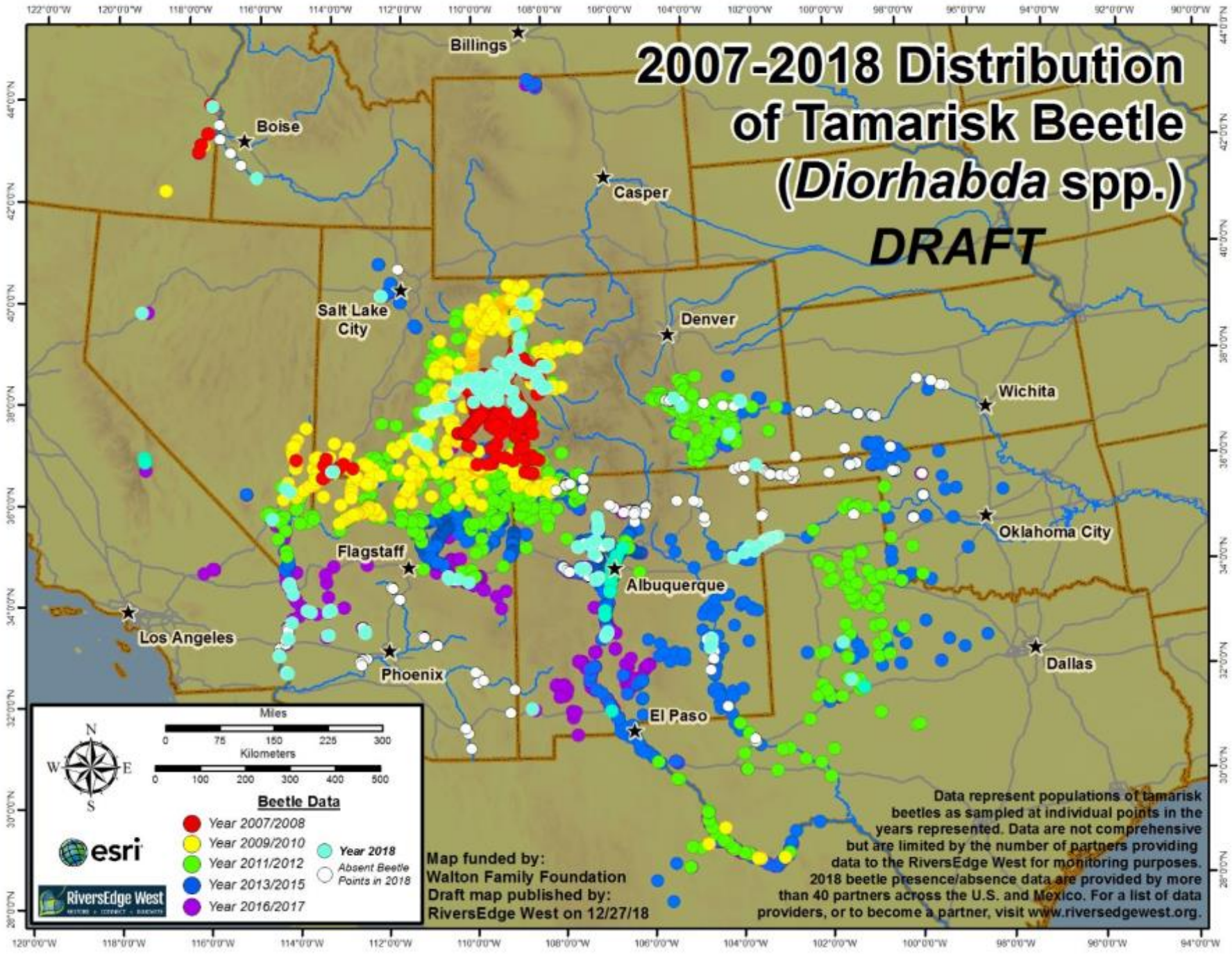
Diorhabda Impact on *Tamarix* Growth & Dieback

