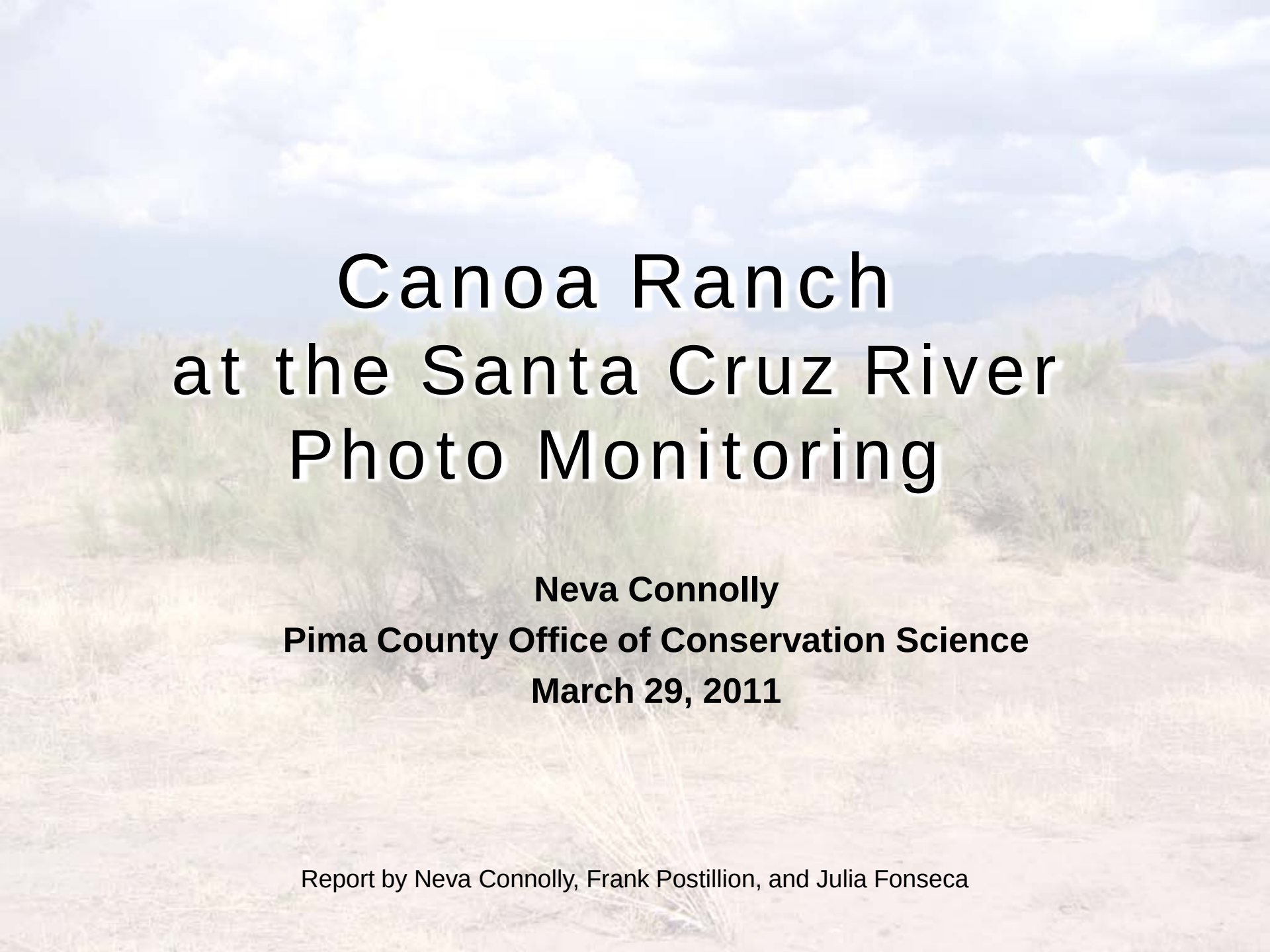
