Bosque Ecosystem Monitoring Program (BEMP)

- 19 years of data
- 11 core datasets
- Data users (federal, state & local agencies, consulting agencies)
- ~ 9000 students from 45 schools involved in monitoring bosque sites each year

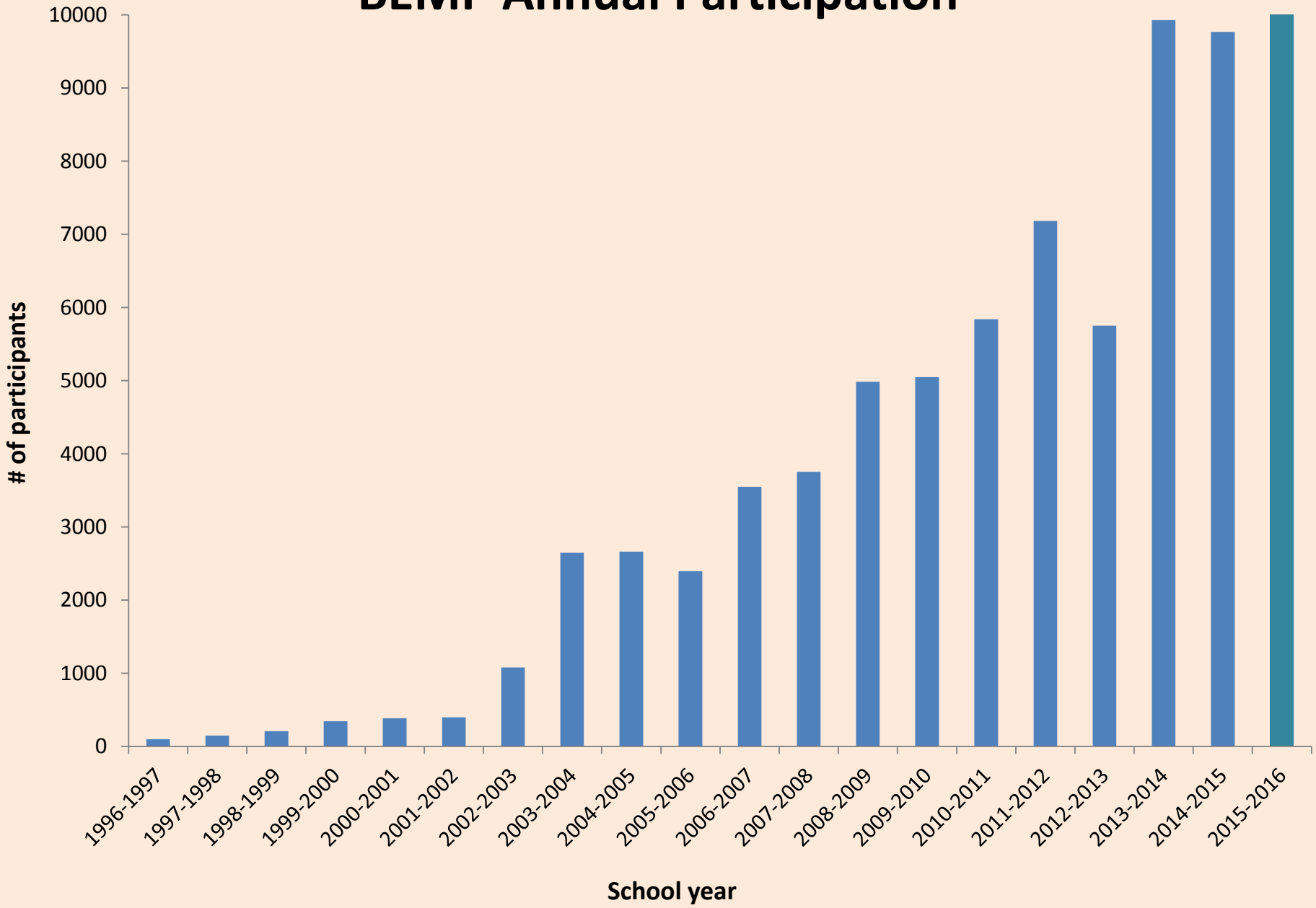
The University of New Mexico

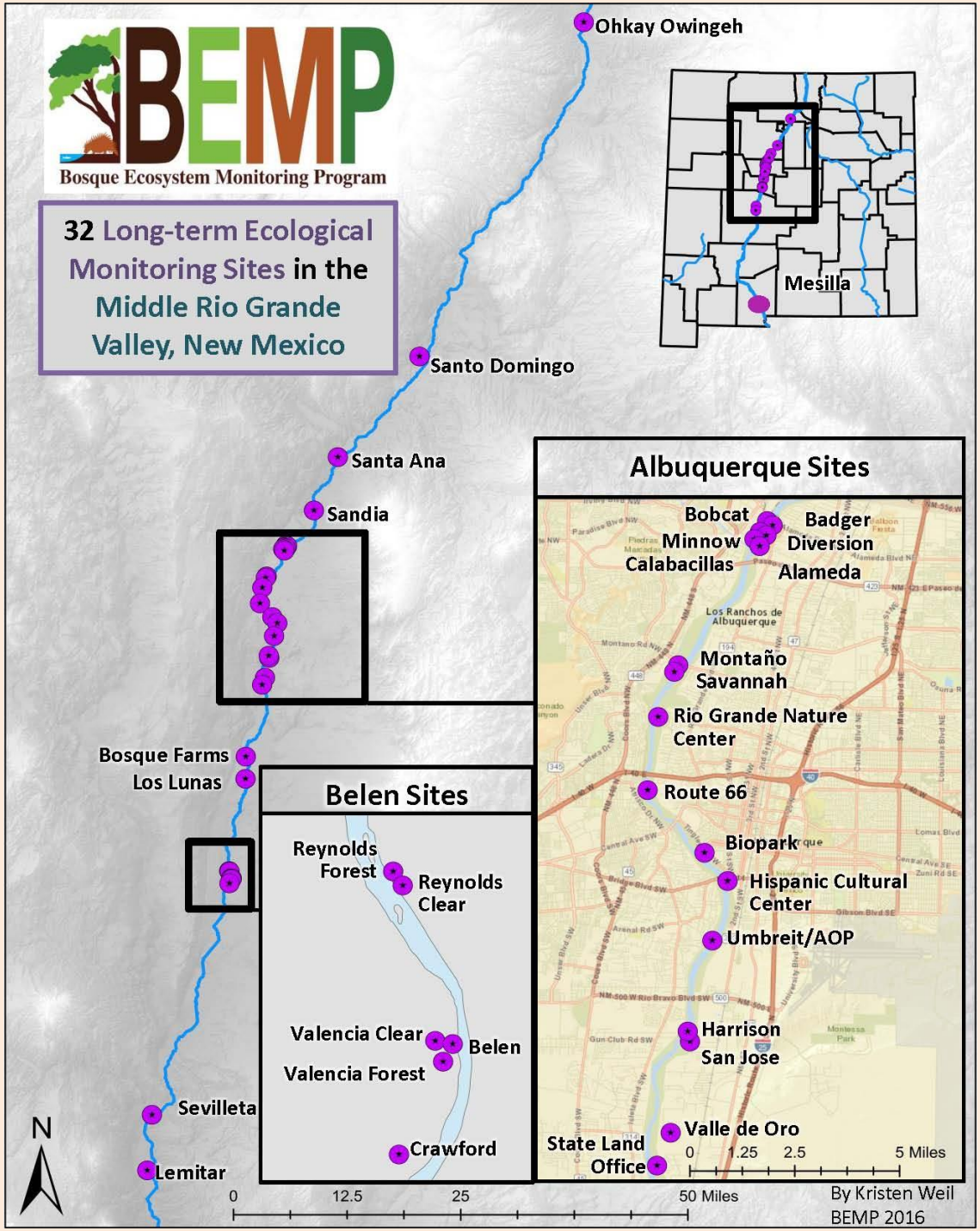
SEVILLETA LTER

LTER

BOSQUE SCHOOL

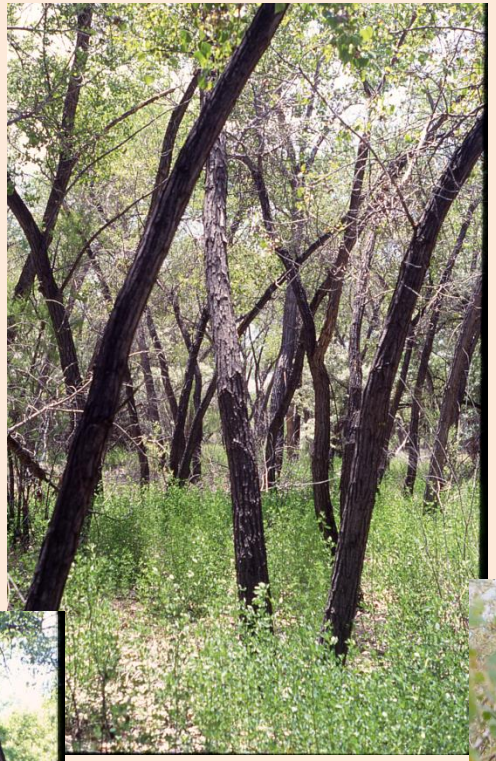
BEMP Annual Participation



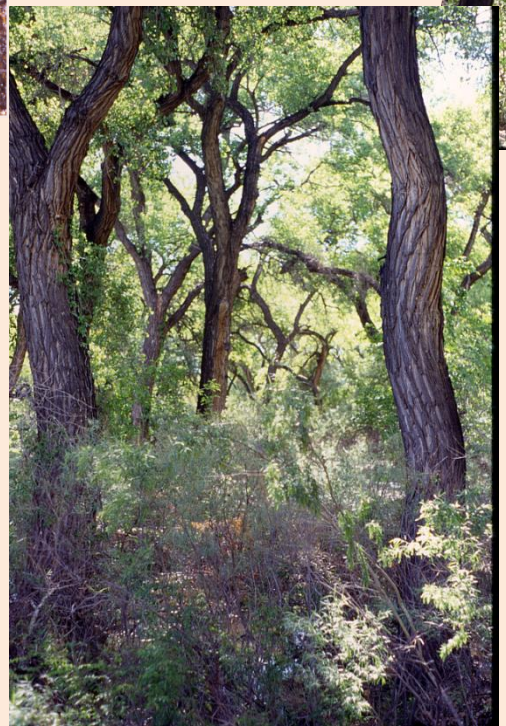

BEMP
Bosque Ecosystem Monitoring Program
32 Long-term Ecological Monitoring Sites in the Middle Rio Grande Valley, New Mexico
Ohkay Owingeh
Mesilla
Santo Domingo
Santa Ana
Sandia
Albuquerque Sites
Bobcat
Badger
Minnow
Diversion
Calabacillas
Alameda
Los Ranchos de Albuquerque
Montaño
Savannah
Rio Grande Nature Center
Route 66
Biopark
Hispanic Cultural Center
Umbreit/AOP
Harrison
San Jose
Valle de Oro
State Land Office
0 1.25 2.5 5 Miles
Bosque Farms
Los Lunas
Belen Sites
Reynolds Forest
Reynolds Clear
Valencia Clear
Belen
Valencia Forest
Crawford
Sevilleta
Lemitar
N
0 12.5 25 50 Miles
By Kristen Weil
BEMP 2016

