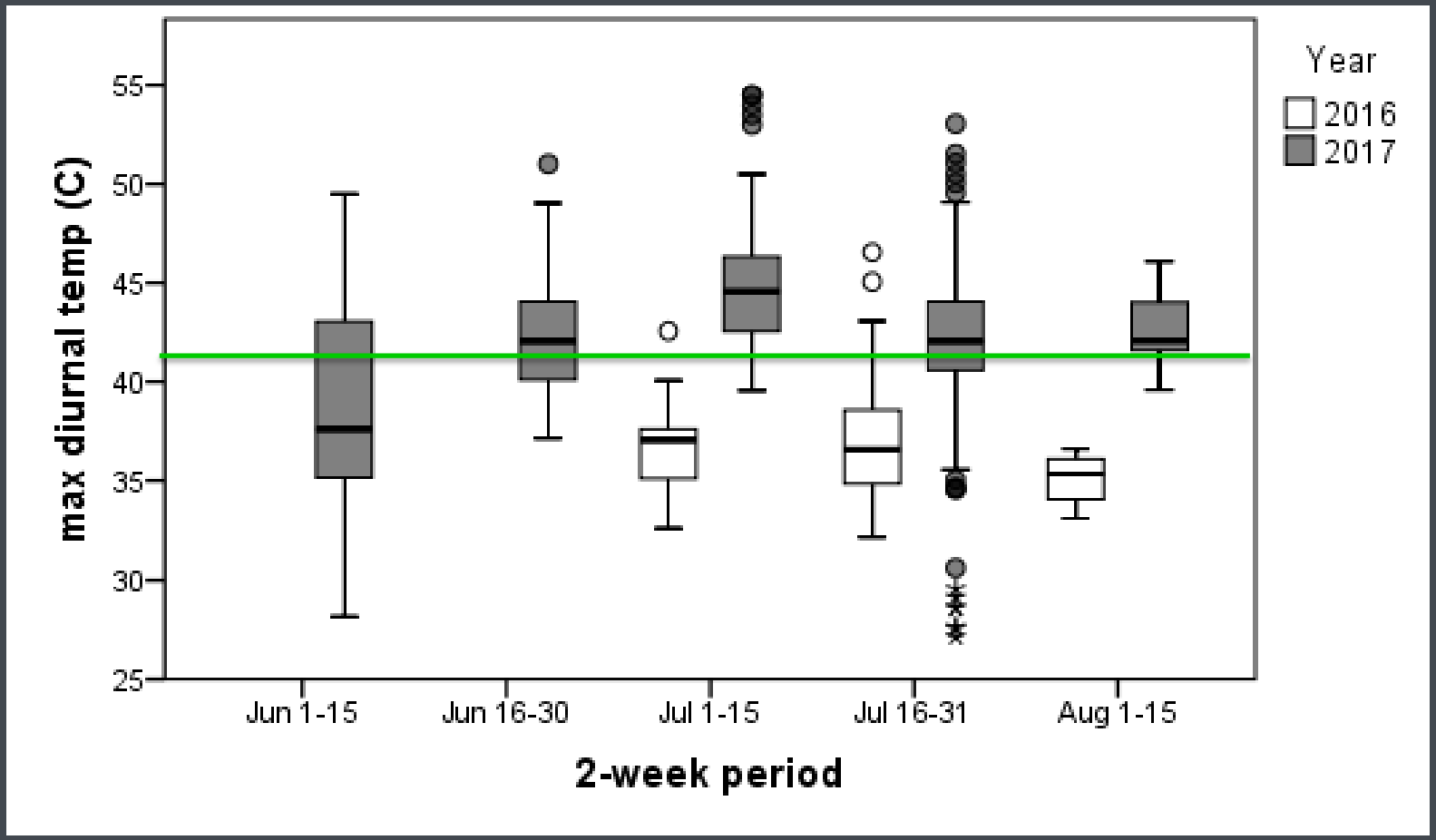


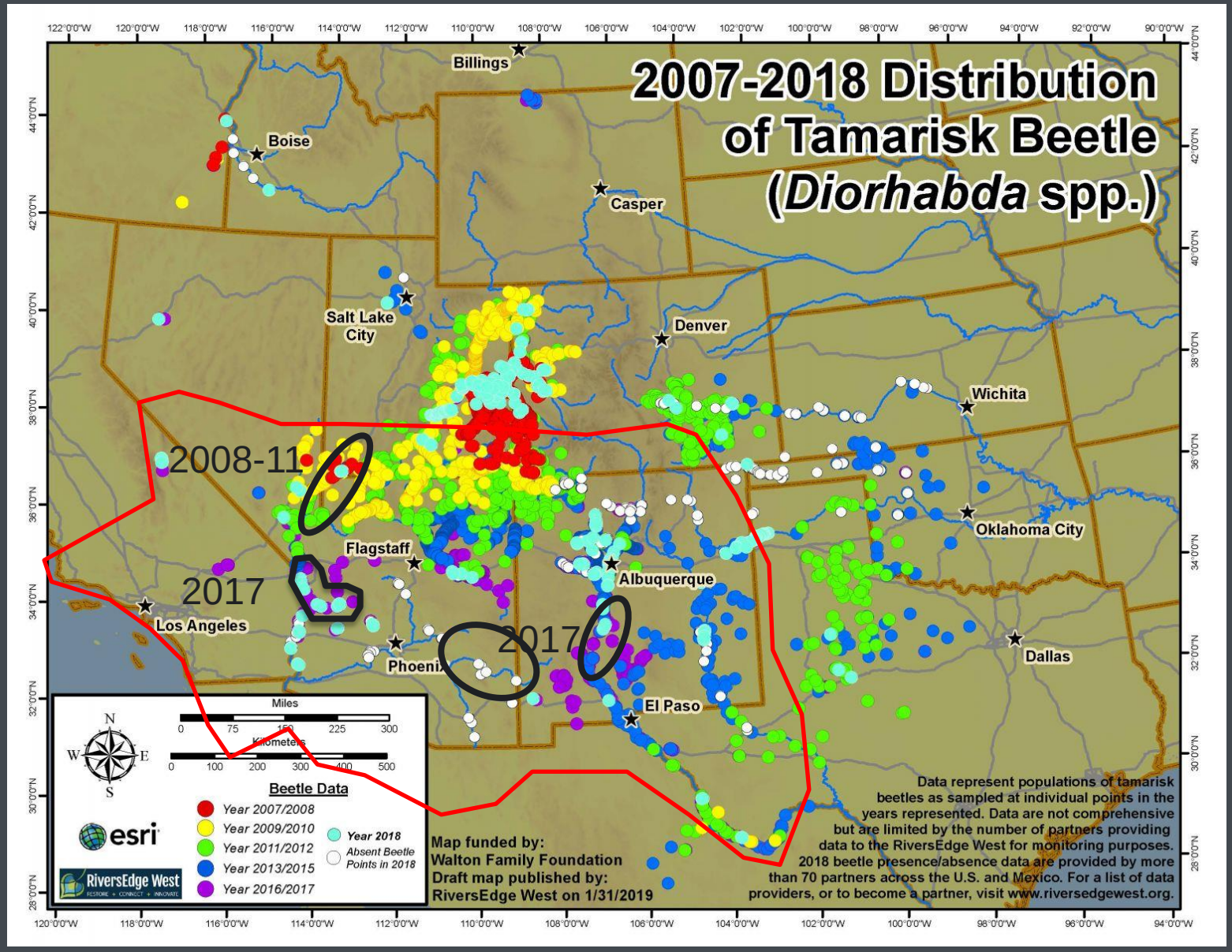
2017 – the only successful nests were early ones; incubation and part of nestling period completed before defoliation

2018 – fecundity unknown (no nest monitoring)

