Tamarisk Beetle Distribution And Potential Impacts

RiversEdge West

RESTORE + CONNECT + INNOVATE

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Program Coordinator

Photo credit: Bob Wick BLM

Tamarisk Beetle - *Diorhabda* spp.






Beetles will not eradicate *Tamarix*

An ecological relationship is established between the herbivore and the plant

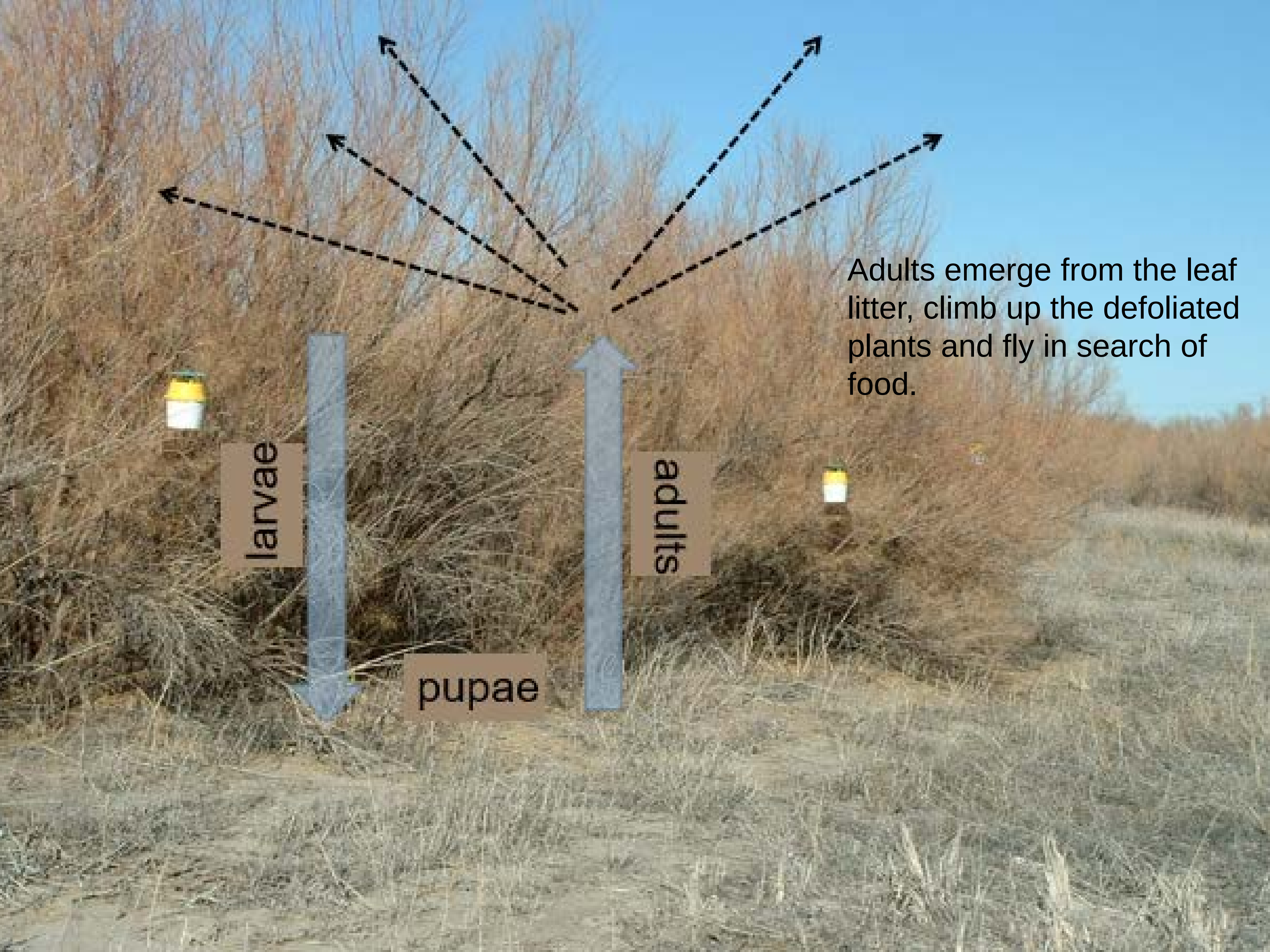
Beetles will shift ecological relationships and likely develop some kind of equilibrium

Biology of *Tamarix*

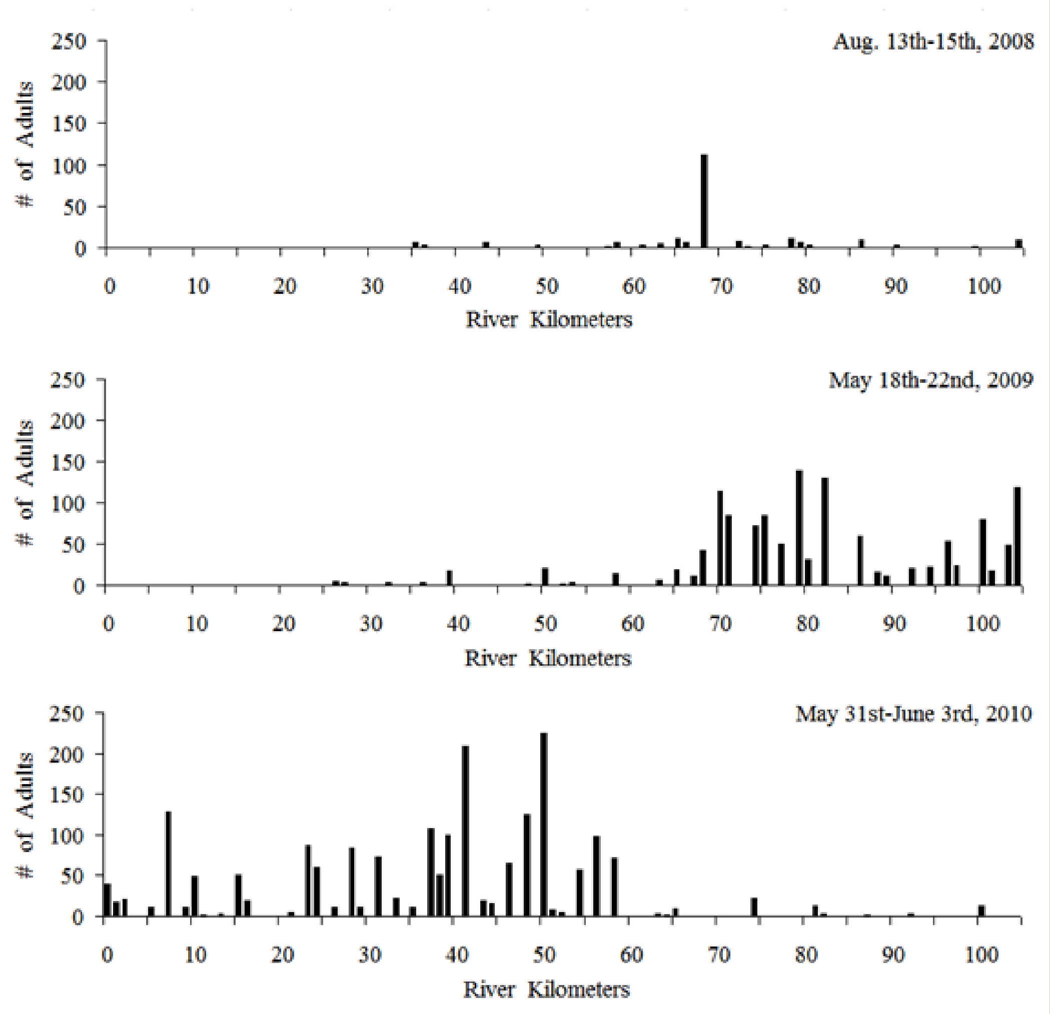
Biology of *Diorhabda*

biotic and abiotic ecosystem components

Beetles drop from host plant and pupate in the leaf litter


Adults emerge from the leaf litter, climb up the defoliated plants and fly in search of food.
larvae
adults
pupae

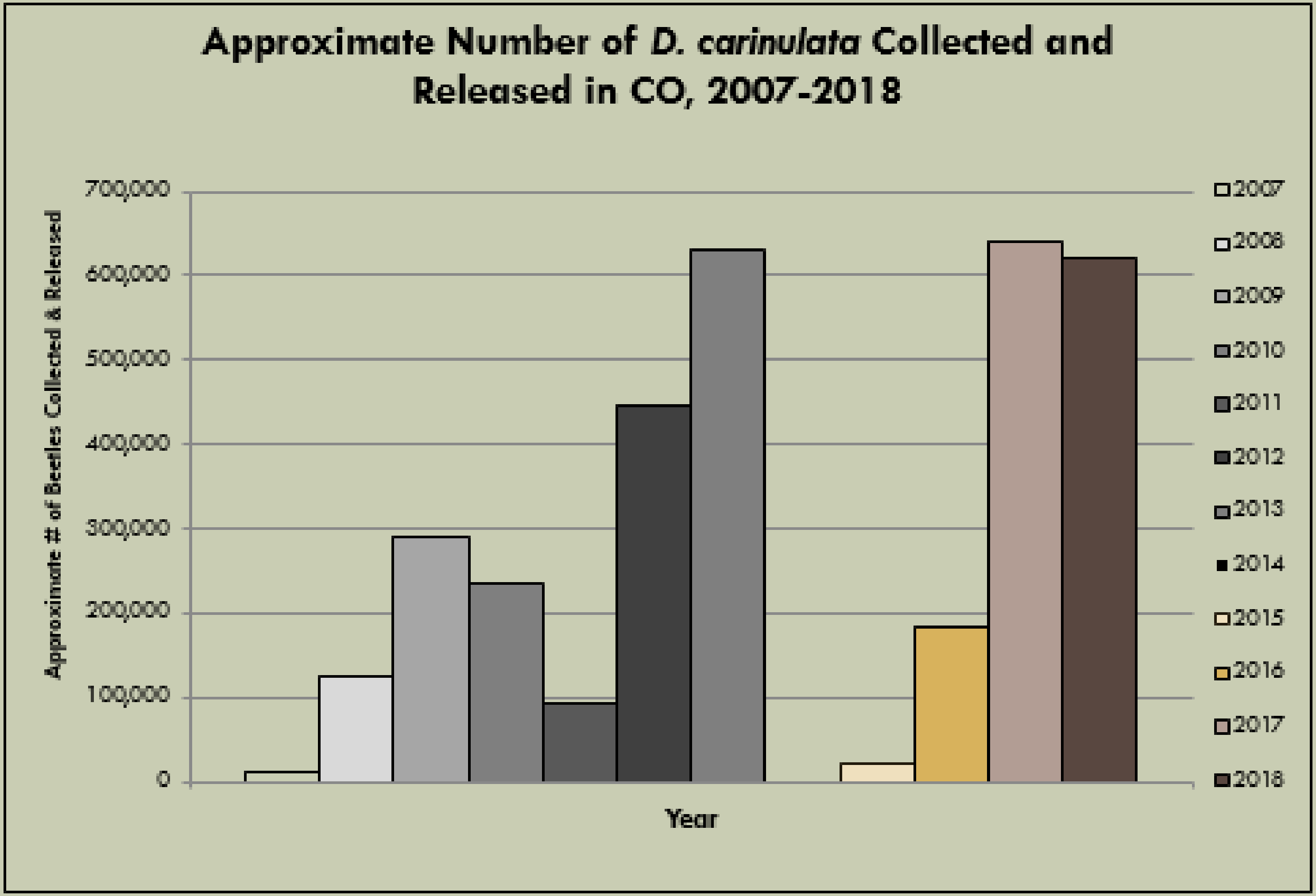
Beetles will defoliate *Tamarix* and the timing and frequency will be variable.