Alameda

Rio Grande Nature Center



Los Lunas



Belen

Santa Ana

Lemitar

Savannah

Hispanic Cultural Center

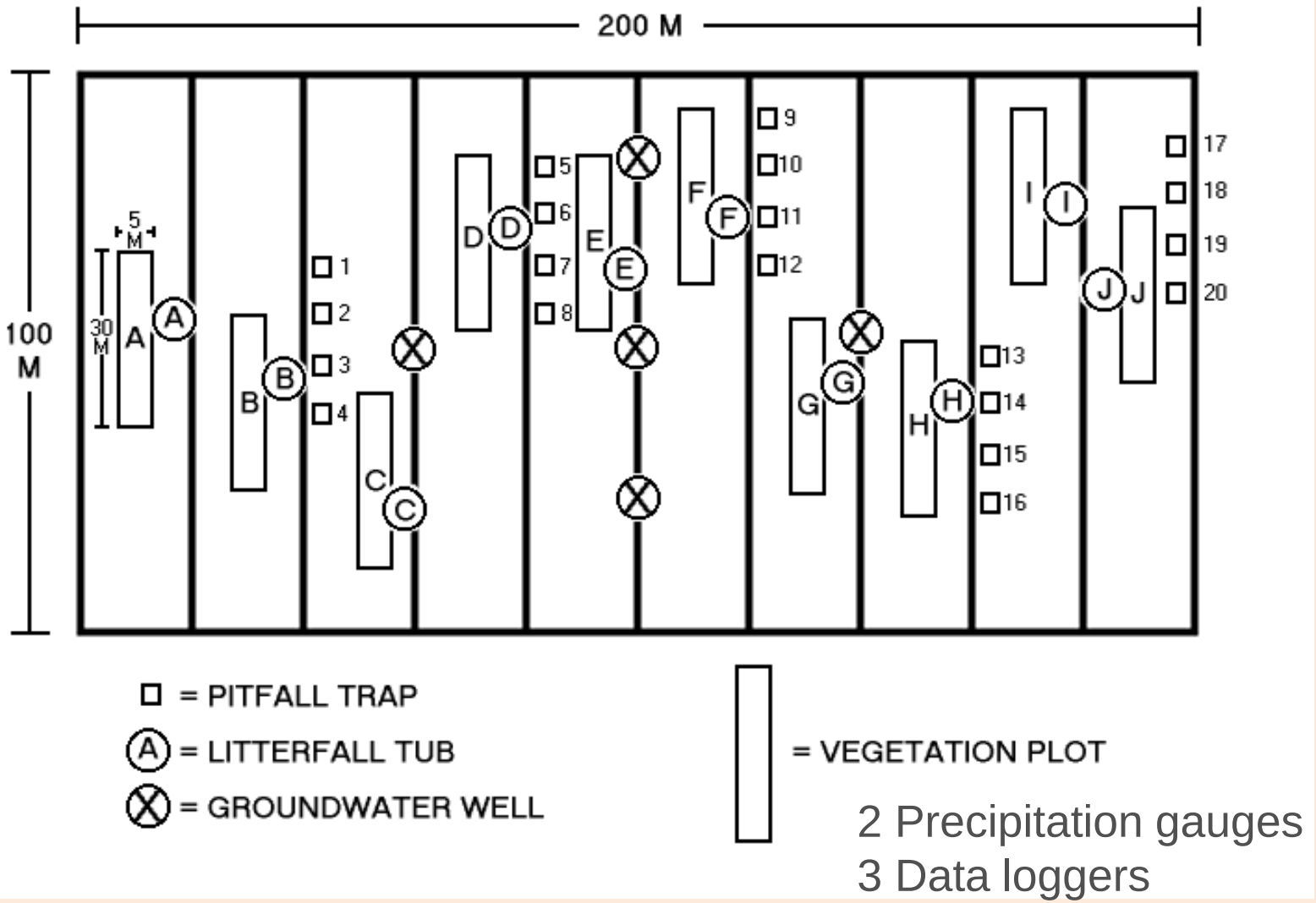
BioPark

Ohkay Owingeh

Valencia Cleared

Valencia Forest

Typical Site Layout



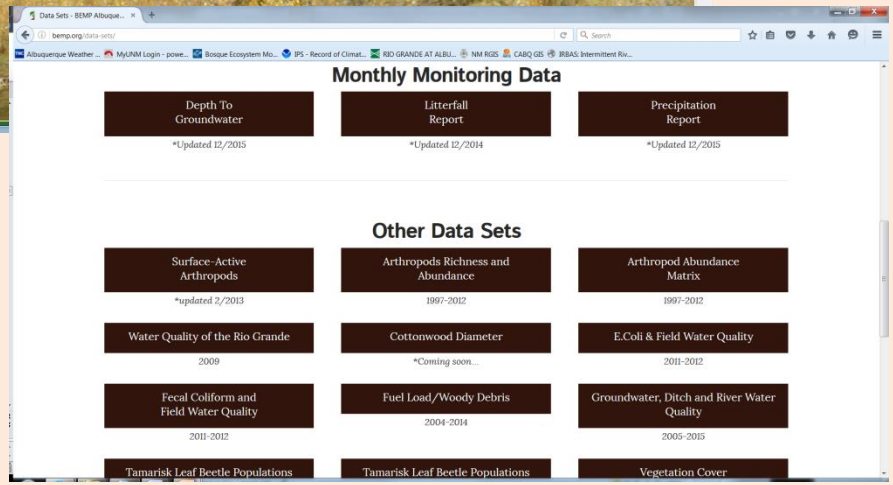
2 Precipitation gauges
3 Data loggers

BEMP's Main Datasets

- Groundwater depth
- Surface water level
- Precipitation
- Litterfall
- Vegetation cover
- Water chemistry
- Temperature
- Cottonwood sex & diameter at breast height
- Surface-active arthropods
- Woody debris/fuel load
- Tamarisk leaf beetle

bemp.org

BEMP Albuquerque | Bosq...
bemp.org
Search
Albuquerque Weather ...
MyUNM Login - powe...
Bosque Ecosystem Mo...
IPS - Record of Climat...
RIO GRANDE AT ALBU...
NM RGIS
CABQ GIS
IRBAS: Intermittent Riv...
Bosque School | UNM
BEMP
Bosque Ecosystem Monitoring Program
HOME
ABOUT US
SCIENCE
EDUCATION
EVENTS
CONTACTS
DONATE
EMPOWERING
CONSERVATION
THROUGH EDUCATION


Monthly Monitoring Data
Depth To Groundwater
*Updated 12/2015
Litterfall Report
*Updated 12/2014
Precipitation Report
*Updated 12/2015
Other Data Sets
Surface-Active Arthropods
*updated 2/2013
Arthropods Richness and Abundance
1997-2012
Arthropod Abundance Matrix
1997-2012
Water Quality of the Rio Grande
2009
Cottonwood Diameter
*Coming soon...
E.Coli & Field Water Quality
2011-2012
Fecal Coliform and Field Water Quality
2011-2012
Fuel Load/Woody Debris
2004-2014
Groundwater, Ditch and River Water Quality
2005-2015
Tamarisk Leaf Beetle Populations
Tamarisk Leaf Beetle Populations
Vegetation Cover

BEMP Monitors Effects of *Anthropogenic Impacts*

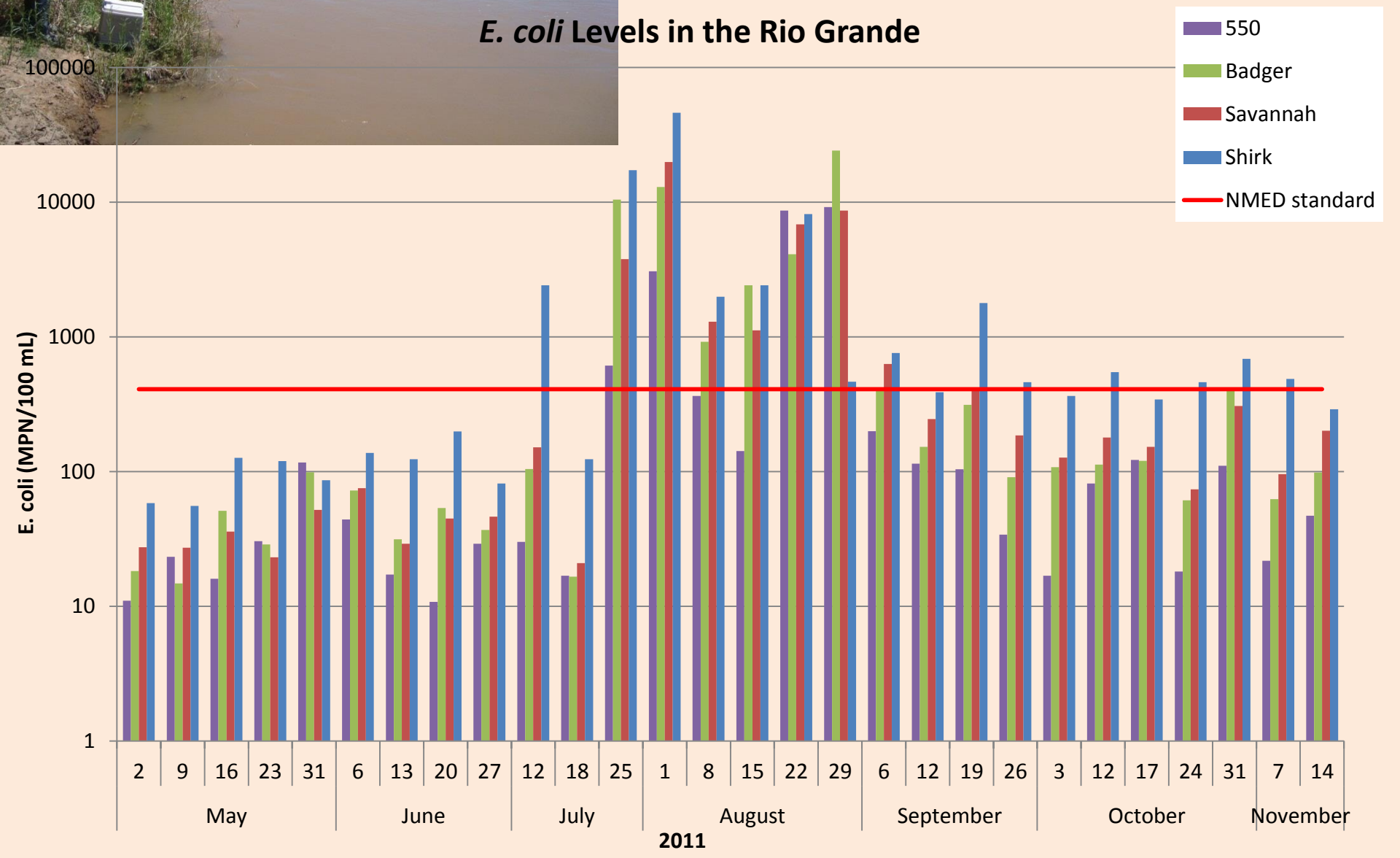
- River regulation
- Importing non-native species
- Fire
- Clearing
- Climate change
- Landscape alteration for riparian and river restoration