2019 – no flycatchers detected; tamarisk mostly dead

- Alamo Lake - microclimate

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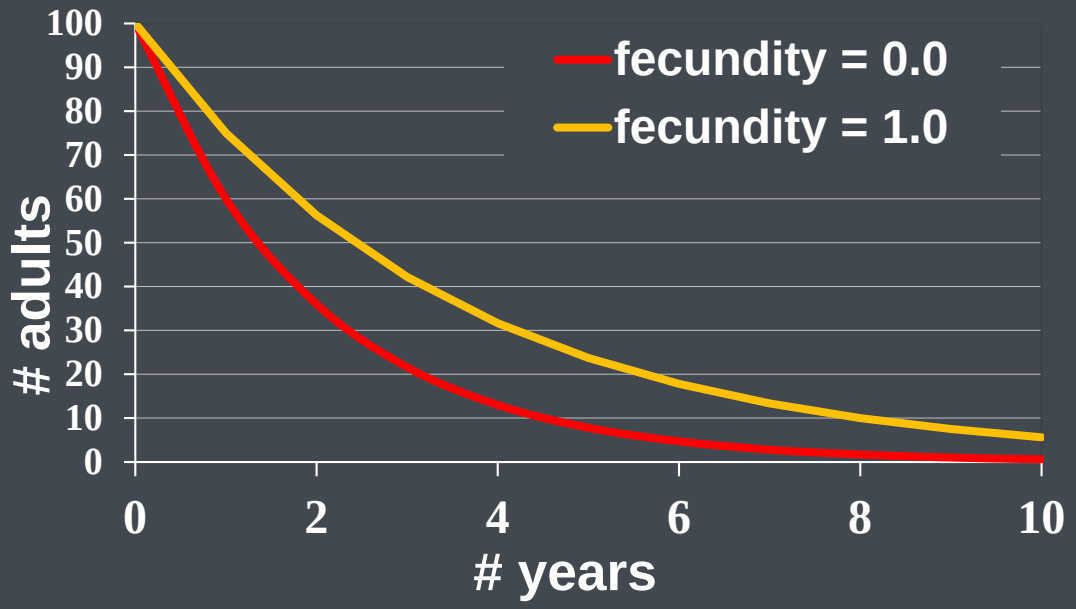
Flycatcher future?

- Beetles will eventually occupy entire flycatcher range
- Effects locally highly variable
- Decline inevitable

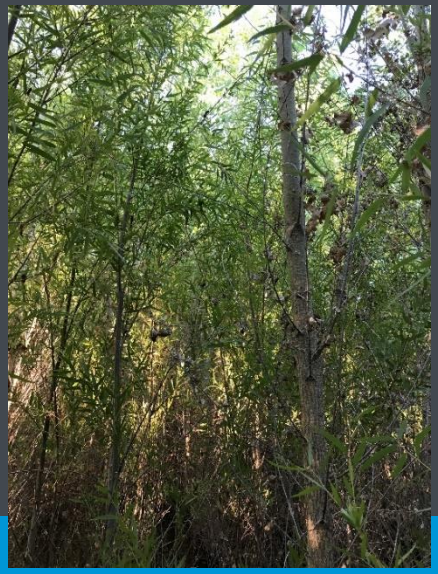


Solutions?

- Immediate, most urgent goal:
  - prevent local extirpation
    - 2% of adult flycatcher dispersals are > 50 km
    - once gone from a river, may be hard to get them back

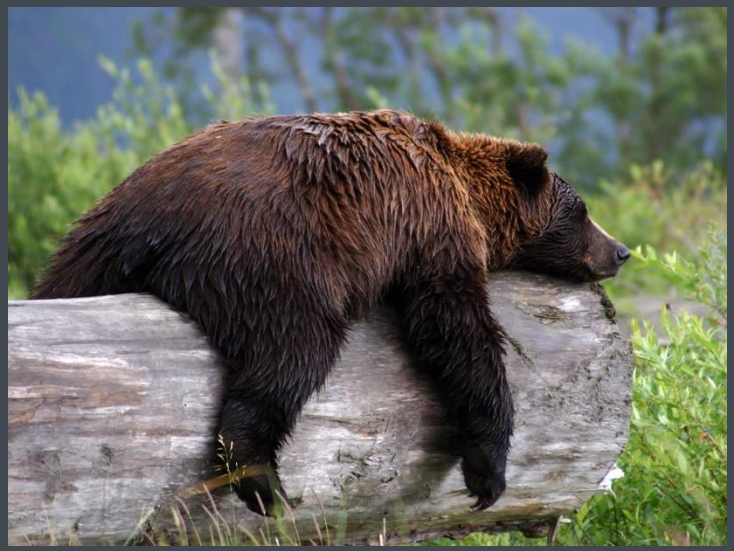
Solutions?