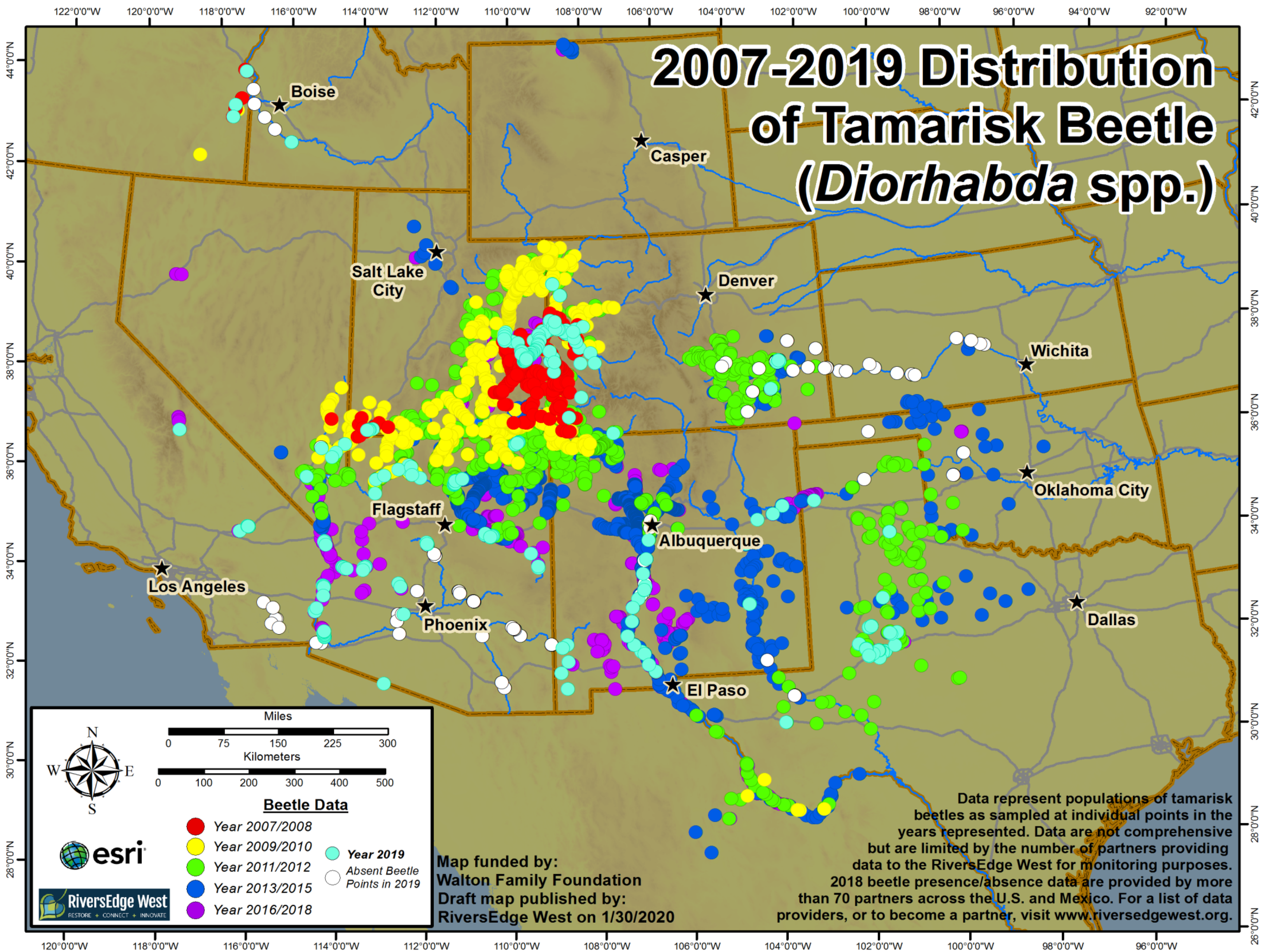


Jamison et al 2015

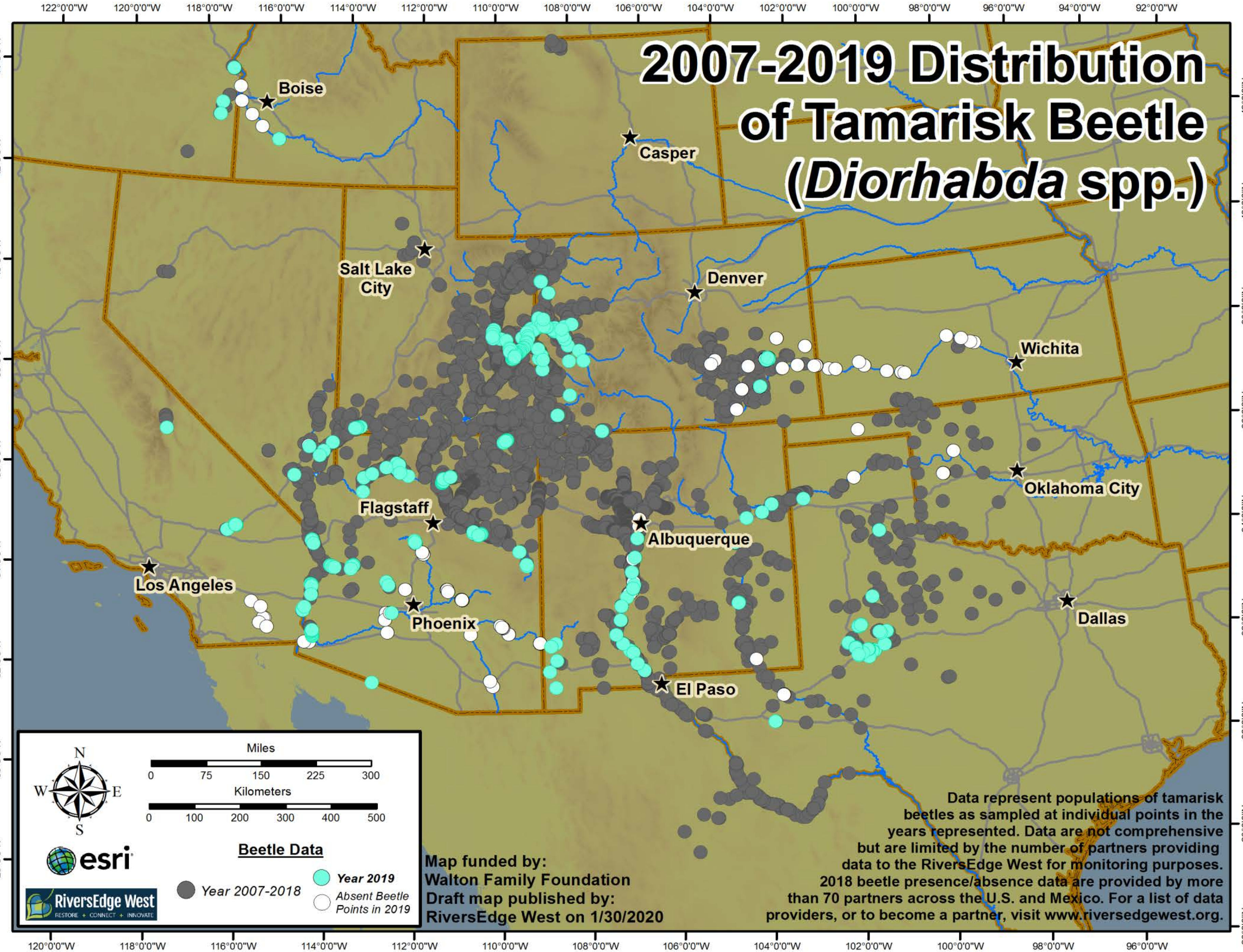
Beetles will move over large distances, periodically defoliating tamarisk stands, as illustrated by their movements on the Dolores River.

We see a steady rise in populations across western CO with widespread defoliation across sites in 2017 and 2018.