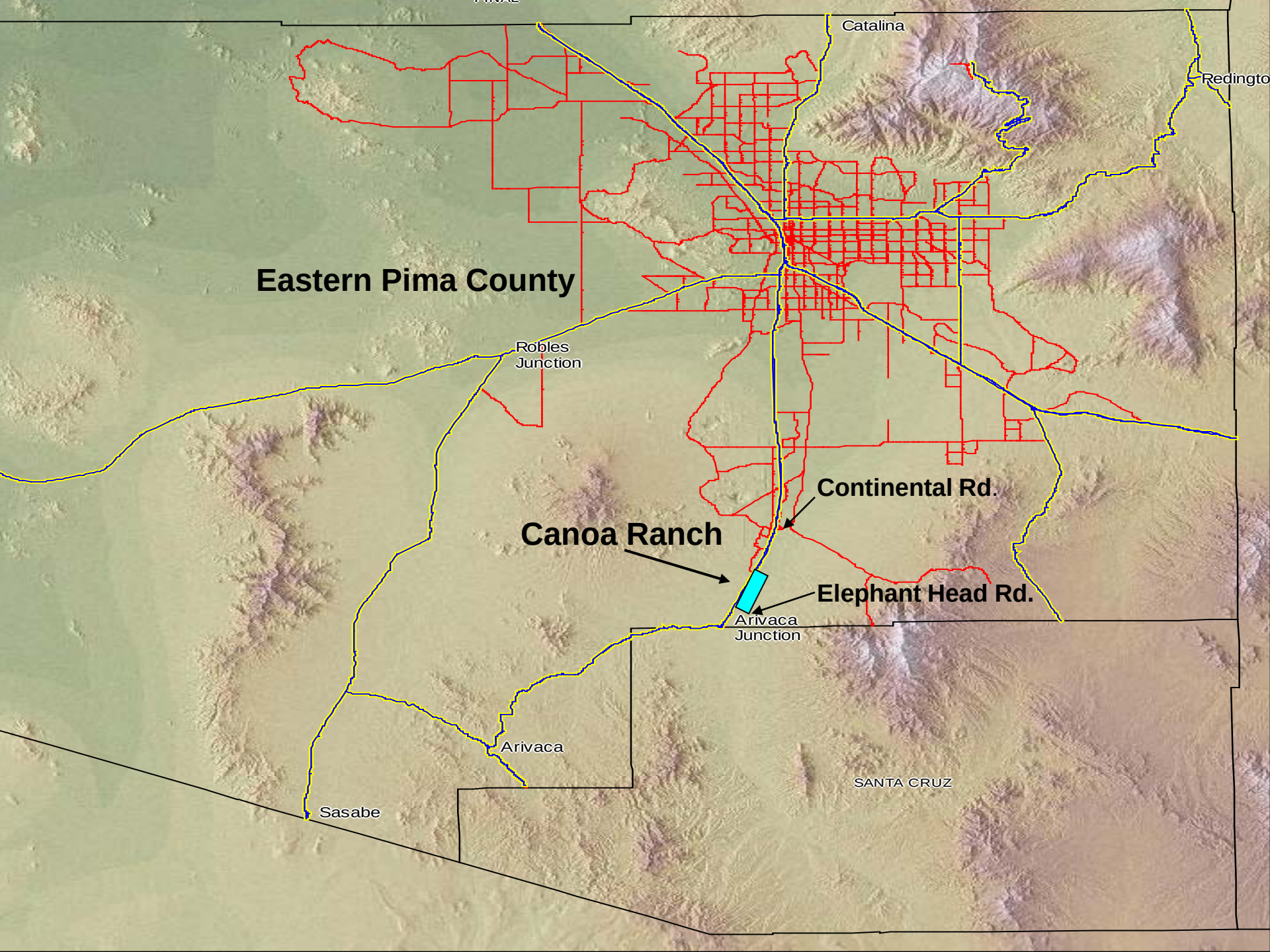




