Monitoring for Impact of Chino Basin Management Plans on Santa Ana River Riparian Habitat

GRAC Annual Conference
October 4, 2017

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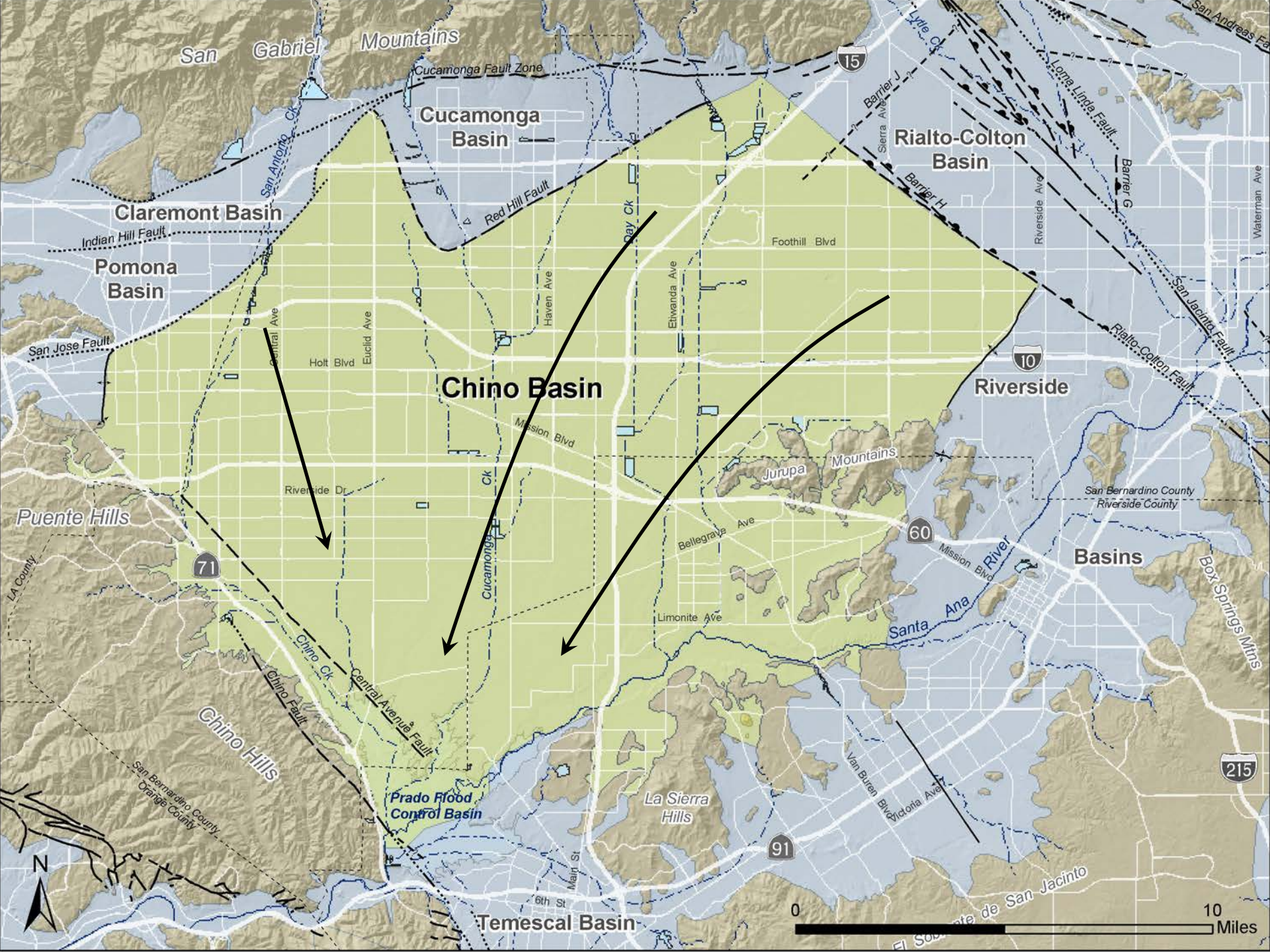
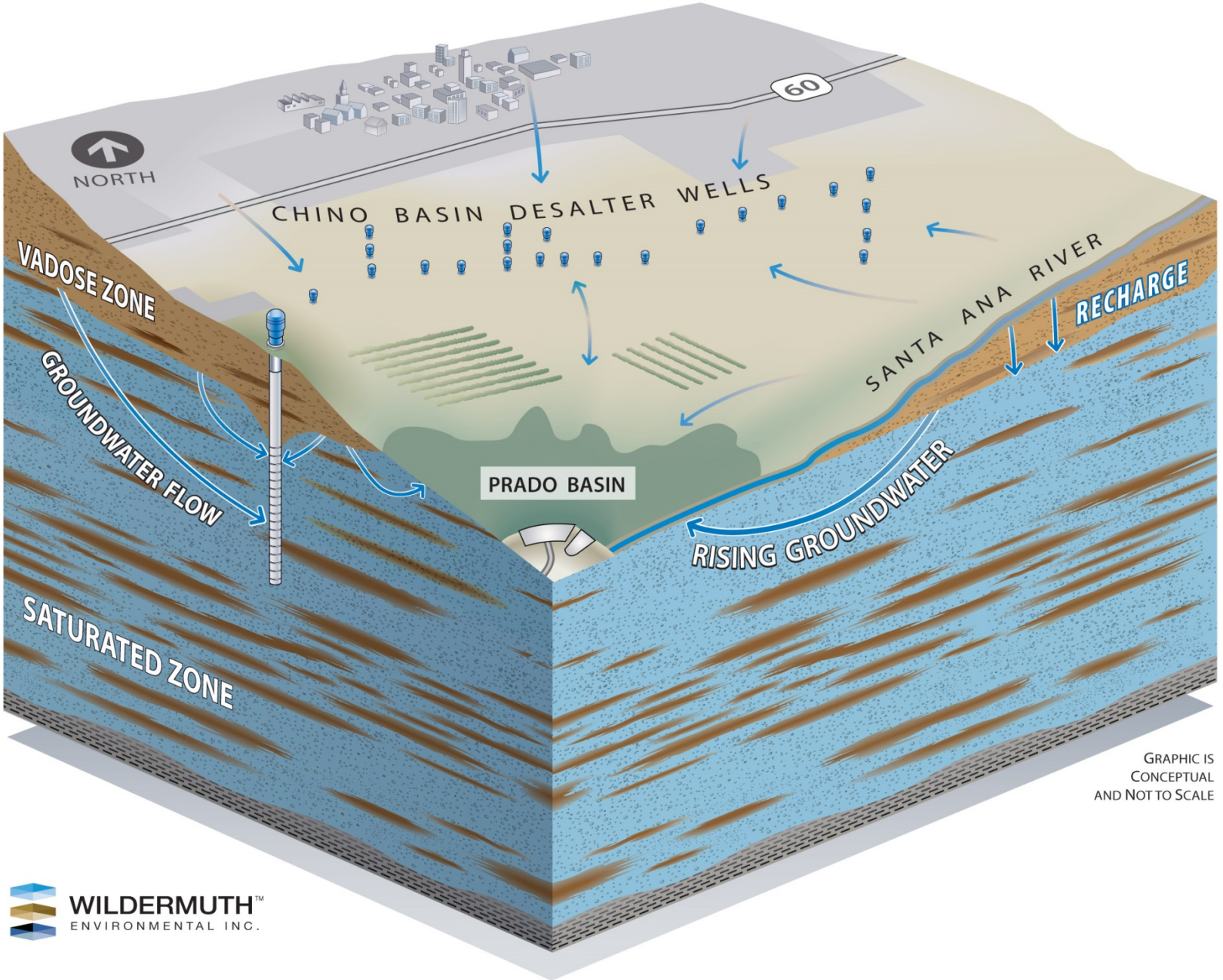
1st Annual Report of the
Prado Basin Habitat Sustainability Committee
http://www.cbwm.org/rep_engineering.htm