As Well as *Historic Drivers*

- Flooding
- Drought

Regulation of the Rio Grande Has Led to a 95-99% Reduction in Wetlands

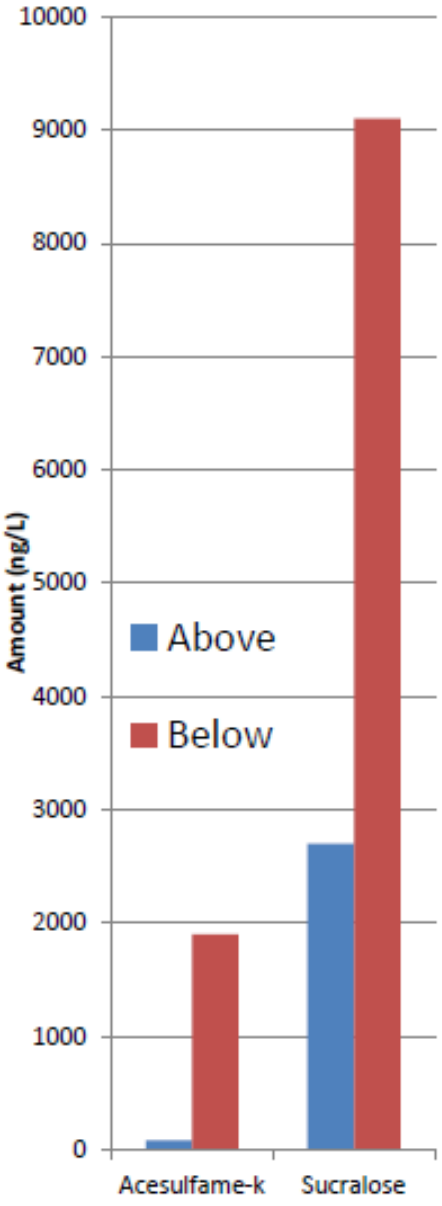
River Quality

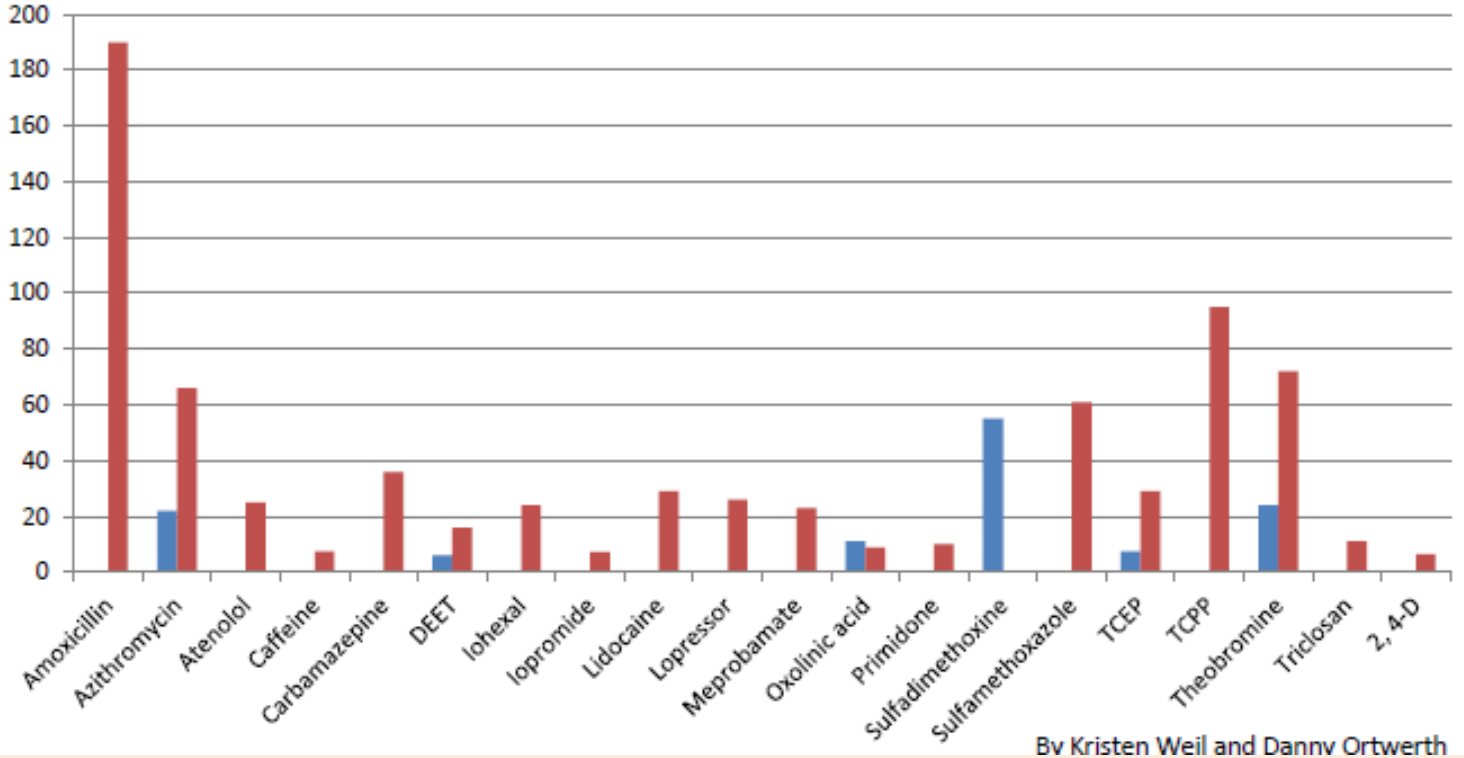


Compounds Found in Rio Grande Above and Below the Wastewater Treatment Plant on June 27th, 2011

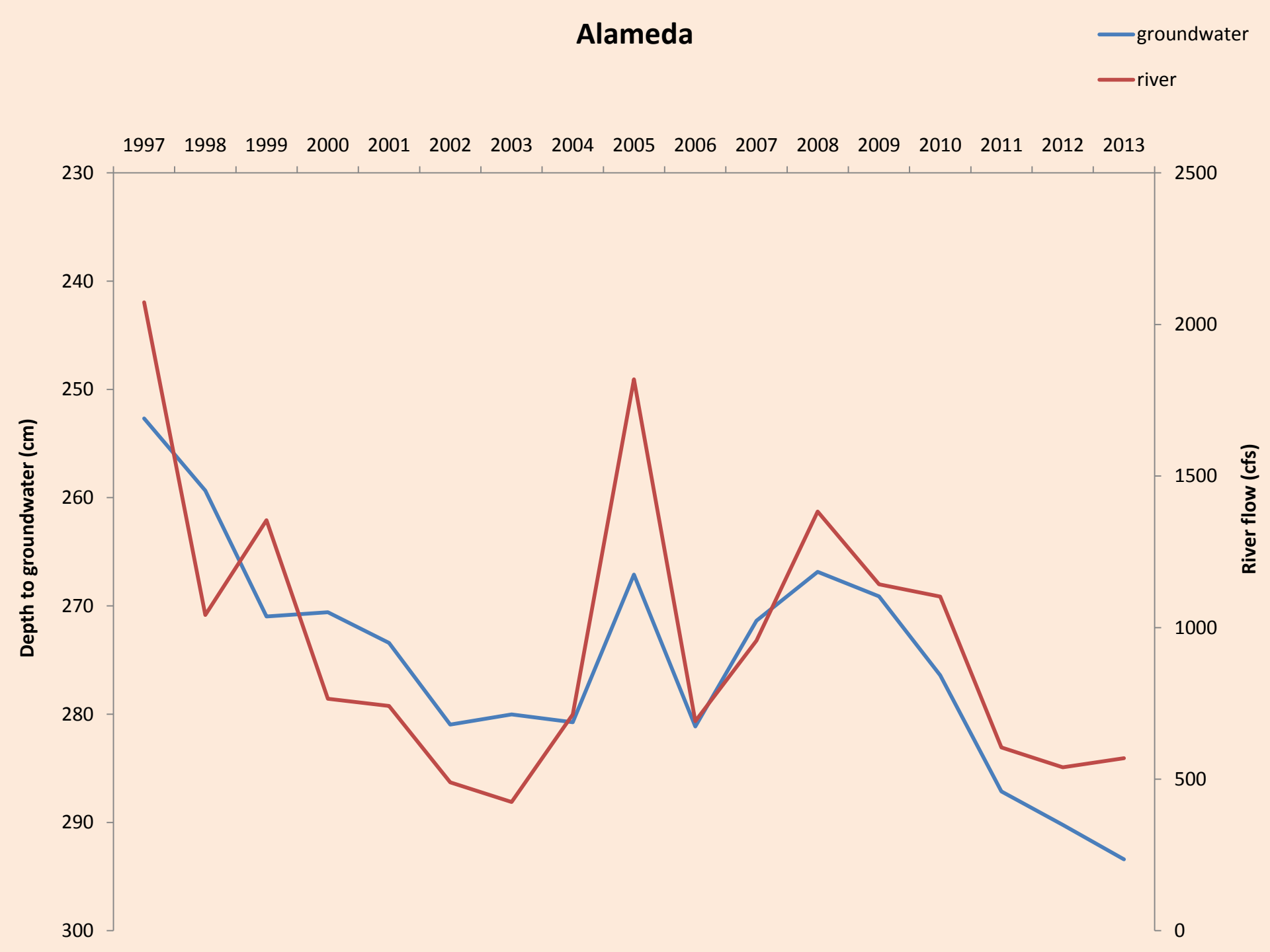
Compounds	What They Are
Acesulfame-k	artificial sweetener
Amoxicillin	antibiotic
Azithromycin	antibiotic
Atenolol	to treat high blood pressure
Caffeine	societal stimulator
Carbamazepine	seizure medication
DEET	Pesticide
Iohexal	x ray contrast agent
Iopromide	x ray contrast agent
Lidocaine	local anesthetic
Lopressor	to treat high blood pressure
Meprobamate	treat anxiety

Compounds	What They Are
Oxolinic acid	antibiotic
Primidone	seizure medication
Sucralose	artificial sweetener
Sulfadimethoxine	treatment for a parasitic infection in the intestines of animals (coccidiosis)
Sulfamethoxazole	antibiotic
TCEP	used for lab work
TCPP	flame retardant compound found in polyurethane
Theobromine	found in chocolate and tea also used medically
Triclosan	antibacterial and antifungal
2, 4-D	herbicide for broadleaf weeds