Canoa Ranch at the Santa Cruz River Photo Monitoring

**Neva Connolly
Pima County Office of Conservation Science
March 29, 2011**

Report by Neva Connolly, Frank Postillion, and Julia Fonseca



Eastern Pima County

Robles Junction

Catalina

Redington

Canoa Ranch

Continental Rd.

Elephant Head Rd.

Arivaca Junction

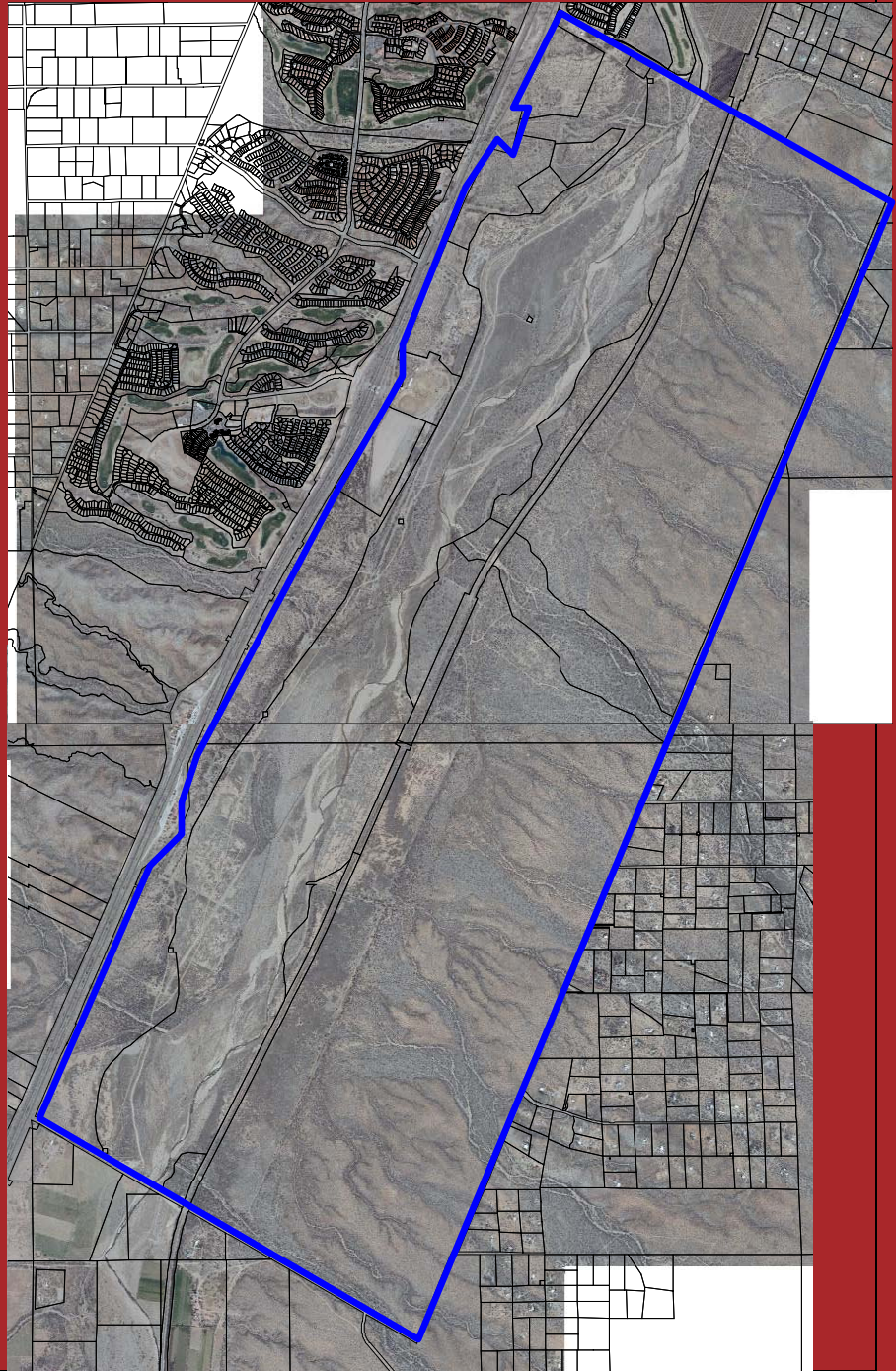
Arivaca

Sasabe

SANTA CRUZ

Canoa Ranch

- 4,800 acres
- Purchased by County in 2001 for historical and cultural preservation, as well as open space preservation.