Keara Bixby-
BEMP Lab Manager and Biologist

Bosque Ecosystem Monitoring Program

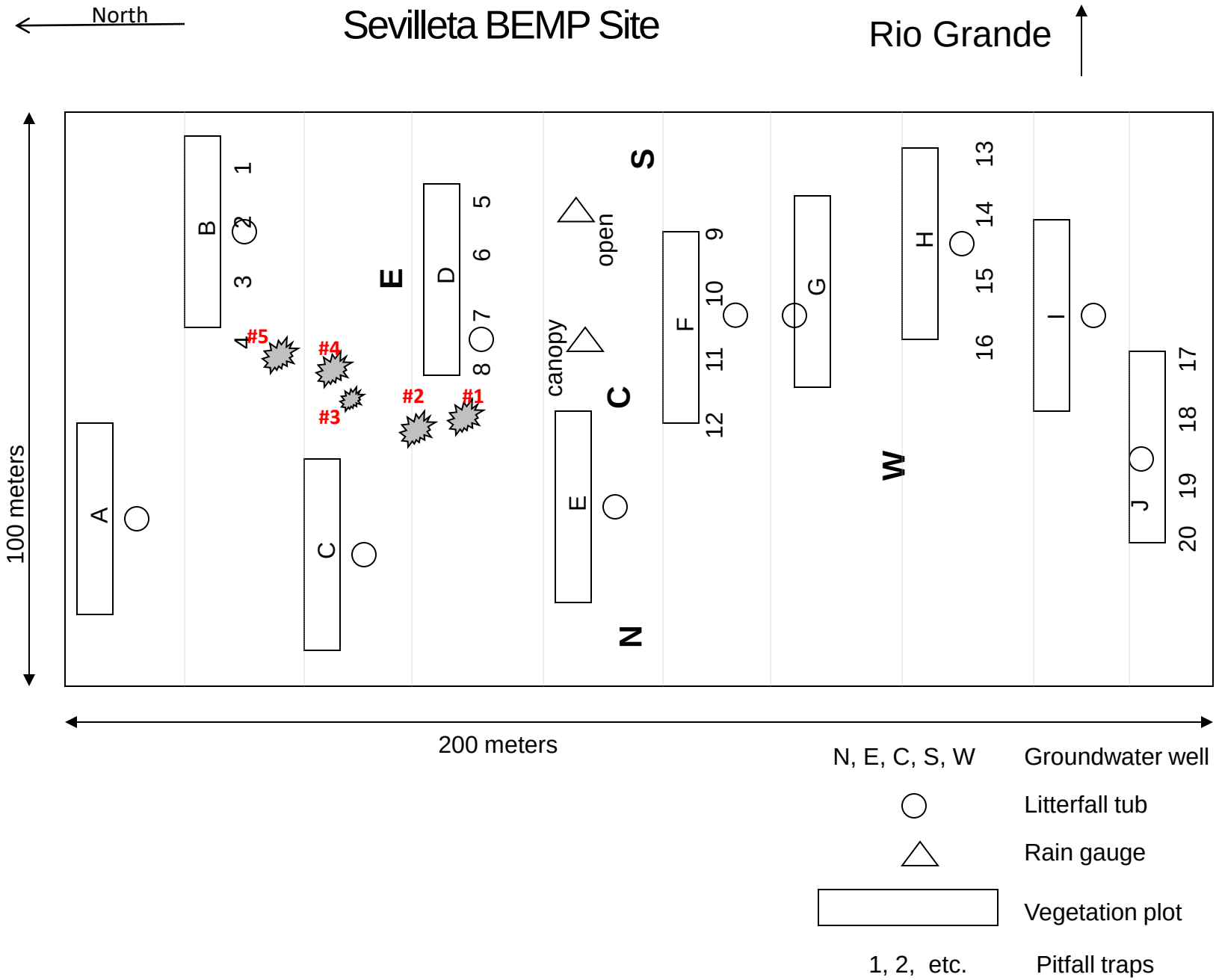
History

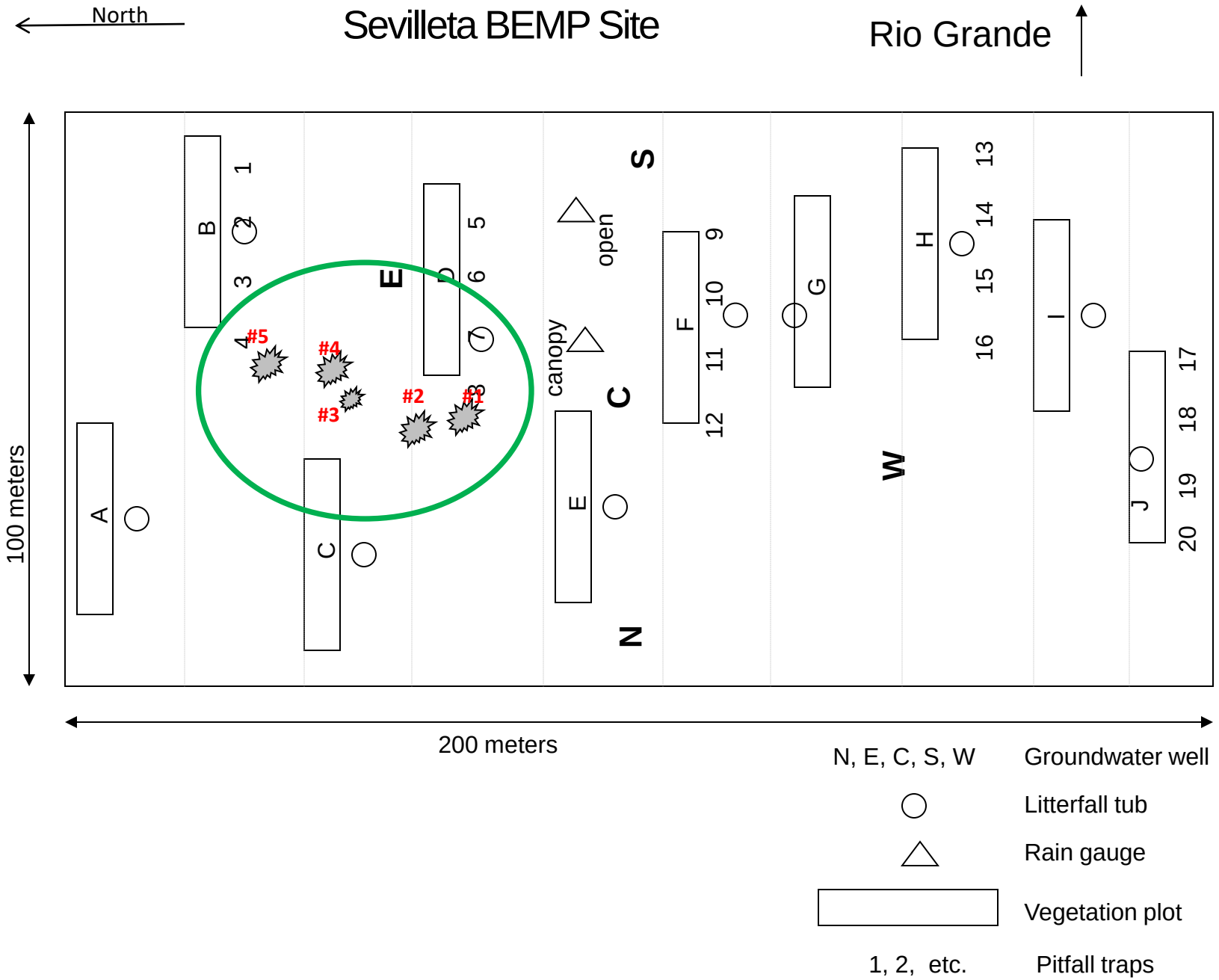
- Saltcedar *Tamarix spp.* Introduced in 1800's in bosque (riparian forest)
- Tamarisk leaf beetle (TLB) (*Diorabhda* spp.) first introduced in surrounding states in 2008
- Concern for migration into New Mexico due to Southwestern Willow Flycatcher (SWFL)

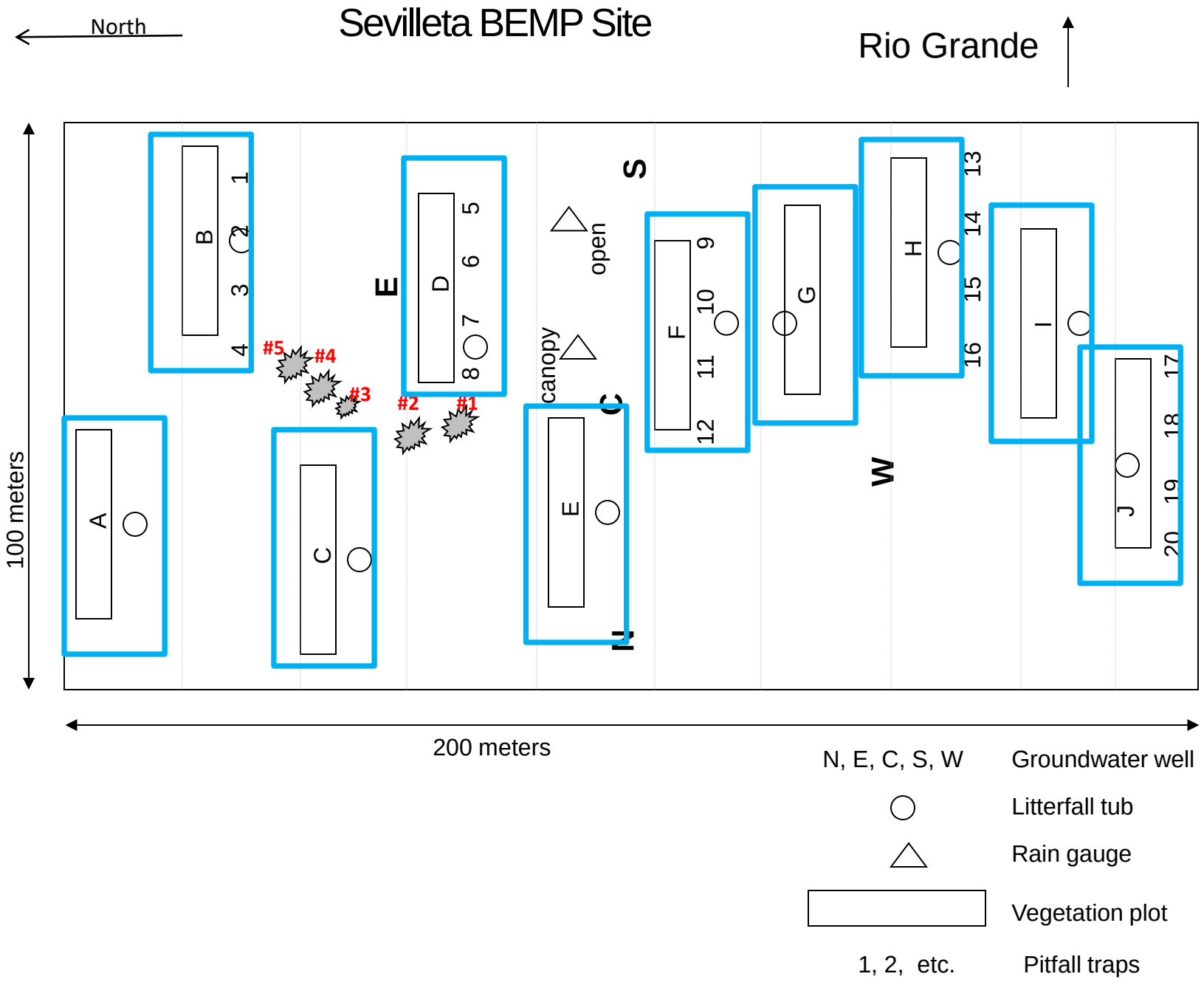

2007-2018 Distribution of Tamarisk Beetle (Diorhabda spp.)
DRAFT
Billings
Boise
Casper
Salt Lake City
Denver
Wichita
Oklahoma City
Flagstaff
Albuquerque
Los Angeles
Phoenix
Dallas
El Paso
Miles
0 75 150 225 300
Kilometers
0 100 200 300 400 500
N
W
E
S
Beetle Data
Year 2007/2008
Year 2009/2010
Year 2011/2012
Year 2013/2015
Year 2016/2017
Year 2018
Absent Beetle Points in 2018
esri
RiversEdge West
Map funded by:
Walton Family Foundation
Draft map published by:
RiversEdge West on 12/27/18
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 40 partners across the U.S. and Mexico. For a list of data providers, or to become a partner, visit www.riversedgewest.org.

