2016 Annual Report of the Prado Basin Habitat Sustainability Committee

Prado Basin Habitat Sustainability Committee Meeting
June 6, 2017

WEI
Wildermuth Environmental, Inc.

Inland Empire Utilities Agency

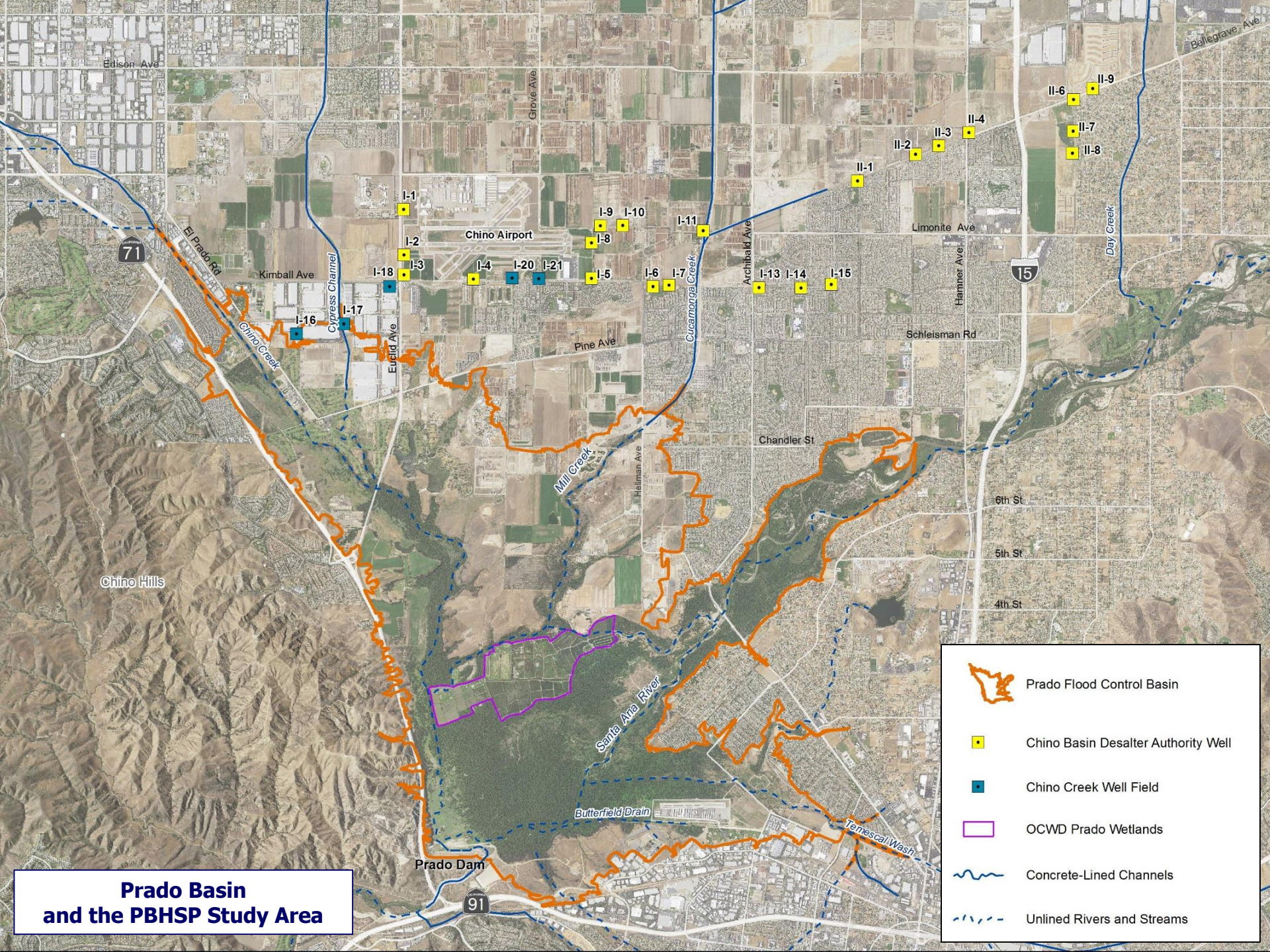
Chino Basin Watermaster
Partners in Basin Management

Agenda

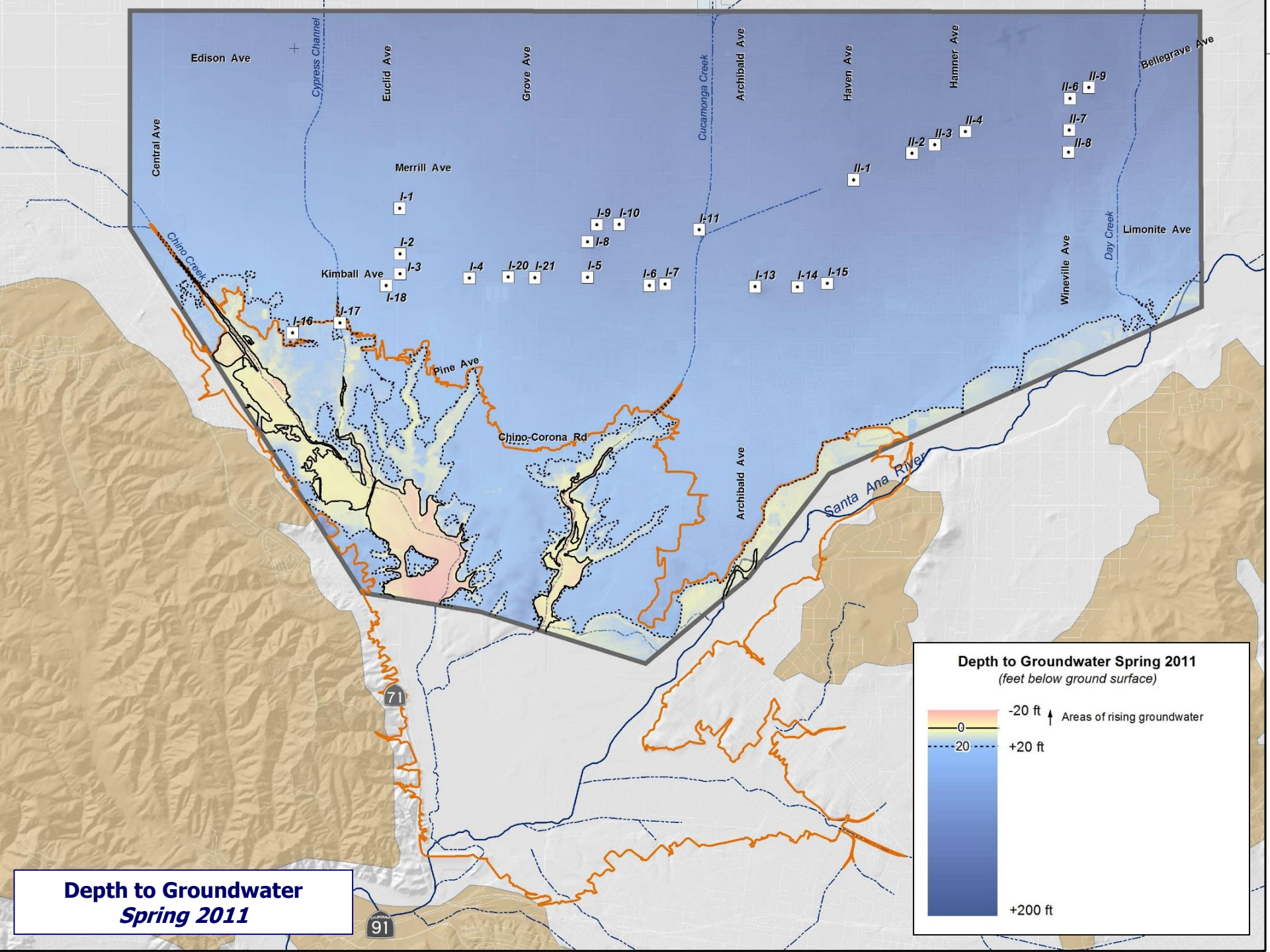
1. Background
2. Review of the draft 2016 Annual Report
3. Next steps

Next Steps

- June 21, 2017 – PBHSC members submit comments and suggested revisions on the draft 2016 Annual Report
- June 30, 2017 – Final 2016 Annual Report
- July 2017 – Annual Report in agenda packet for Watermaster/IEUA meetings