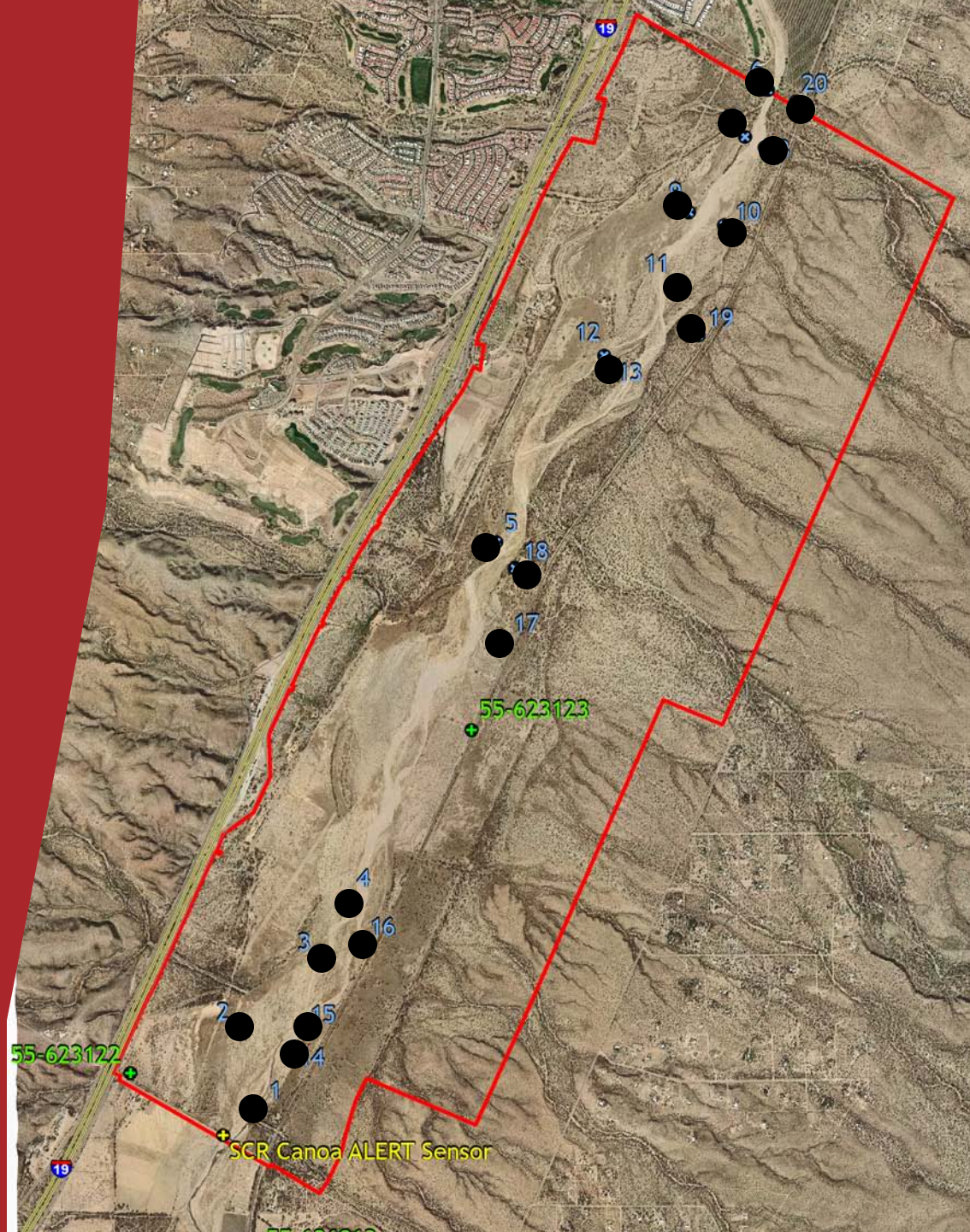


Why Photo Monitoring?

- Tool for monitoring landscape level change¹
- Quick and effective²
- Inform trends in vegetative condition or hydraulic roughness³
- In Canoa, interest in documenting changes in floodplain vegetation.
- Presence of vegetation in the floodplain helps to reduce flood peaks downstream by slowing down and spreading out the flows.

Photo Monitoring Locations

- 20 photo points
- 17 located on bank or in channel of Santa Cruz River
- 3 located on the east side of the river
- Points were recorded in GPS unit and marked with rebar stakes
- Photos taken in each of the 4 cardinal directions
- Distance to bank measurements were taken
- Photo points taken in 2002, 2004, 2006



Results: 2002-2008

- The Santa Cruz River channel in Canoa Ranch is increasing in vegetative roughness.
 - Burrobush recruitment and coarsening of bedload.
- Drought has reduced vigor of perennial grasses, shrubs and trees.
- Obligate riparian species change varied.