Bosque Ecosystem Monitoring Program-BEMP

- Community science based organization focused on long term ecological research of the Middle Rio Grande bosque.
- Collaboration with University of New Mexico department of Biology and Bosque School
- Science, education, stewardship, and outreach throughout the Middle Rio Grande
- Engage with 8000-10,000 participants annually from over 40 schools in 7 NM counties
- 1996 organization started, now 33 active research sites


North
Sevilleta BEMP Site
Rio Grande
100 meters
200 meters
A
B
C
D
E
F
G
H
I
J
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
#1
#2
#3
#4
#5
open
canopy
N
E
C
S
W
N, E, C, S, W
Groundwater well
Litterfall tub
Rain gauge
Vegetation plot
1, 2, etc.
Pitfall traps


North
Sevilleta BEMP Site
Rio Grande
100 meters
200 meters
A
B
C
D
E
F
G
H
I
J
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
#1
#2
#3
#4
#5
canopy
open
N
E
C
S
W
N, E, C, S, W
Groundwater well
Litterfall tub
Rain gauge
Vegetation plot
1, 2, etc.
Pitfall traps


North
Sevilleta BEMP Site
Rio Grande
100 meters
200 meters
A
B
C
D
E
F
G
H
I
J
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
#1
#2
#3
#4
#5
canopy
open
N
E
C
S
W
N, E, C, S, W
Groundwater well
Litterfall tub
Rain gauge
Vegetation plot
1, 2, etc.
Pitfall traps

Methods

- Field Collections

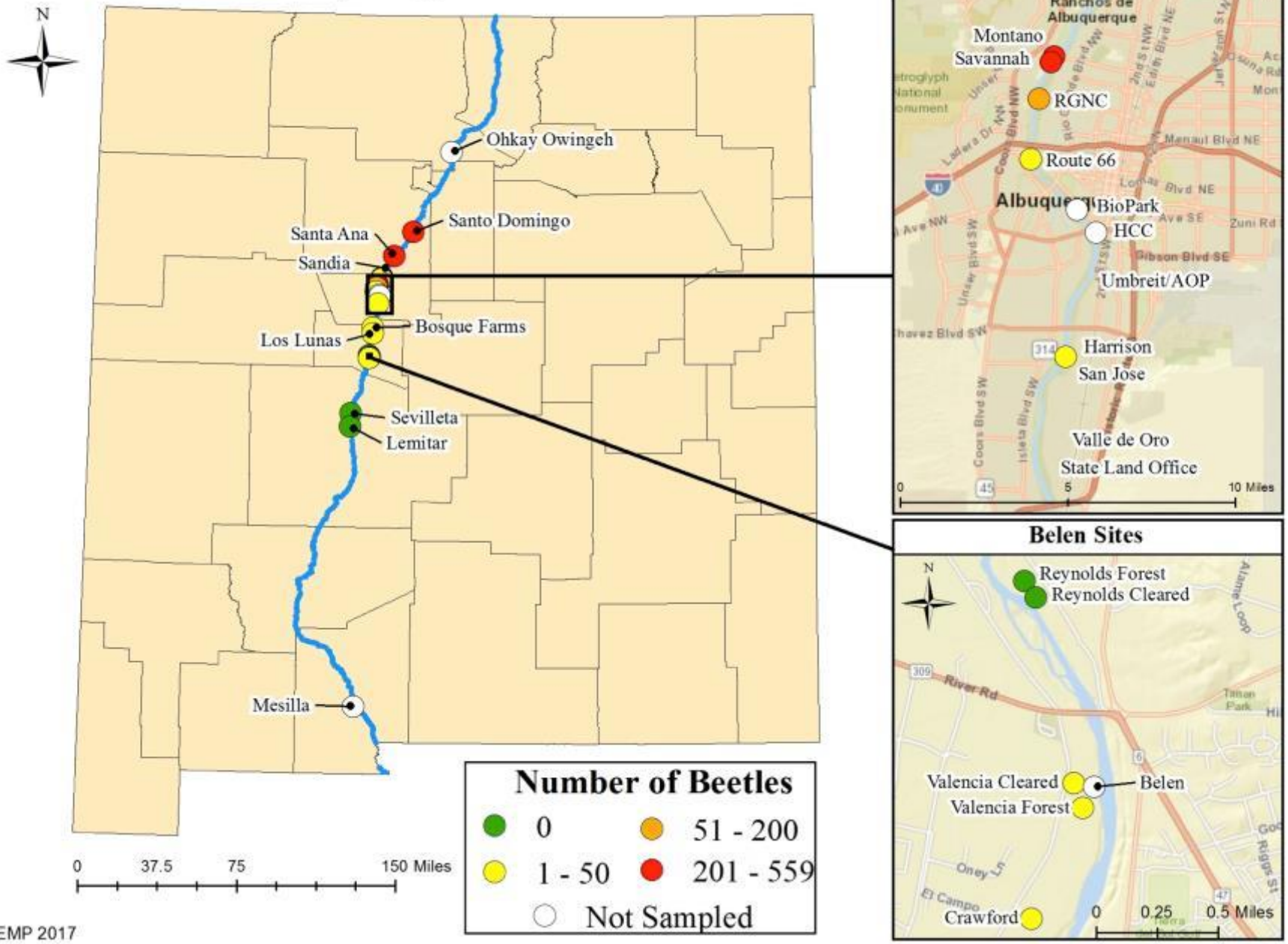
Methods-Lab Processing

- Tamarisk Leaf Beetle
  - Adults
  - Larvae: early/late
  - Egg masses
- Other defoliators
  - Splendid tamarisk weevils (*Coniatus splendidulus)*
  - Tamarisk leaf hoppers (*Opsius stactogalus*)
- Predators
  - ants/spiders/lady beetles

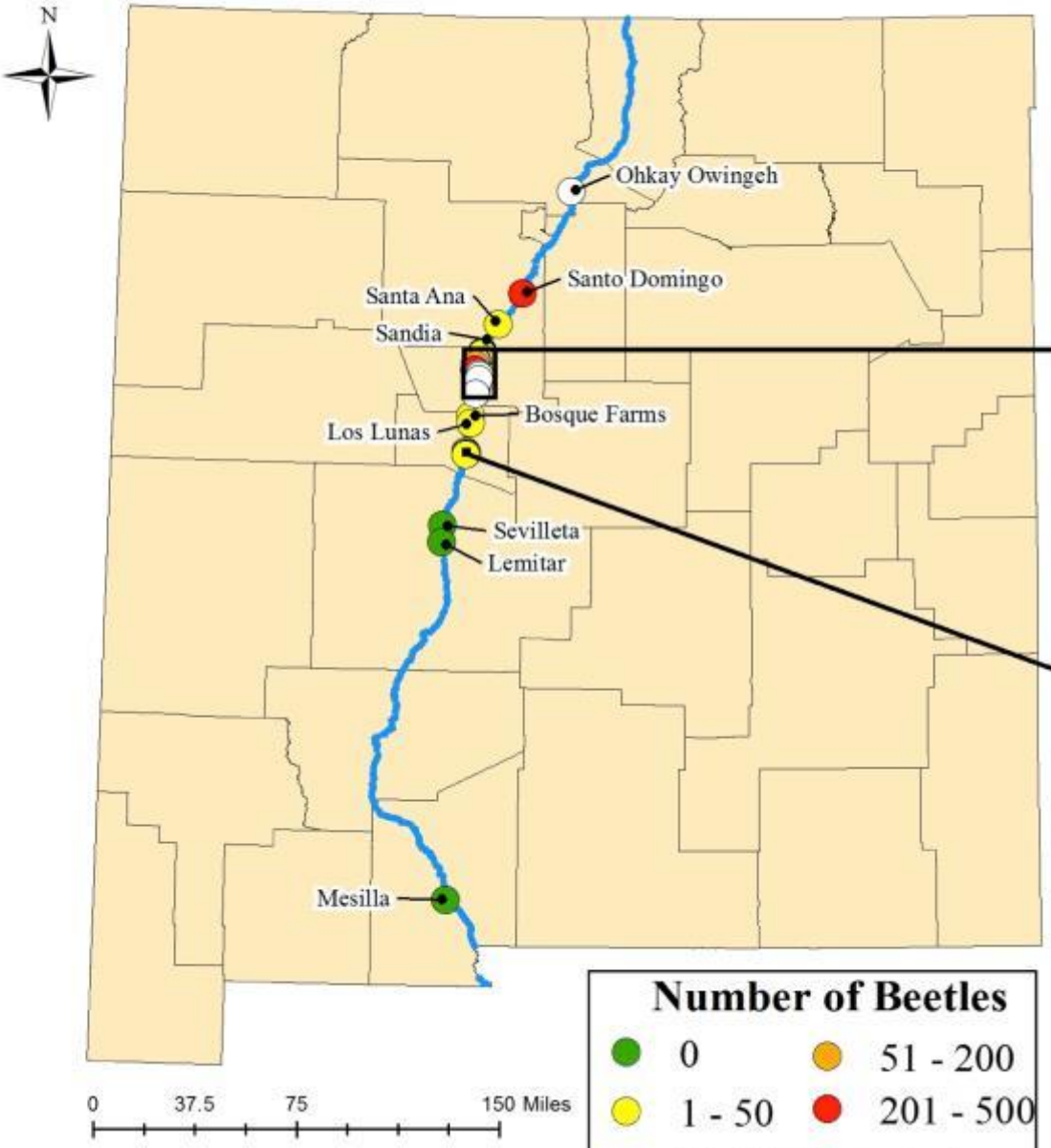
Splendid tamarisk weevils (*Coniatus splendidulus*)