2007-2019 Distribution of Tamarisk Beetle (*Diorhabda* spp.)
Boise
Casper
Salt Lake City
Denver
Wichita
Oklahoma City
Flagstaff
Albuquerque
Los Angeles
Phoenix
El Paso
Dallas
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 2016/2018
Year 2019
Absent Beetle Points in 2019
esri
RiversEdge West
RESTORE + CONNECT + INNOVATE
Map funded by:
Walton Family Foundation
Draft map published by:
RiversEdge West on 1/30/2020
Data represent populations of tamarisk beetles as sampled at individual points in the years represented. Data are not comprehensive but are limited by the number of partners providing data to the RiversEdge West for monitoring purposes. 2018 beetle presence/absence data are provided by more than 70 partners across the U.S. and Mexico. For a list of data providers, or to become a partner, visit www.riversedgewest.org.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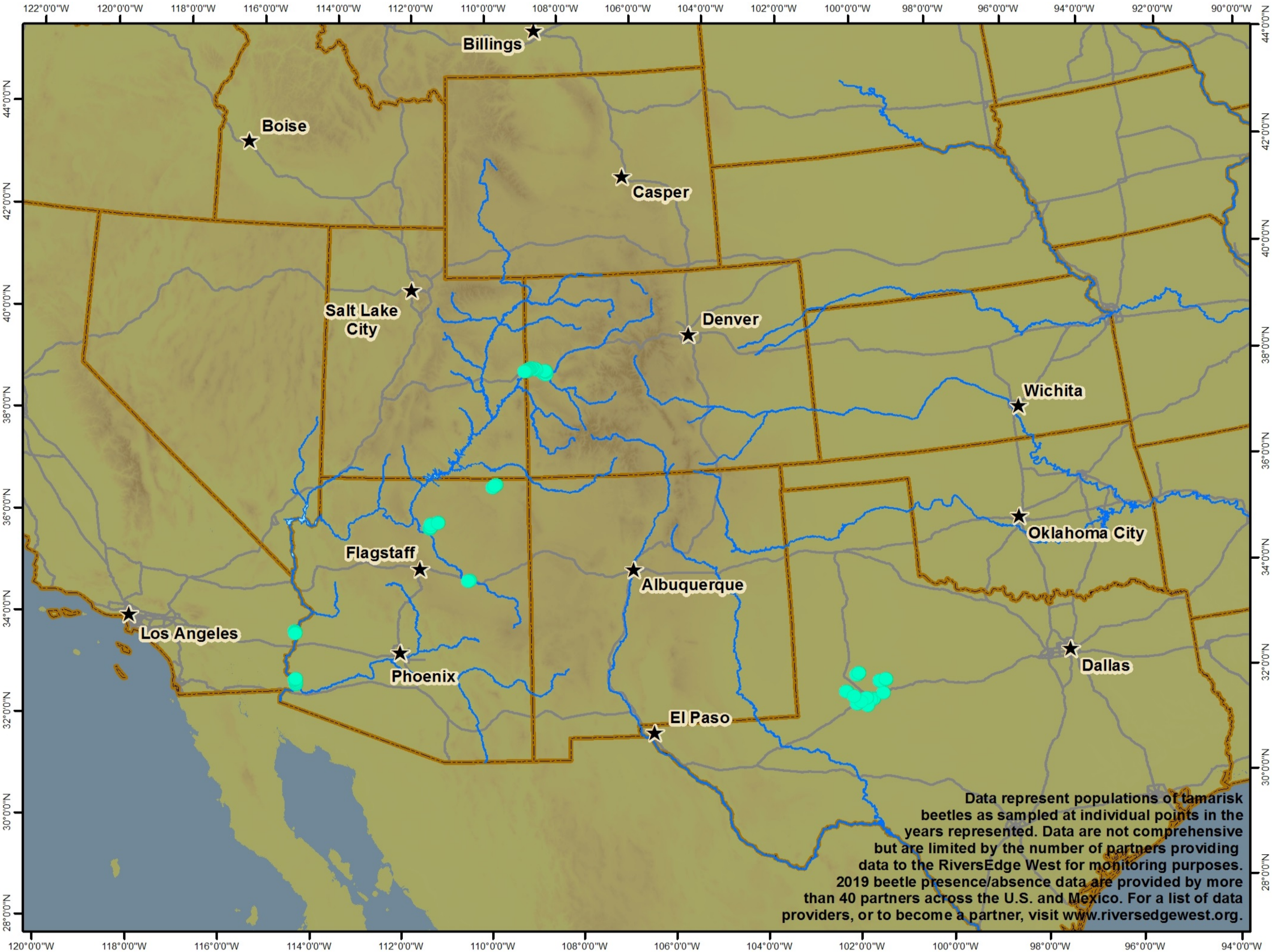

Billings
Boise
Casper
Salt Lake City
Denver
Wichita
Oklahoma City
Flagstaff
Albuquerque
Los Angeles
Phoenix
Dallas
El Paso
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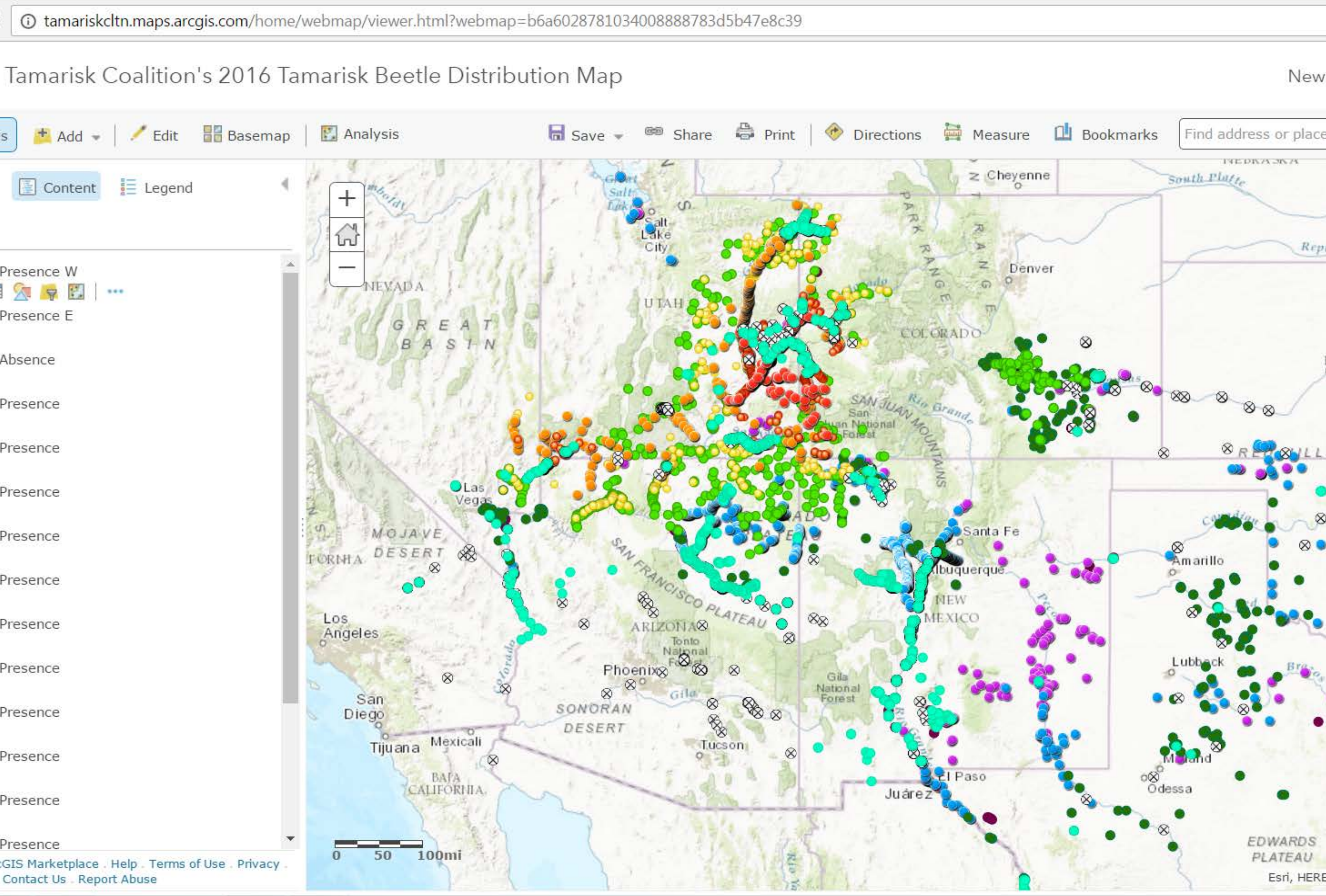
WALTERS
CAMP