San Gabriel Mountains
Cucamonga Fault Zone
Cucamonga Basin
Rialto-Colton Basin
Claremont Basin
Pomona Basin
Chino Basin
Riverside
Puente Hills
Chino Hills
La Sierra Hills
Jurupa Mountains
Box Springs Mtns
Temescal Basin
Prado Flood Control Basin
Basins
San Antonio Ck
Red Hill Fault
Indian Hill Fault
San Jose Fault
Central Ave
Euclid Ave
Holt Blvd
Haven Ave
Etiwanda Ave
Day Ck
Foothill Blvd
Sierra Ave
Riverside Ave
Waterman Ave
Barrier J
Barrier H
Barrier G
Lytle Ck
Loma Linda Fault
San Andreas Fault
San Jacinto Fault
Rialto-Colton Fault
Mission Blvd
Riverside Dr
Cucamonga Ck
Bellegrave Ave
Limonite Ave
Santa Ana River
Chino Ck
Chino Fault
Central Avenue Fault
Main St
6th St
Van Buren Blvd
Victoria Ave
San Bernardino County
Riverside County
Orange County
LA County
15
10
60
71
91
215
N
0
10
Miles

Surface-Water and Groundwater Interaction in the Southern Portion of Chino Basin



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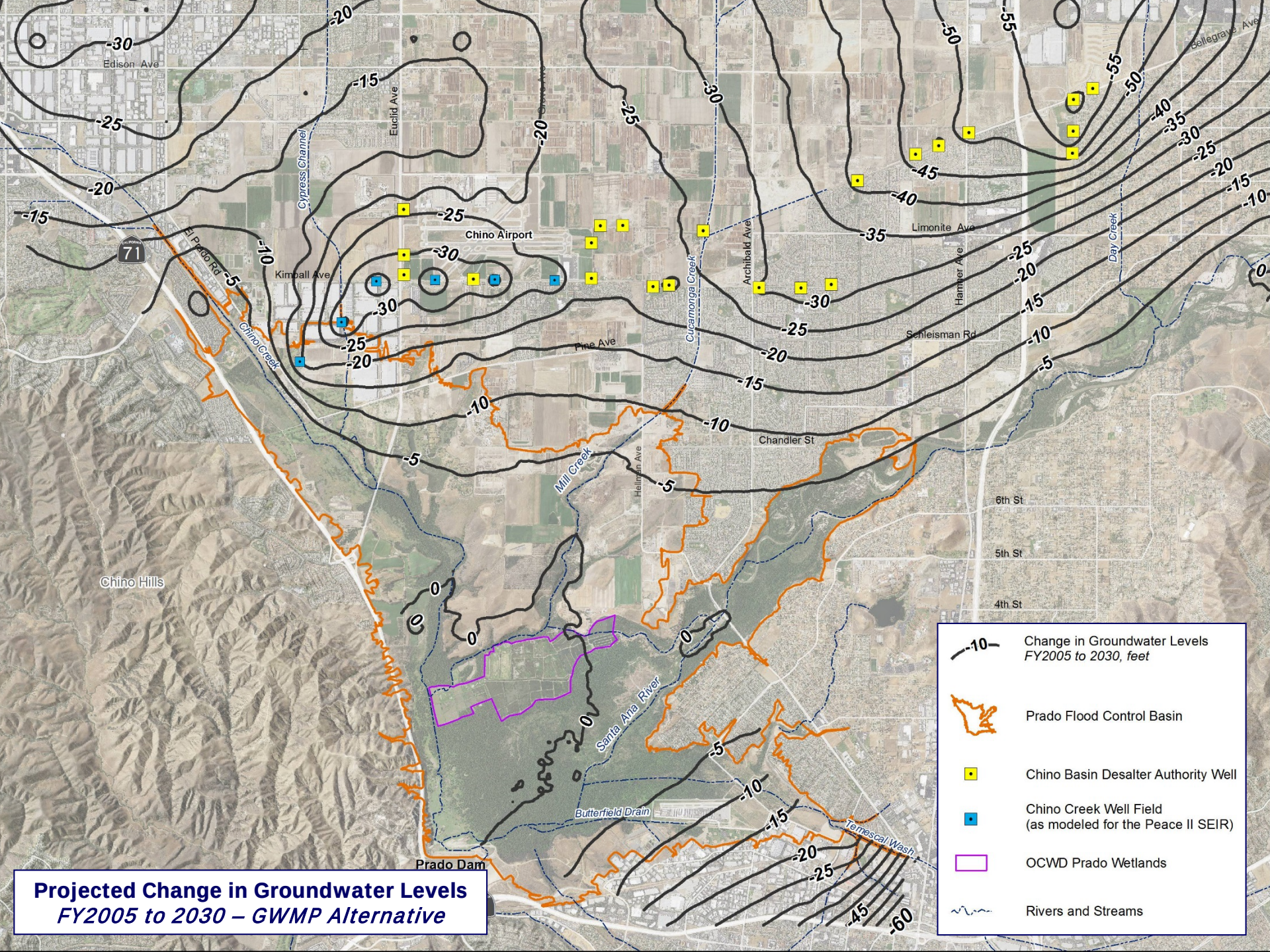
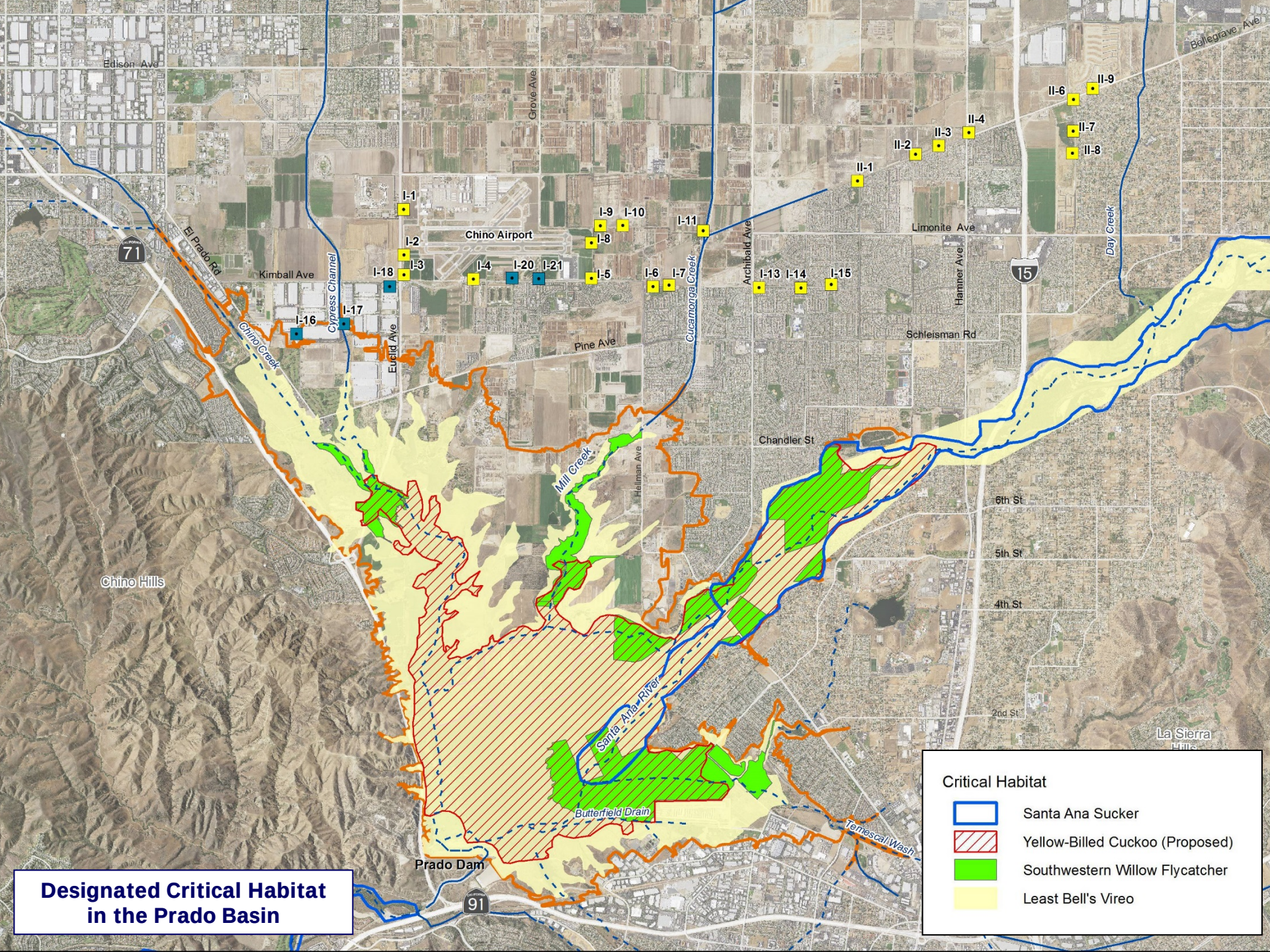
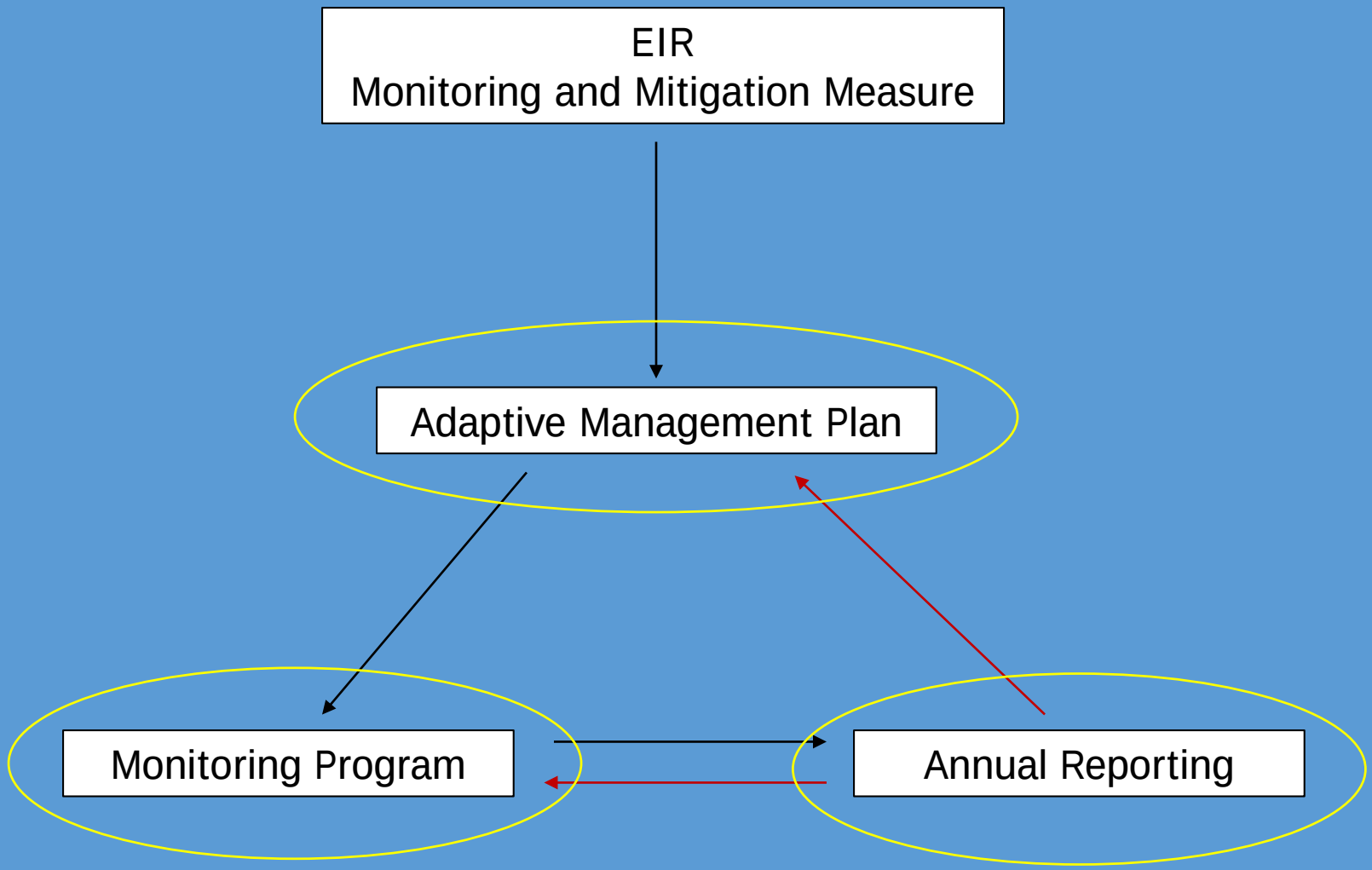