Prado Basin and the PBHSP Study Area


Edison Ave
Cypress Channel
Euclid Ave
Grove Ave
Cucamonga Creek
Archibald Ave
Haven Ave
Hamner Ave
Bellegrave Ave
Central Ave
Merrill Ave
Chino Creek
Kimball Ave
Pine Ave
Chino-Corona Rd
Archibald Ave
Santa Ana River
Wineville Ave
Day Creek
Limonite Ave
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I-20
I-21
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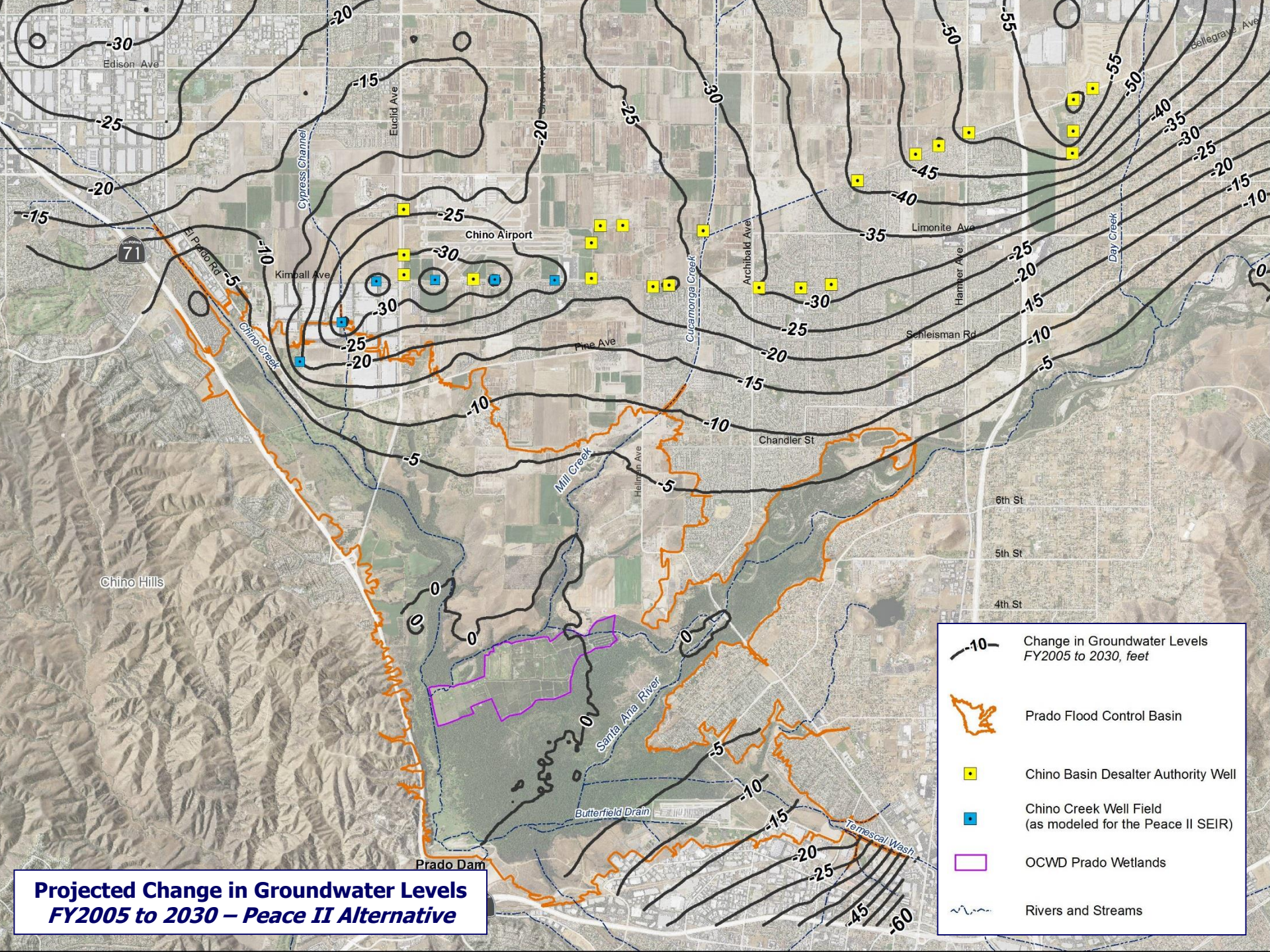
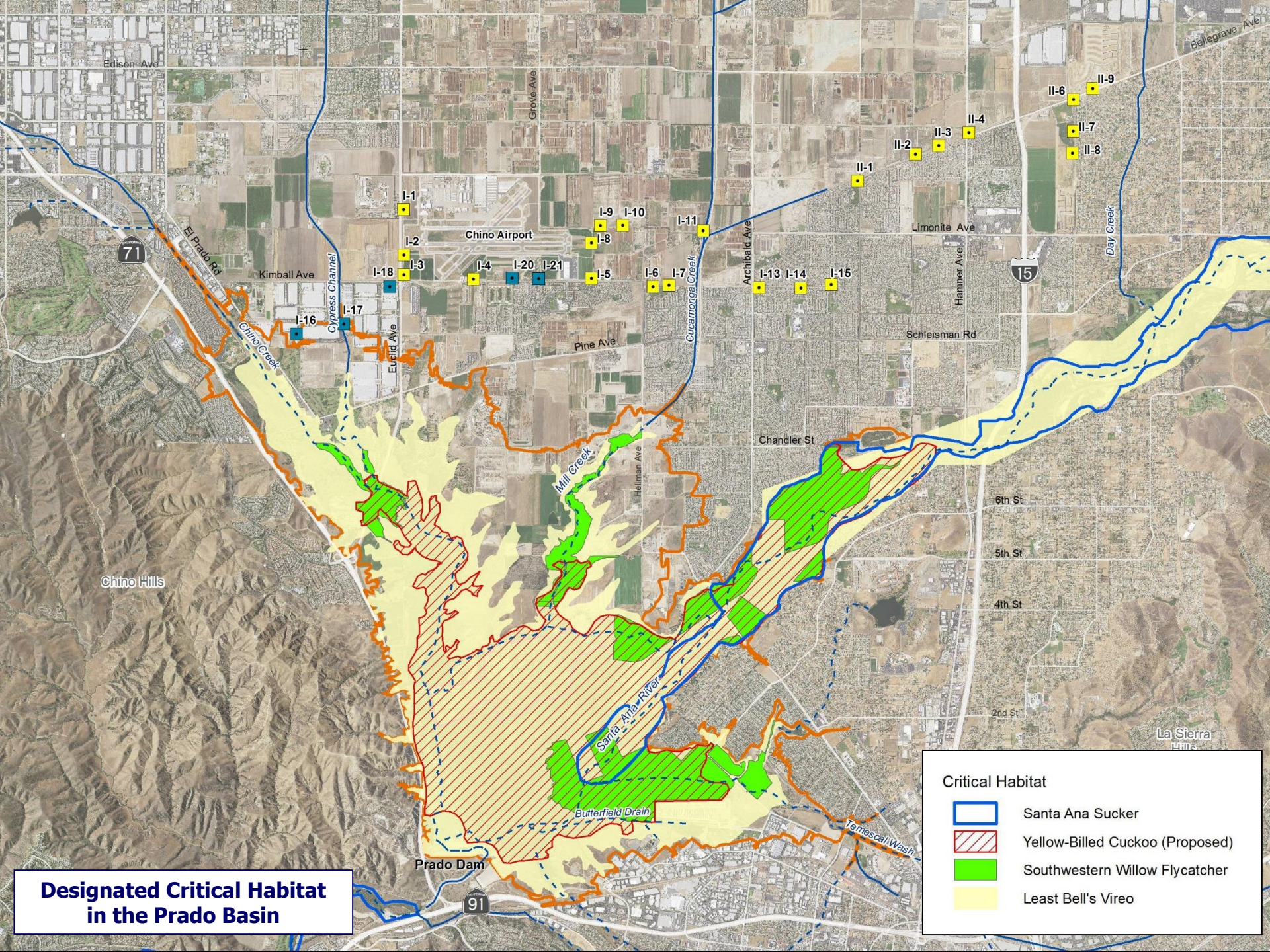
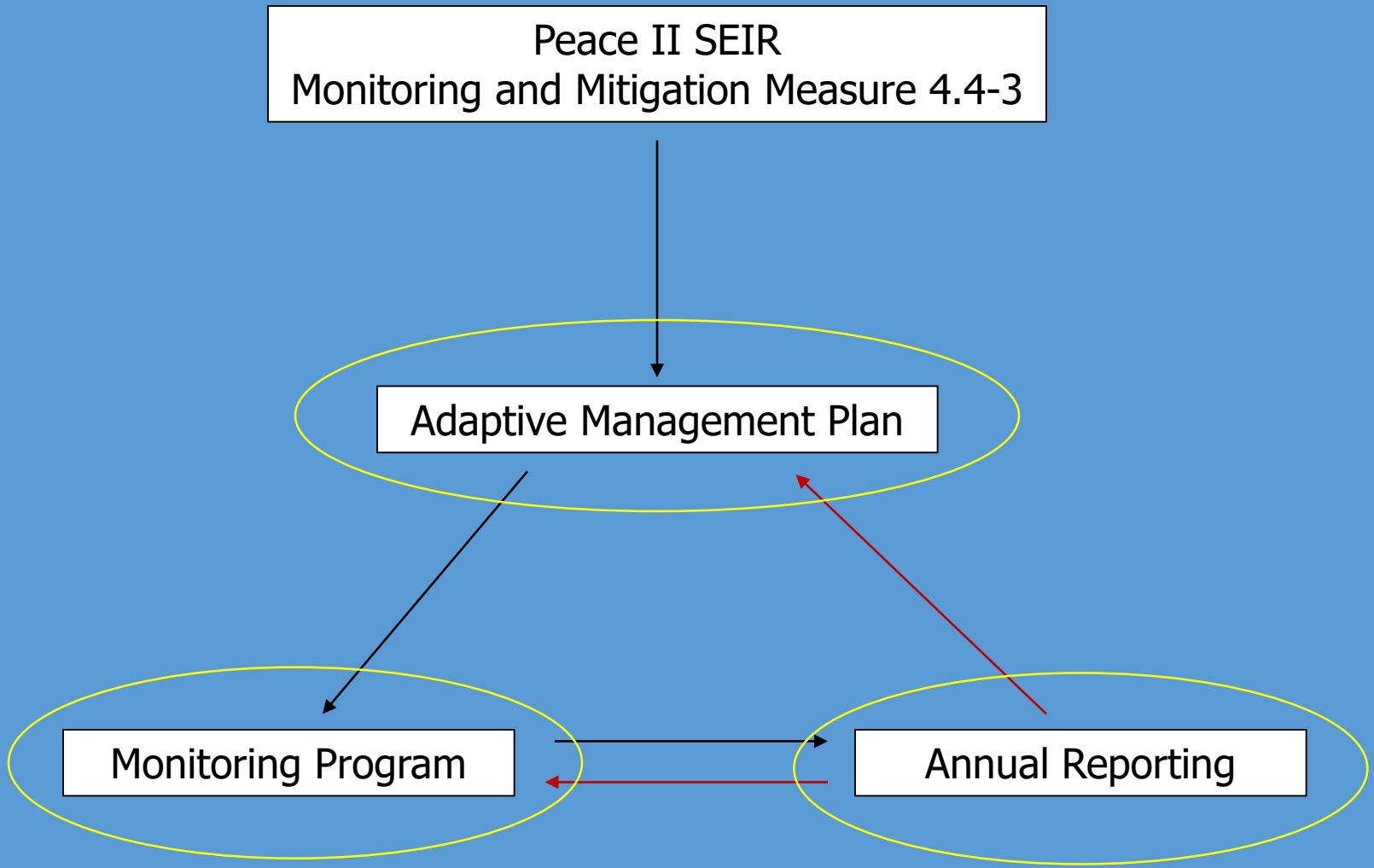
II-2
II-3
II-4
II-6
II-7
II-8
II-9
71
91
Depth to Groundwater Spring 2011
(feet below ground surface)
-20 ft
0
20
+20 ft
+200 ft
Areas of rising groundwater
Depth to Groundwater
Spring 2011



Projected Change in Groundwater Levels
FY2005 to 2030 – Peace II Alternative



Designated Critical Habitat in the Prado Basin


Peace II SEIR
Monitoring and Mitigation Measure 4.4-3
Adaptive Management Plan
Monitoring Program
Annual Reporting

Methods

1. Inspect the universe of historical data
   - Pre- and post-Peace II implementation
   - 1960s to 2016 → Ongoing monitoring
2. Characterize the time-series of the extent and quality of the riparian habitat
3. Characterize the time-series of all potential stressors
   - Stressors related to Peace II implementation
   - Stressors not related to Peace II implementation
4. Identify cause-and-effect relationships
   - Is Peace II implementation causing adverse impacts?
5. Annual reporting → Develop conclusions and recommendations
   - Ongoing monitoring
   - Mitigation measures