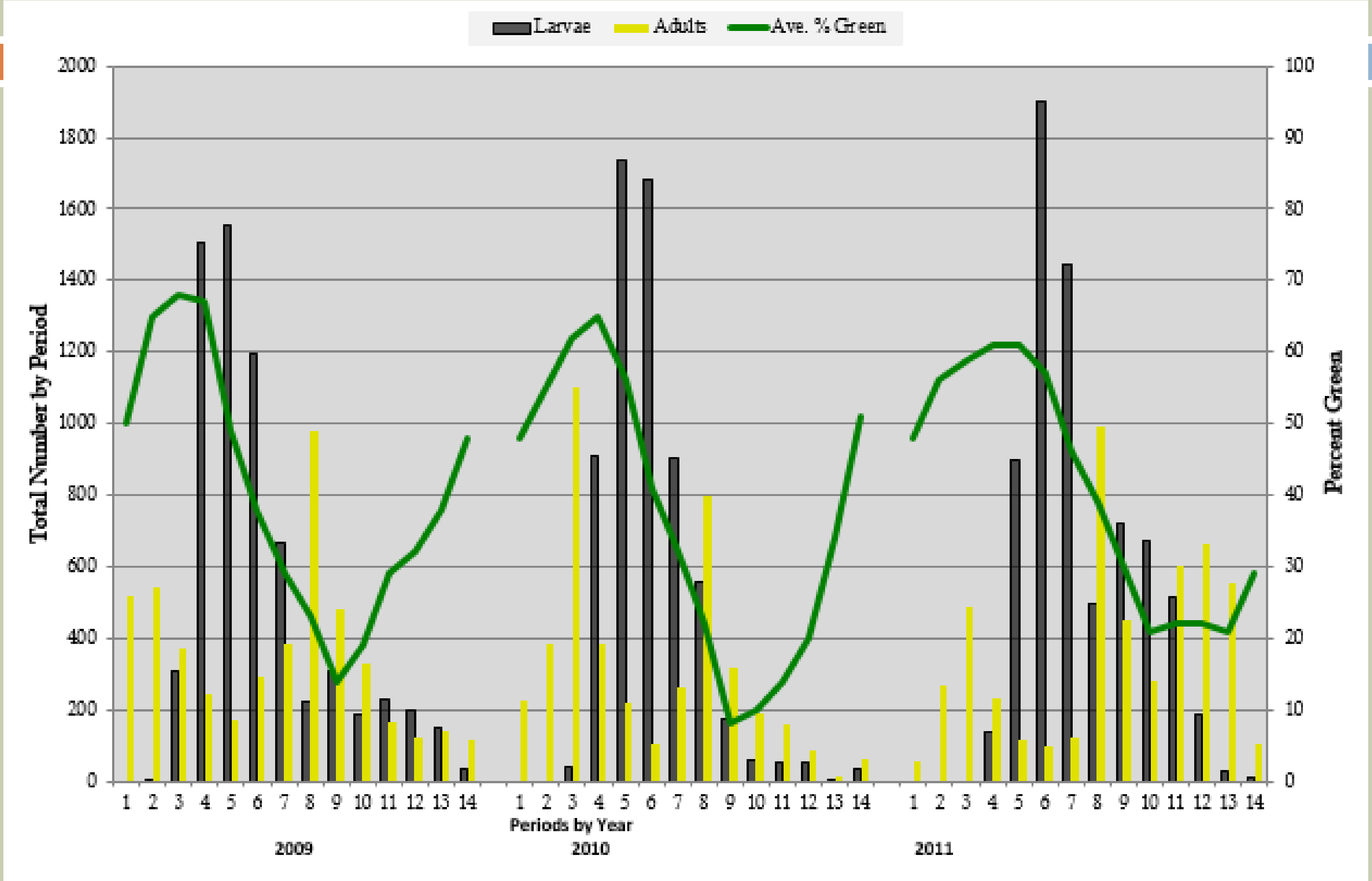
TC ArcGIS Online Map



Beetles and larvae defoliating tamarisk

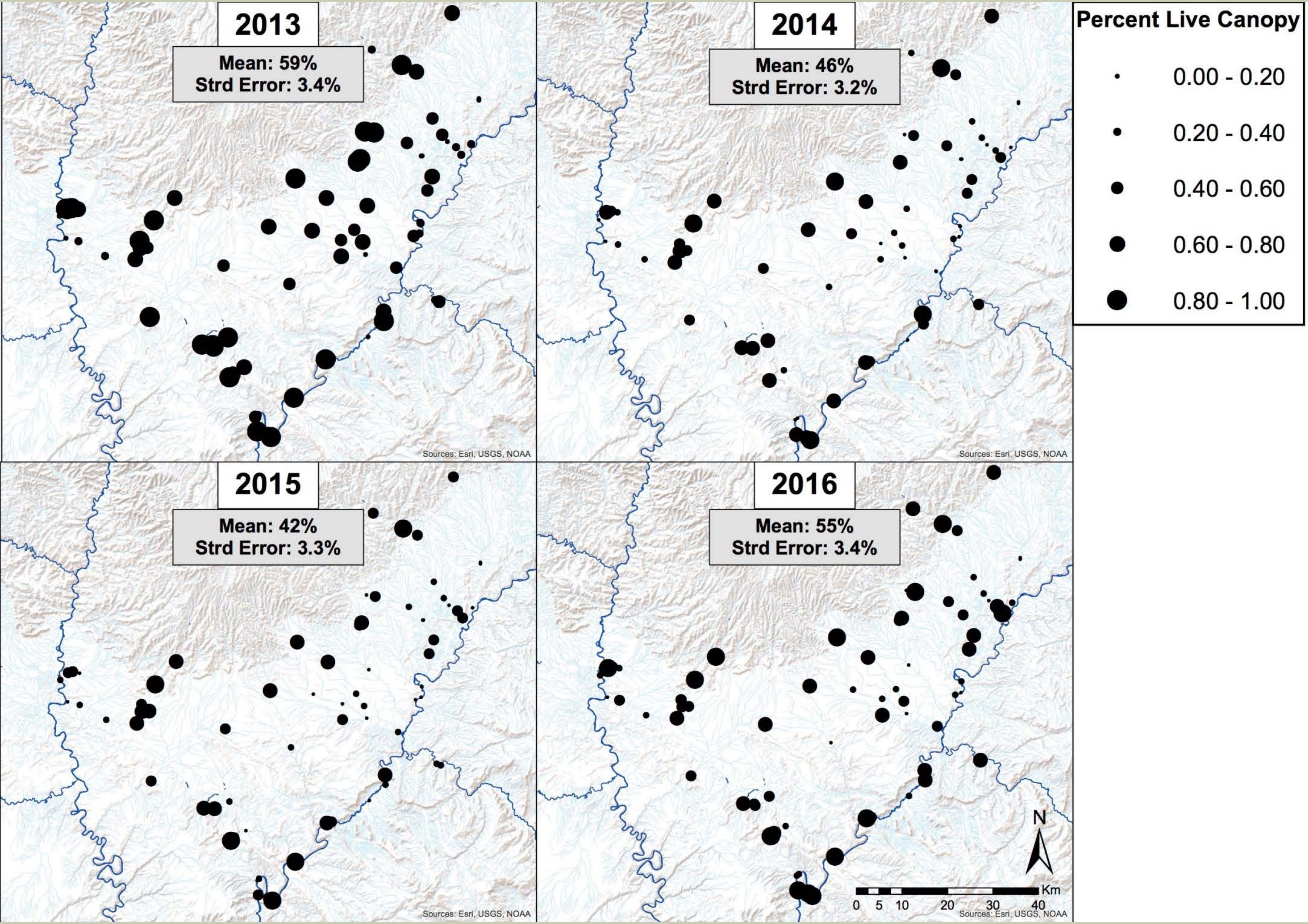
Courtesy of Dr. Dan Bean, Palisade Insectary

Beetle/Tamarisk Interaction: Green to Brown 2009 - 2011

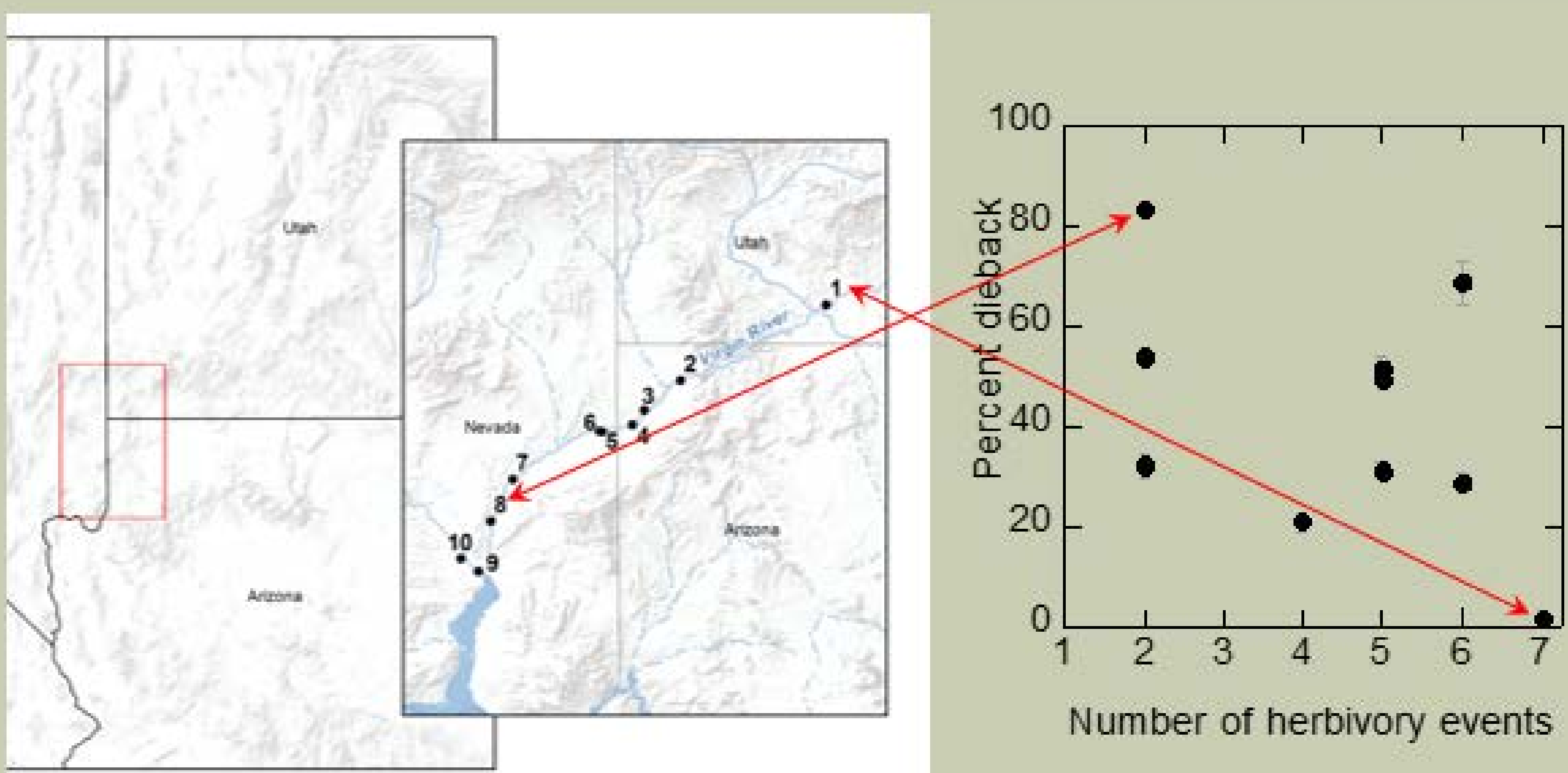


Colorado River near Moab, Utah

Stan Young ranch along East Salt Creek in Mesa County before and after beetles released.