Projected Change in Groundwater Levels
FY2005 to 2030 – GWMP Alternative



Designated Critical Habitat in the Prado Basin


EIR
Monitoring and Mitigation Measure
Adaptive Management Plan
Monitoring Program
Annual Reporting

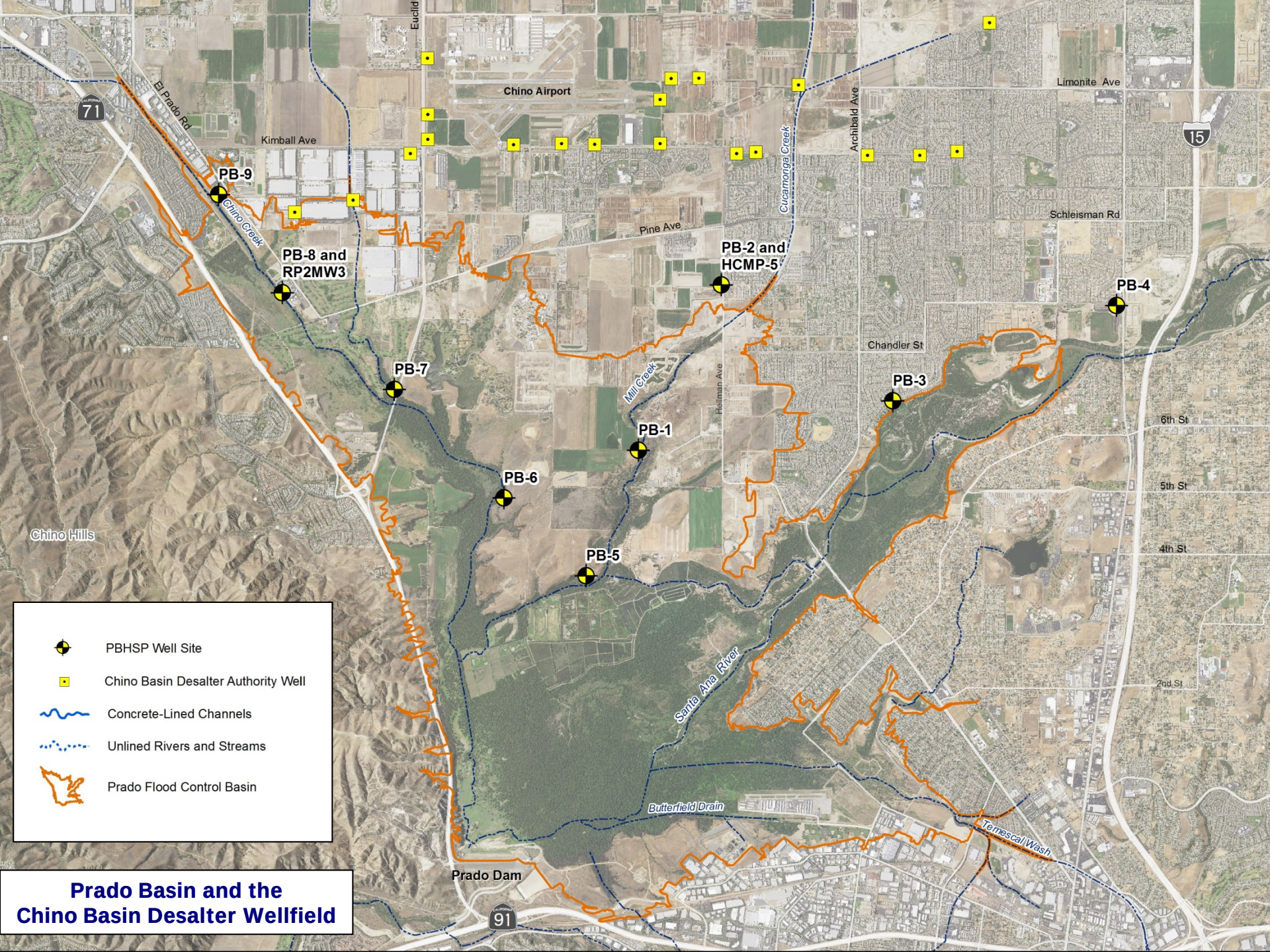
The Monitoring Program

- Extent and Quality of the Riparian Habitat
- Groundwater Levels
- Climate
  - precipitation
  - temperature
- Stream Discharge
- Other Factors
  - Wildfire
  - Pests
- Analysis of Prospective Loss of Riparian Habitat