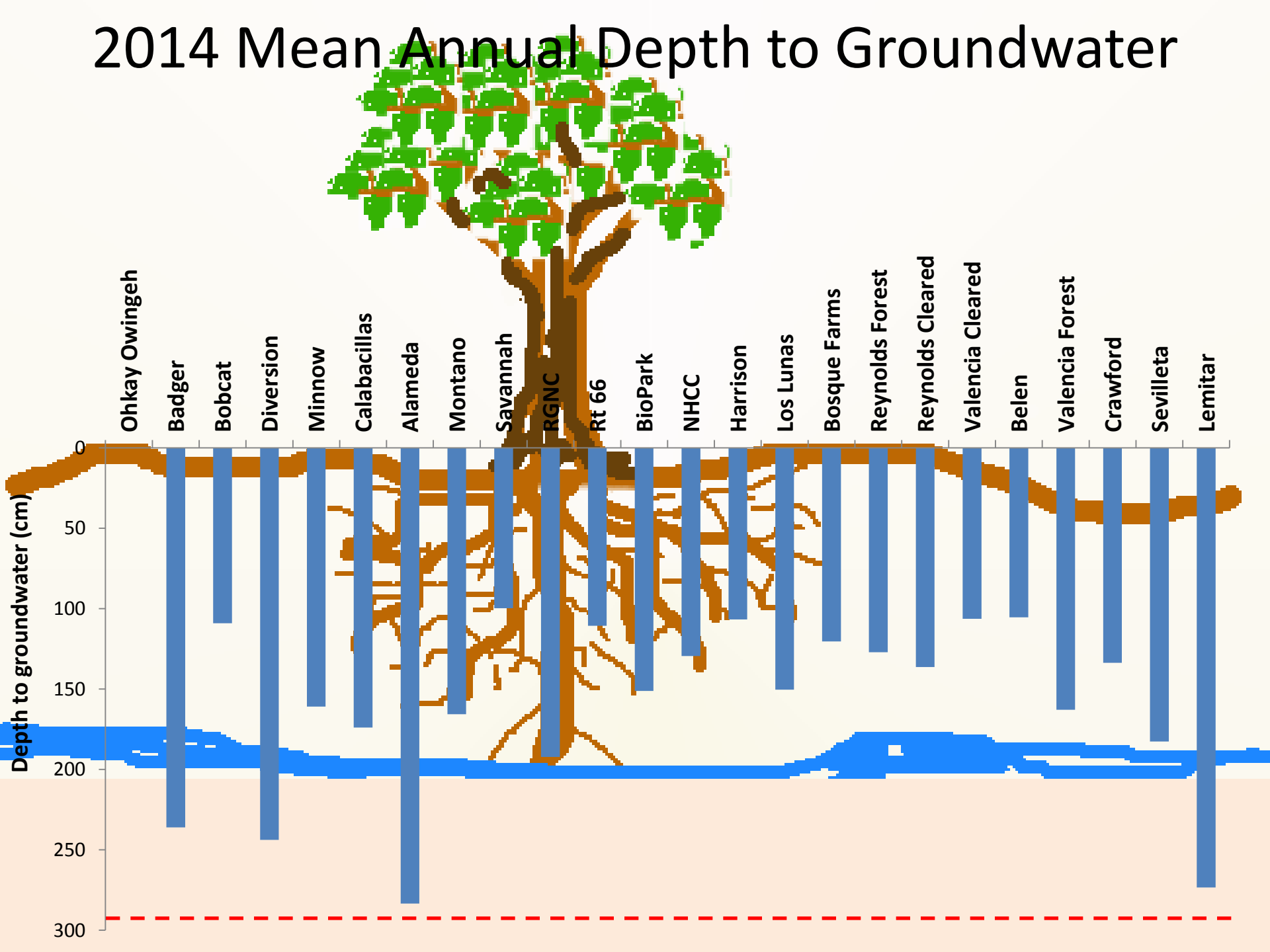




By Kristen Weil and Danny Ortwerth

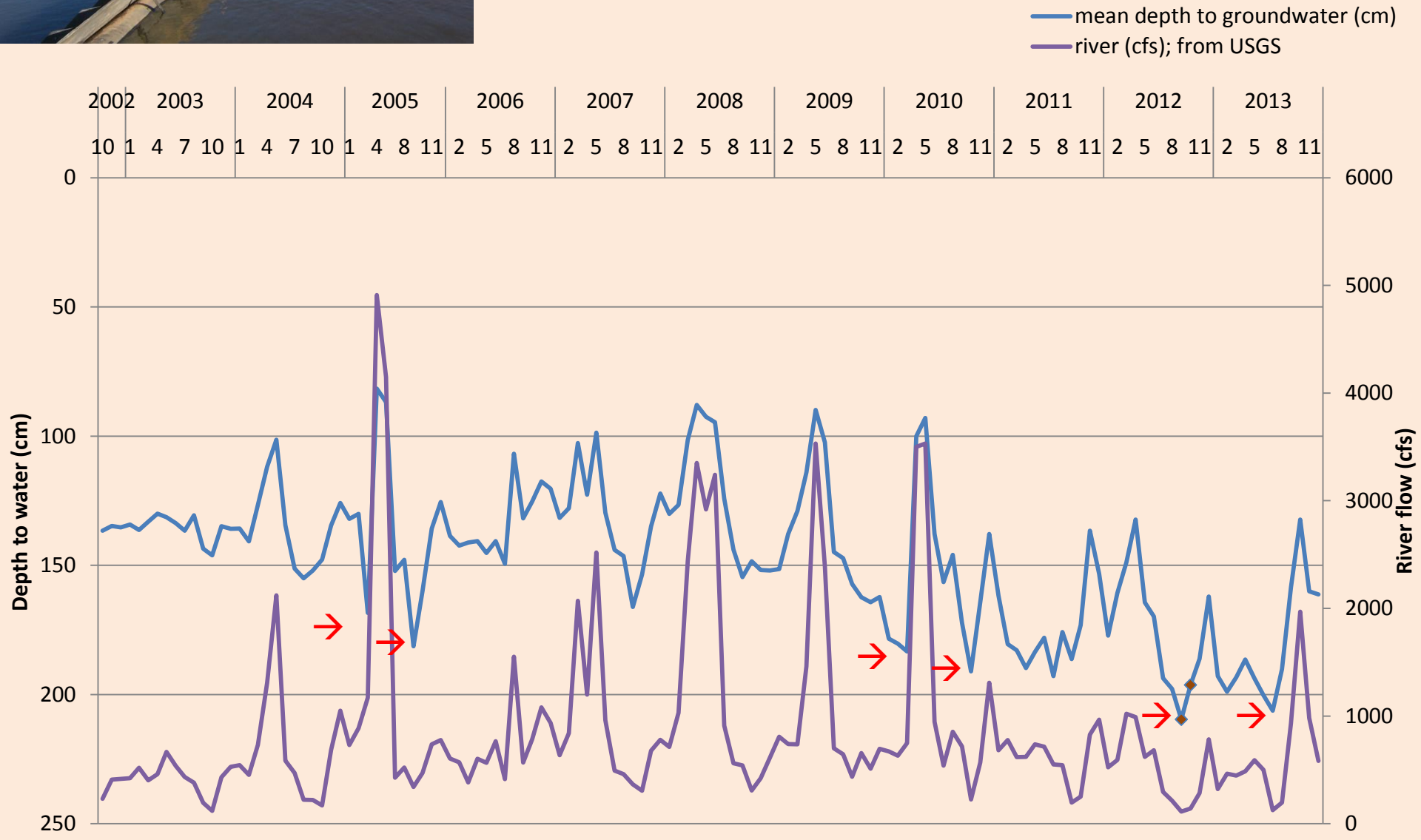

Alameda
groundwater
river
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
230
240
250
260
270
280
290
300
2500
2000
1500
1000
500
0
Depth to groundwater (cm)
River flow (cfs)