No major change



2002



2004



2006



2008

Photo Point 10 East

Increase in channel vegetation

Photo Point 4 South



2002



2004



2006



2008

Increase in channel vegetation

Photo Point 11 South



2002



2004



2006



2008

Increase in channel roughness



2002



2004



2006



2008

Photo Point 1 West

Increase in vigor

Photo Point 14 West



2002



2004



2006



2008

Loss of vigor

Photo Point 16 East



2002



2004



2006



2008

Loss of vigor

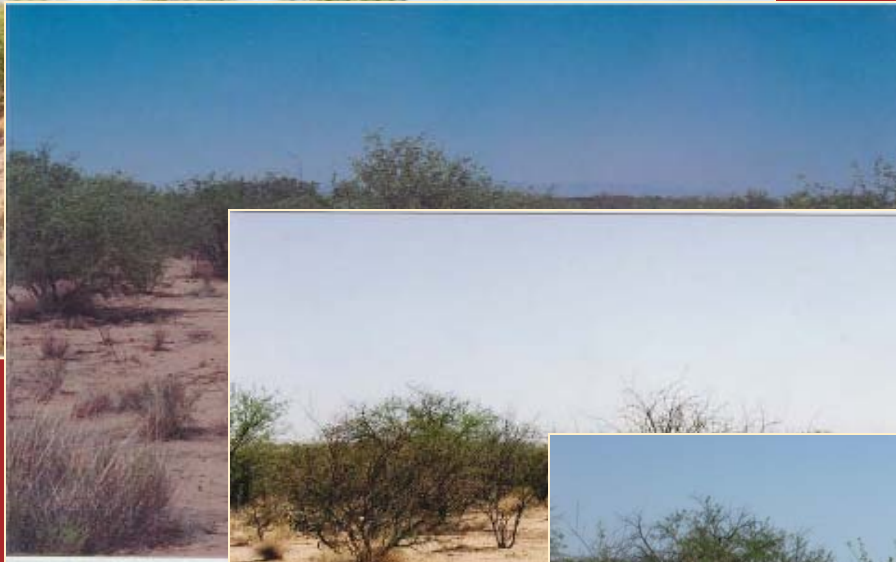
Photo Point 19 North

2002

2004

2006

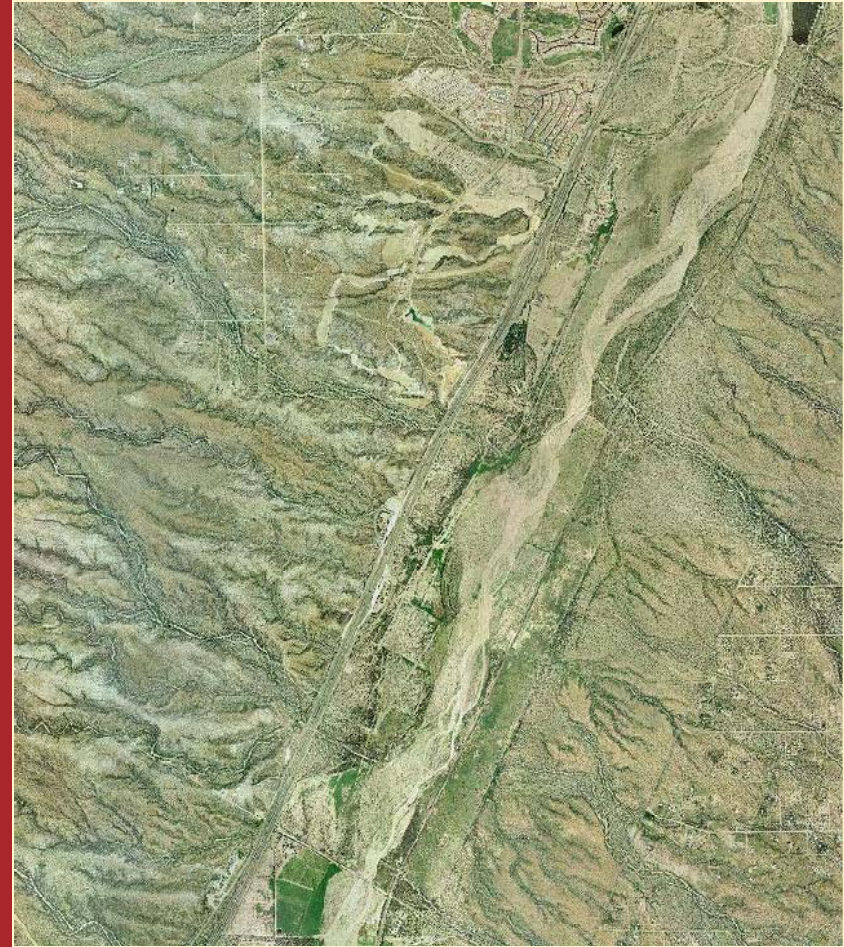
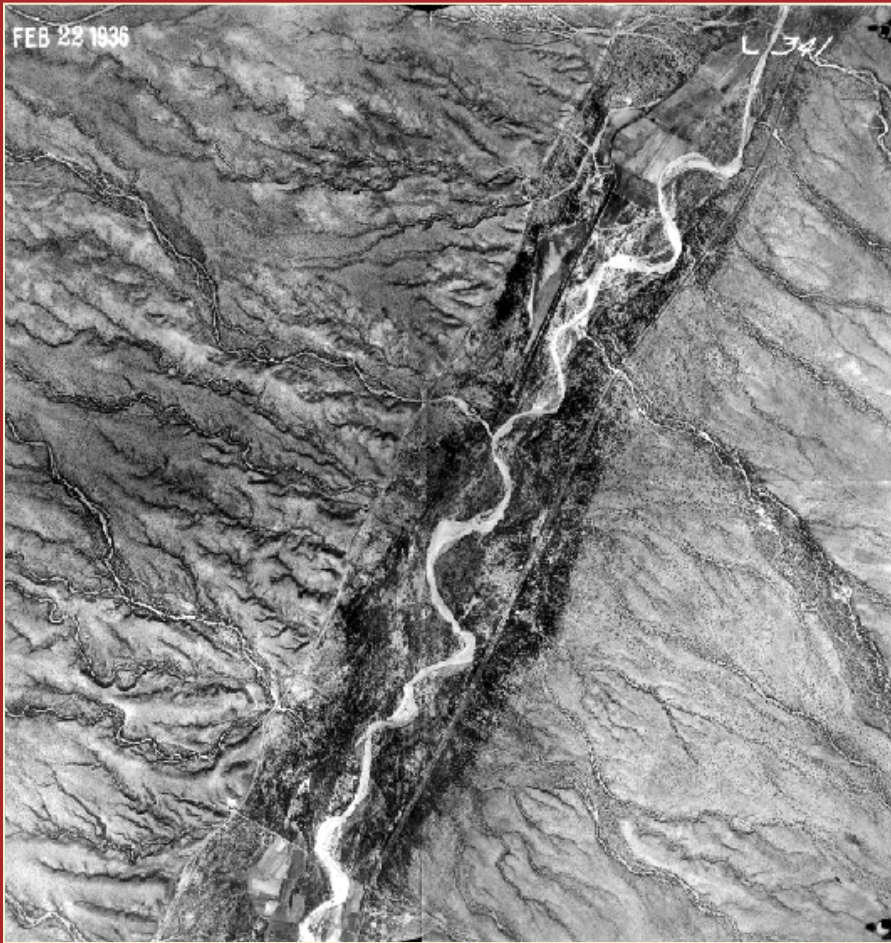
2008