1st Annual Report

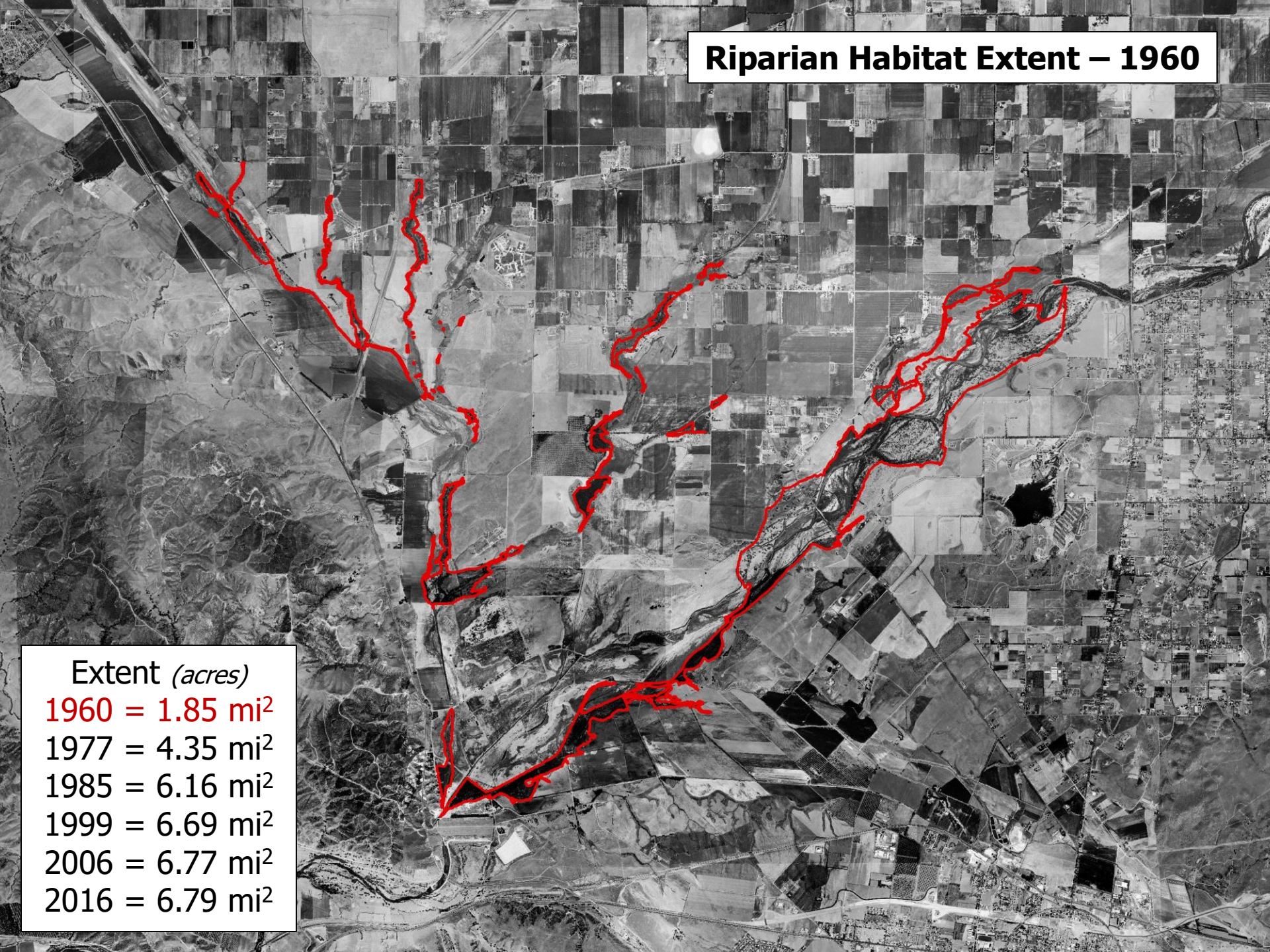
Table of Contents

Potential Stressors

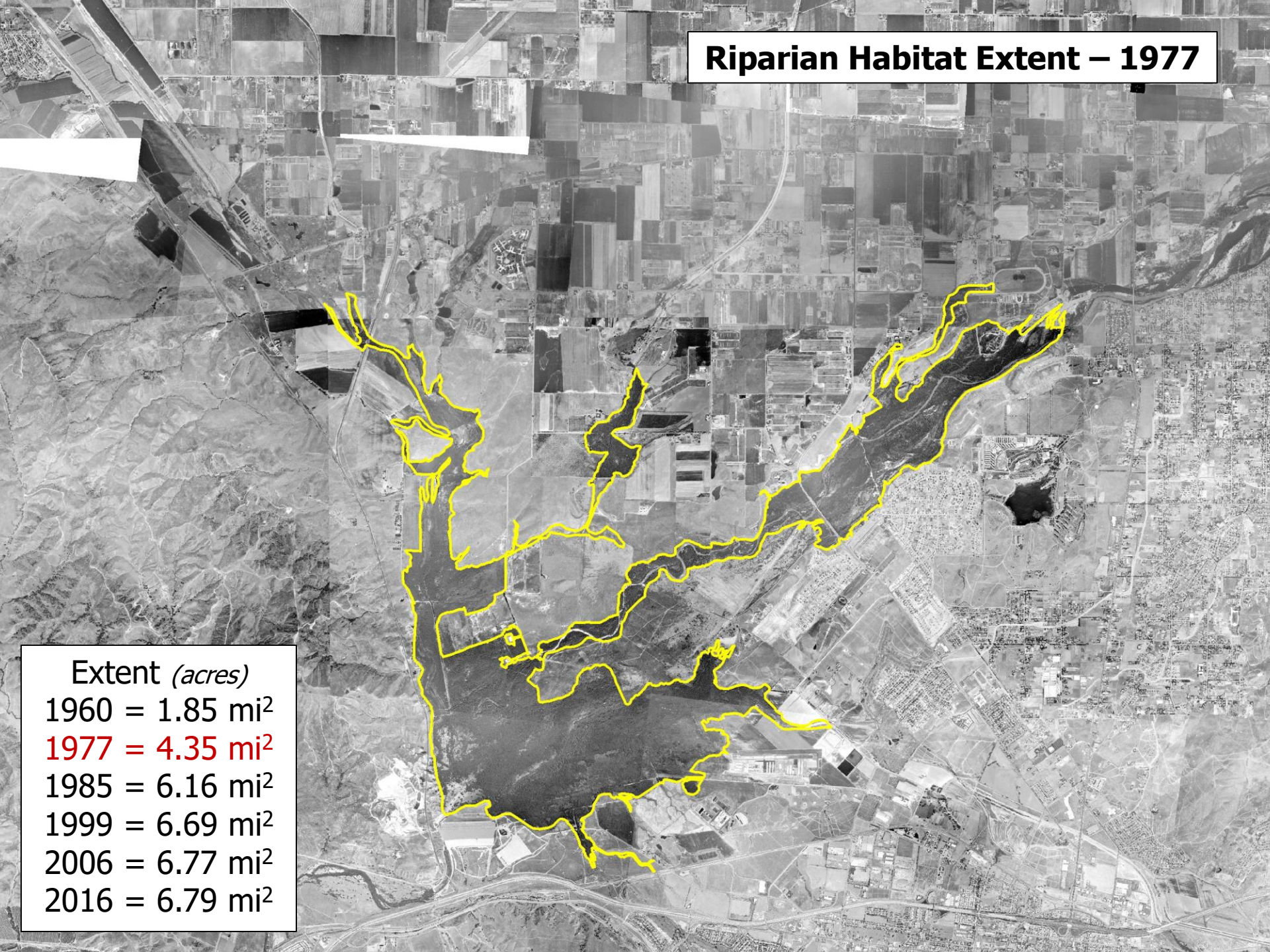
Riparian Habitat Monitoring Program

- Characterize the extent and quality of the riparian habitat over time

- Two Types of Assessment:
  - Regional Assessment
    - Interpretations of air photos
    - Remote sensing data (NDVI derived from Landsat imagery)
  - Site Specific Assessment → "Ground-truth" the regional assessment
    - Vegetation Surveys (USBR and OCWD)


Riparian Habitat Extent – 1960
Extent (acres)
1960 = 1.85 mi²
1977 = 4.35 mi²
1985 = 6.16 mi²
1999 = 6.69 mi²
2006 = 6.77 mi²
2016 = 6.79 mi²

Riparian Habitat Extent – 1977



Extent *(acres)*

1960 = 1.85 mi^2

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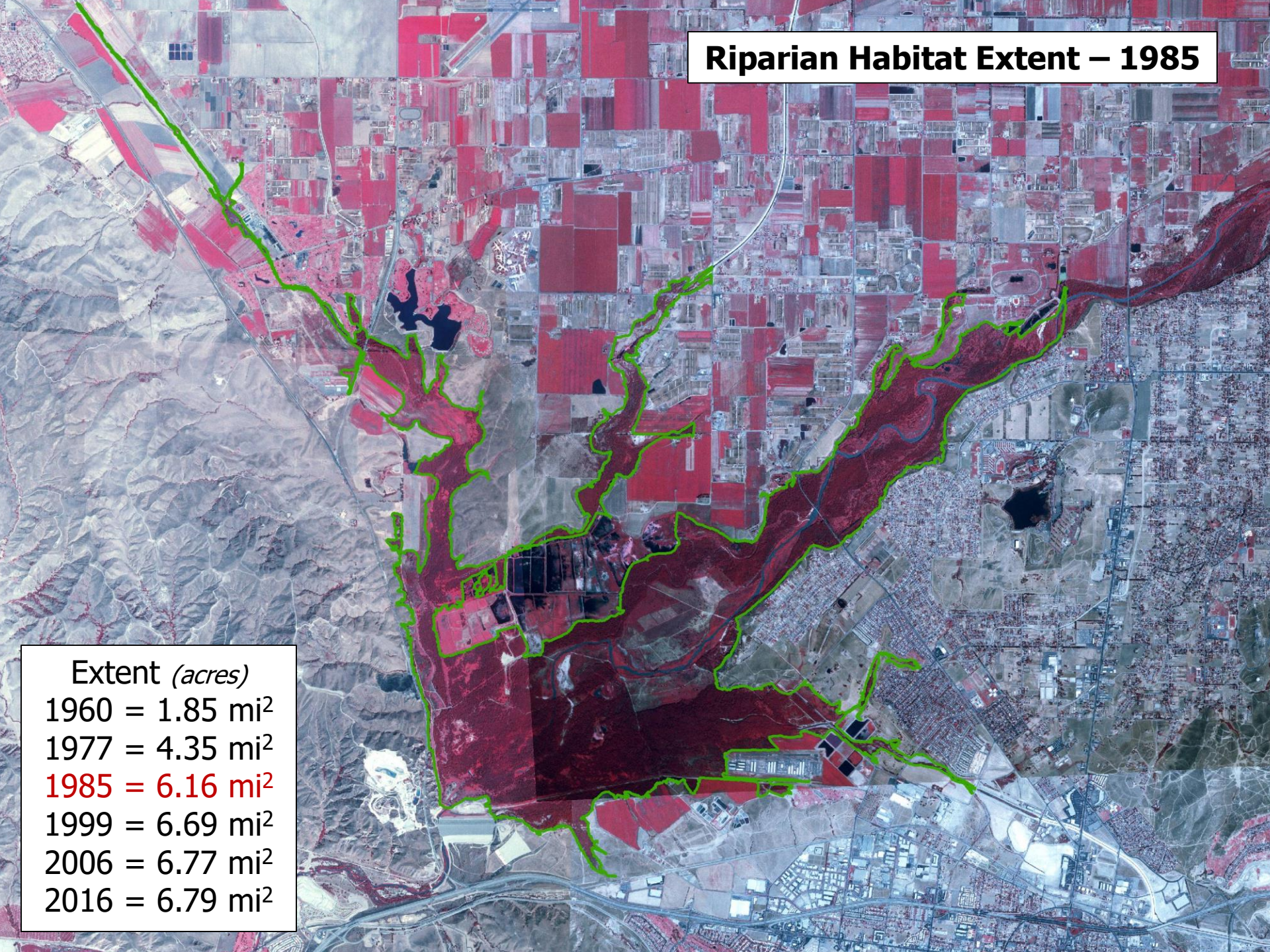
2006 = 6.77 mi^2