2014 Mean Annual Depth to Groundwater

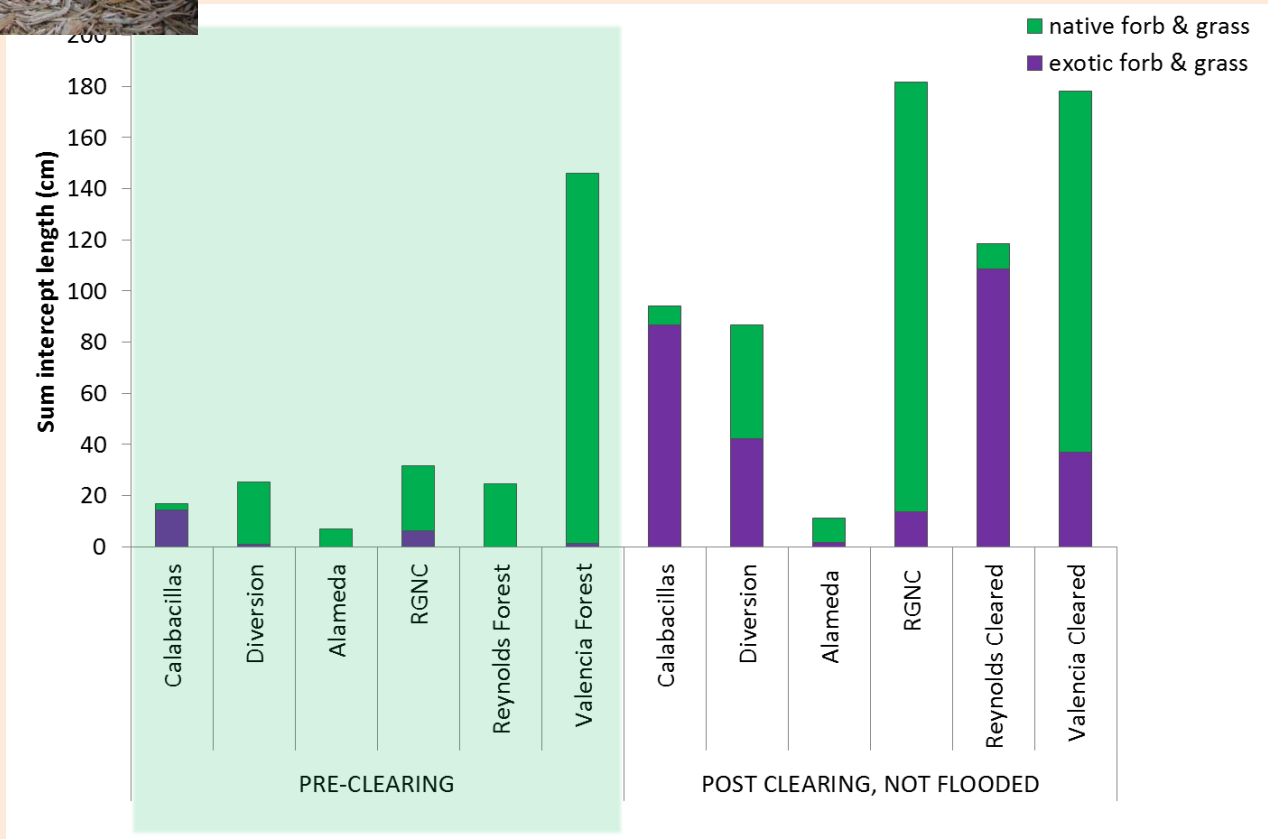


Drinking Water Project Diversion Dam

Groundwater at Calabacillas, Below the Dam

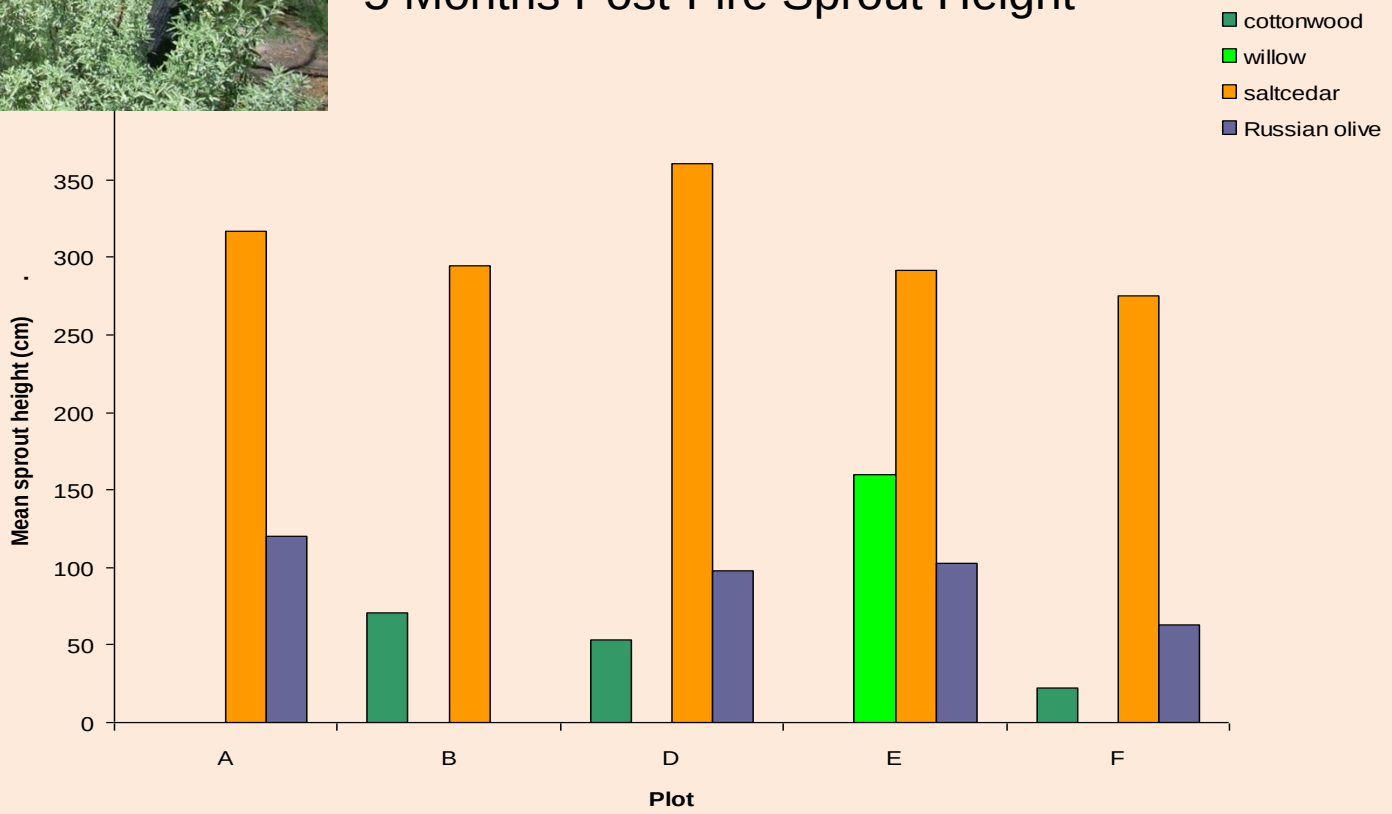


Clearing without Subsequent Flooding Leads to Increased Exotic Understory

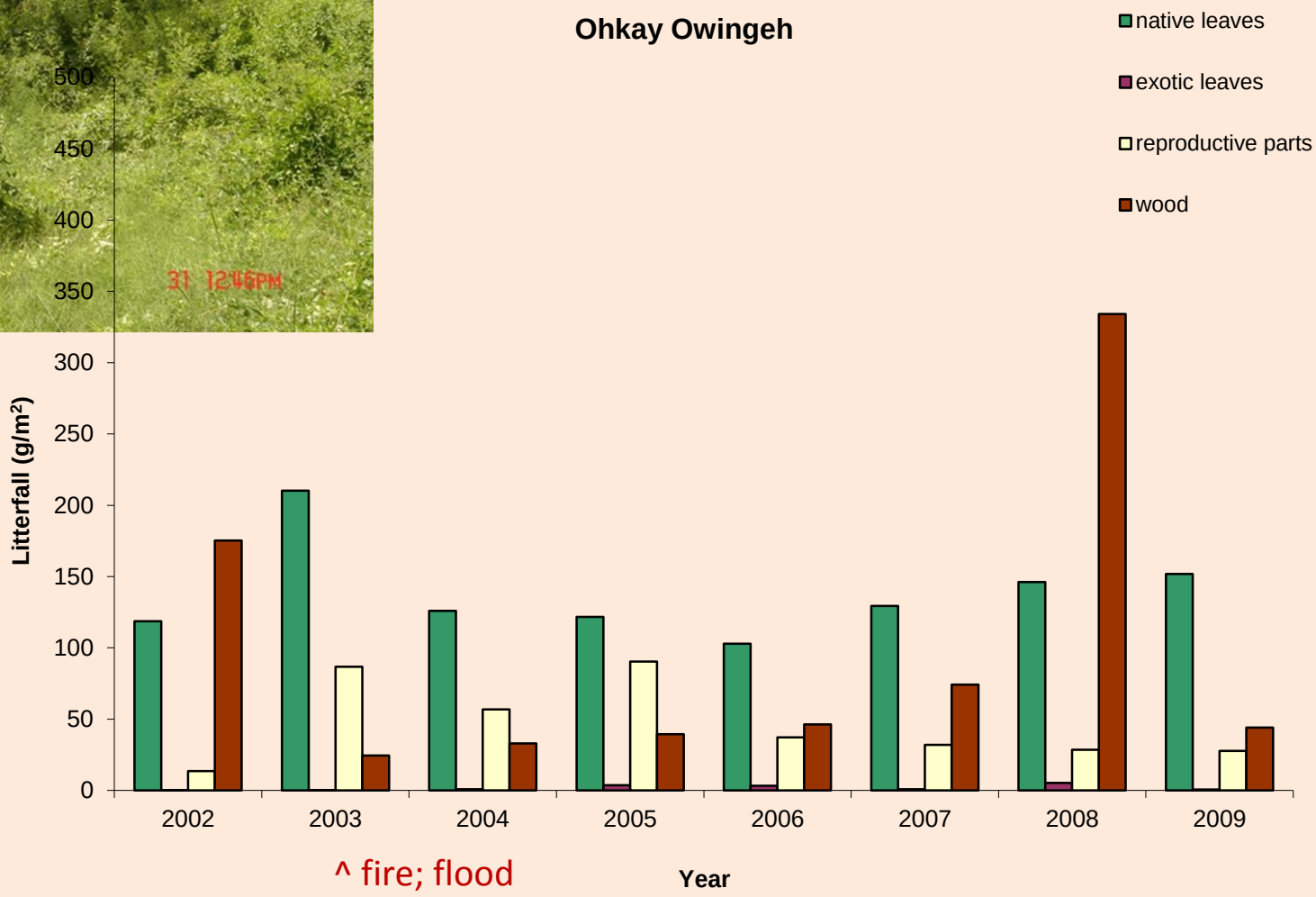


Exotics Dominating Post-Fire, No Flooding

5 Months Post-Fire Sprout Height

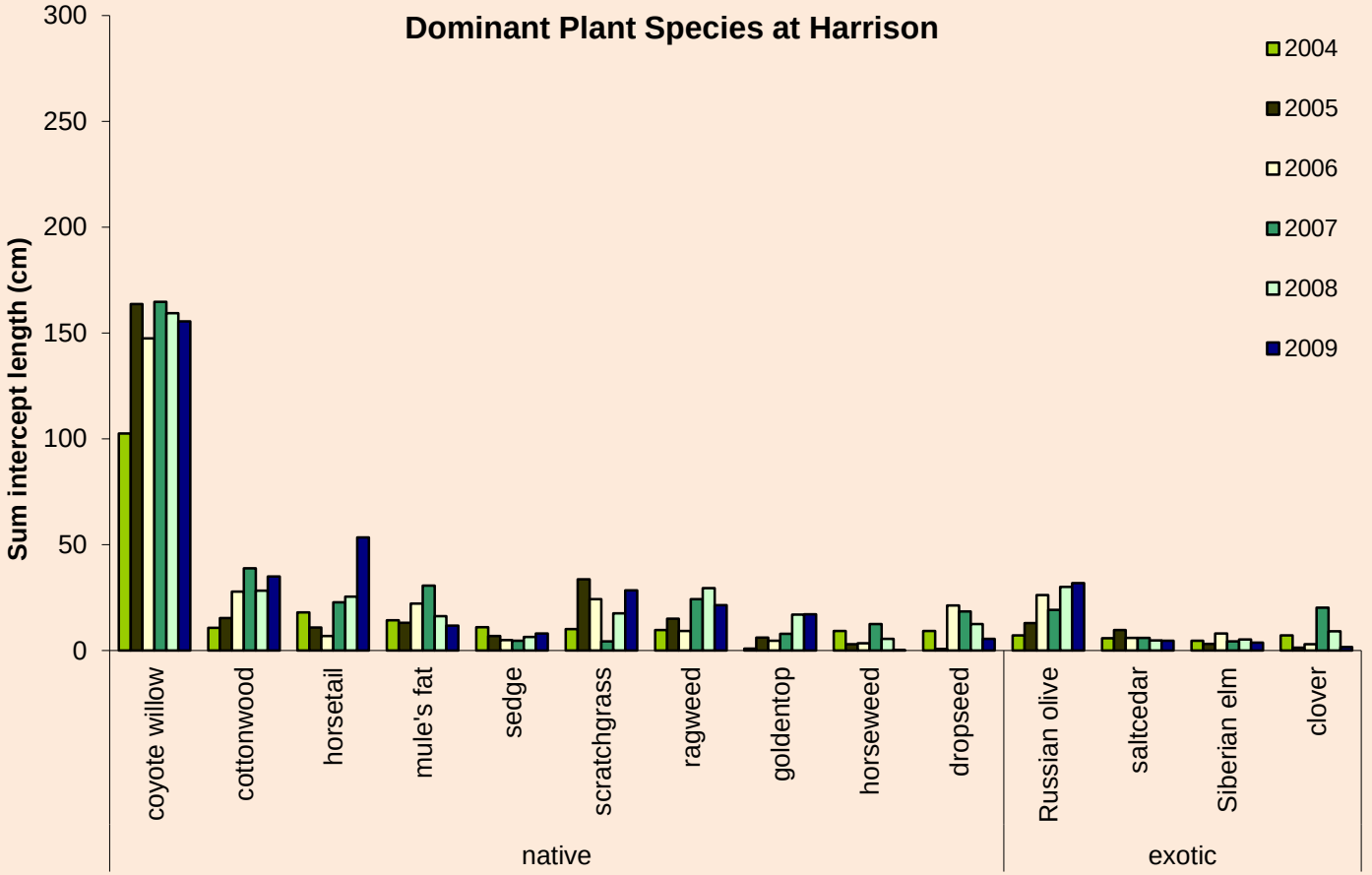


Natives Dominating, Post-Fire Followed by Flooding

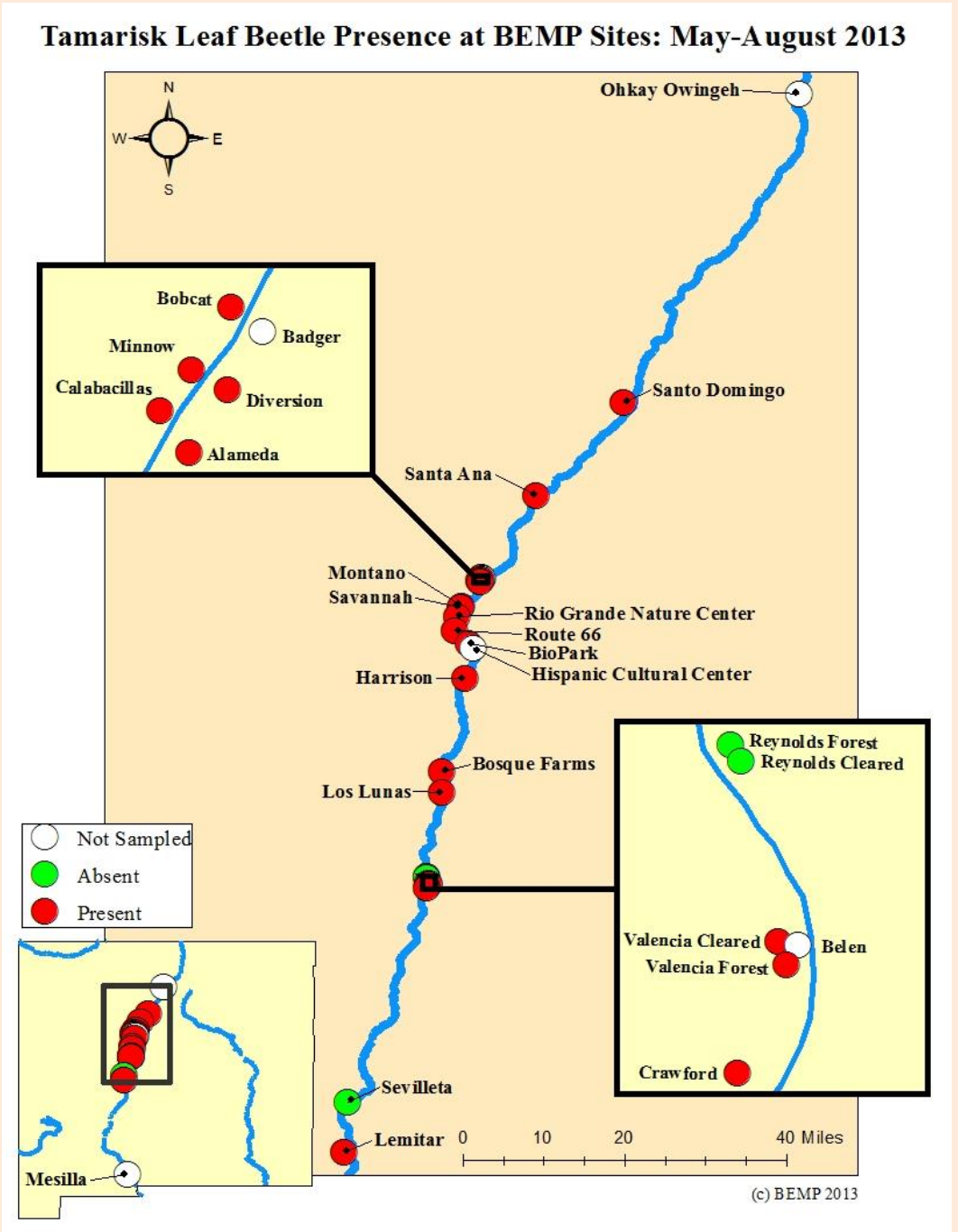


^ fire; flood

Sites that Experience Overbank Floods; High Native Diversity and Cover



J. Schuetz


Tamarisk Leaf Beetle Presence at BEMP Sites: May-August 2013
N
W
E
S
Ohkay Owingeh
Santo Domingo
Santa Ana
Bobcat
Badger
Minnow
Calabacillas
Diversion
Alameda
Montano
Savannah
Rio Grande Nature Center
Route 66
BioPark
Hispanic Cultural Center
Harrison
Bosque Farms
Los Lunas
Reynolds Forest
Reynolds Cleared
Valencia Cleared
Belen
Valencia Forest
Crawford
Sevilleta
Lemitar
Mesilla
Not Sampled
Absent
Present
0
10
20
40 Miles
(c) BEMP 2013