2013
Mean: 59%
Strd Error: 3.4%
2014
Mean: 46%
Strd Error: 3.2%
2015
Mean: 42%
Strd Error: 3.3%
2016
Mean: 55%
Strd Error: 3.4%
Percent Live Canopy
0.00 - 0.20
0.20 - 0.40
0.40 - 0.60
0.60 - 0.80
0.80 - 1.00
N
Km
0 5 10 20 30 40
Sources: Esri, USGS, NOAA

Patterns of mortality are highly variable across the landscape



1000 tamarisk trees monitored (n = 100 / site)

No relationship between herbivory events and dieback

Hultine et al. 2015a

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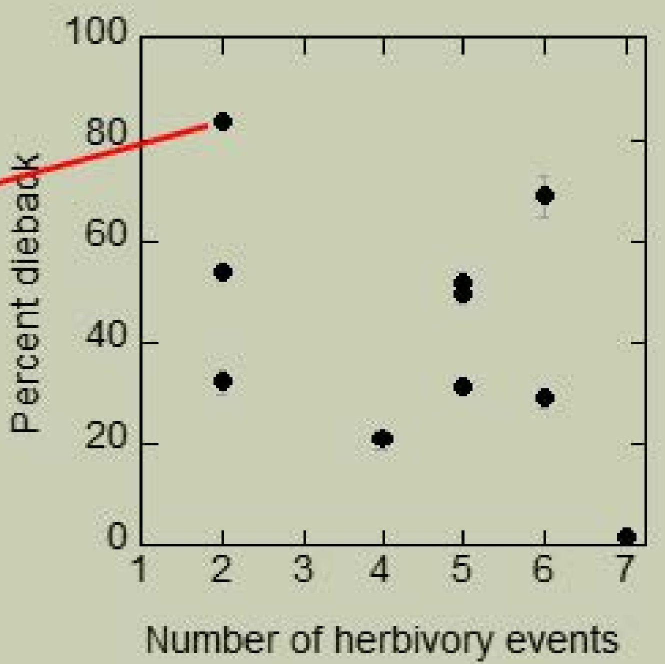


1000 tamarisk trees monitored (n = 100 / site)

No relationship between herbivory events and dieback

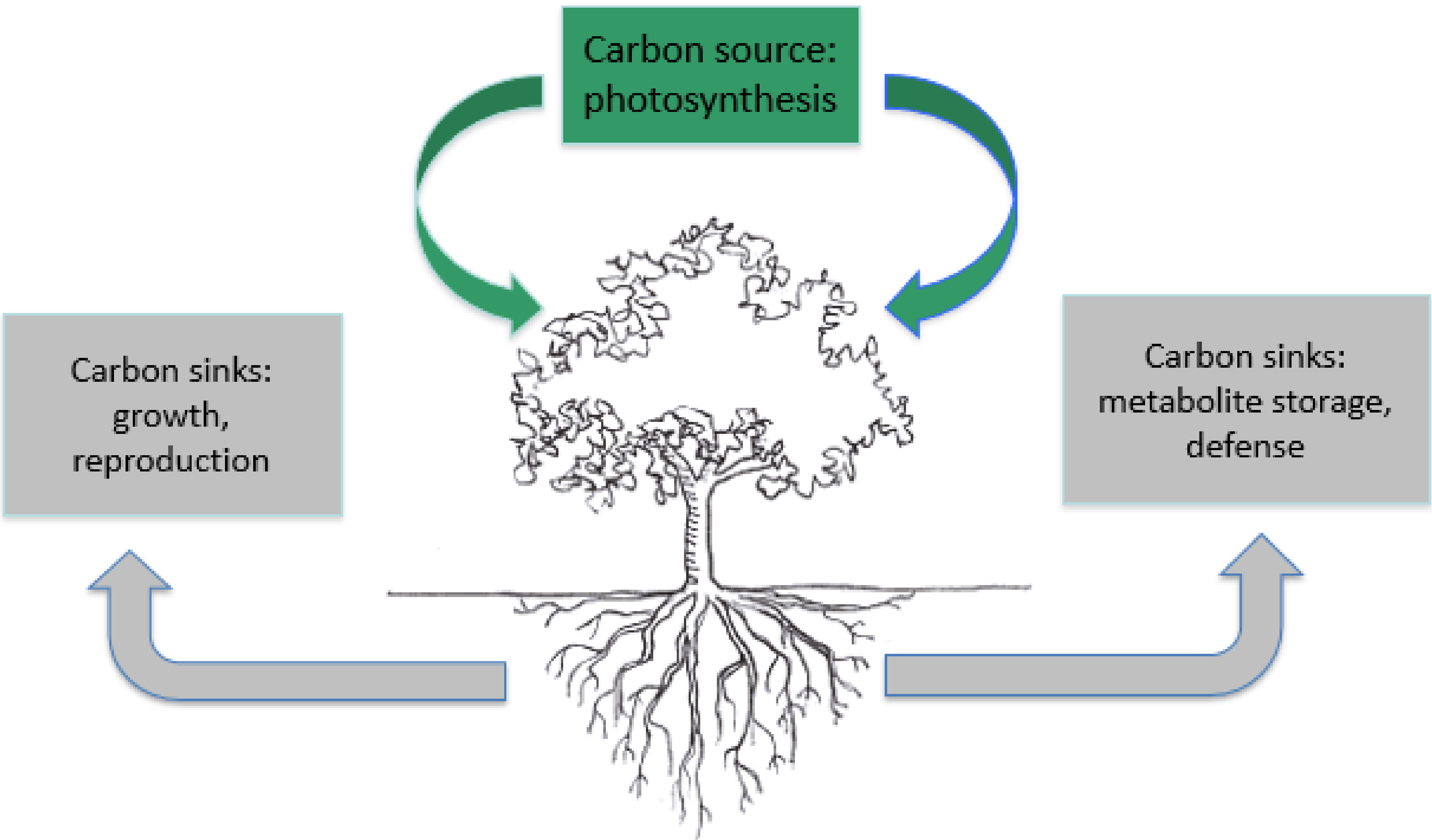
Hultine et al. 2015

Tamarix response will include a depletion of carbohydrate reserves, decreased canopy cover and decreased flowering