2016 = 6.79 mi^2

Riparian Habitat Extent – 1985



Extent *(acres)*

1960 = 1.85 mi^2

1977 = 4.35 mi^2

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1999 = 6.69 mi^2

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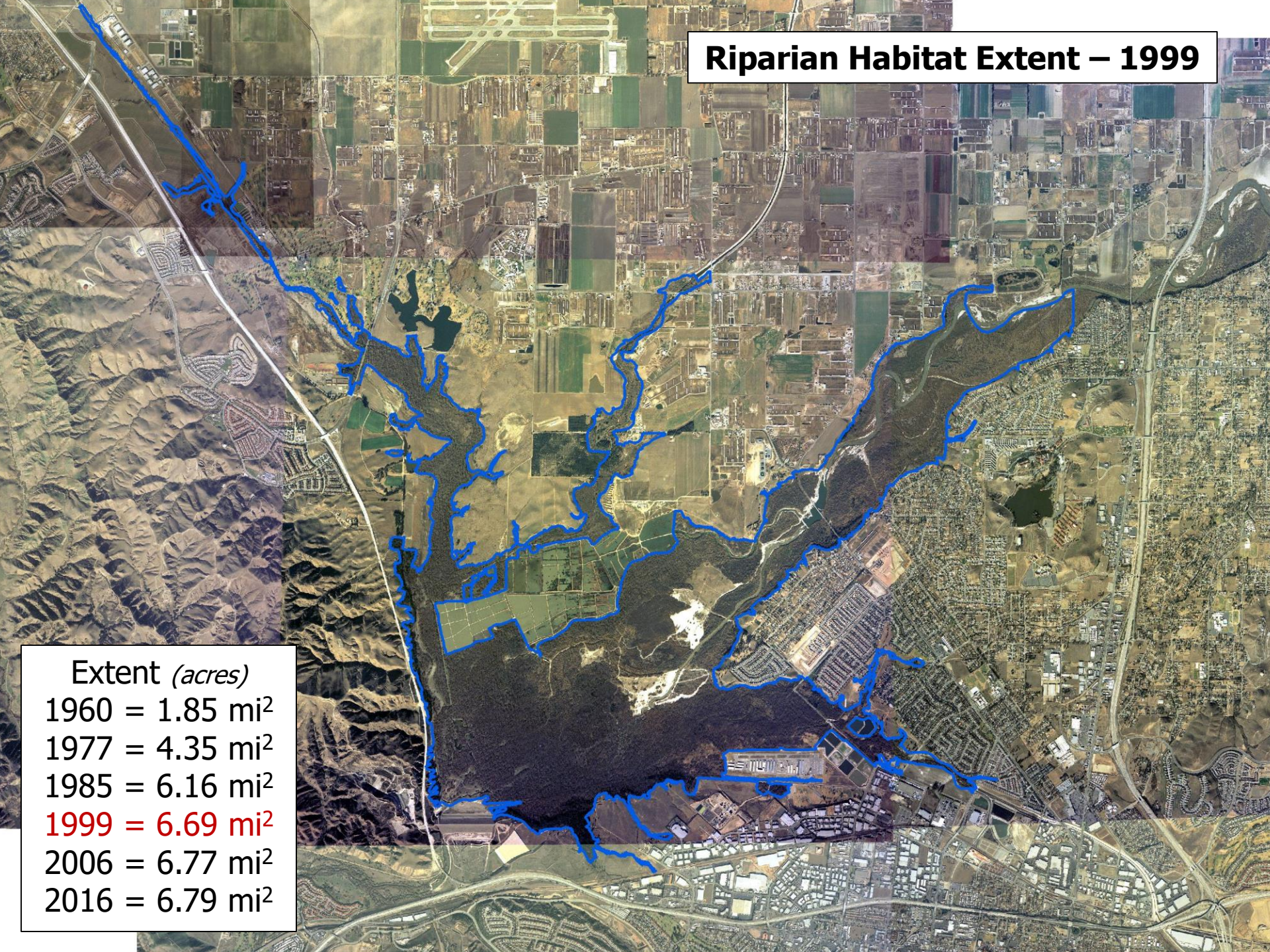
Riparian Habitat Extent – 1999



Extent *(acres)*

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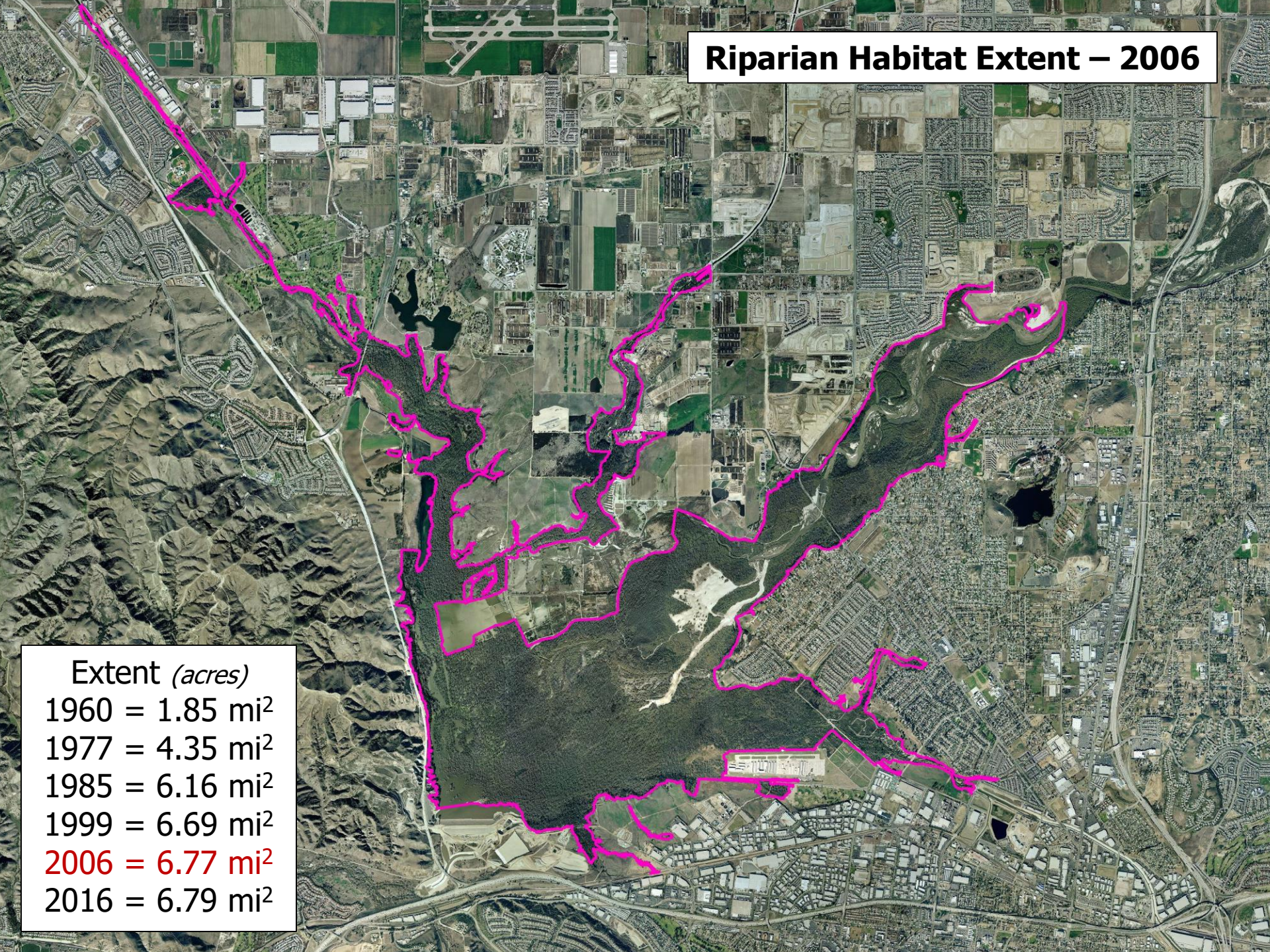
2006 = 6.77 mi^2

2016 = 6.79 mi^2

Riparian Habitat Extent – 2006



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1960 = 1.85 mi^2

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1985 = 6.16 mi^2

1999 = 6.69 mi^2

2006 = 6.77 mi^2

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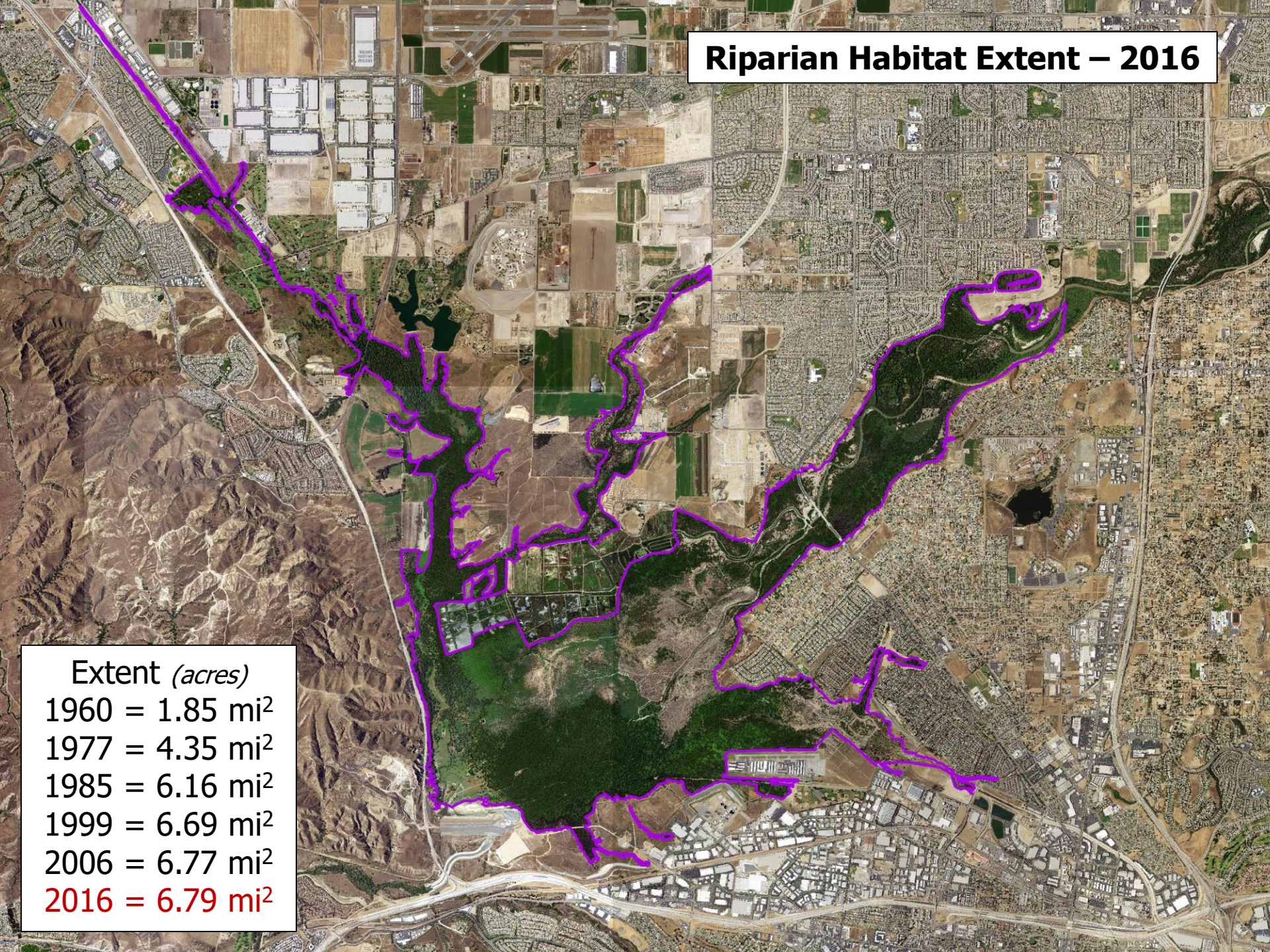
Riparian Habitat Extent – 2016



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

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)