Potential Stressors

The Monitoring Program

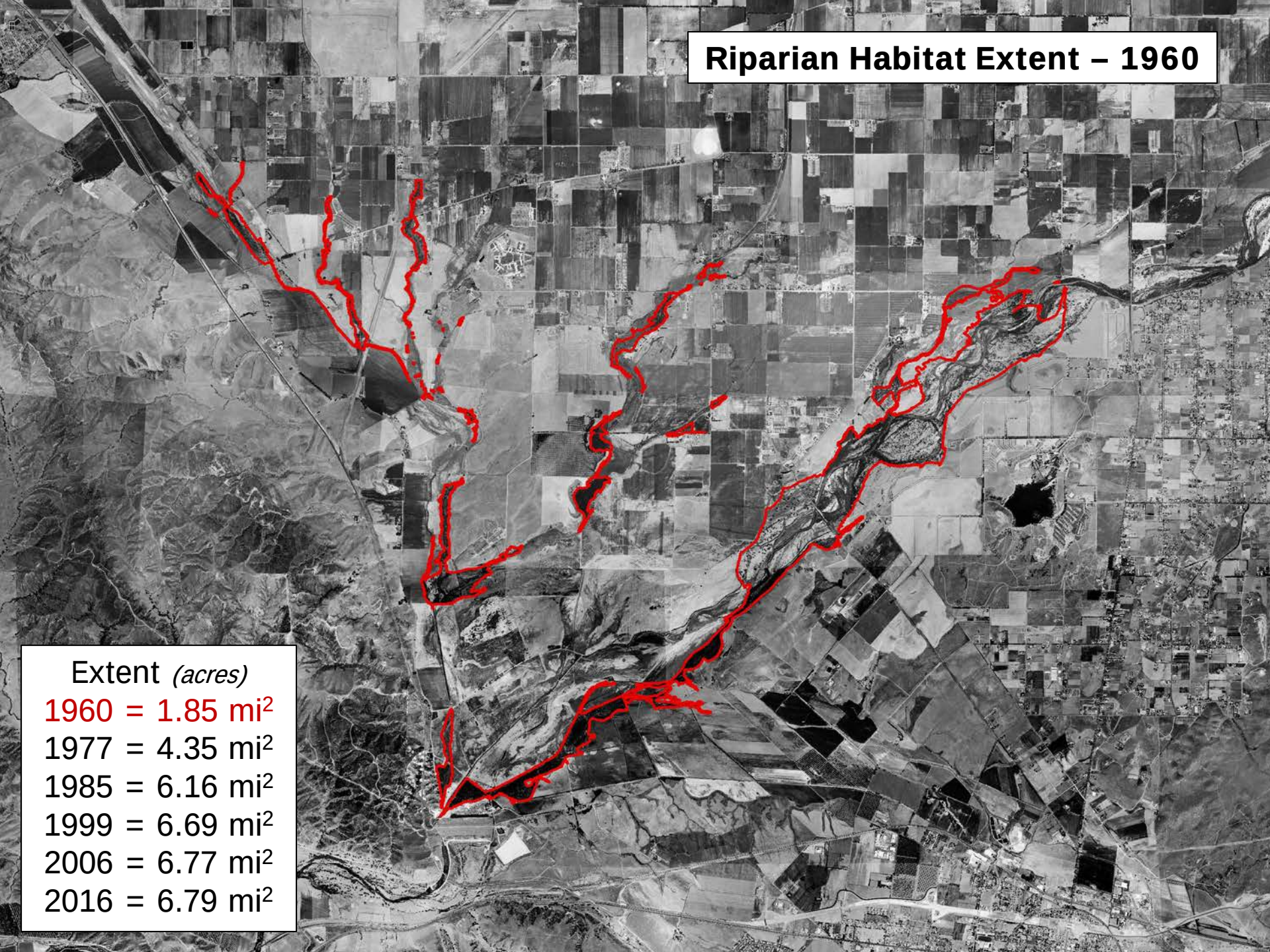
- Collect and analyze historical data
  - Prior to implementation of groundwater management plan
  - During implementation
- Conduct monitoring program
  - Installation of new monitoring wells
  - Annual data analysis and report
- Make projections
  - Use groundwater model to characterize future declines in groundwater levels
  - Identify areas of “prospective loss of riparian habitat”