Owl Draw, Utah

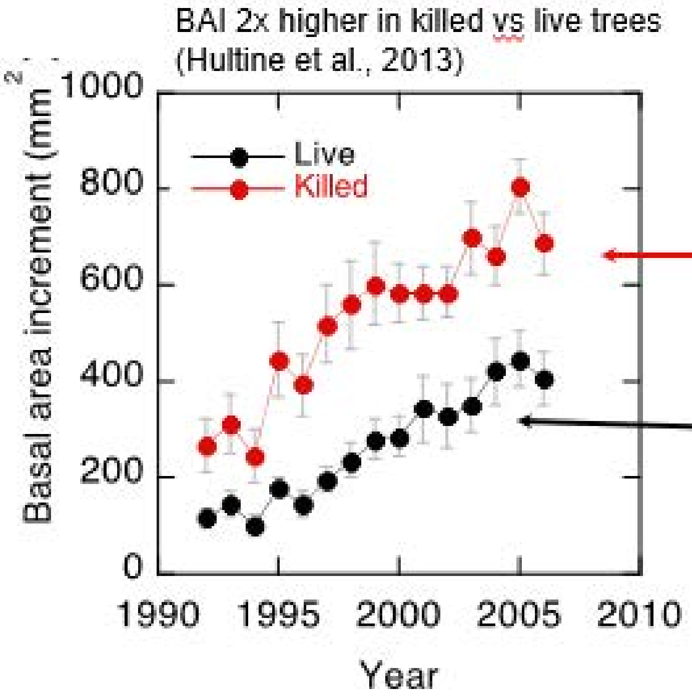
Dolores River, Utah

The plant carbon budget is a balance between sources and sinks

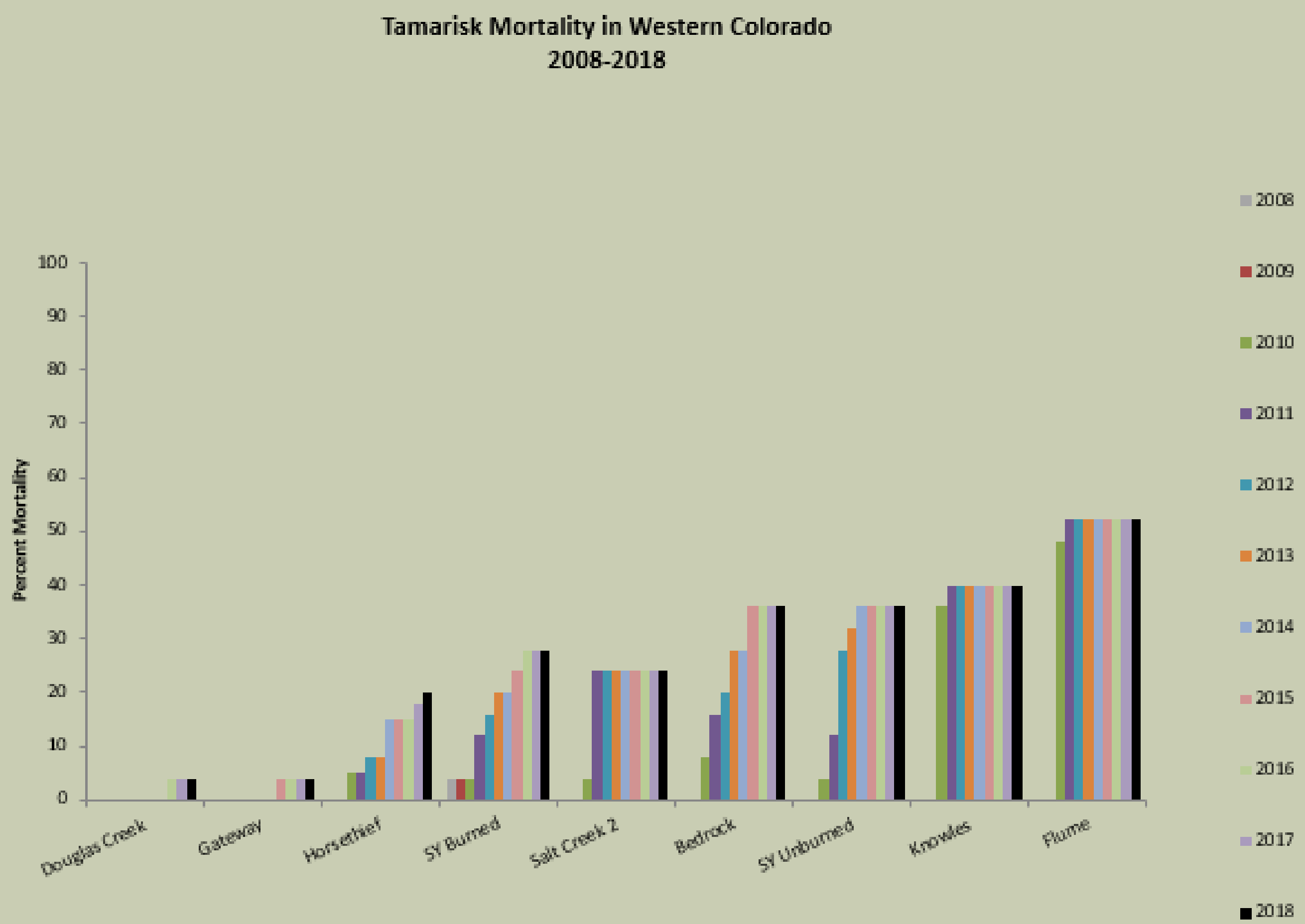


Growth versus carbon storage

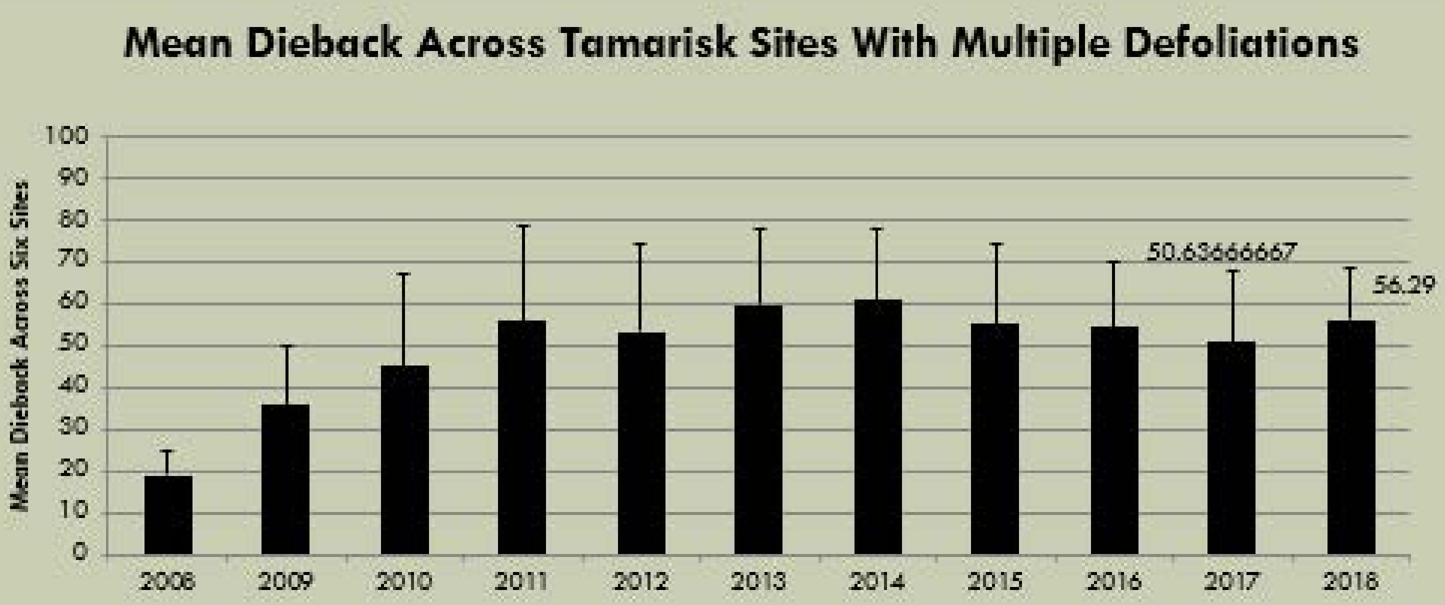
- Traditional hypothesis: “spillover” of available photosynthates (Chapin et al., 1990)



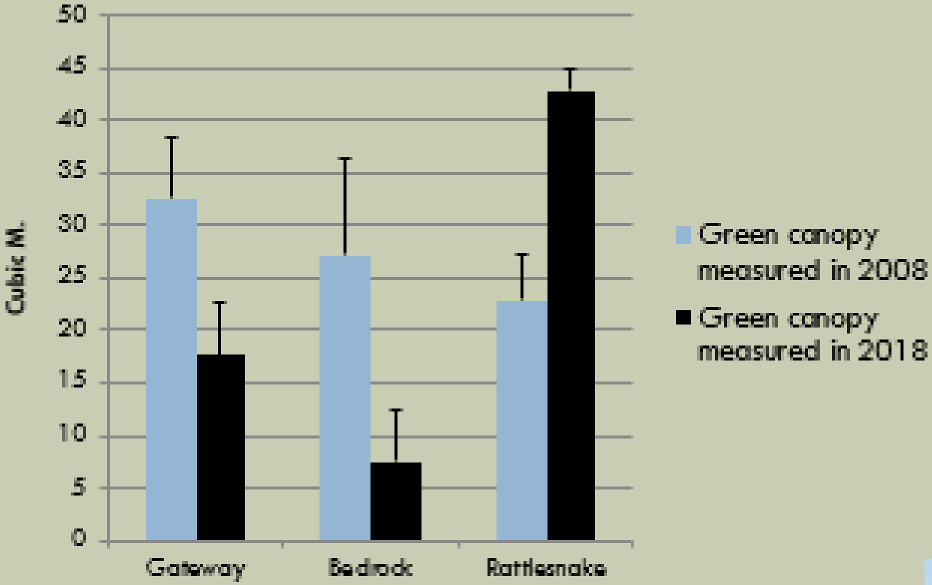
- Contemporary hypothesis: Allocation of photosynthates is highly regulated (Sala et al., 2012)

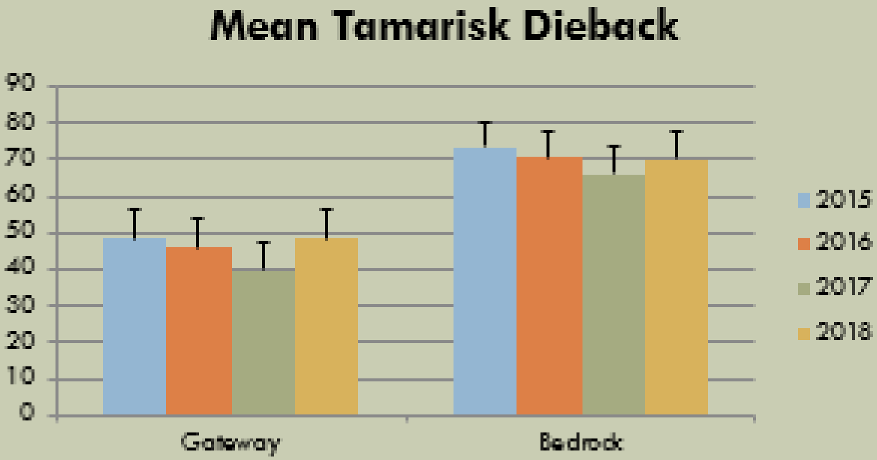

Tamarisk Mortality in Western Colorado
2008-2018
Percent Mortality
0
10
20
30
40
50
60
70
80
90
100
Douglas Creek
Gateway
Horsethief
SY Burned
Salt Creek 2
Bedrock
SY Unburned
Knowles
Flume
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