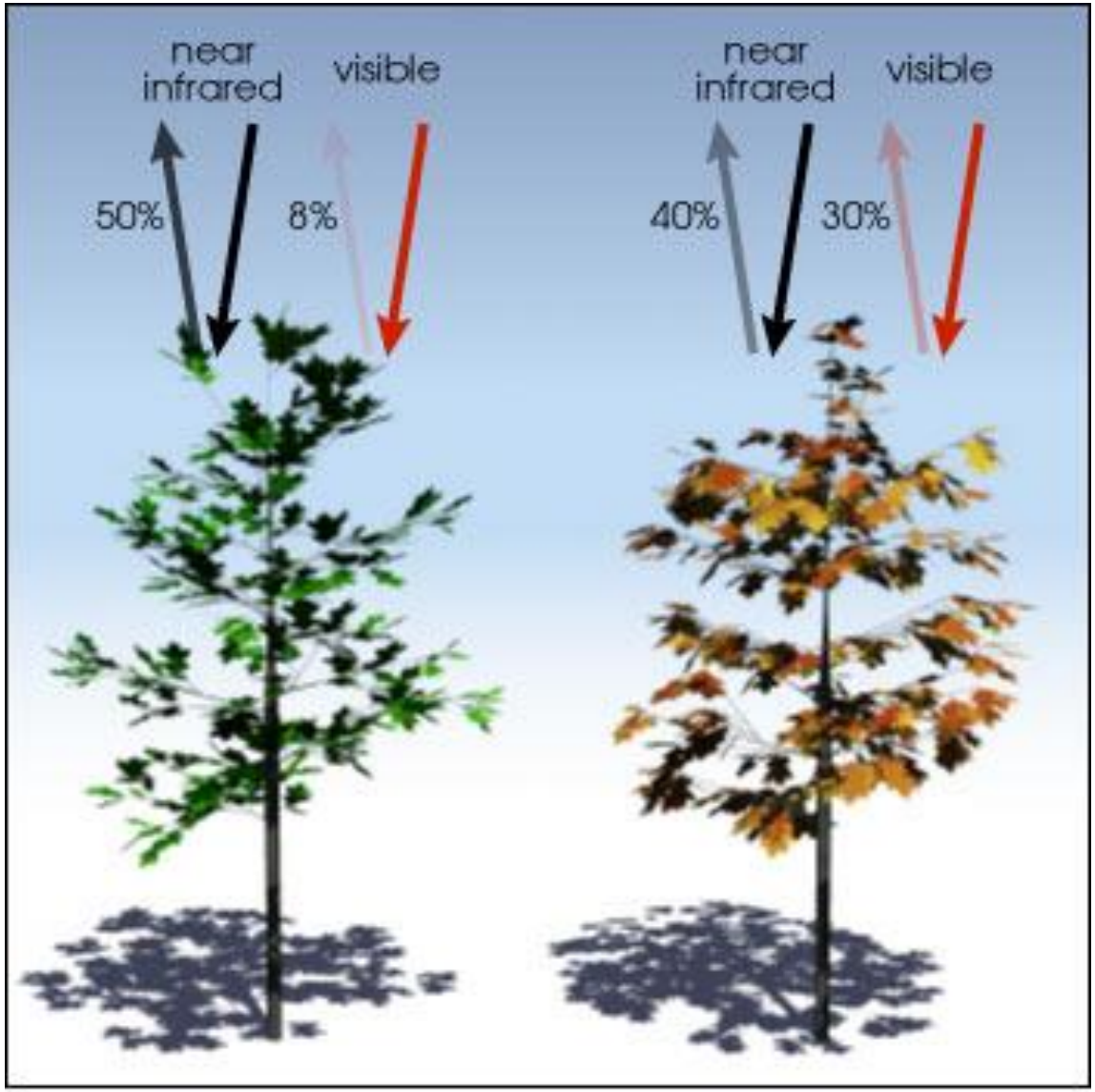
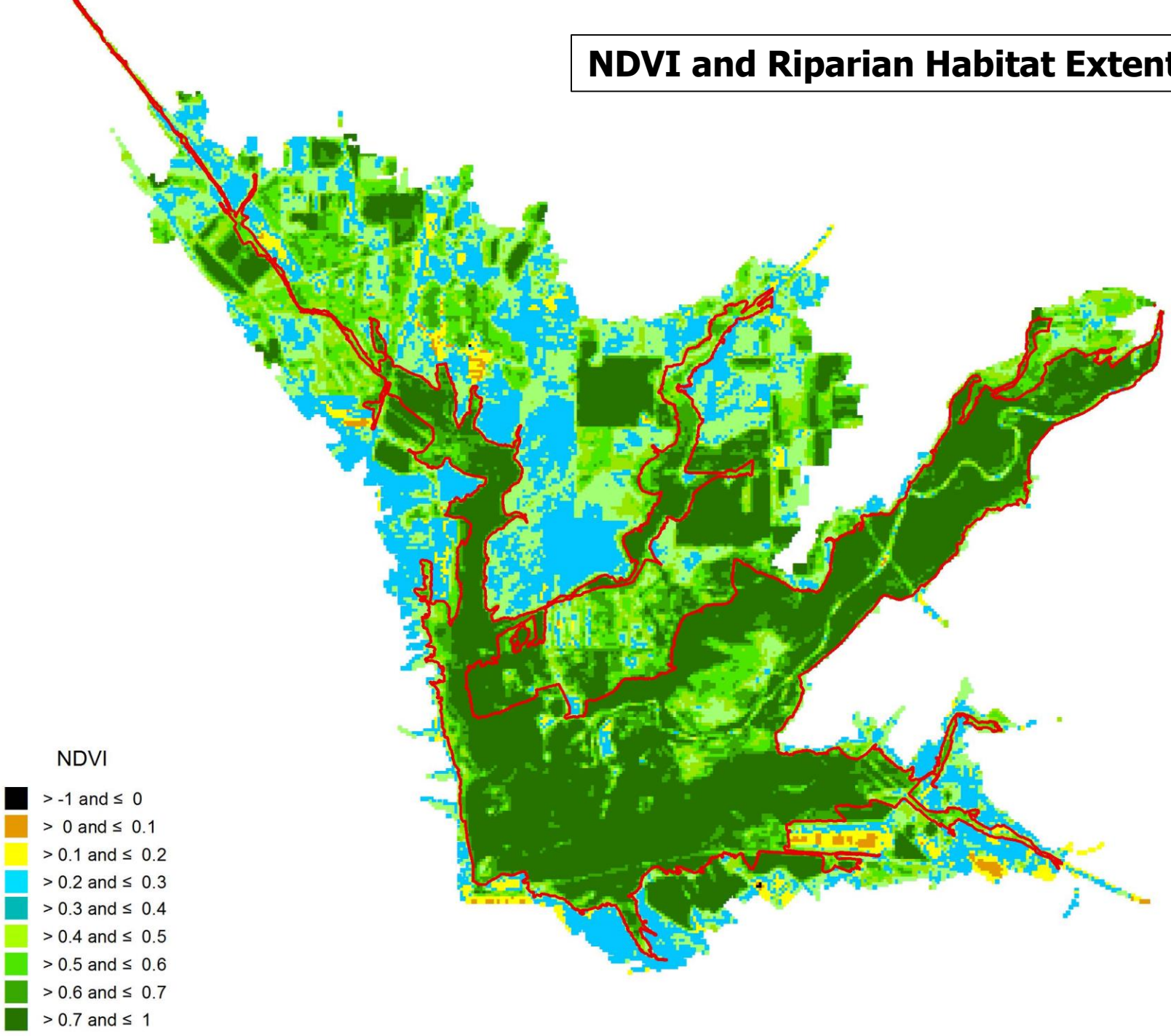
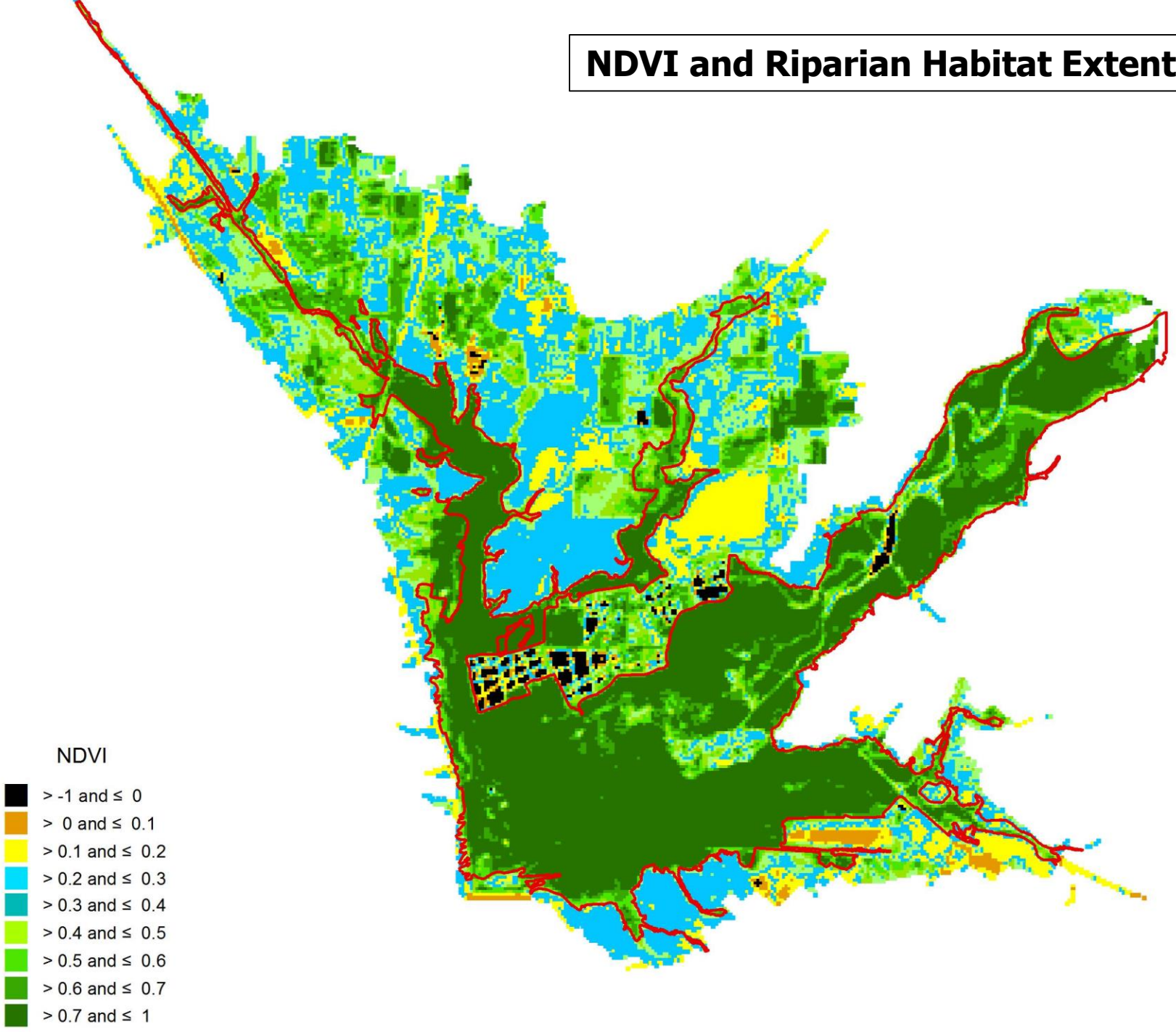


Image source: http://earthobservatory.nasa.gov/Features/MeasuringVegetation/measuring_vegetation_2.php