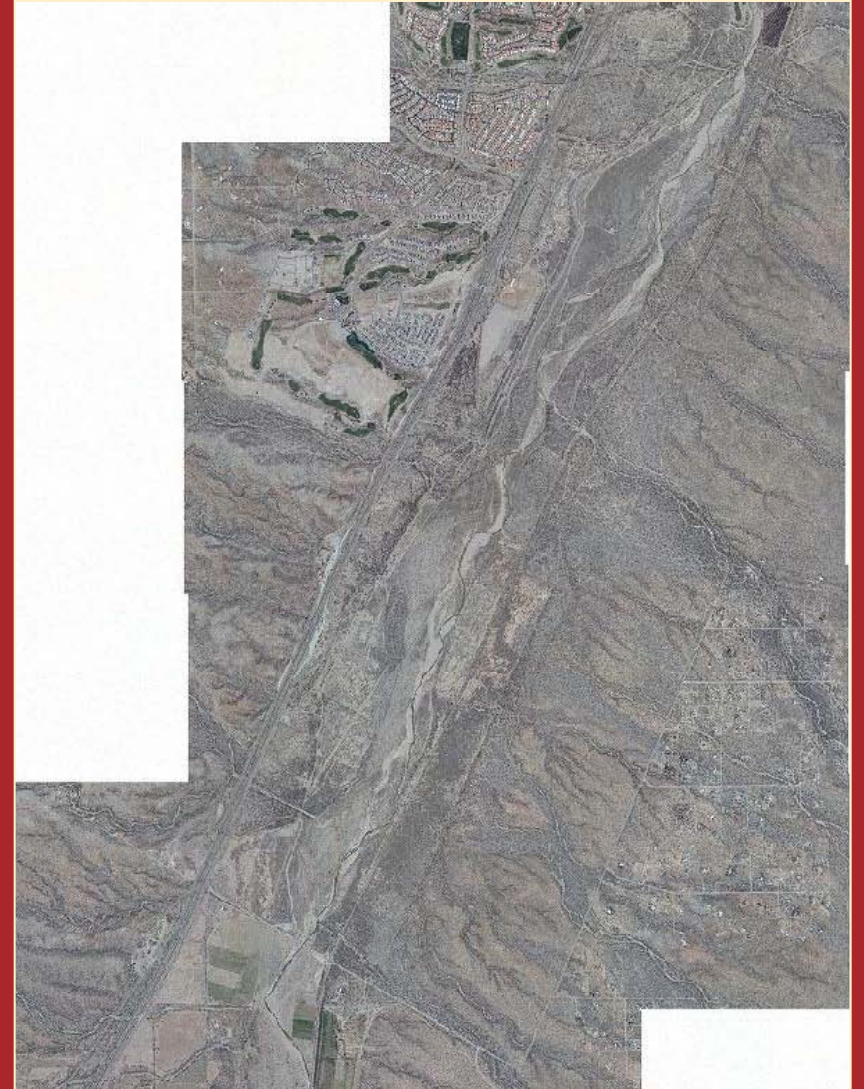
Aerial Photographs

- Distance to bank measurements were not effective in determining channel bank change.
- Regional aerial photography available every 2-3 years.
- Can be used to determine channel changes.
- When used with photo monitoring, can tell a more complete story.

Aerial comparison: 1936-2002



Aerial comparison: 2002-2008



Issues with Photo Monitoring

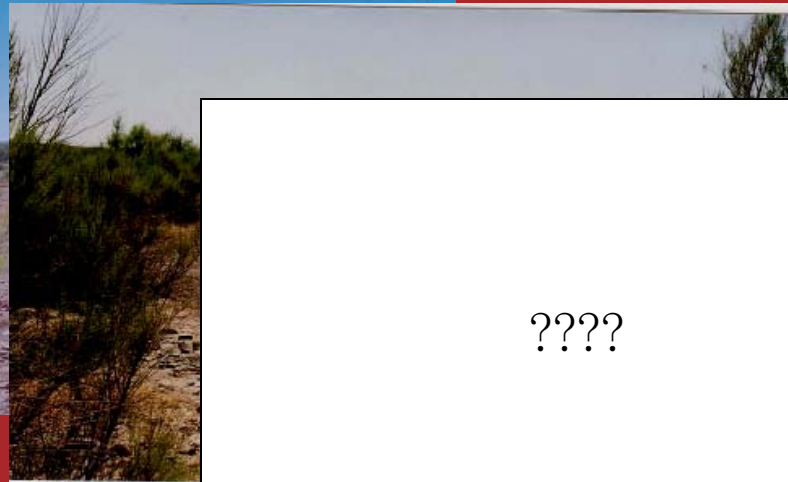
- Data management and presentation



2002



2004