Tamarisk Dieback Across Sites 2008- 2018



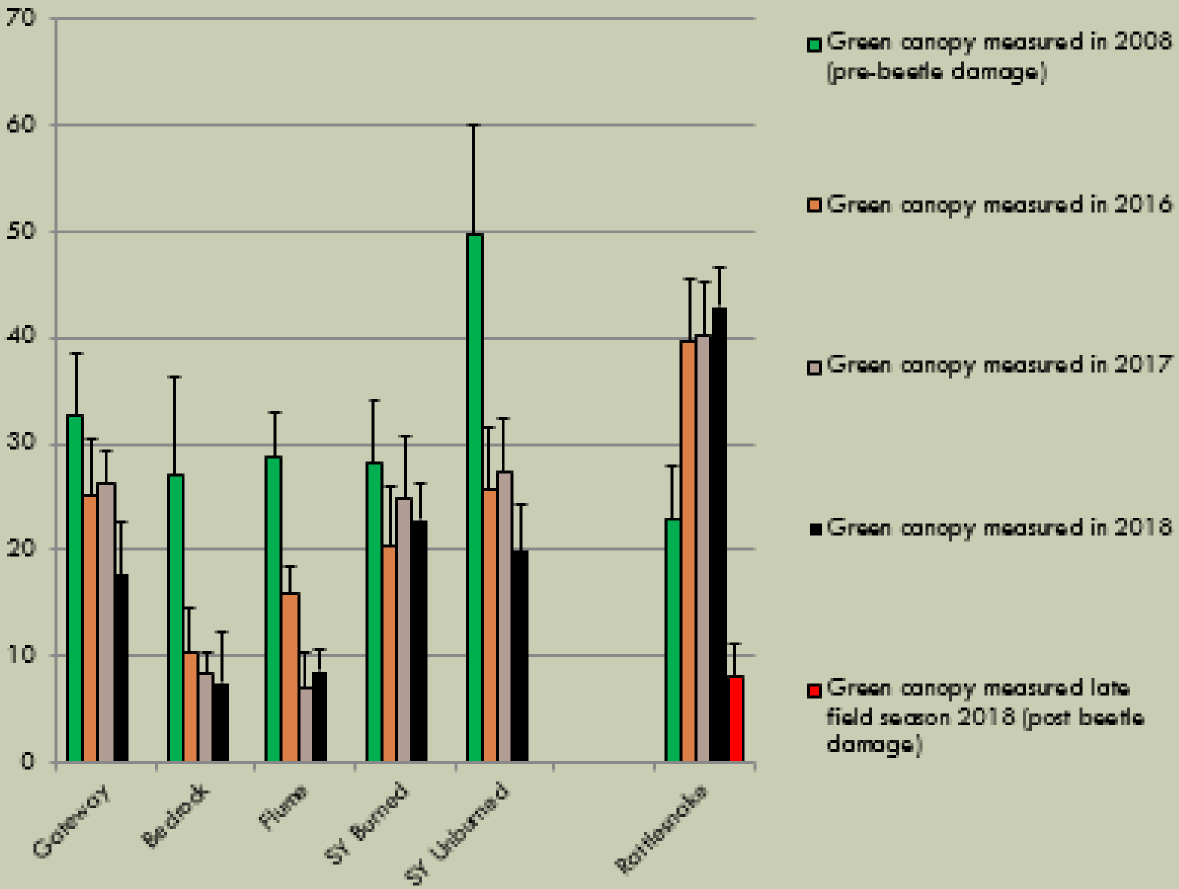
Monitoring Results Gateway and Bedrock



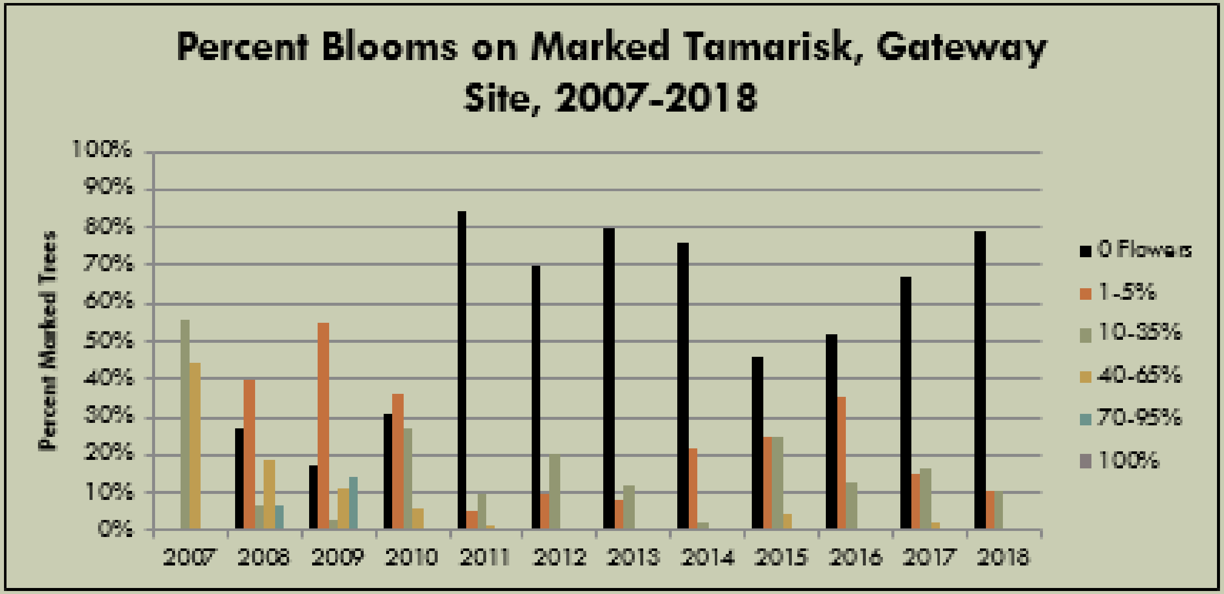


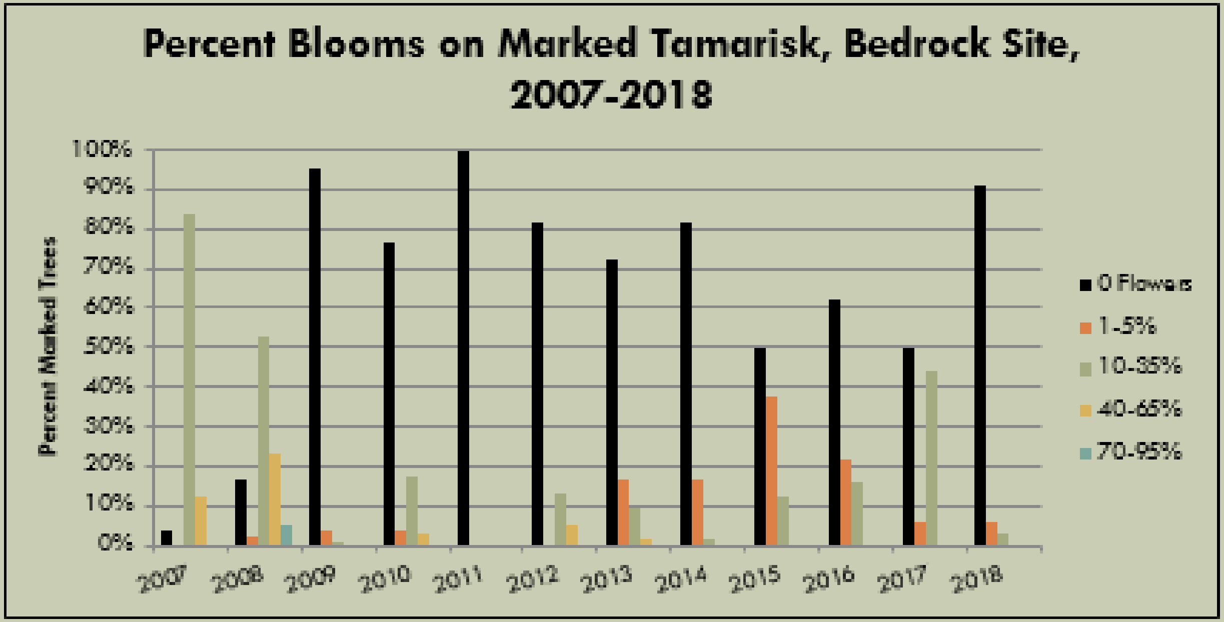
Canopy Volume 2008 vs.2016-2018

- **As of 2018 mean canopy volume has decreased by an average of 46% at damaged sites (at least three defoliations) from measurements recorded in 2008.**
- **Whereas we see a 50% increase at the Rattlesnake Gulch from measurements taken in 2008.**

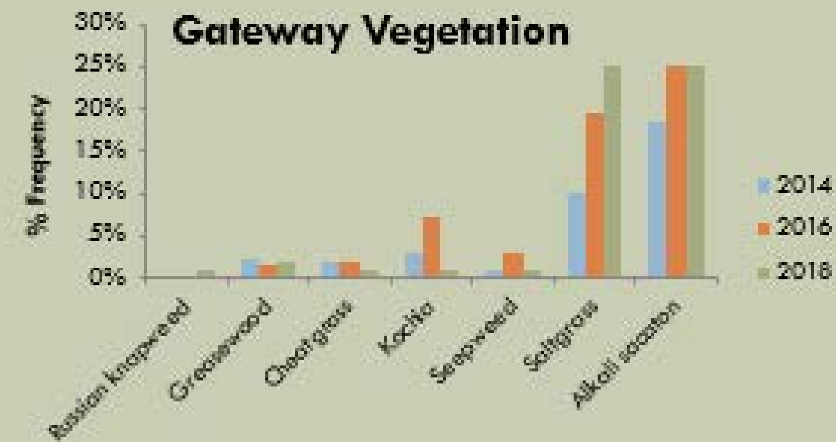


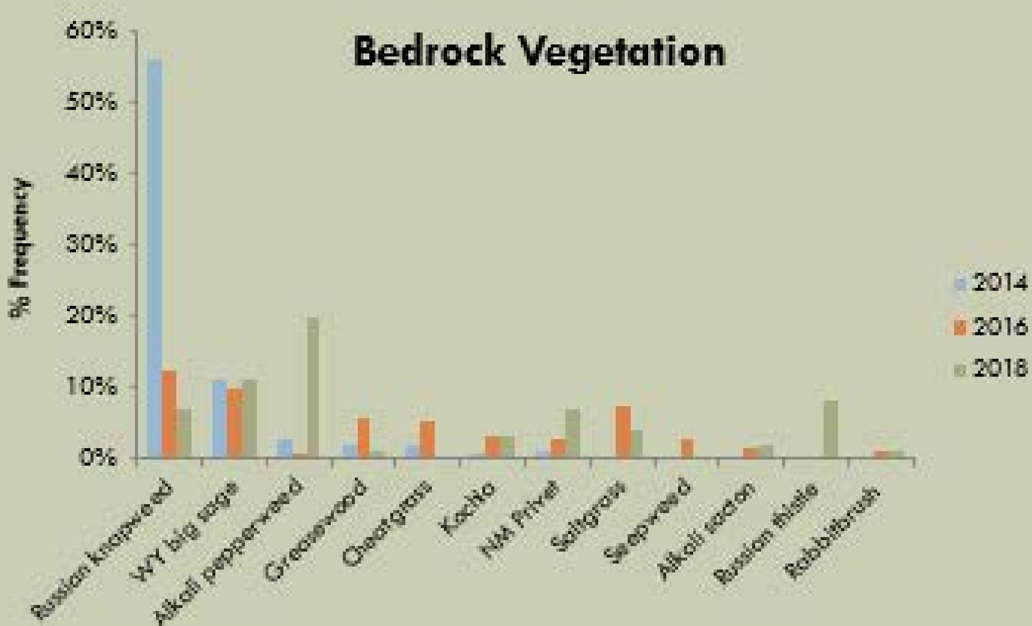
Flower Decline





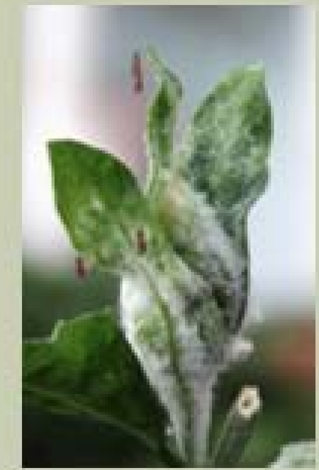
Site Level Vegetation Composition





Invaders to keep an eye on:

Russian knapweed
Russian thistle
Cheatgrass
Kochia

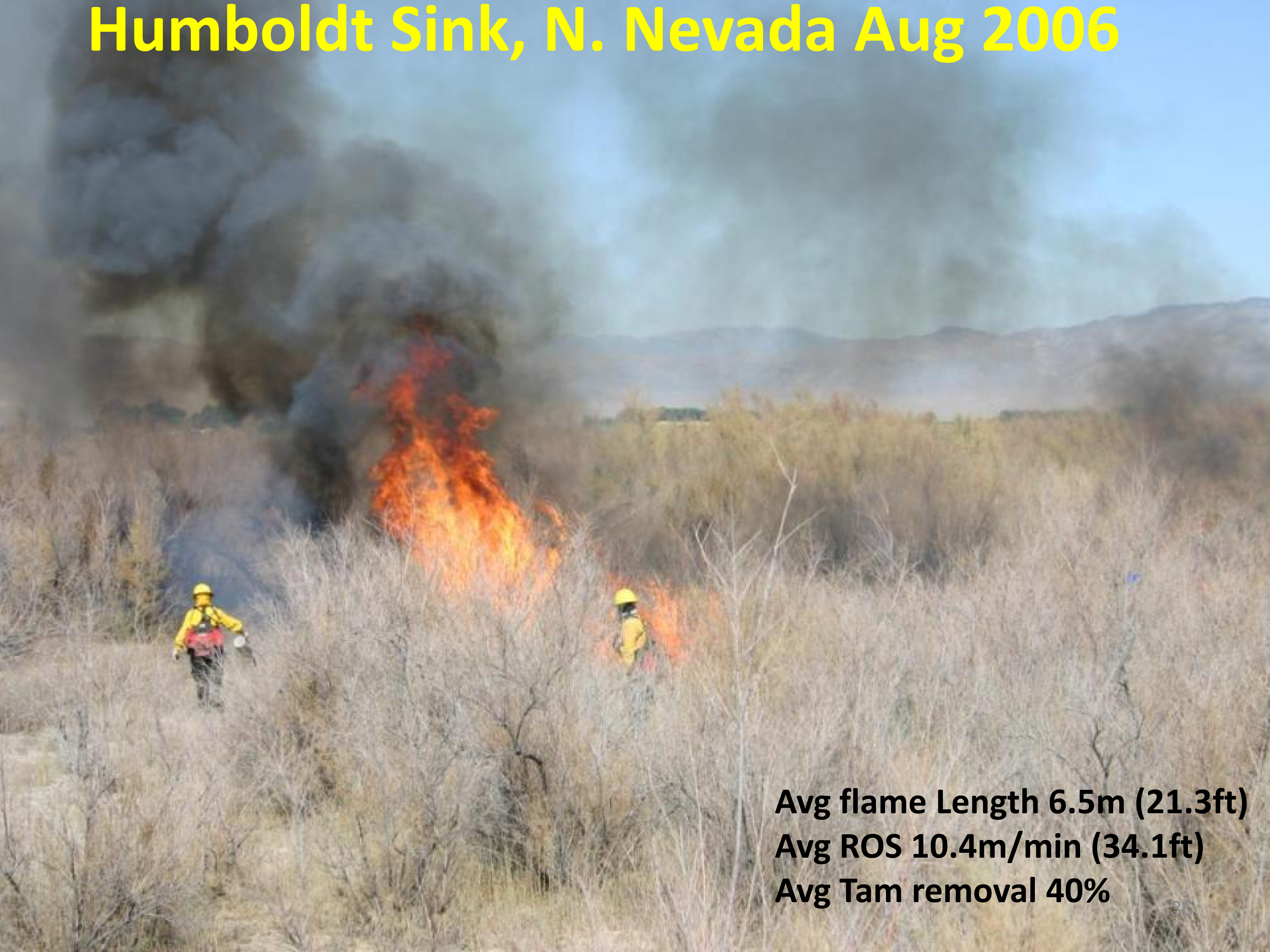


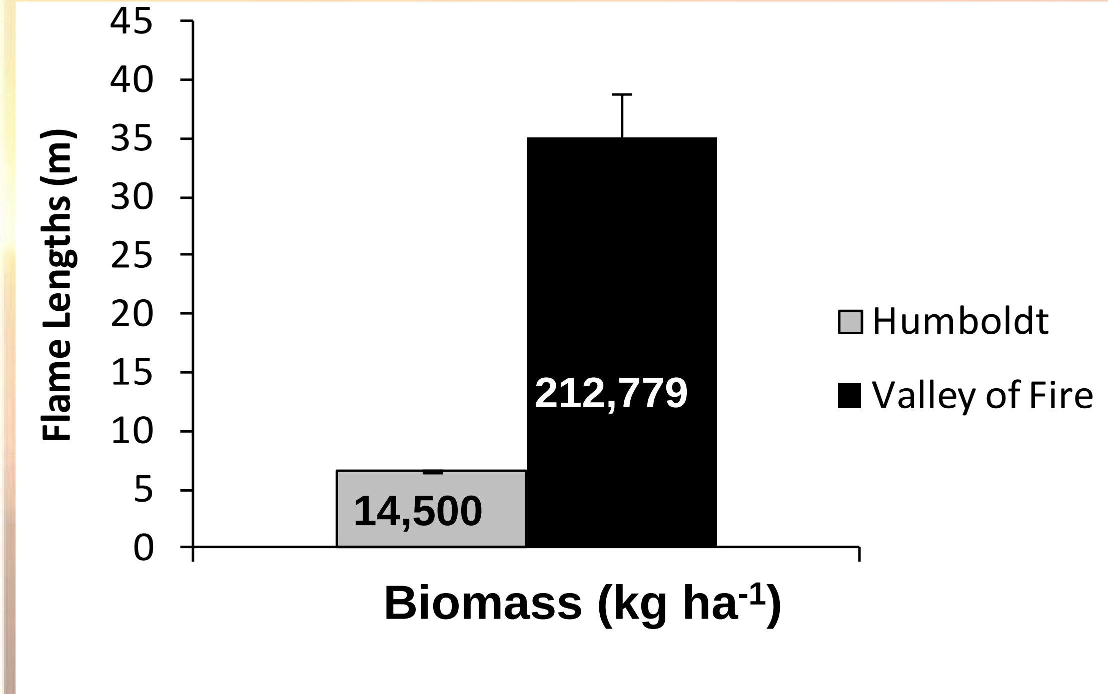
Salix coming up under defoliated *tamarix*

Valley of fire wash, S. Nevada Sept 2008

Valley of fire wash, S. Nevada Sept 2008

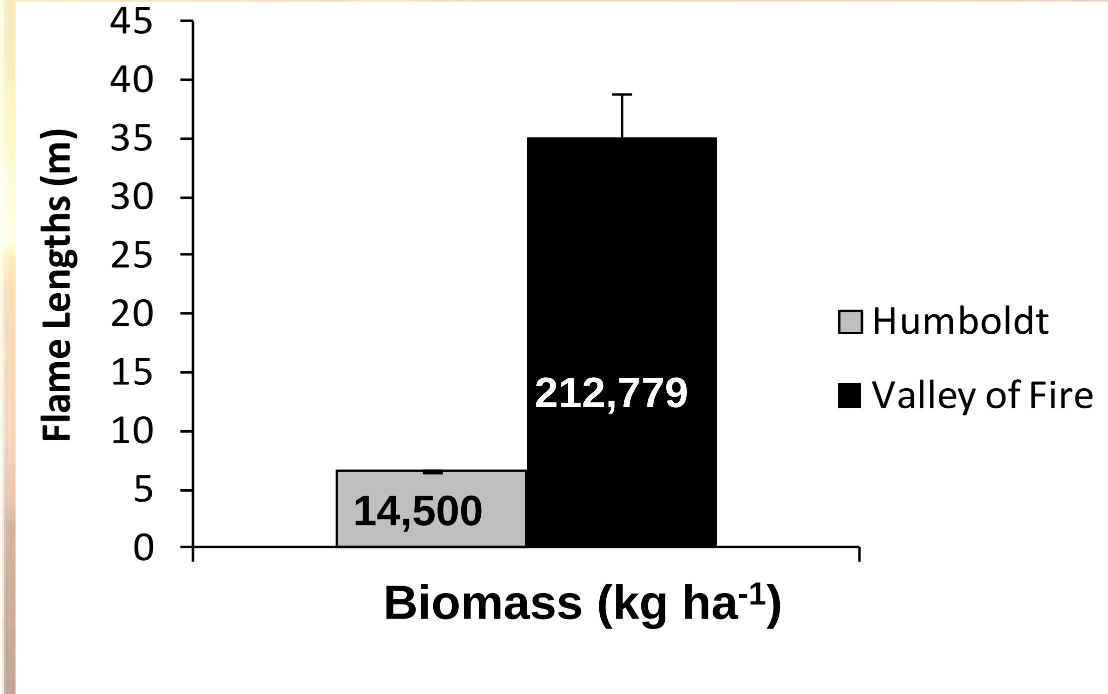
Humboldt Sink, N. Nevada Aug 2006





Anova: $p < 0.001$

Tamarix fire intensity is biomass dependent



Anova: p< 0.001

Tamarix fire intensity is biomass dependent


Should expect > frequent fires with > extreme behavior in areas following initial defoliation
Fire frequency and intensity should decrease as foliage drops and trees die back
St. George Utah
June 1, 2014
(photo by Maysen Fielding)

Fort Thomas Fire 2018

Unmanaged

Understory thinned

Expert Panel Report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Tom Till Photography, Inc.