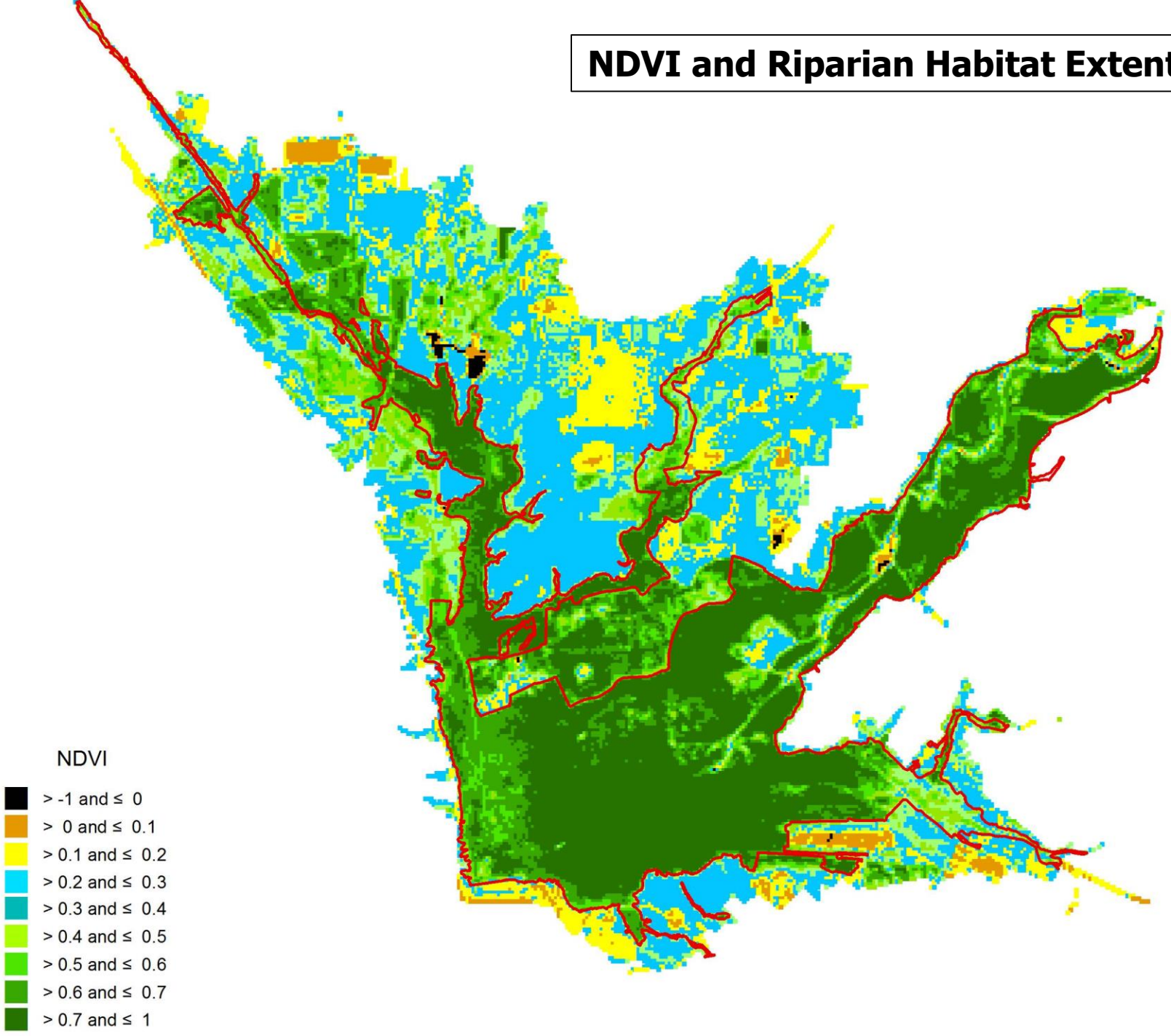
NDVI and Riparian Habitat Extent – 1985



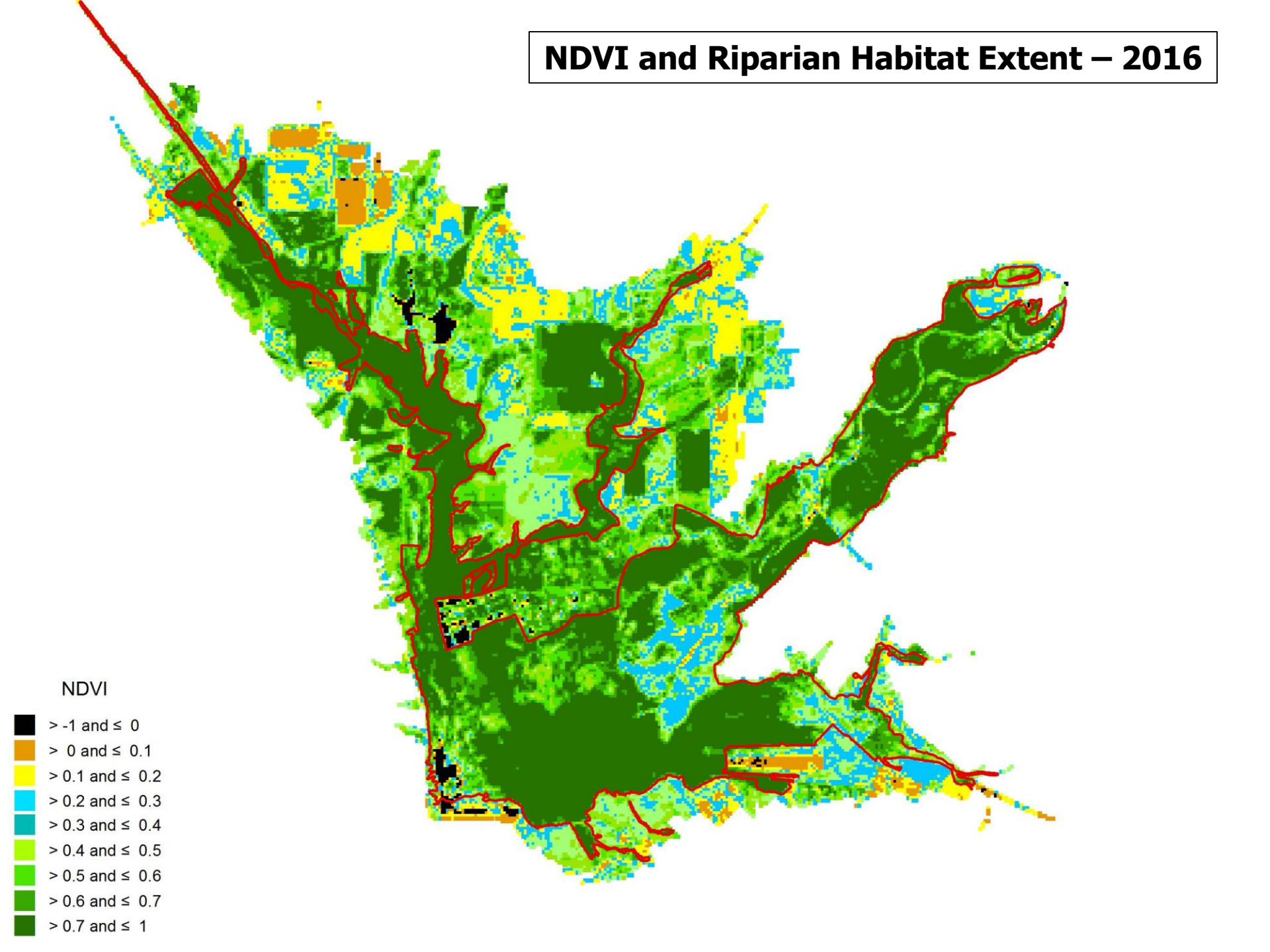
NDVI and Riparian Habitat Extent – 1999



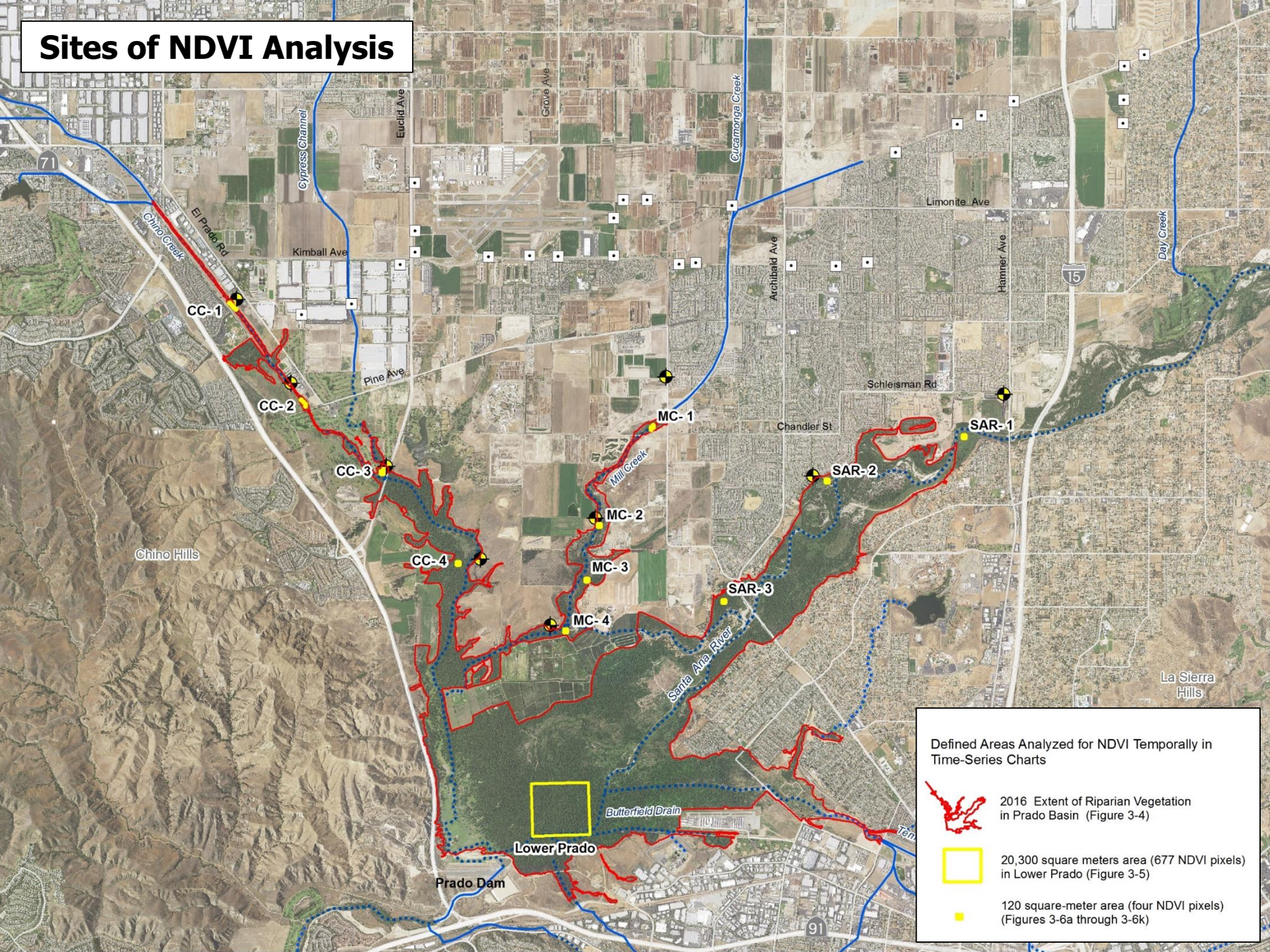
NDVI and Riparian Habitat Extent – 2006



NDVI and Riparian Habitat Extent – 2016



Sites of NDVI Analysis



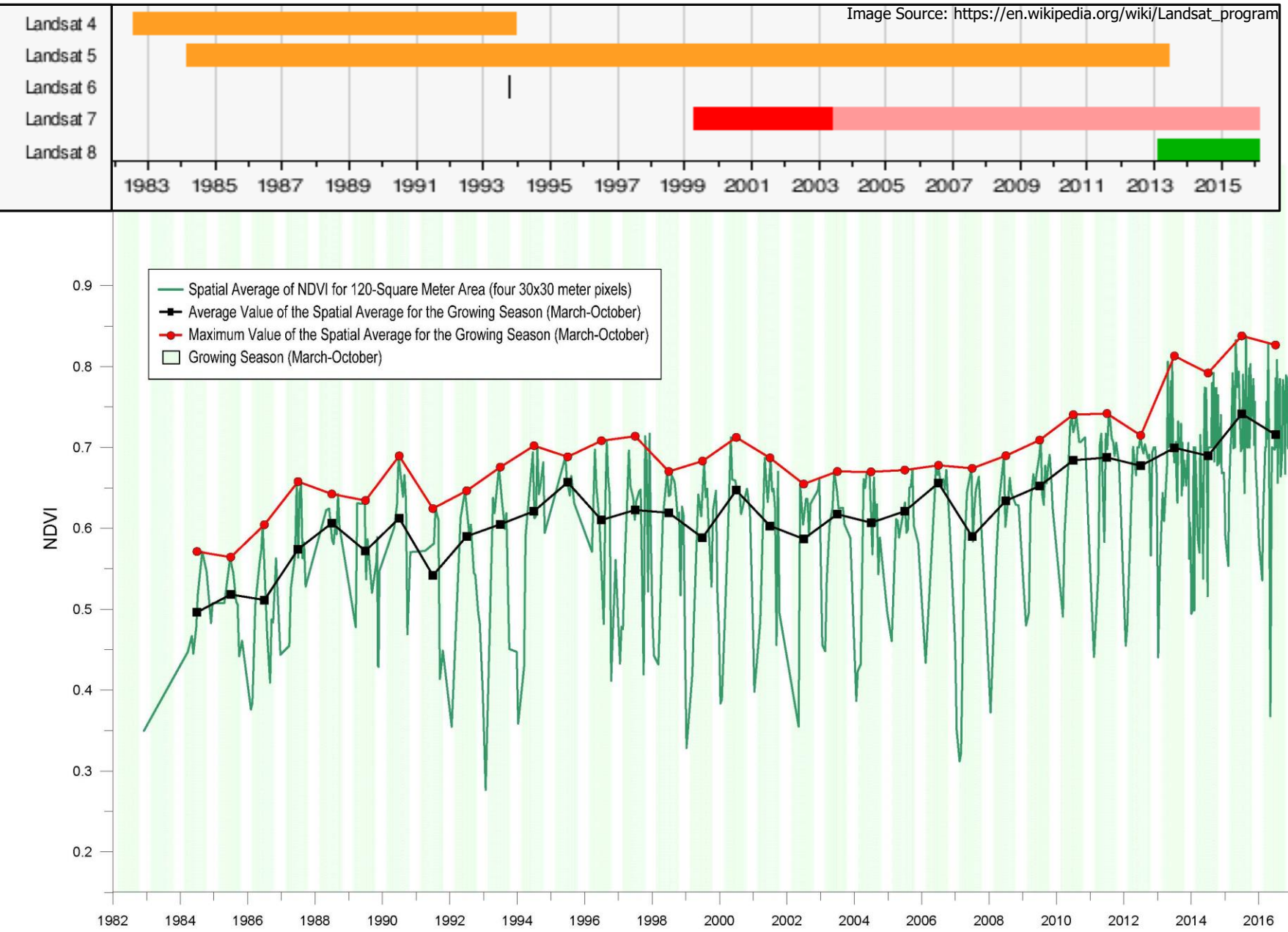
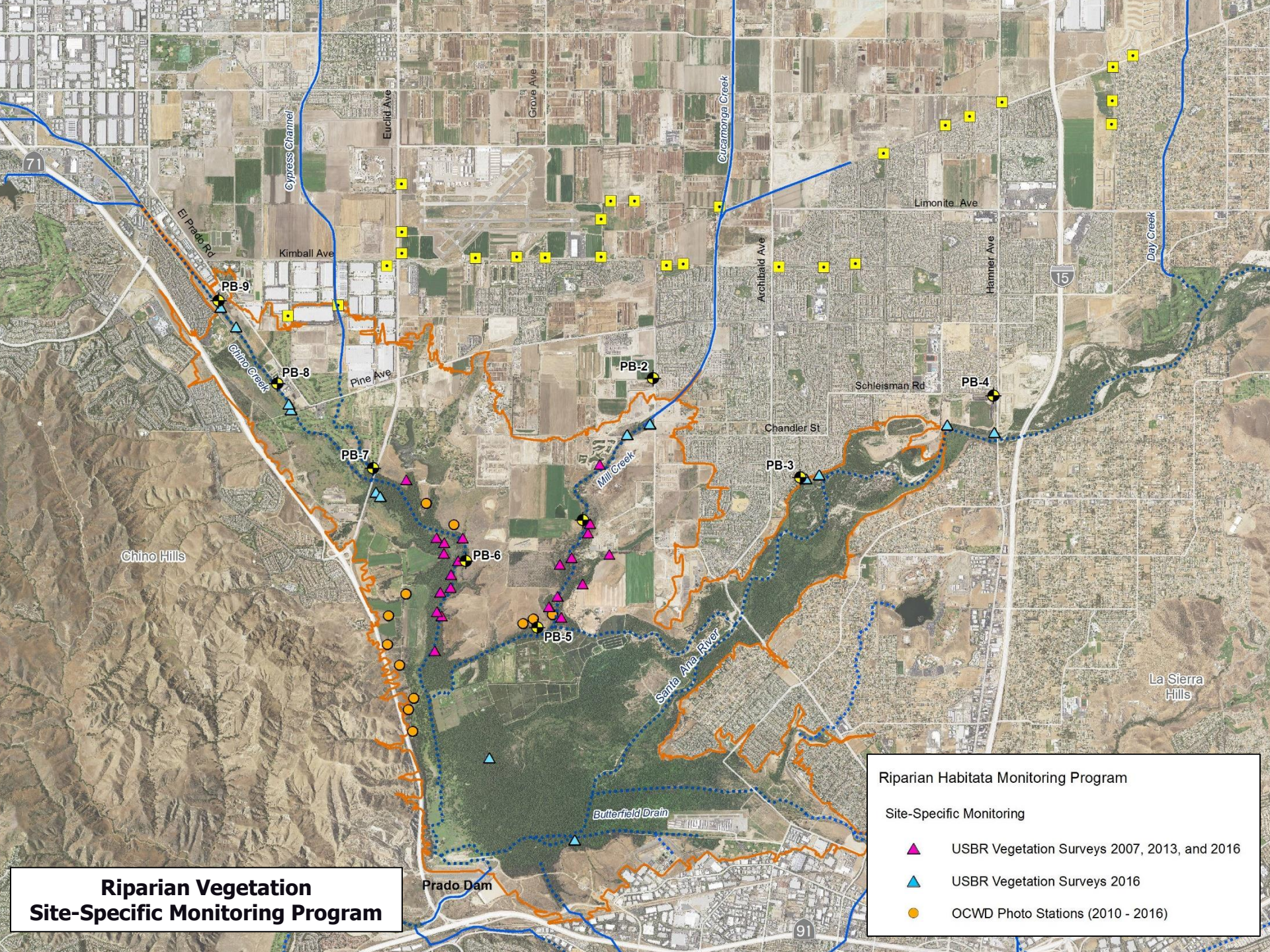
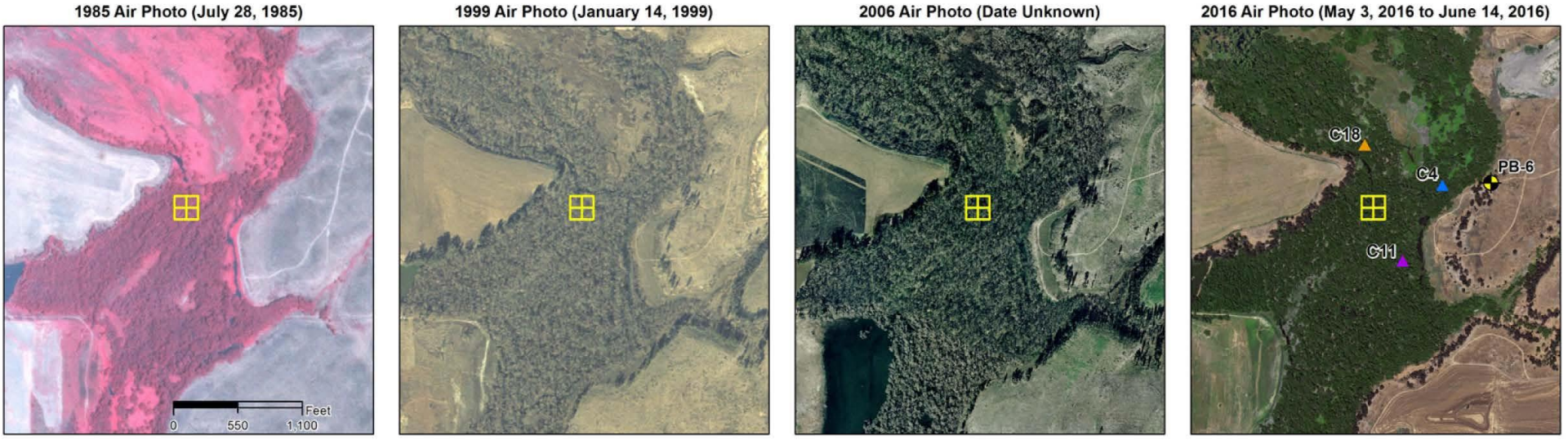
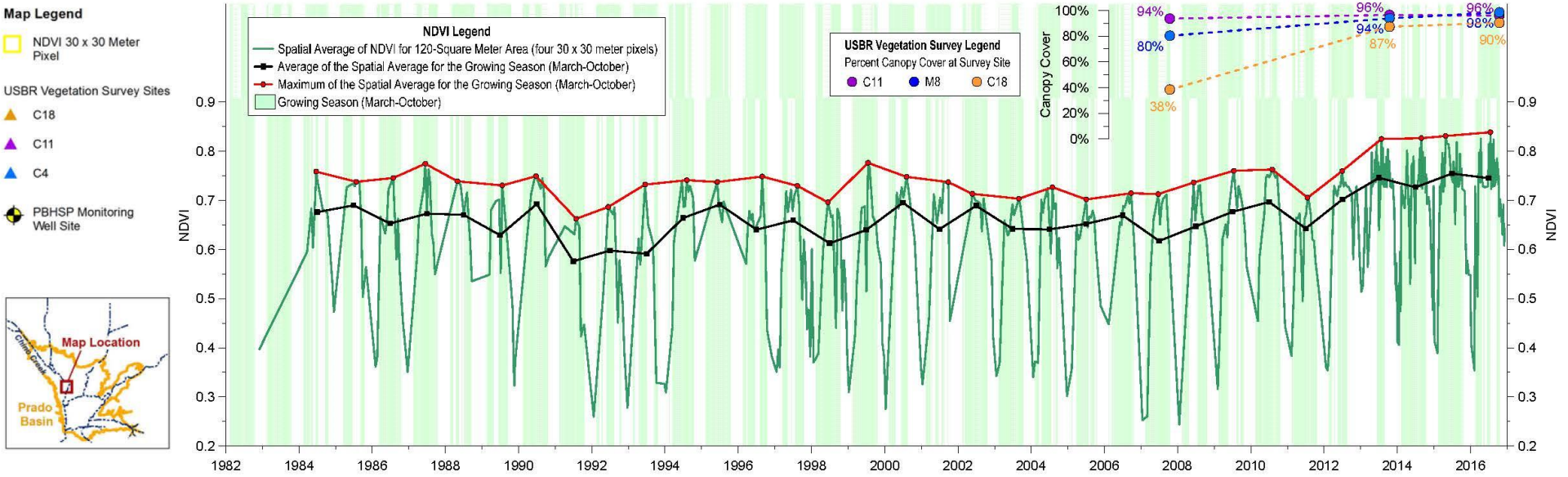


Image Source: https://en.wikipedia.org/wiki/Landsat_program
Landsat 4
Landsat 5
Landsat 6
Landsat 7
Landsat 8
1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015
Spatial Average of NDVI for 120-Square Meter Area (four 30x30 meter pixels)
Average Value of the Spatial Average for the Growing Season (March-October)
Maximum Value of the Spatial Average for the Growing Season (March-October)
Growing Season (March-October)
NDVI
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016


Riparian Vegetation
Site-Specific Monitoring Program
Riparian Habitata Monitoring Program
Site-Specific Monitoring
USBR Vegetation Surveys 2007, 2013, and 2016
USBR Vegetation Surveys 2016
OCWD Photo Stations (2010 - 2016)
PB-9
PB-8
PB-7
PB-6
PB-5
PB-2
PB-4
PB-3
Chino Hills
La Sierra Hills
Prado Dam
Santa Ana River
Mill Creek
Chino Creek
Cucamonga Creek
Cypress Channel
Day Creek
Butterfield Drain
Euclid Ave
Grove Ave
Archibald Ave
Hamner Ave
El Prado Rd
Kimball Ave
Pine Ave
Limonite Ave
Schleisman Rd
Chandler St
71
15
91