Prado Basin and the Chino Basin Desalter Wellfield

Prado Basin
Monitoring Wells

Riparian Habitat Extent – 1960



Extent *(acres)*

1960 = 1.85 mi^2

1977 = 4.35 mi^2

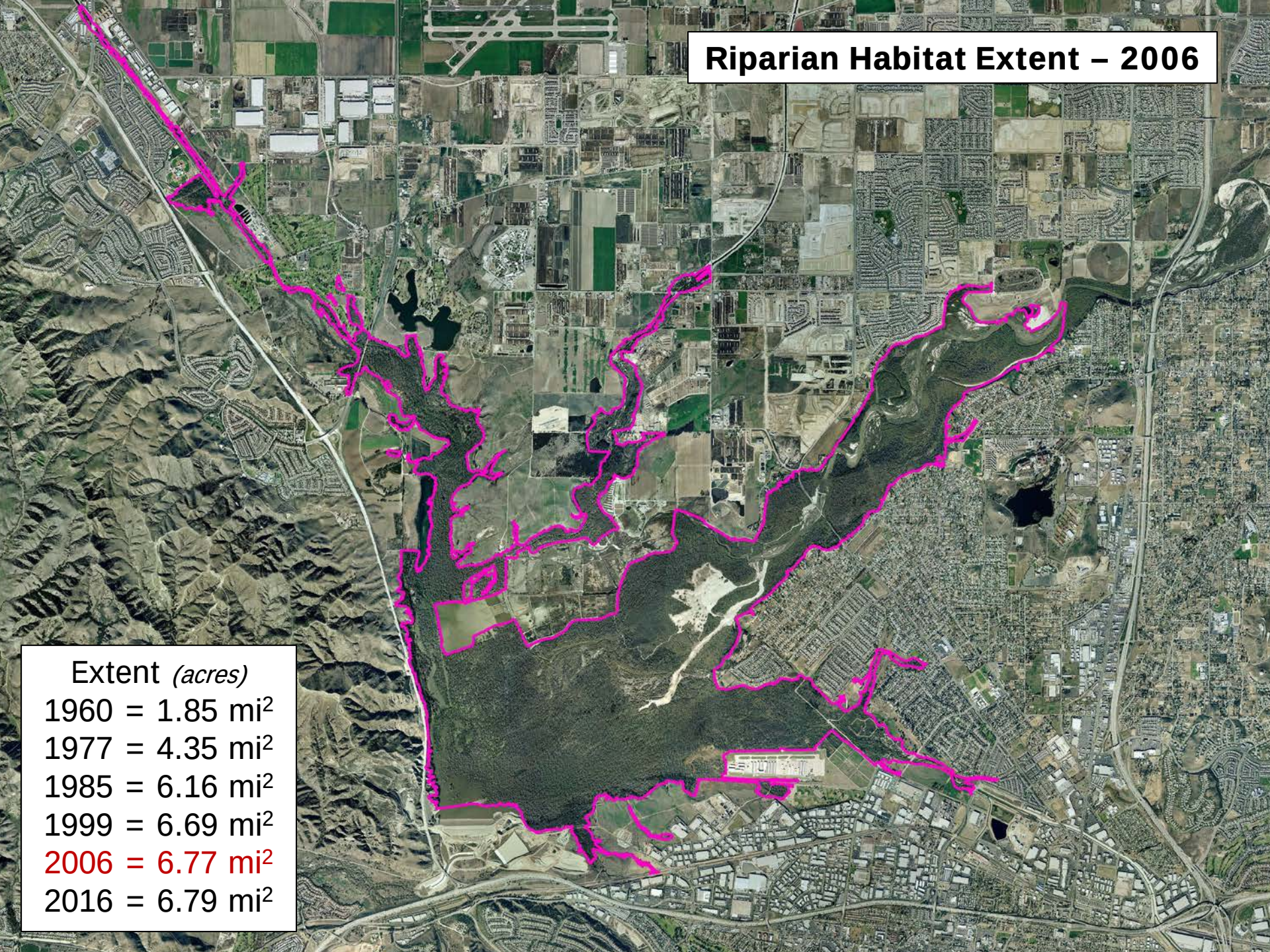
1985 = 6.16 mi^2

1999 = 6.69 mi^2

2006 = 6.77 mi^2

2016 = 6.79 mi^2

Riparian Habitat Extent – 2006



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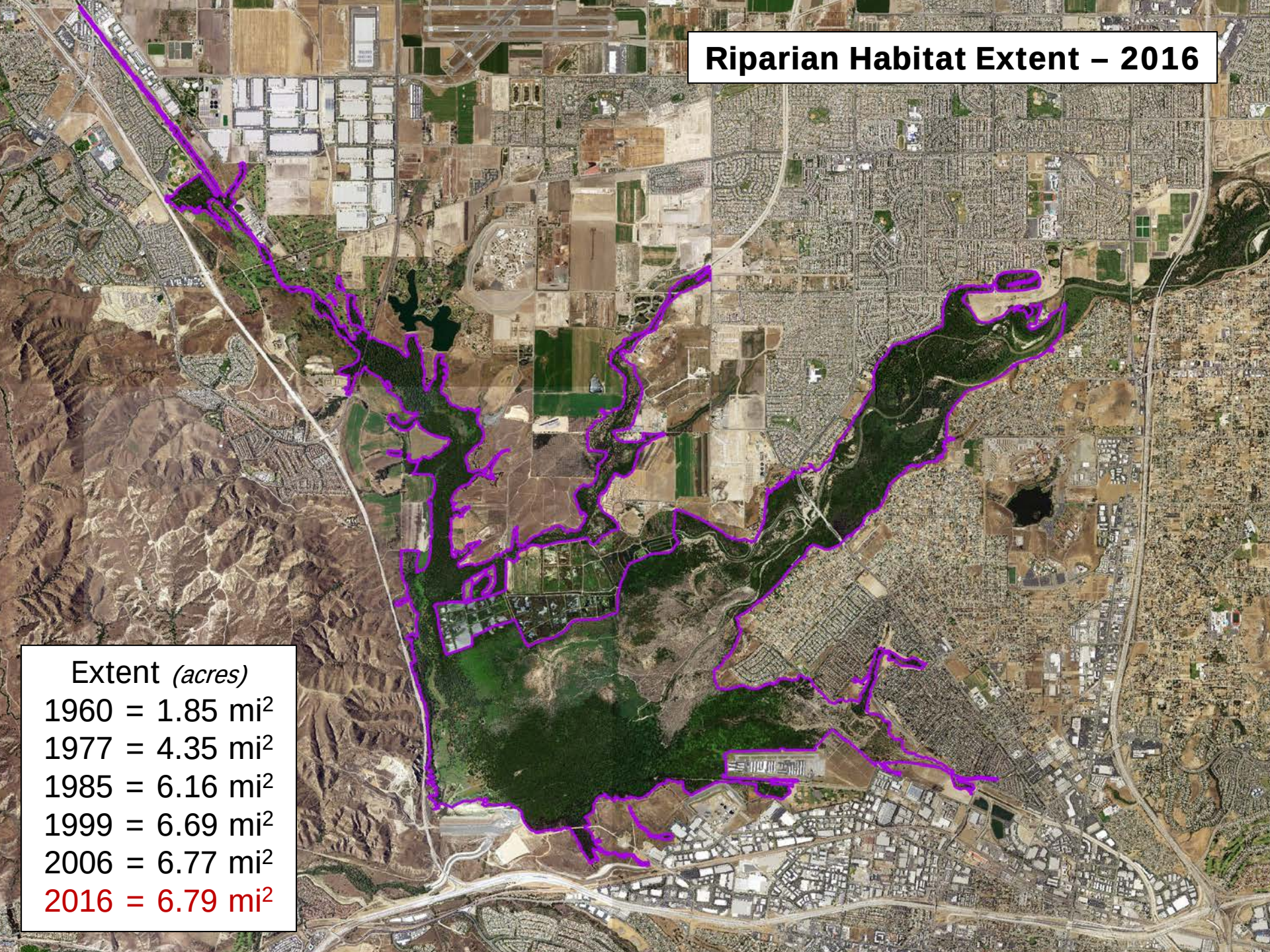
Riparian Habitat Extent – 2016



Extent *(acres)*

1960 = 1.85 mi^2

1977 = 4.35 mi^2

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1999 = 6.69 mi^2

2006 = 6.77 mi^2

2016 = 6.79 mi^2

Normalized Difference Vegetation Index (NDVI)

$$NDVI = \frac{NIR - VIS}{NIR + VIS}$$

Ratio calculated from absorbed and reflected light

Numerical indicator of the extent and quality of vegetation because it is correlated with photosynthesis

Can be used to access the temporal and spatial changes in vegetation (since 1980s)