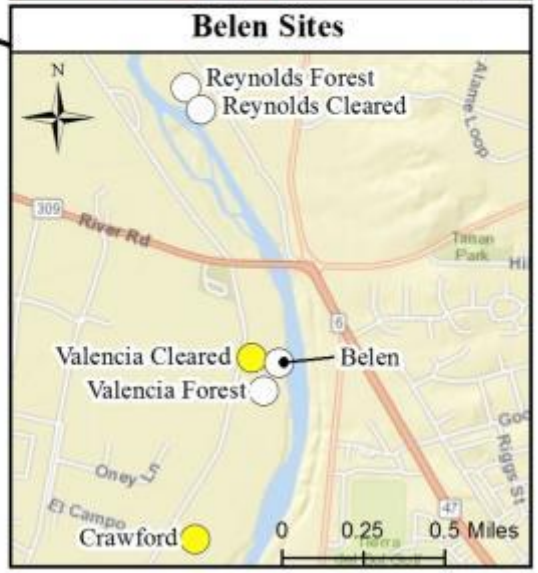
Tamarisk leaf hoppers (*Opsius stactogalus*)

Total Tamarisk Leaf Beetle Captured at BEMP Sites May-August 2013



Total Tamarisk Leaf Beetle Captured at BEMP Sites May-August 2014

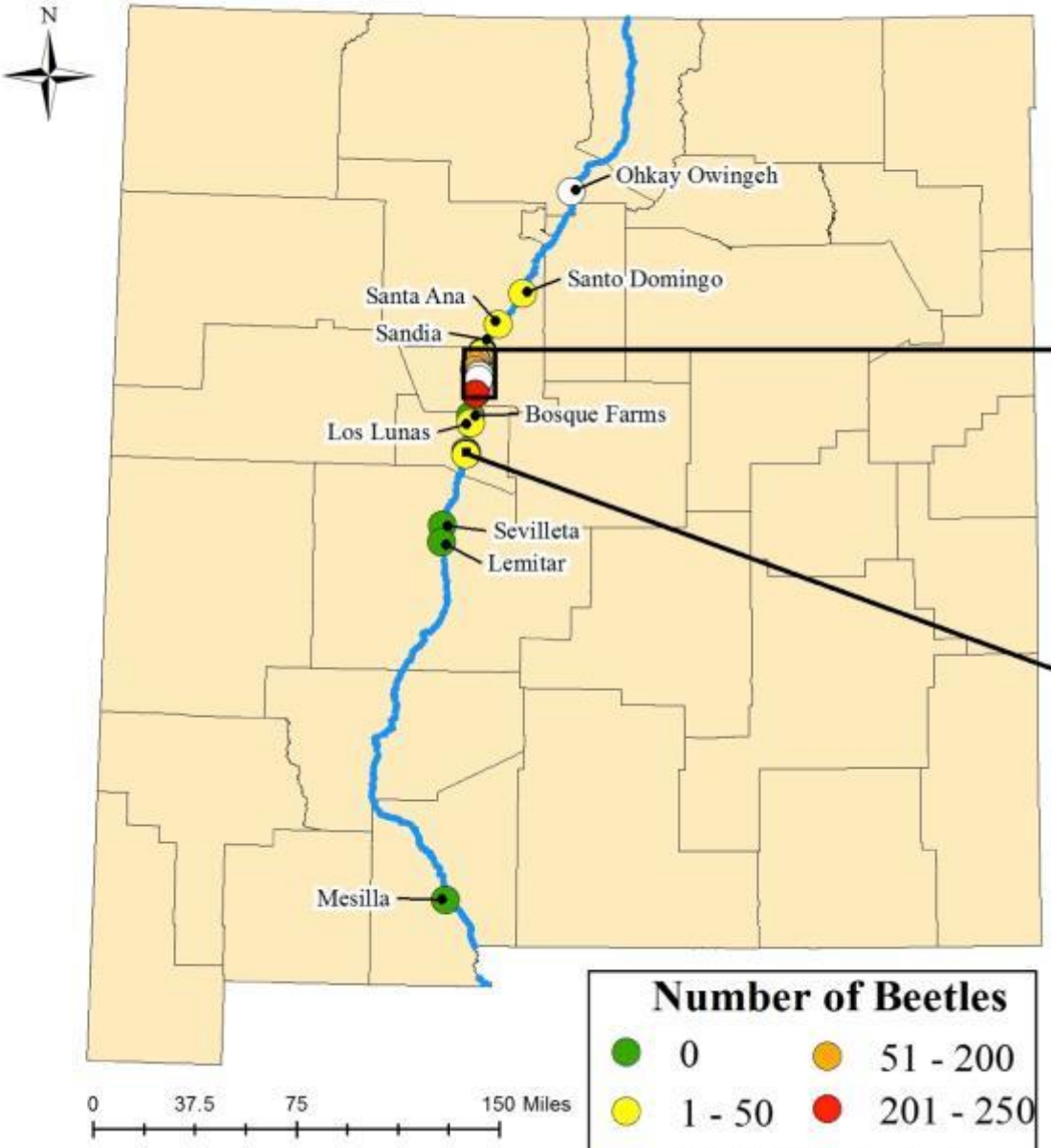


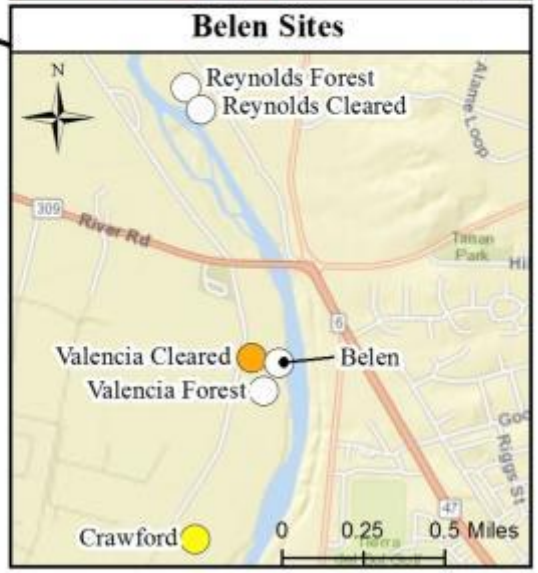


Number of Beetles

- 0
- 1 - 50
- 51 - 200
- 201 - 500
- Not Sampled

Total Tamarisk Leaf Beetle Captured at BEMP Sites May-August 2015