2006

????

2008, 2010, 2012...

Data Management

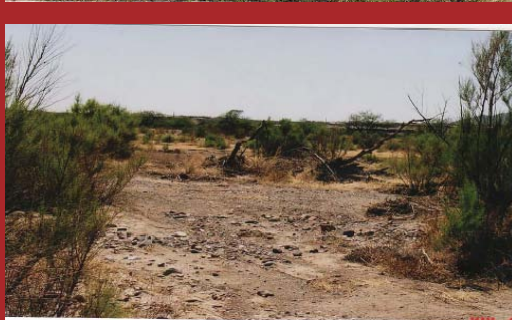
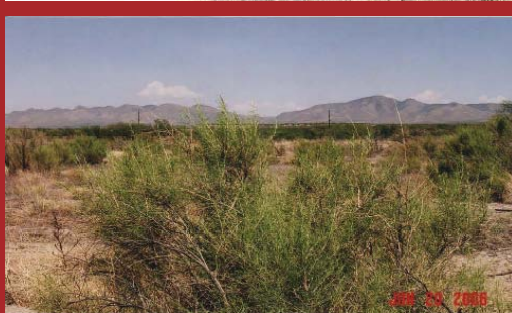


Photo Point 11

20

Not

Field Notes and other
Useful Data

Sou

Wes

55-623

Eas



Conclusions

- Photo monitoring has been effective at documenting change in the floodplain.
- Additional analysis tools and techniques are helpful.
 - Aerial photo comparison
 - Hydrological conditions data
- Data management is crucial.

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