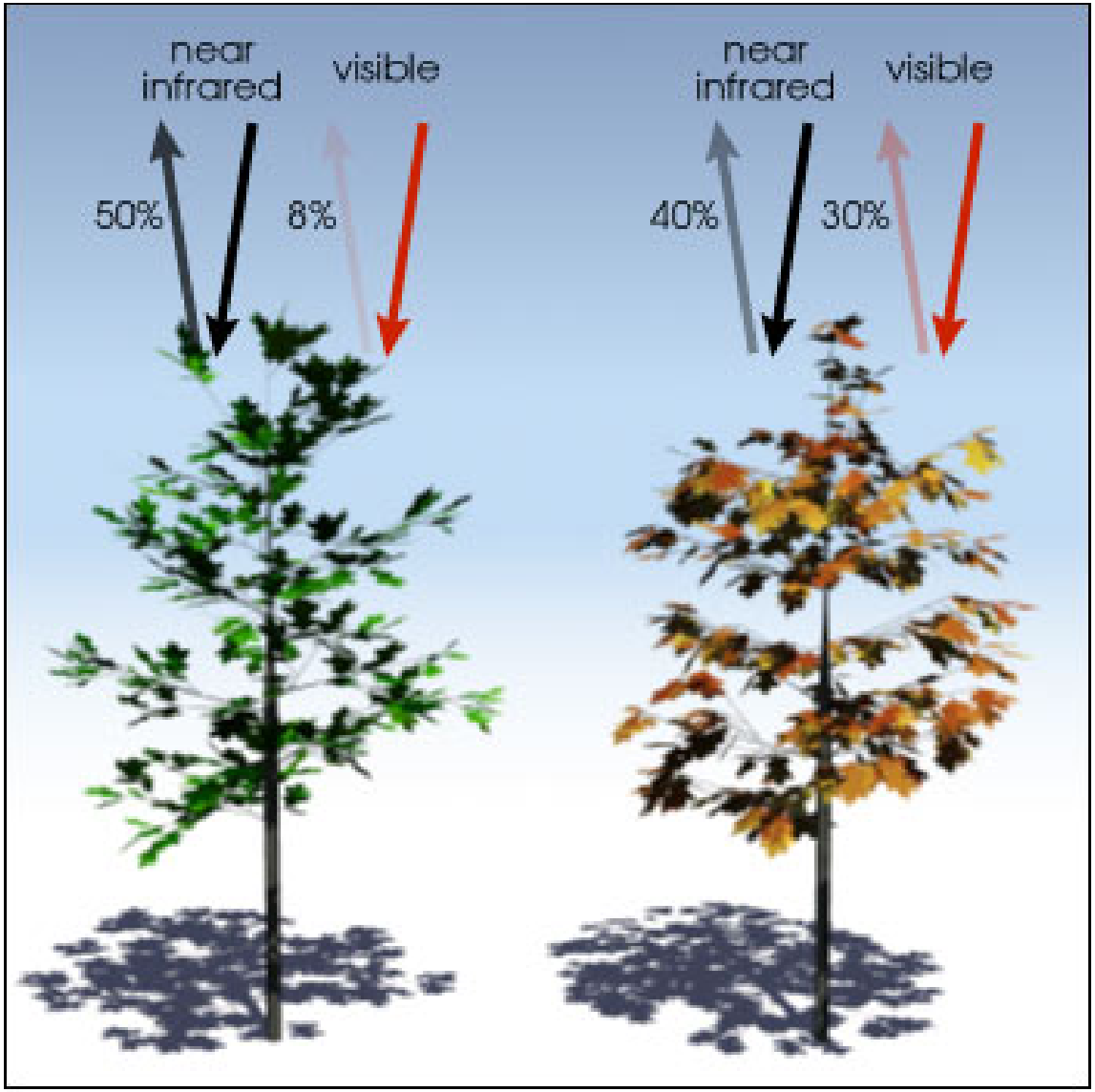
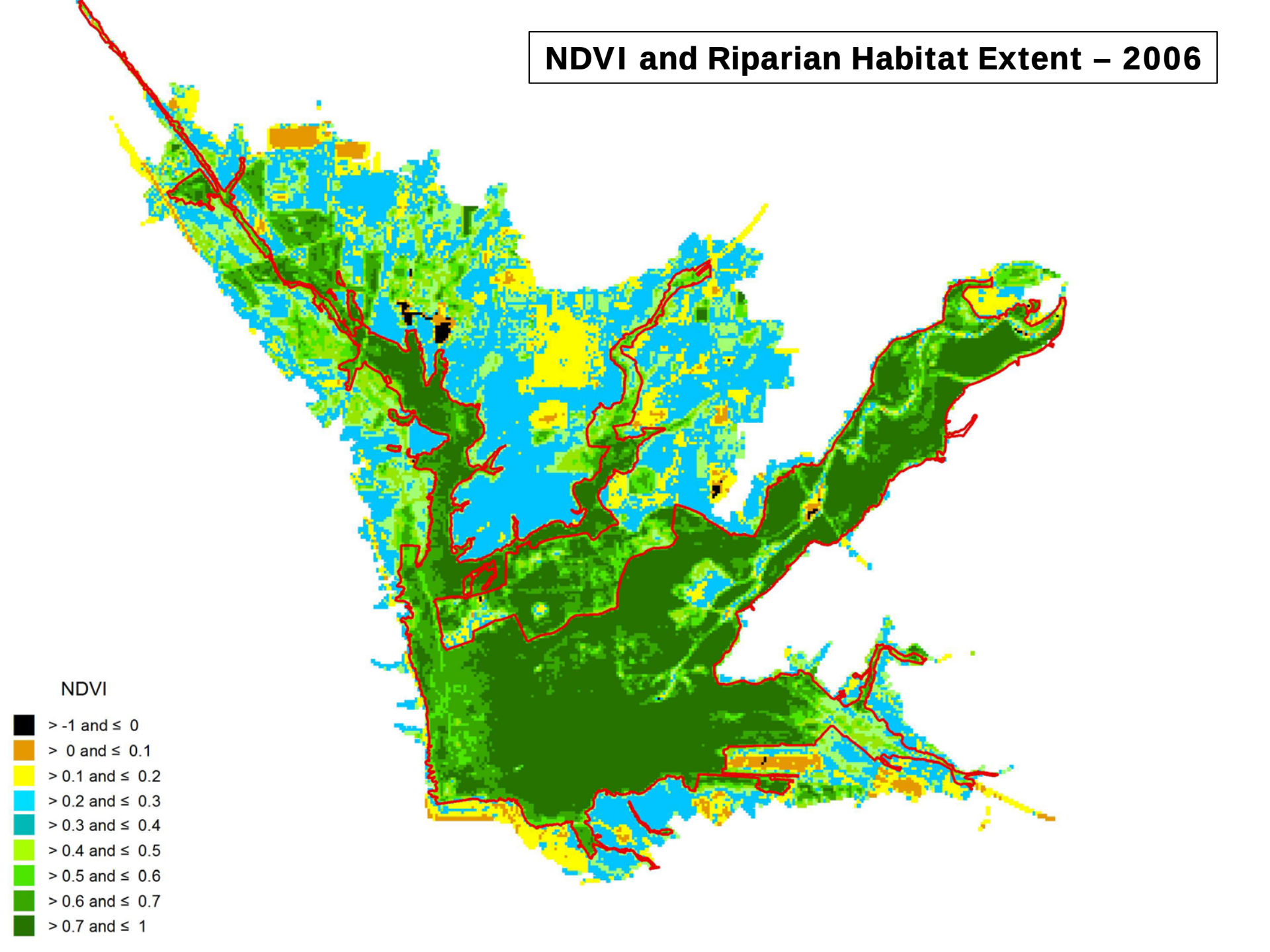
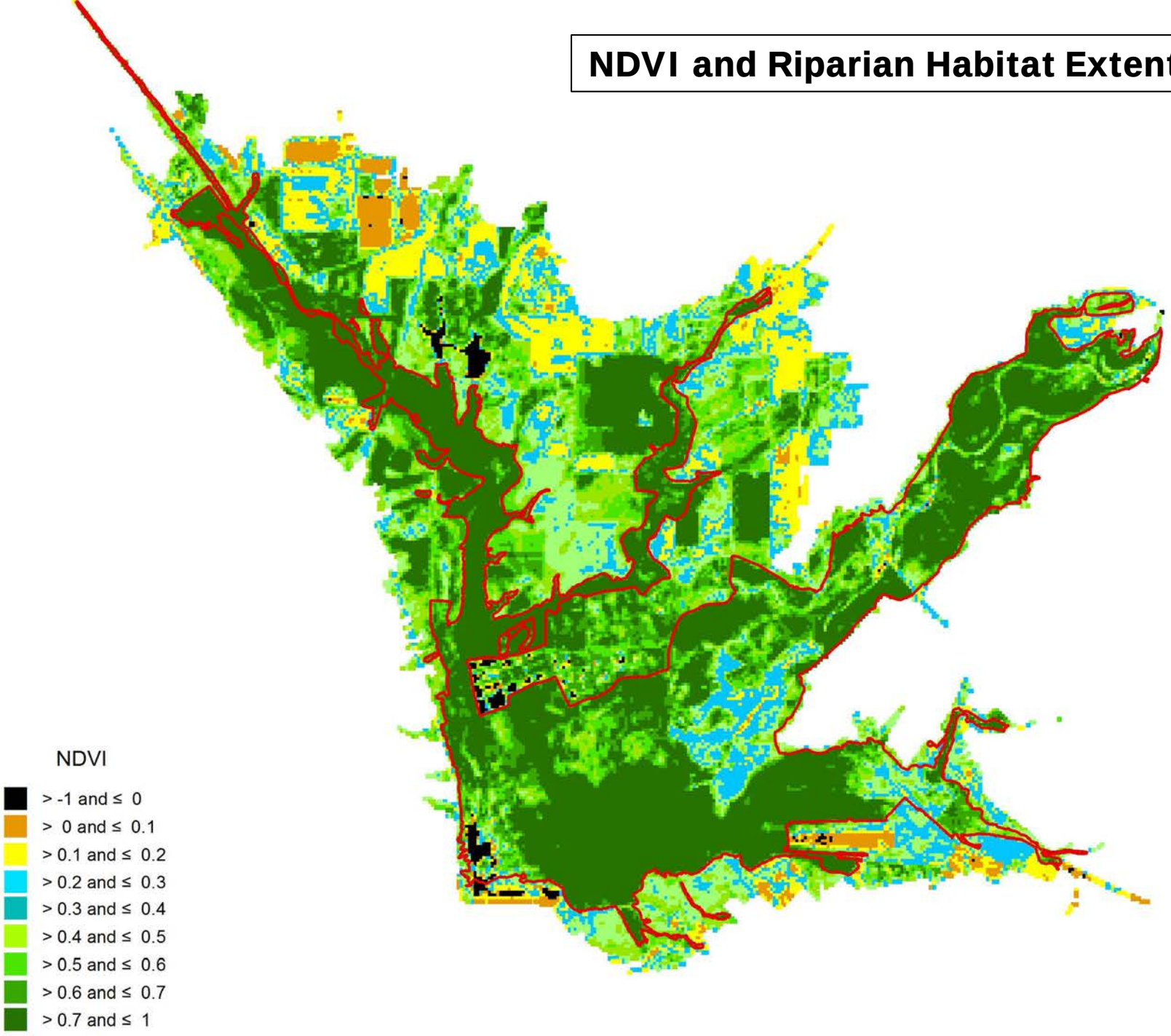


Image source: http://earthobservatory.nasa.gov/Features/MeasuringVegetation/measuring_vegetation_2.php