Crawford Site – Bank Lowering

April 21, 2009

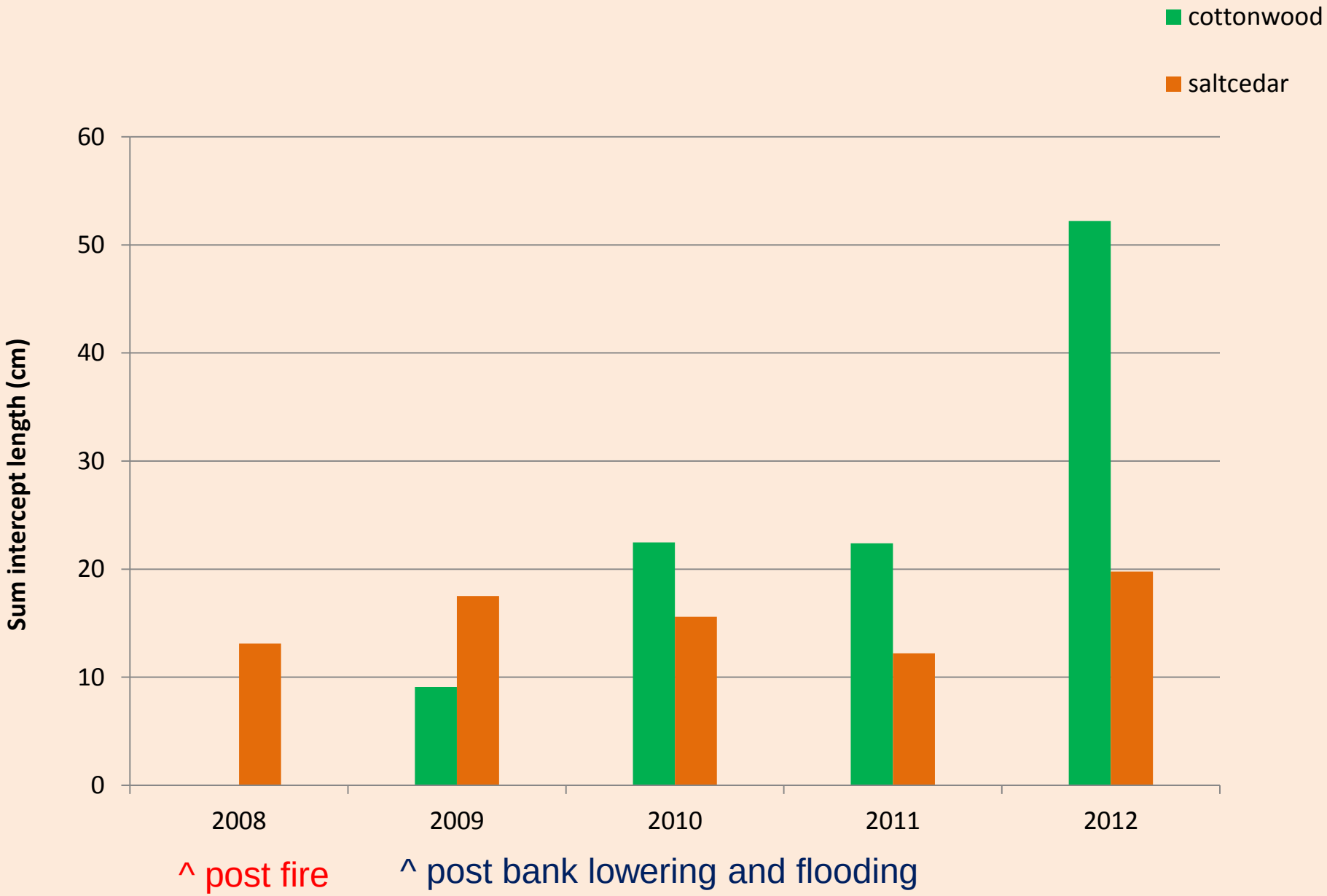
May 7, 2009

May 19, 2009

July 21, 2009

August 18, 2009

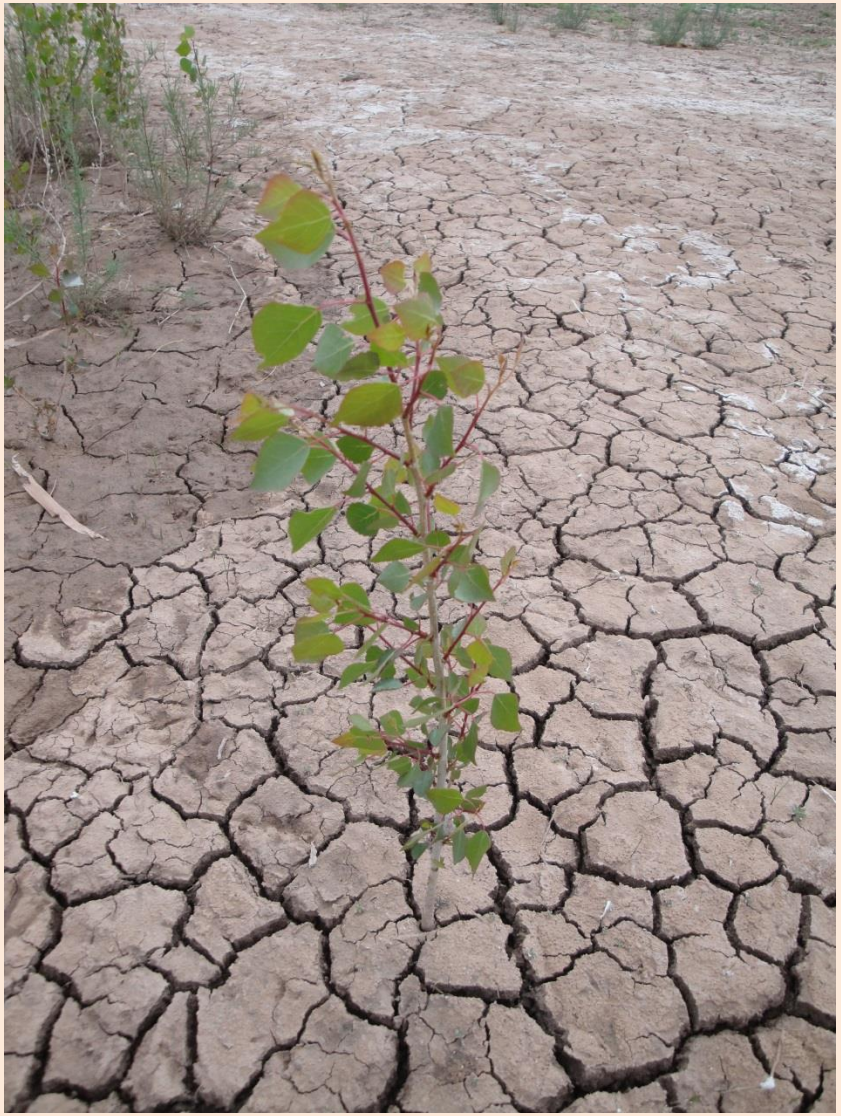
Cottonwood and Saltcedar Cover



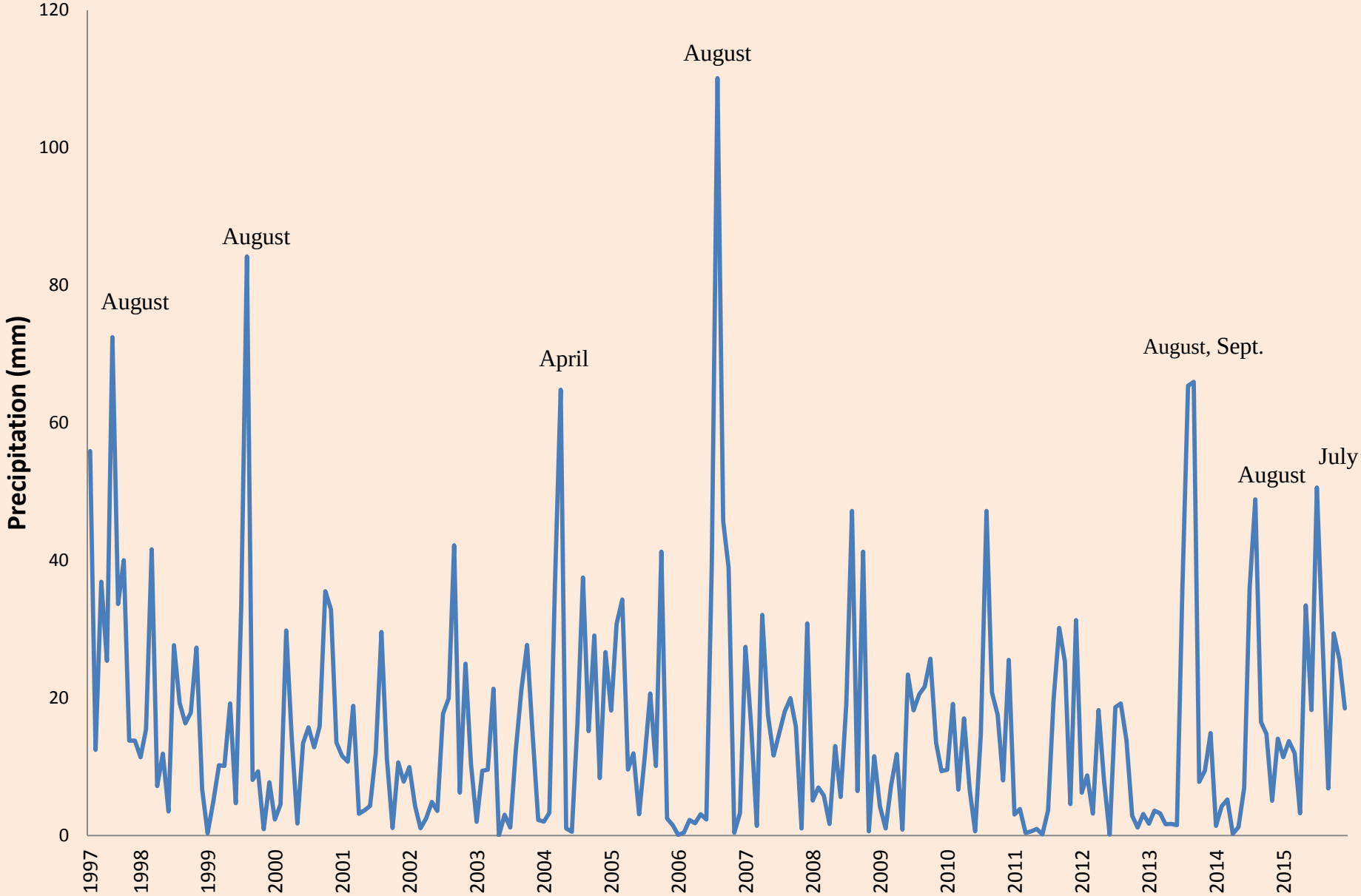
September 2010

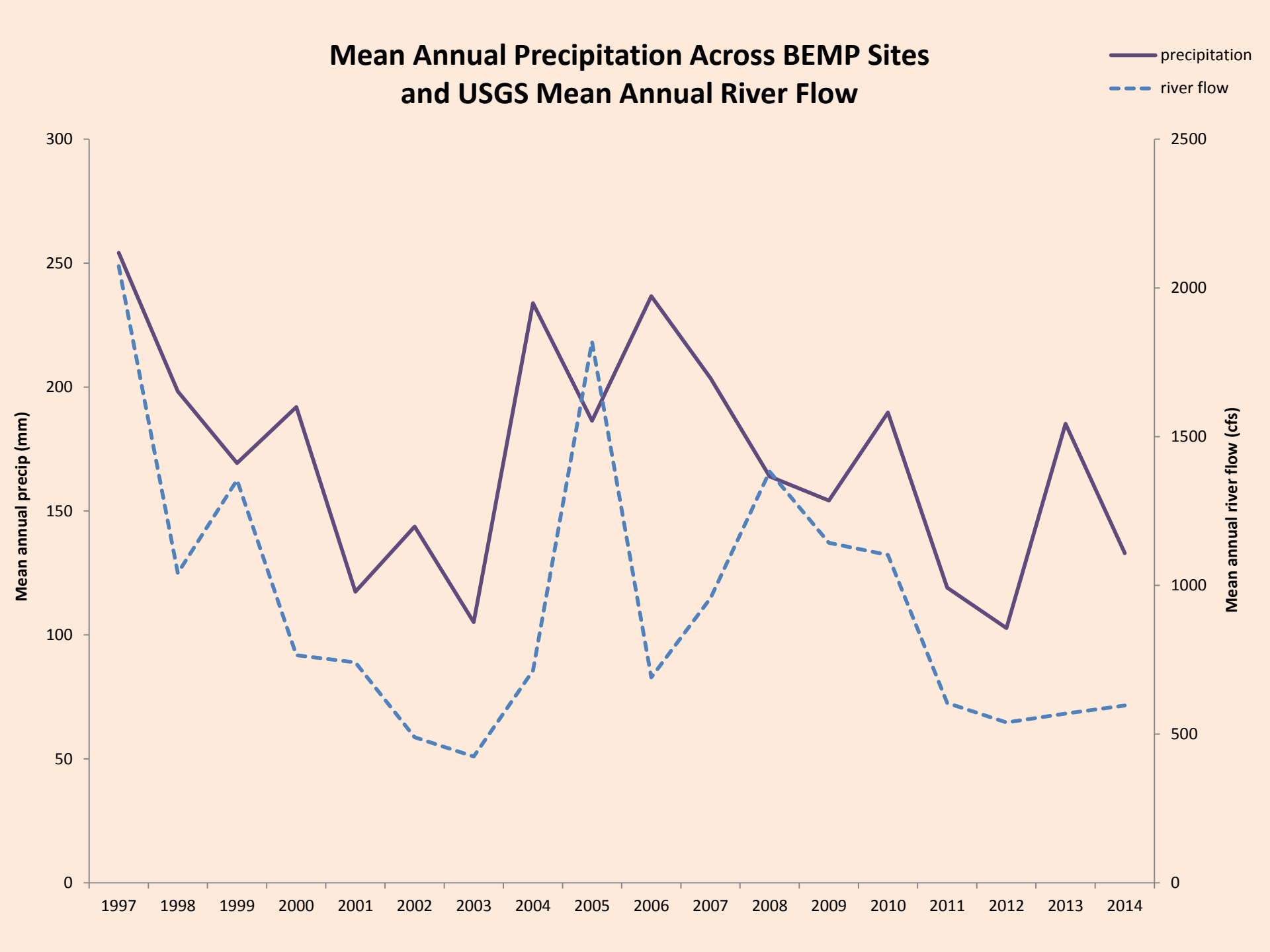
August 2013

Response to Drought