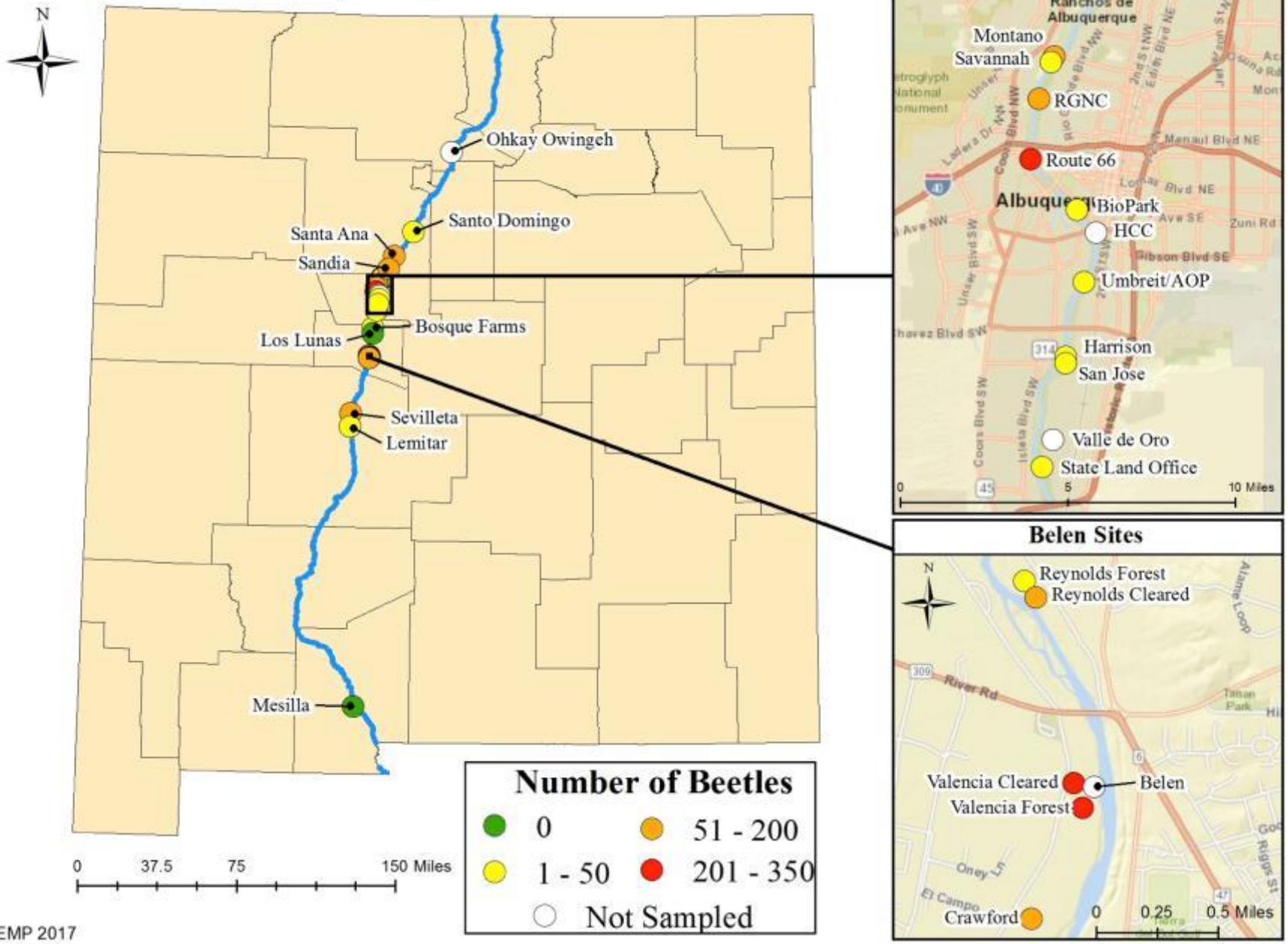




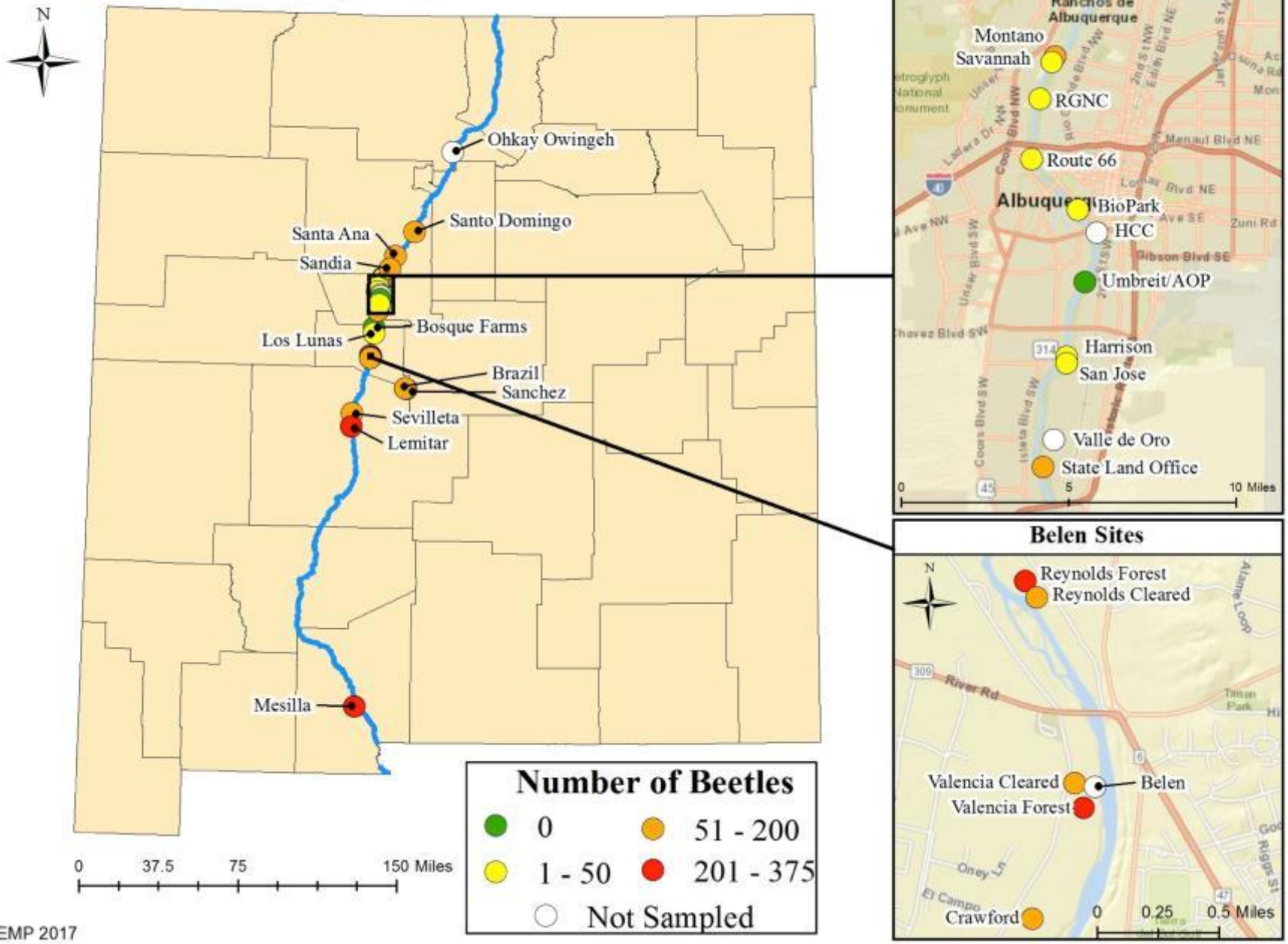
Number of Beetles

- 0
- 1 - 50
- 51 - 200
- 201 - 250
- Not Sampled

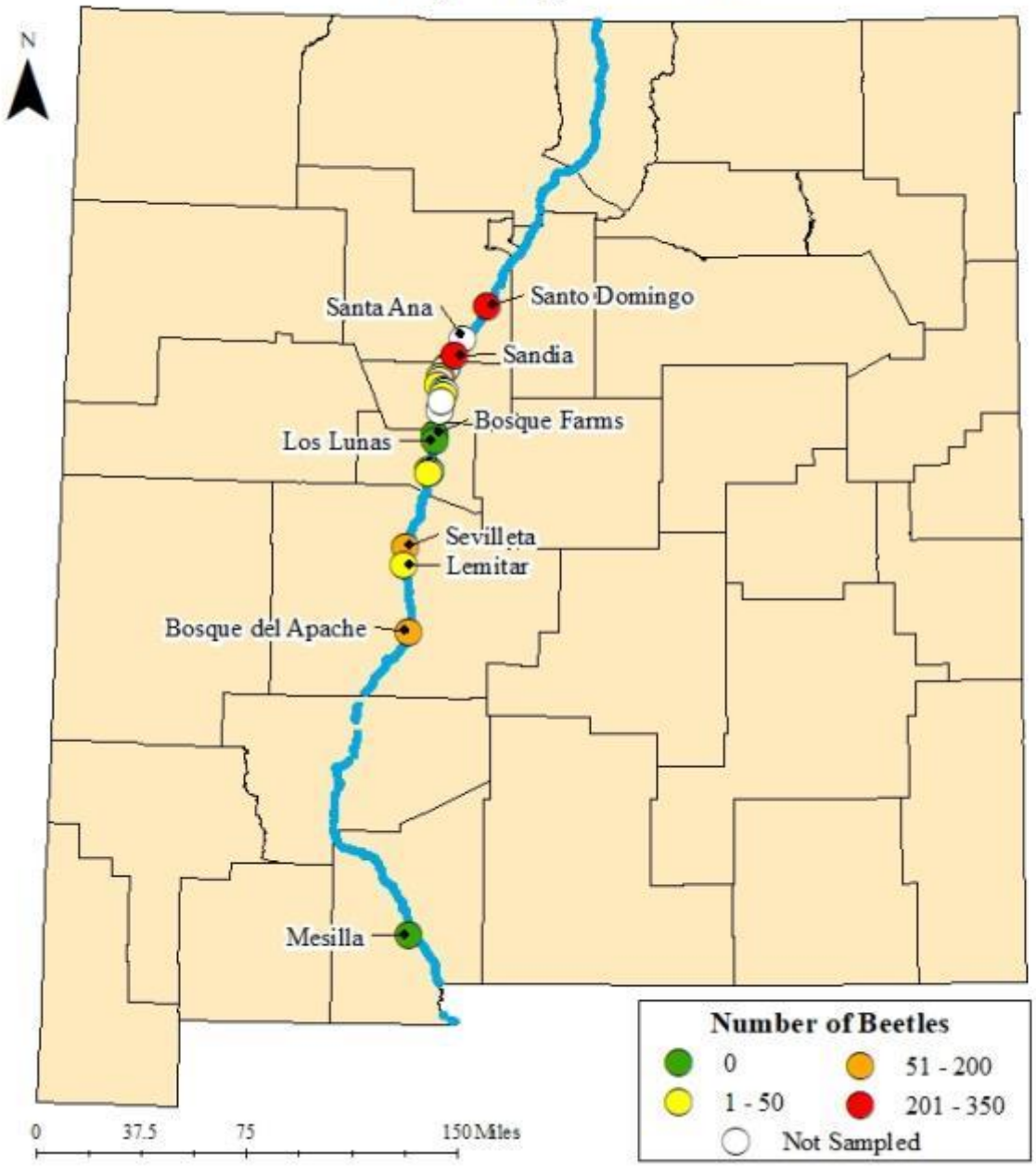
Total Tamarisk Leaf Beetle Captured at BEMP Sites May-August 2016



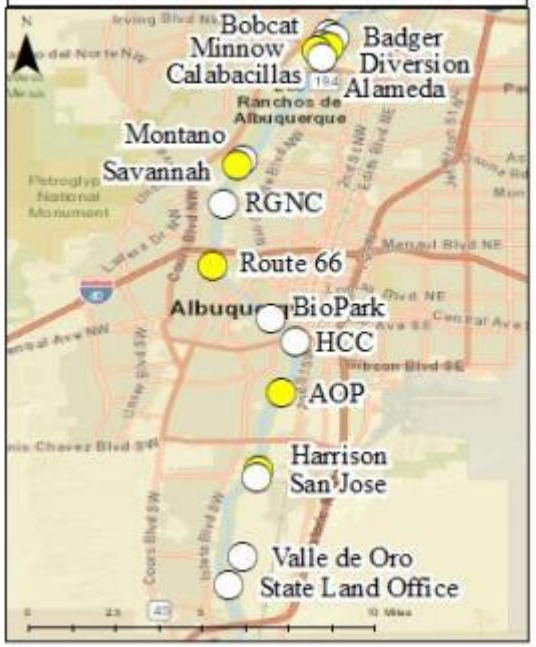
Total Tamarisk Leaf Beetle Captured at BEMP Sites May-August 2017



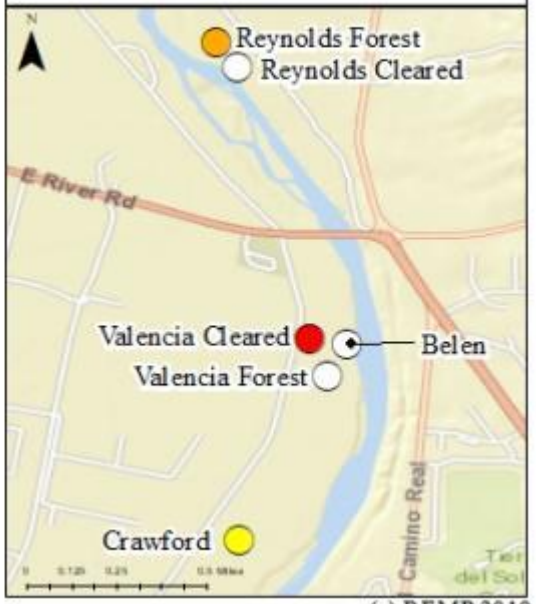
Sum of Tamarisk Leaf Beetles Captured at BEMP Sites May-August 2018