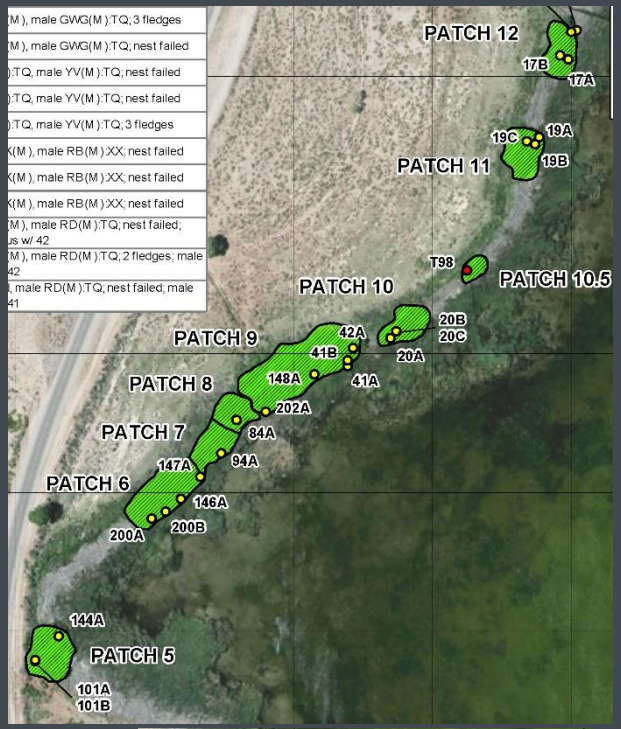
- Active restoration of riparian woodlands
  - Near existing flycatcher populations in tamarisk
    - < 30 km, closer is better
  - Careful site selection to maximize chances of success
    - near water
    - formerly occupied, beetle-affected flycatcher sites

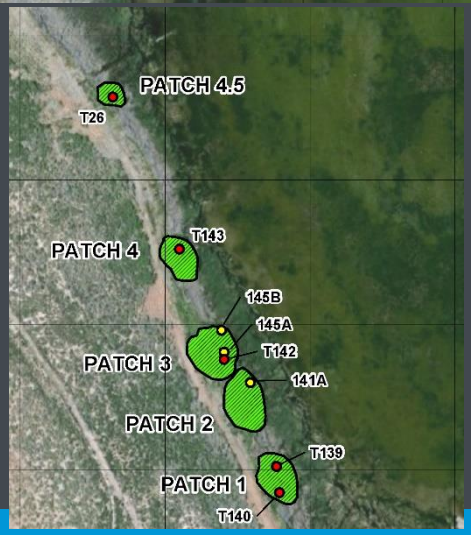


Solutions?

- How big?
  - These are not grizzly bears (or cuckoos)
  - Home range during breeding season 0.38 ha (Cardinal 2005)
  - 5-yr review: 1.1 ha per territory
  - Multiple small patches in close proximity can function as a larger patch







Small patch examples

- Key Pittman (Lincoln Co., NV)
  - “String of pearls”
  - Coyote willow
  - Patches as small as 0.05 ha
  - Total size 1.5 ha
  - Supported up to 17 pairs

Small patch examples

- Mormon Mesa
  - Dense coyote willow
    - 3 patches, biggest 0.15 ha
    - nest sites
  - Goodding's willow overstory
    - singing perches, foraging
  - Total area ~ 1 ha
  - Surrounded by dead tamarisk

Do not discount the value of a site just because it's small!

APHIS flycatcher conservation program

- Result of a lawsuit
- Funding actions that
  - Provide conservation benefit to the flycatcher
  - Are within APHIS's authority
- Looking for partners

- For further information contact:

  Kai Caraher (APHIS)

  Kai.Caraher@aphis.usda.gov

  (301) 851-2345

Acknowledgments

Bureau of Reclamation – Boulder City (funding)

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Bird Banding Laboratory
U.S. Fish and Wildlife Service – Southern NV Field Office
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Bureau of Land Management
SWCA Field Crews