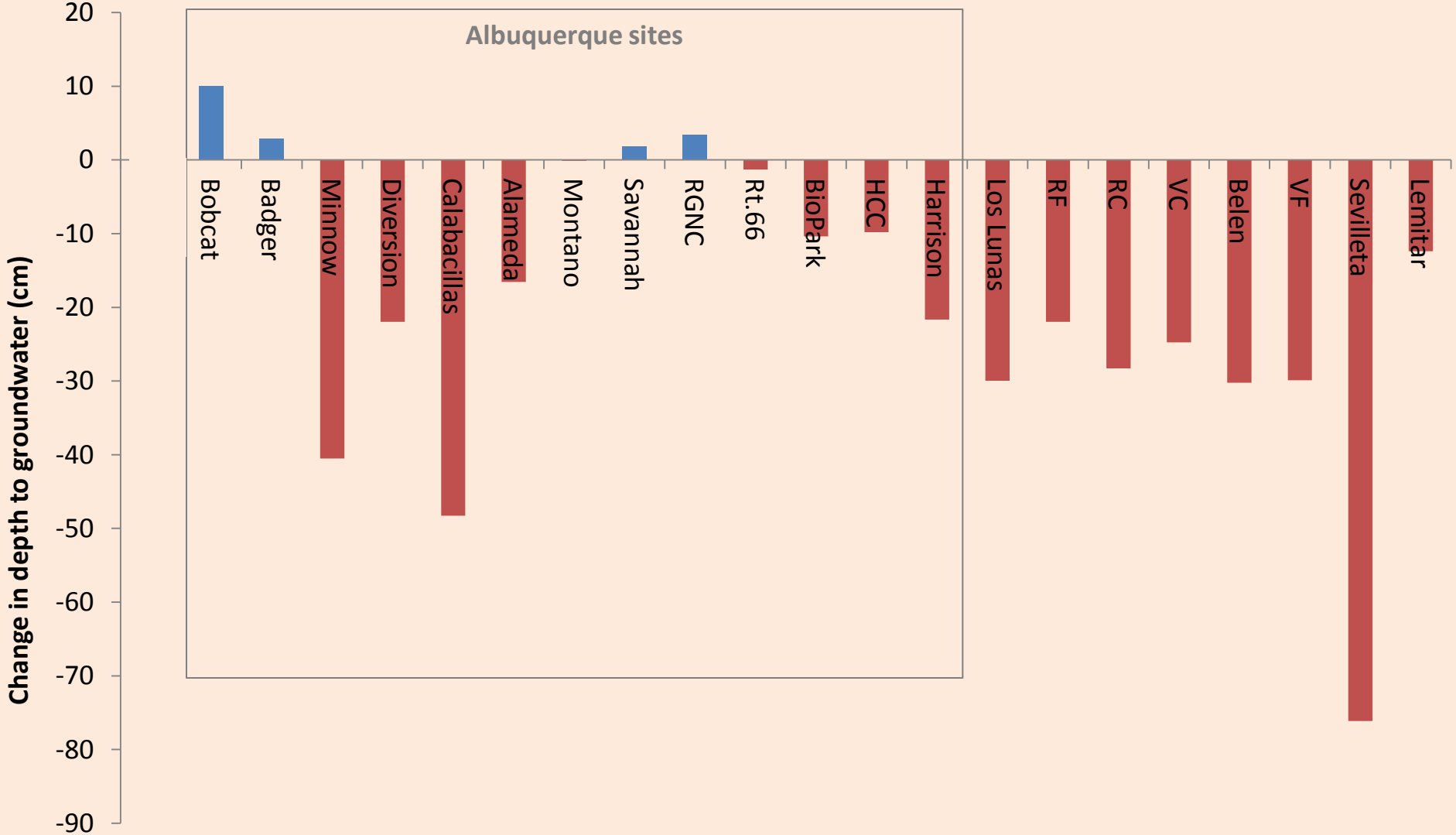


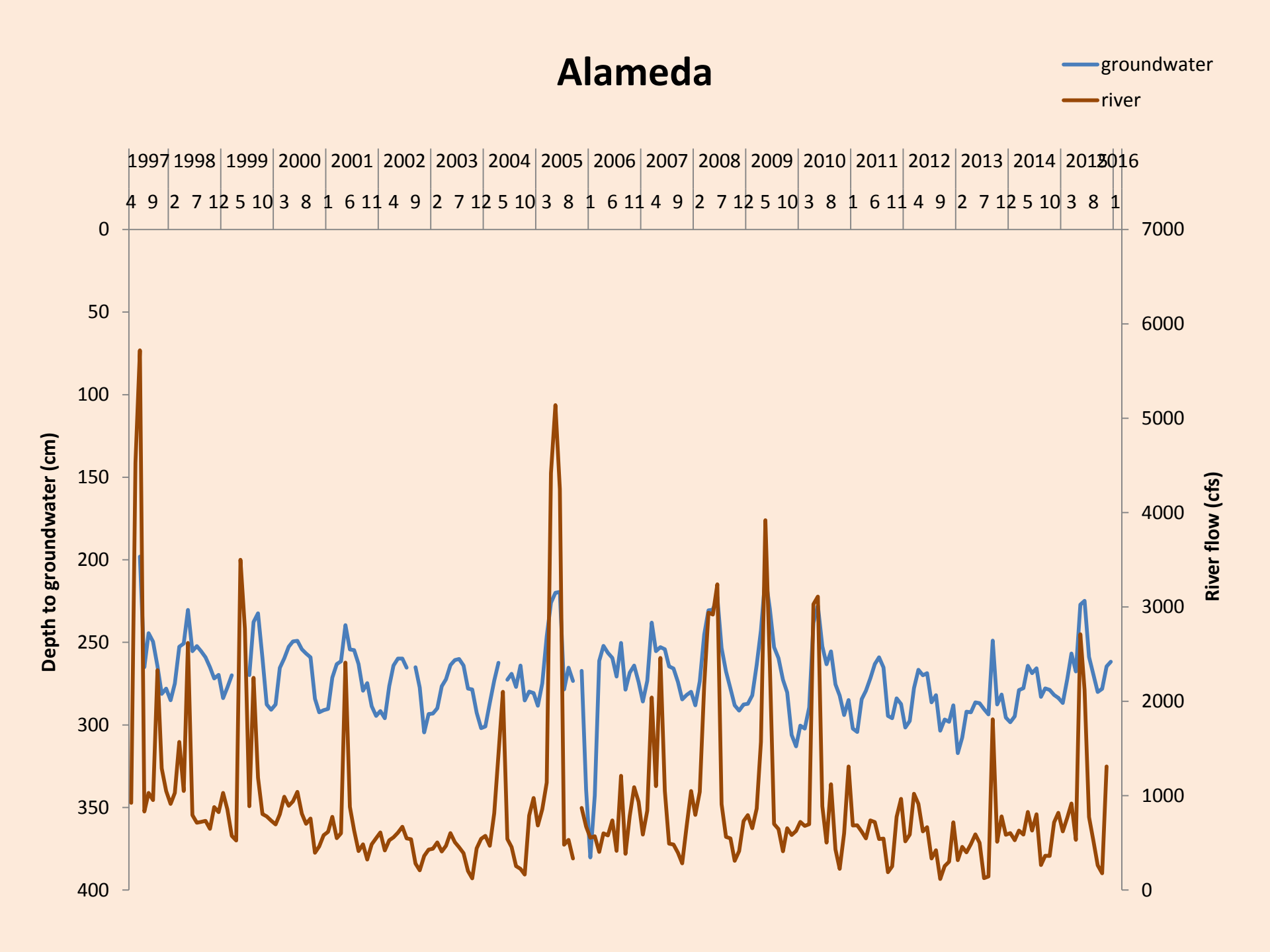
Monthly Precipitation For All Sites




Mean Annual Precipitation Across BEMP Sites
and USGS Mean Annual River Flow
precipitation
river flow
Mean annual precip (mm)
Mean annual river flow (cfs)
300
250
200
150
100
50
0
2500
2000
1500
1000
500
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014