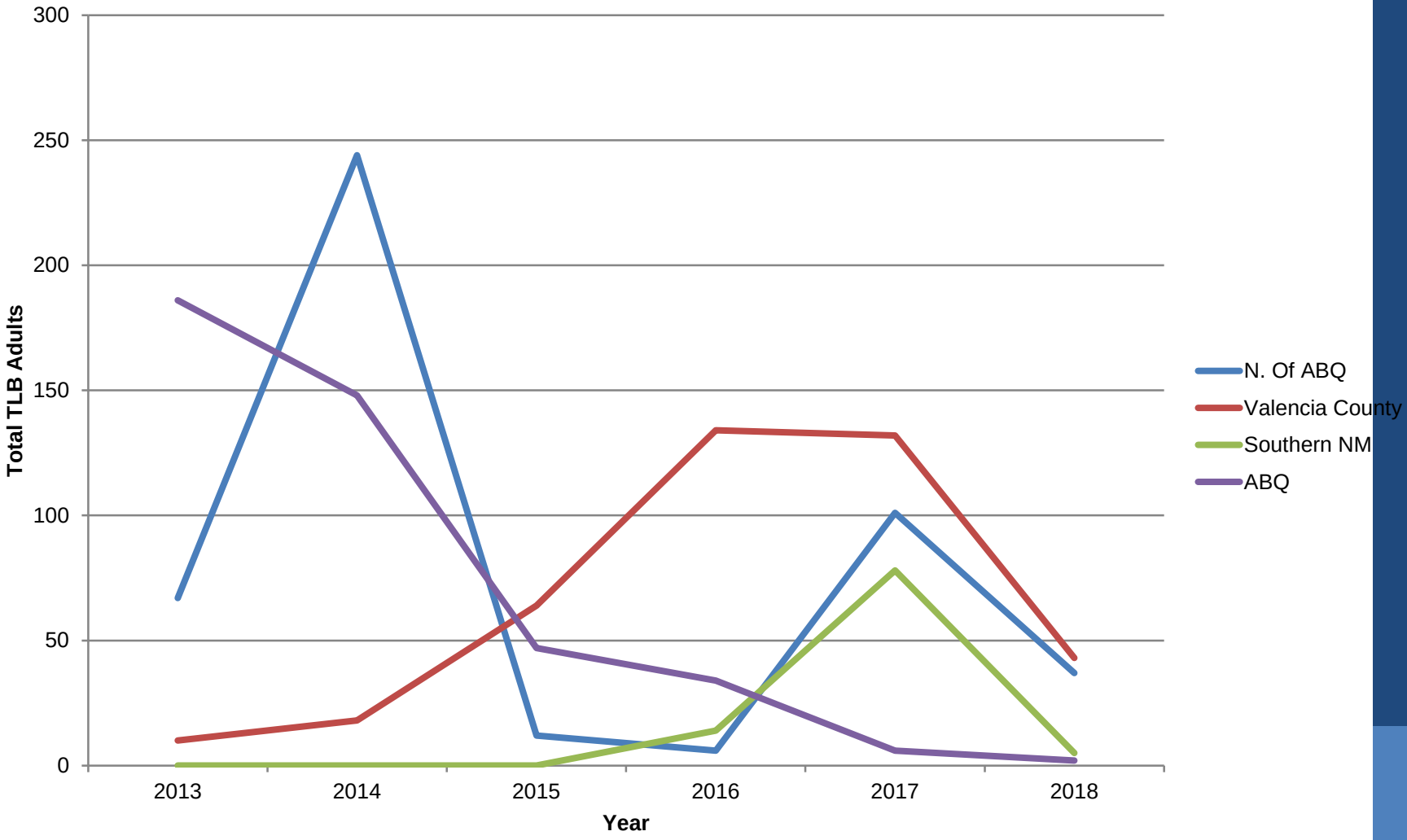
Albuquerque Sites



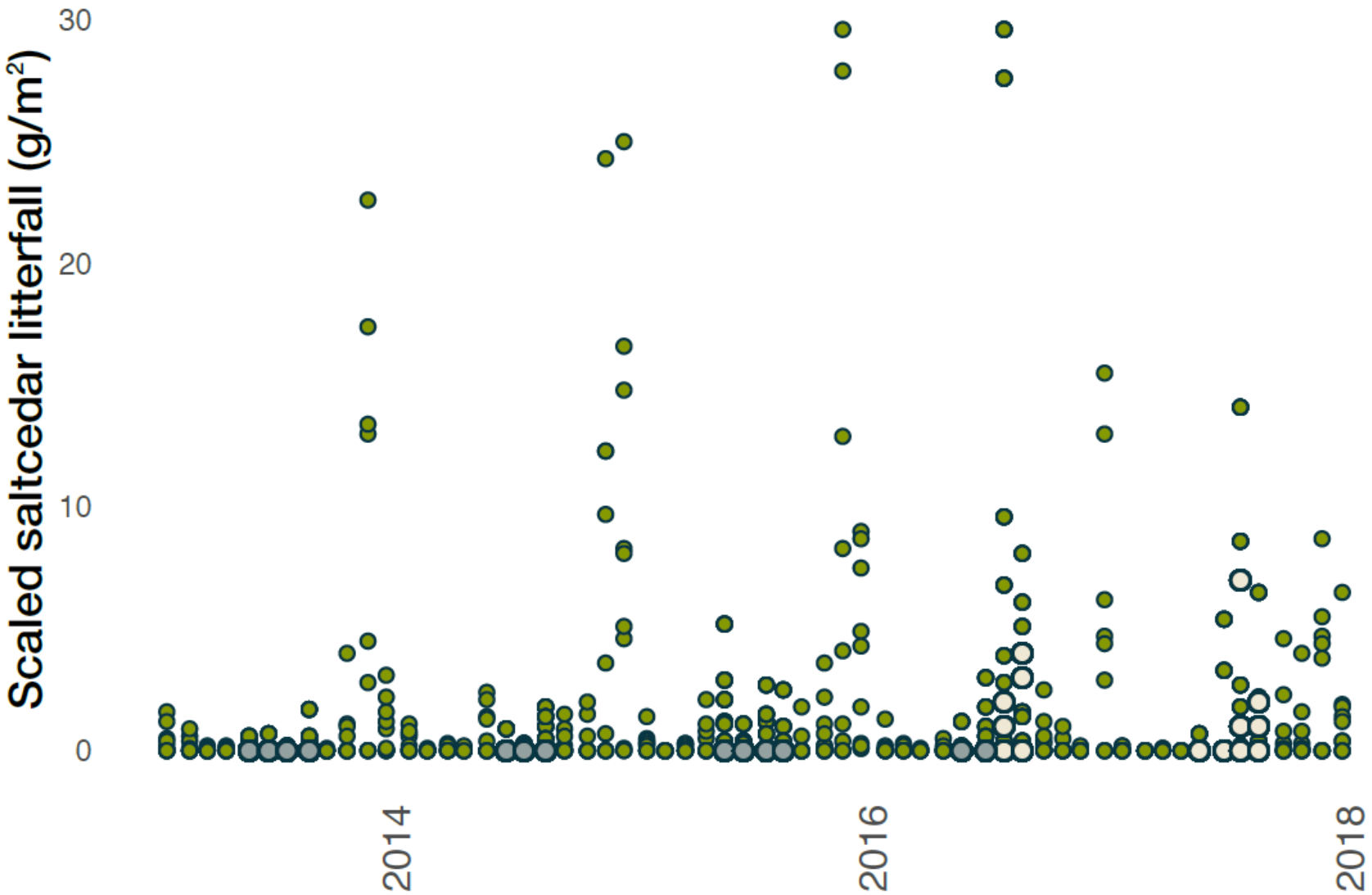
Belen Sites



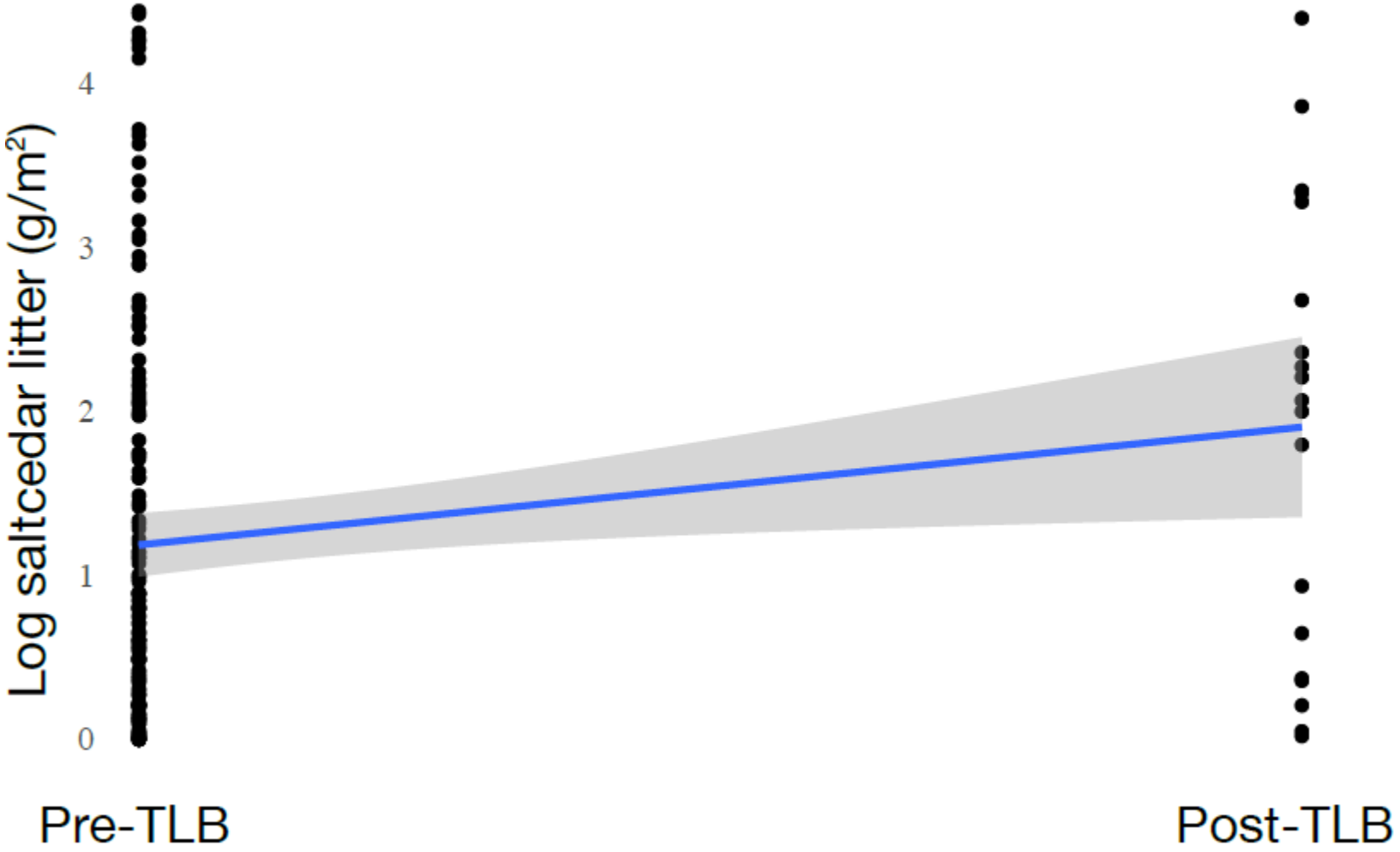
Total TLB Adults Captured at Continuously Monitored Sites 2013-2018