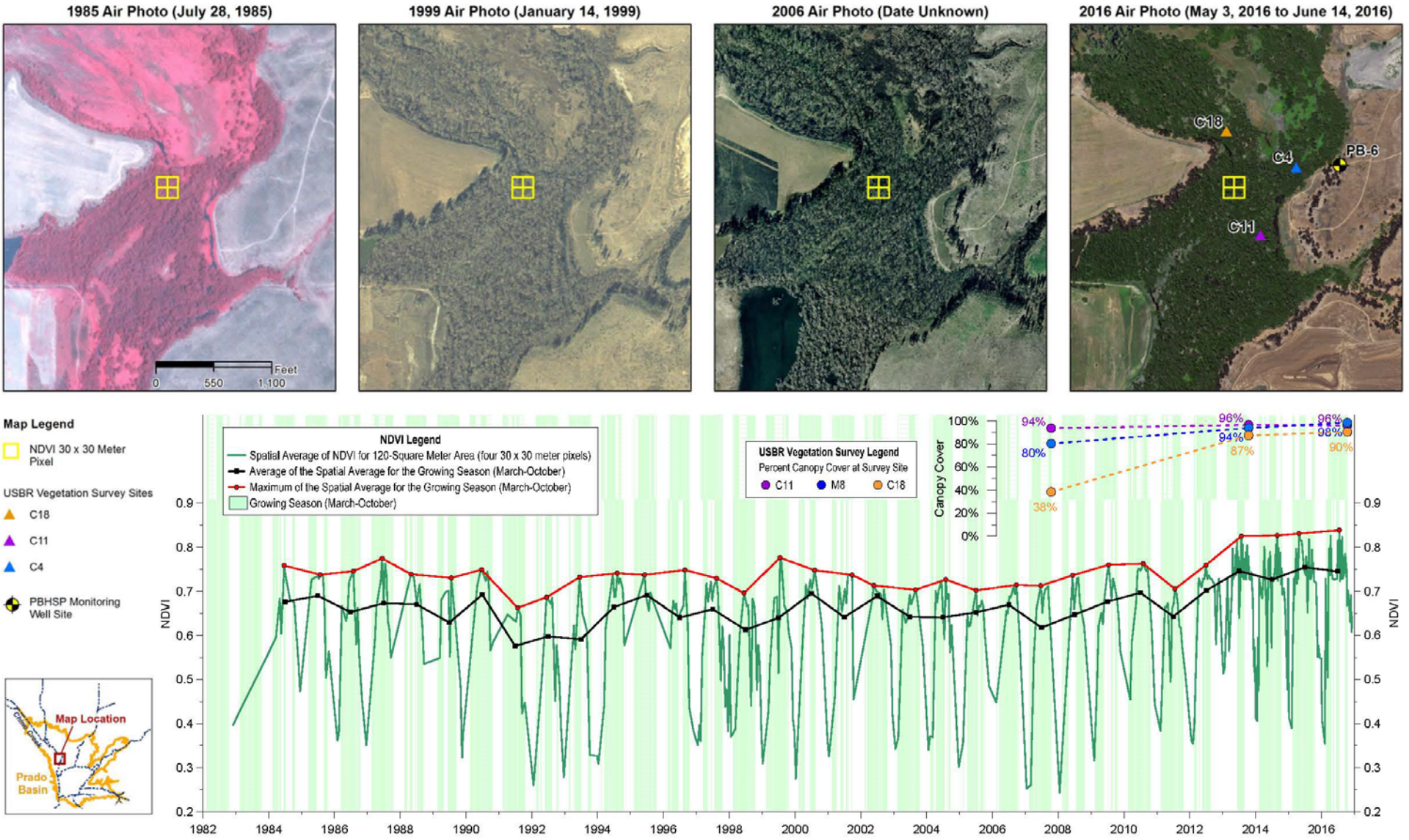
NDVI and Riparian Habitat Extent – 2006



NDVI and Riparian Habitat Extent – 2016



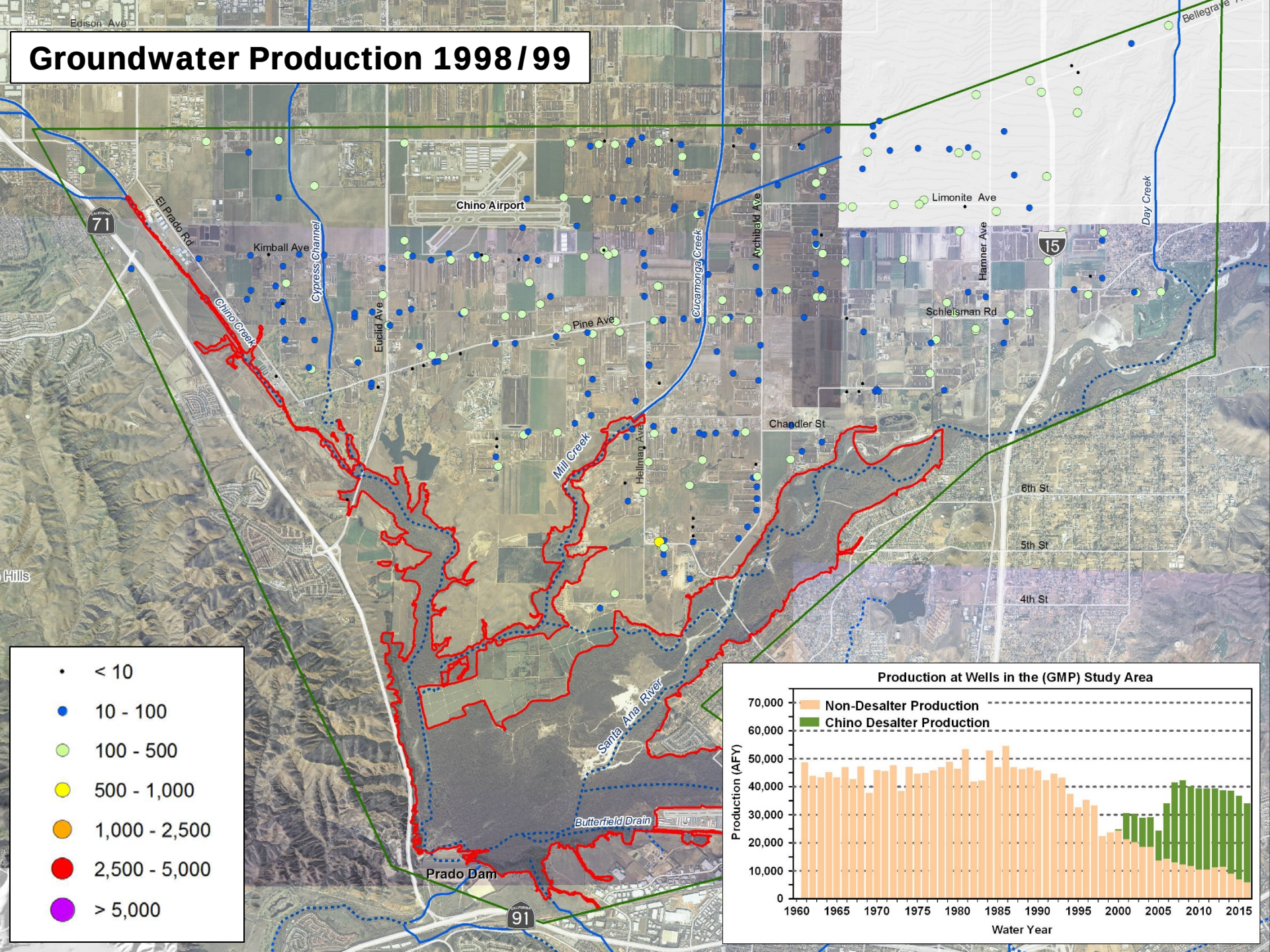
NDVI Analysis – Chino Creek 4



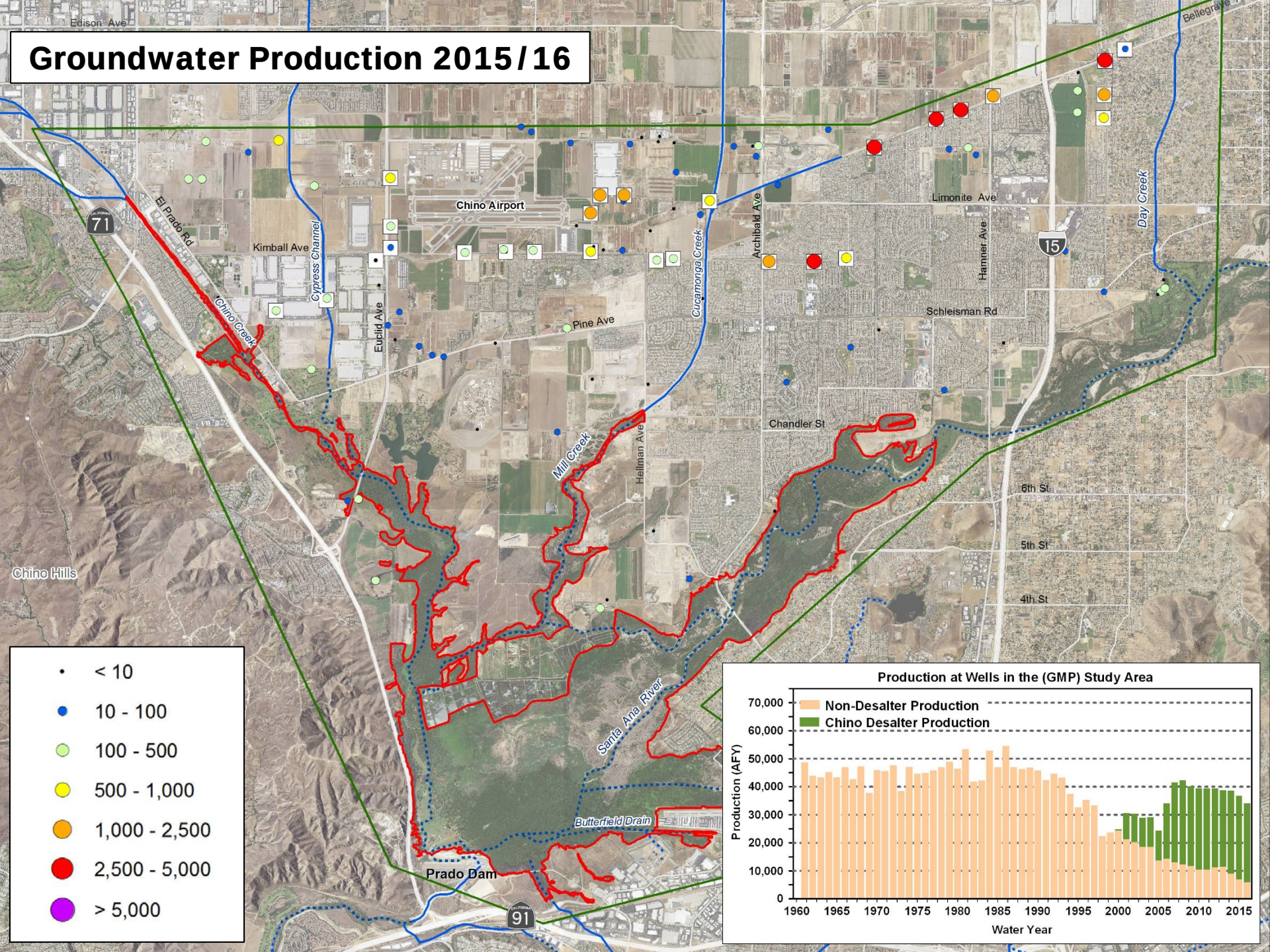
Prepared by:
WEI
Wildermuth Environmental, Inc.
Author: VMW/RT
Date: 20170314
Filename: ndvi_time series_Chino Creek 4.grf

Time Series of NDVI and Air Photos
CC-4 Area for 1984 to 2016
Figure 3-6d

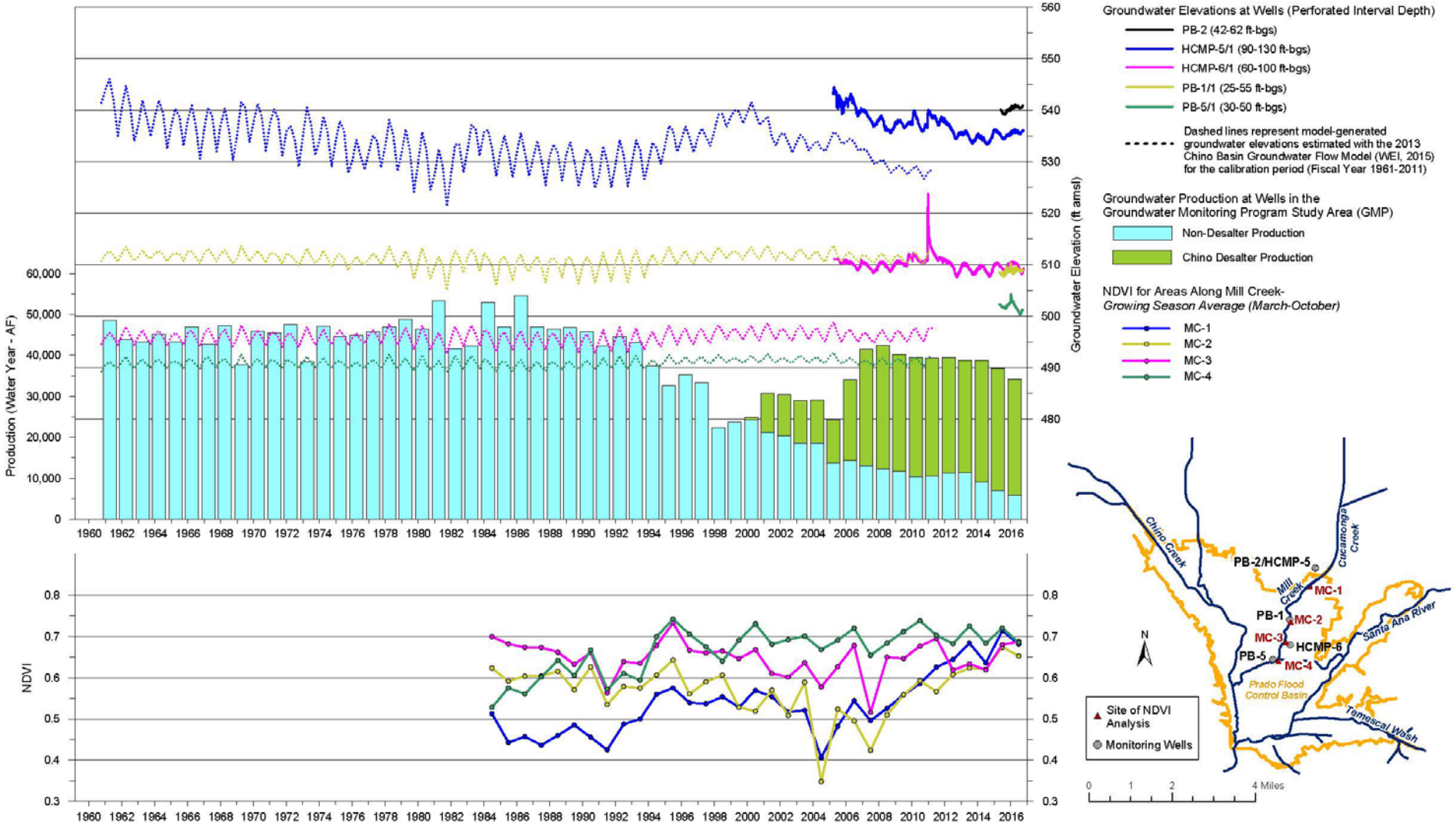
Groundwater Production 1998/99



Groundwater Production 2015/16



Groundwater Production / Levels vs. NDVI – Mill Creek



Prepared by:
WEI
Wildermuth Environmental, Inc.

Author: RT
Date: 20170329
Filename: Flows_WLs_MillCreek.grf

2016 Annual Report
Prado Basin Habitat Sustainability Committee

Groundwater Production and Groundwater Levels versus NDVI
Mill Creek Area for 1960-2016

Figure 3-9b

Conclusions

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- The riparian habitat experienced no trend in degradation contemporaneous with GWMP implementation
- Groundwater levels have remained stable across the Prado Basin and appear unaffected by GWMP implementation, with two exceptions: northern reaches of Mill Creek and SAR
- The riparian habitat experienced no trend in degradation that correlates with the dry period from 1999 to 2016 → Source waters other than precipitation and storm flow are more important for consumptive use by riparian vegetation, such as base flow and shallow groundwater

Conclusions

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- The riparian habitat has experienced no trend in degradation that correlates with the reduction in stream discharge that started in 2005, and may have improved in the northern reaches of Chino Creek, Mill Creek and the SAR
- Other factors have had documented adverse impacts on the riparian habitat, such as wildfires and pests (PSHB beetle)
- Projected changes is groundwater levels in Prado Basin through 2030 are +/- five feet → area of greatest concern for prospective loss of riparian habitat is the northern reach of Mill Creek

Recommendations

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- No recommendations for mitigation as of yet
- Continue monitoring program
- Perform research to validate and refine methods
- Prepare 2nd annual report