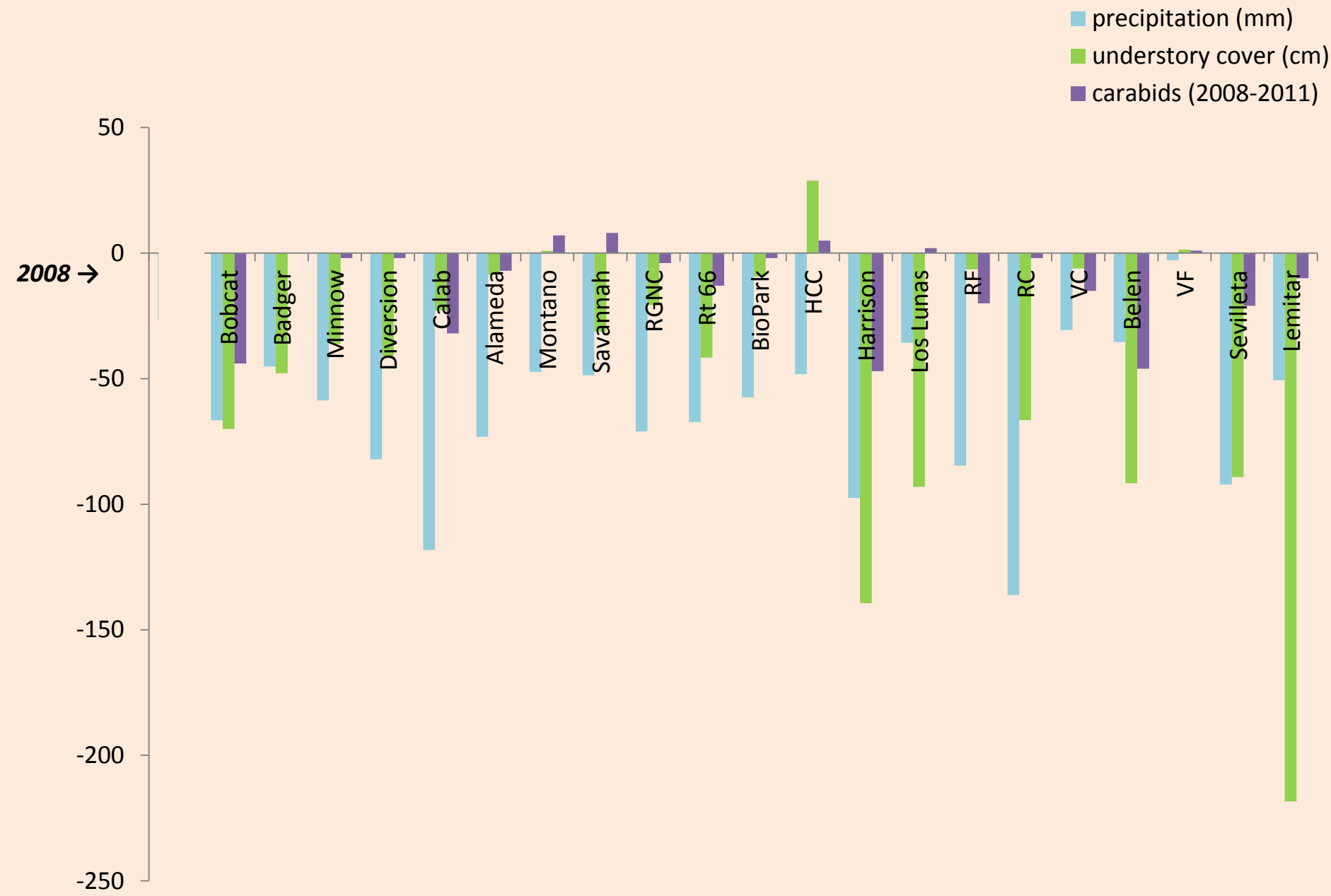
Change in Depth to Groundwater from 2008 to 2014




Alameda
groundwater
river
1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
4 9 2 7 12 5 10 3 8 1 6 11 4 9 2 7 12 5 10 3 8 1 6 11 4 9 2 7 12 5 10 3 8 1 6 11 4 9 2 7 12 5 10 3 8 1
0 50 100 150 200 250 300 350 400
Depth to groundwater (cm)
7000 6000 5000 4000 3000 2000 1000 0
River flow (cfs)

Fuel Load

Change from 2008 to 2012



Prolonged drought leads to ↓ river flows and ↓ groundwater

↑ cottonwood limb and tree mortality

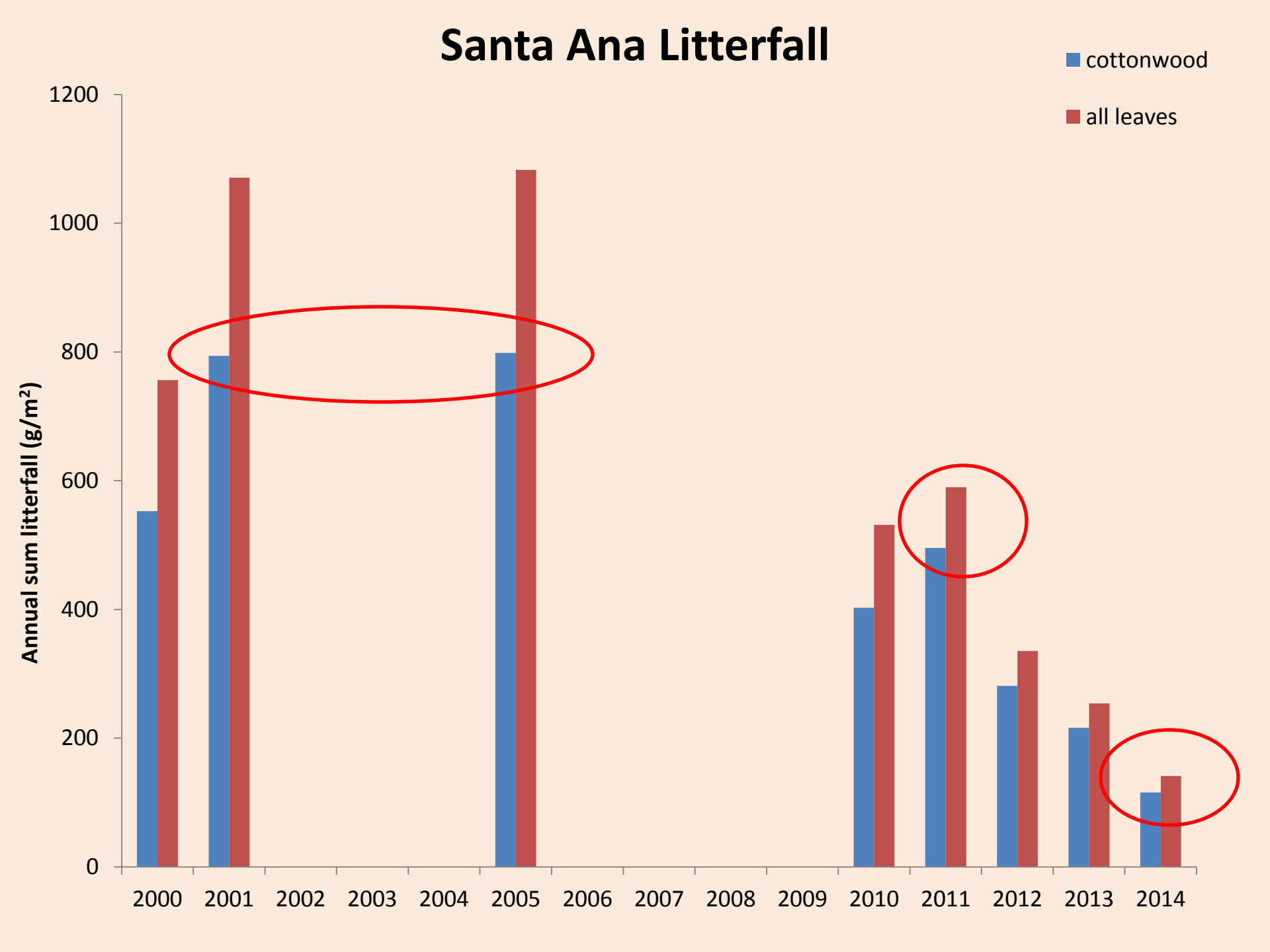
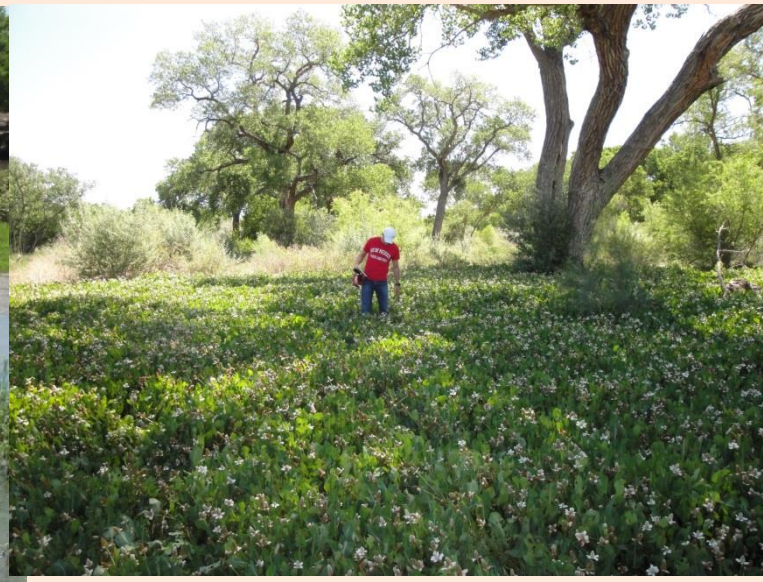
↑ shrub mortality

↑ wood fall and fuel load

↑ fire hazard

↓ opportunity for restoration projects based on restored river function

Santa Ana 2014


Santa Ana Litterfall
cottonwood
all leaves
Annual sum litterfall (g/m²)
1200
1000
800
600
400
200
0
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014

Need to restore a **mosaic** of habitats to increase ecosystem resilience and sustainability