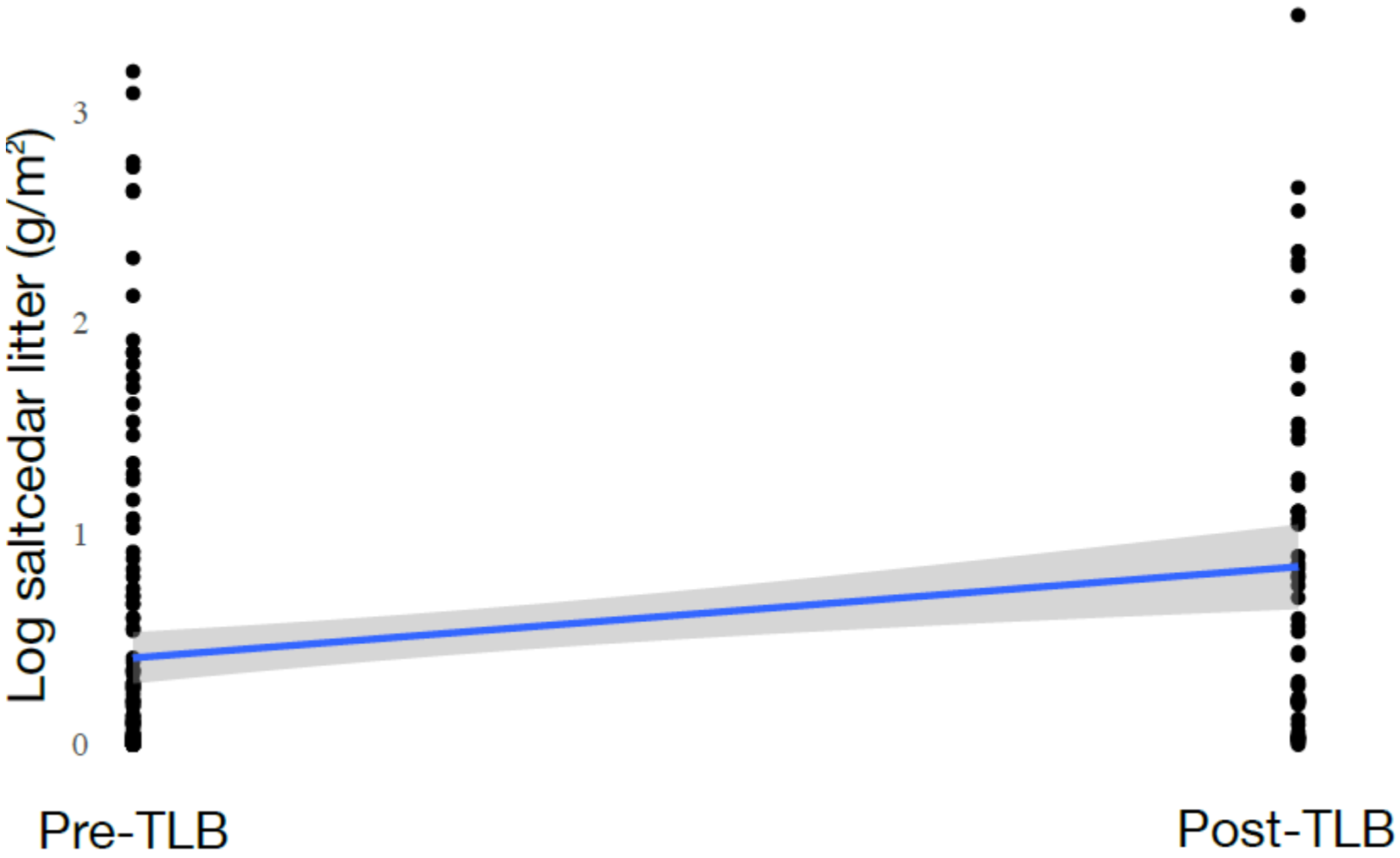
Saltcedar litterfall vs. TLB Presence Sevilleta



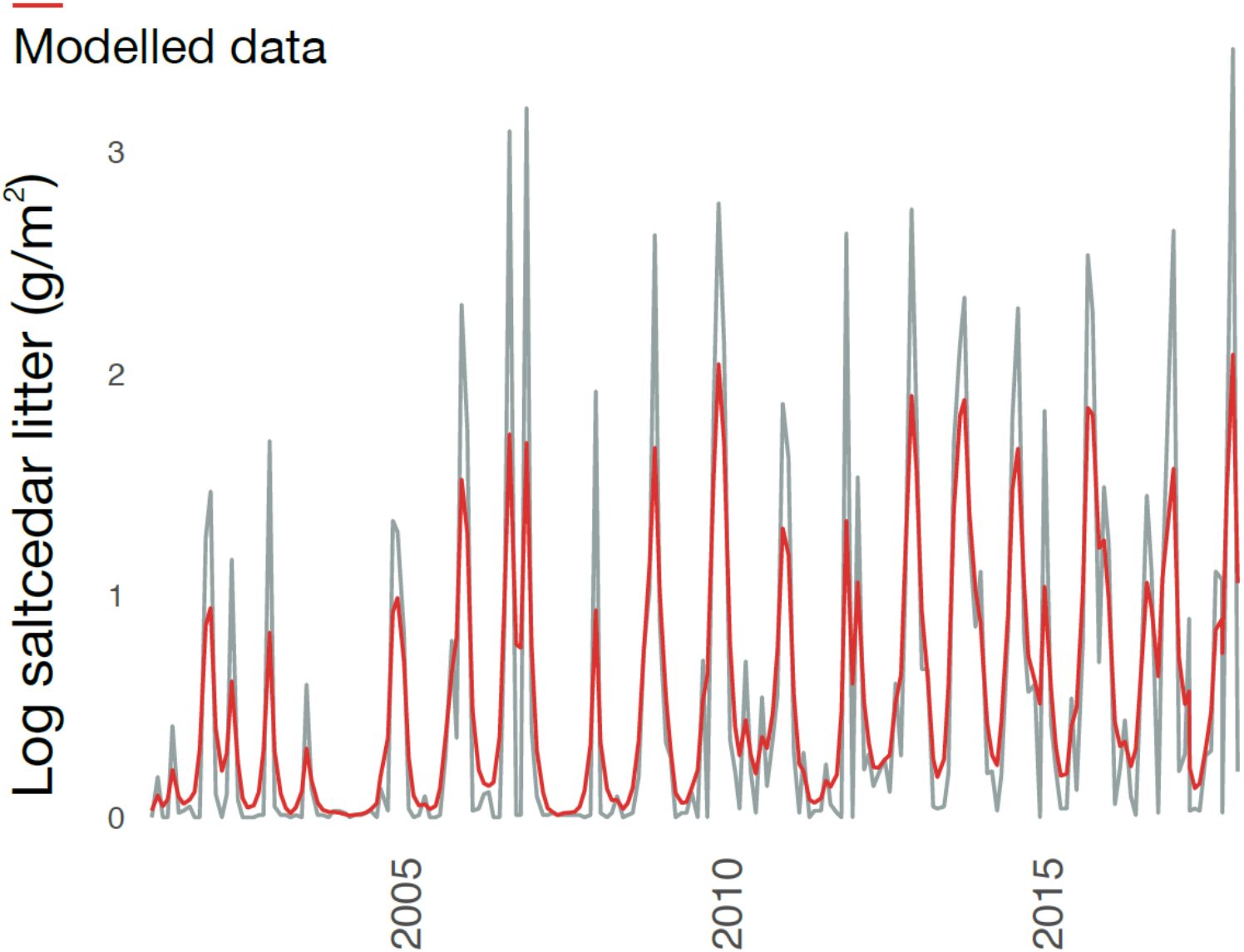
Sevilleta *Tamarix* Leaf fall pre and post Beetle



Savannah *Tamarix* Leaf fall pre and post Beetle



Model of Tamarix Litterfall (Savannah)



June 2018

July 2018

August 2018

Tamarix grow back
October 2018

May 2017

August 2017

May 2018

August 2018

Discussion

Results

- Change in timing of saltcedar leaf fall in wake of beetle presence
- Overall increase in leaf fall of saltcedar
- Cyclical pattern of beetle presence

Implication

- Direct changes to SWFL habitat
- Potential increase to fuel load in the bosque
- Costly to plant fitness
- Hybridizing beetles

Thank you to our TLB funders and partners

- Greater Rio Grande Watershed Alliance
- Rivers Edge West
- Army Corps of Engineers
- Northern Arizona University
- Bosque School
- University of New Mexico
- Santo Domingo Pueblo

Thank you.

Keara.bixby@bosqueschool.org

505.277.0758

Data available to public at www.bemp.org

Preserved specimens housed at UNM