NDVI Analysis – Chino Creek 4





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

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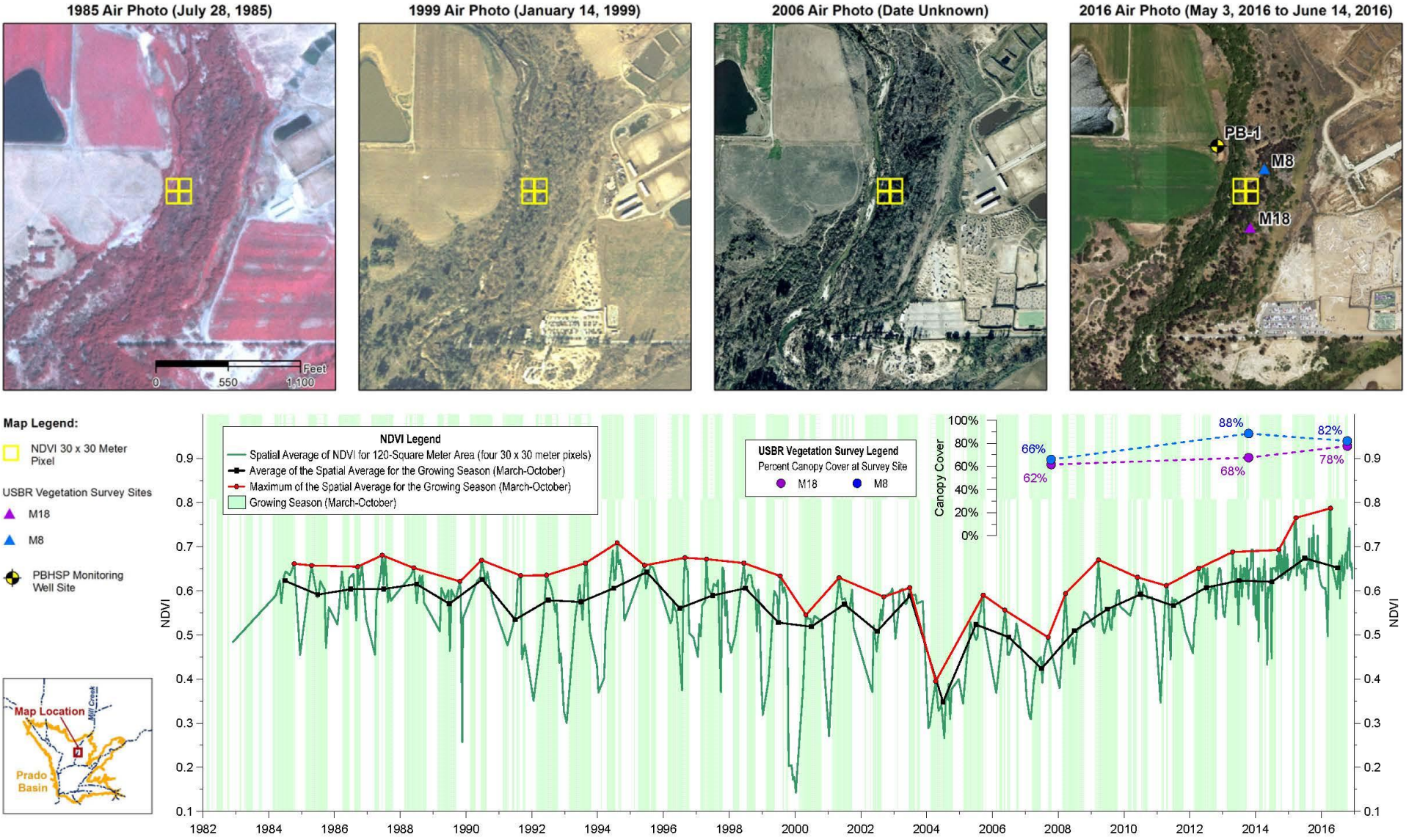
Time Series of NDVI and Air Photos
CC-4 Area for 1984 to 2016

Figure 3-6d

NDVI Analysis – Mill Creek 2



Prepared by:
WEI
Wildermuth Environmental, Inc.

Author: VMWRT
Date: 20170314
Filename: ndvi_time series_Mill Creek 2.grf

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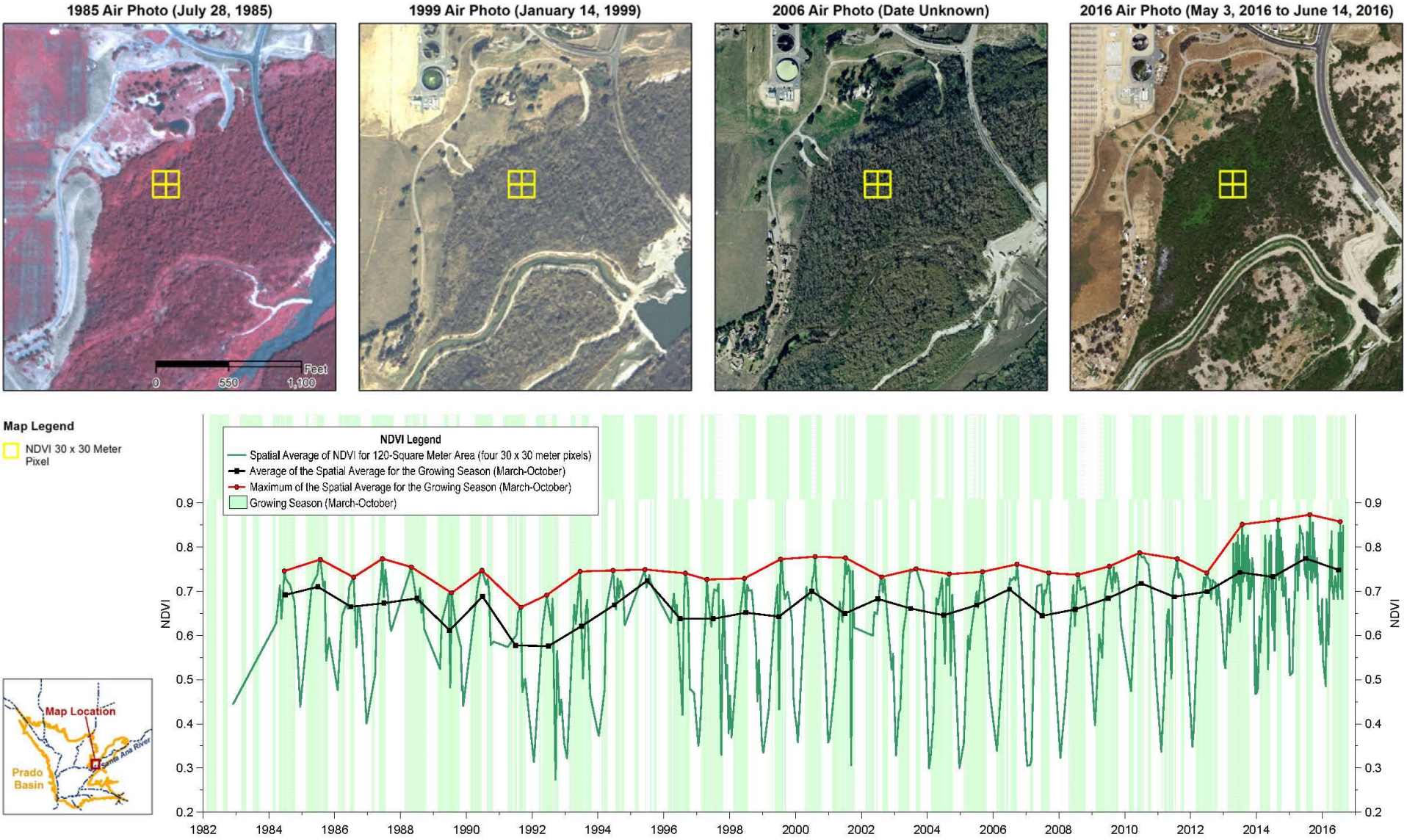
Time Series of NDVI and Air Photos
MC-2 Area for 1984 to 2016

Figure 3-6f

NDVI Analysis – SAR 3



Prepared by:
WEI
Wildermuth Environmental, Inc.

Author: VMW/RT
Date: 20170414
Filename: ndvi_time series_SAR 3.grf

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Time Series of NDVI and Air Photos
SAR-3 Area for 1984 to 2016

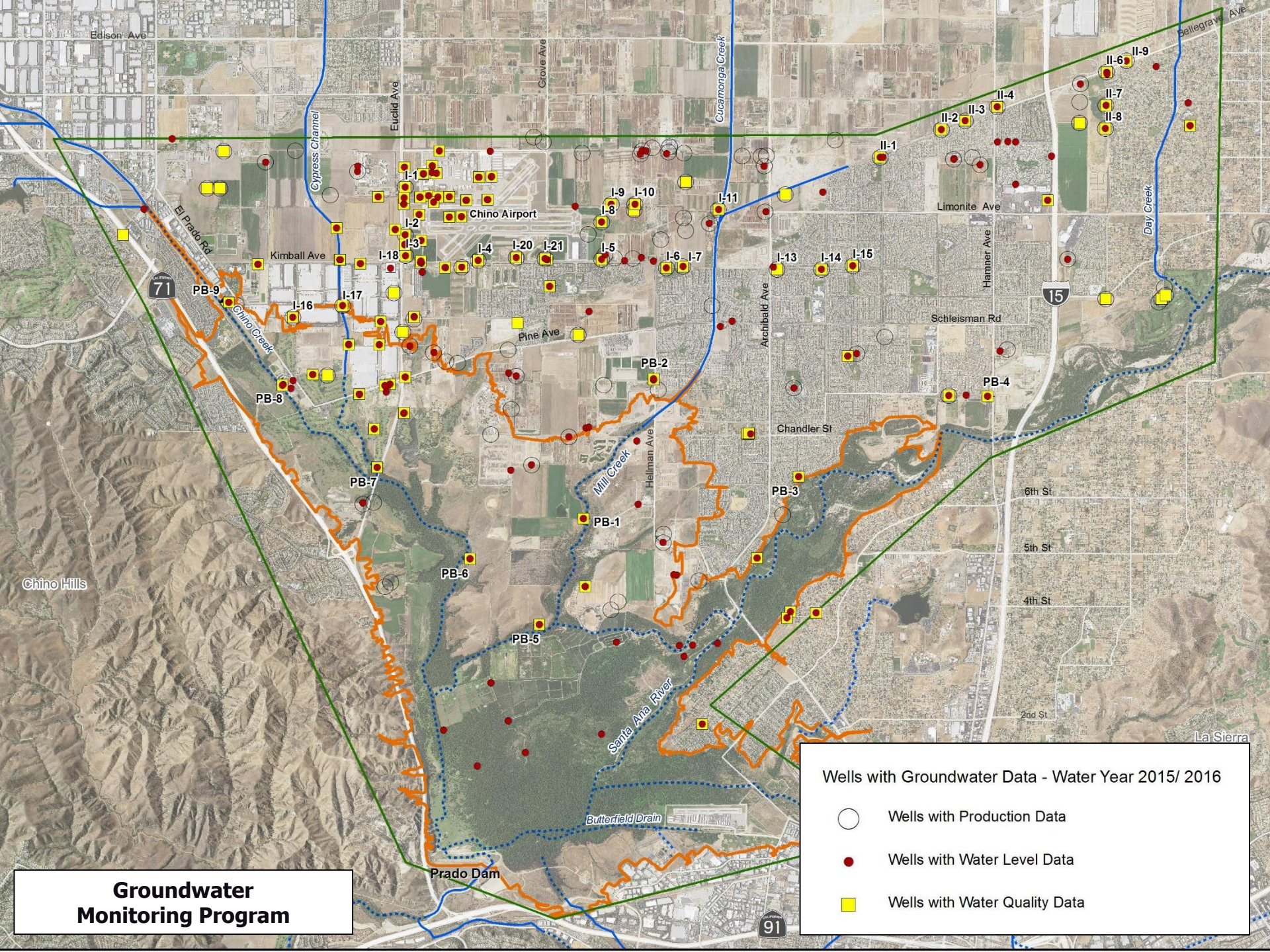
Figure 3-6k

Conclusions and Recommendations

Riparian Habitat Monitoring Program

- No trend in degradation contemporaneous with Peace II implementation

- Recommendations:
  - Continue monitoring program
    - 2017 air photo and NDVI
  - Perform research
    - Potential bias in Landsat 8 data → bias correction method
    - Other field methods to “ground truth” NDVI


Edison Ave
Cypress Channel
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Kimball Ave
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Limonite Ave
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Chandler St
Hellman Ave
Mill Creek
Chino Creek
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5th St
4th St
2nd St
La Sierra
Chino Hills
Santa Ana River
Butterfield Drain
Prado Dam
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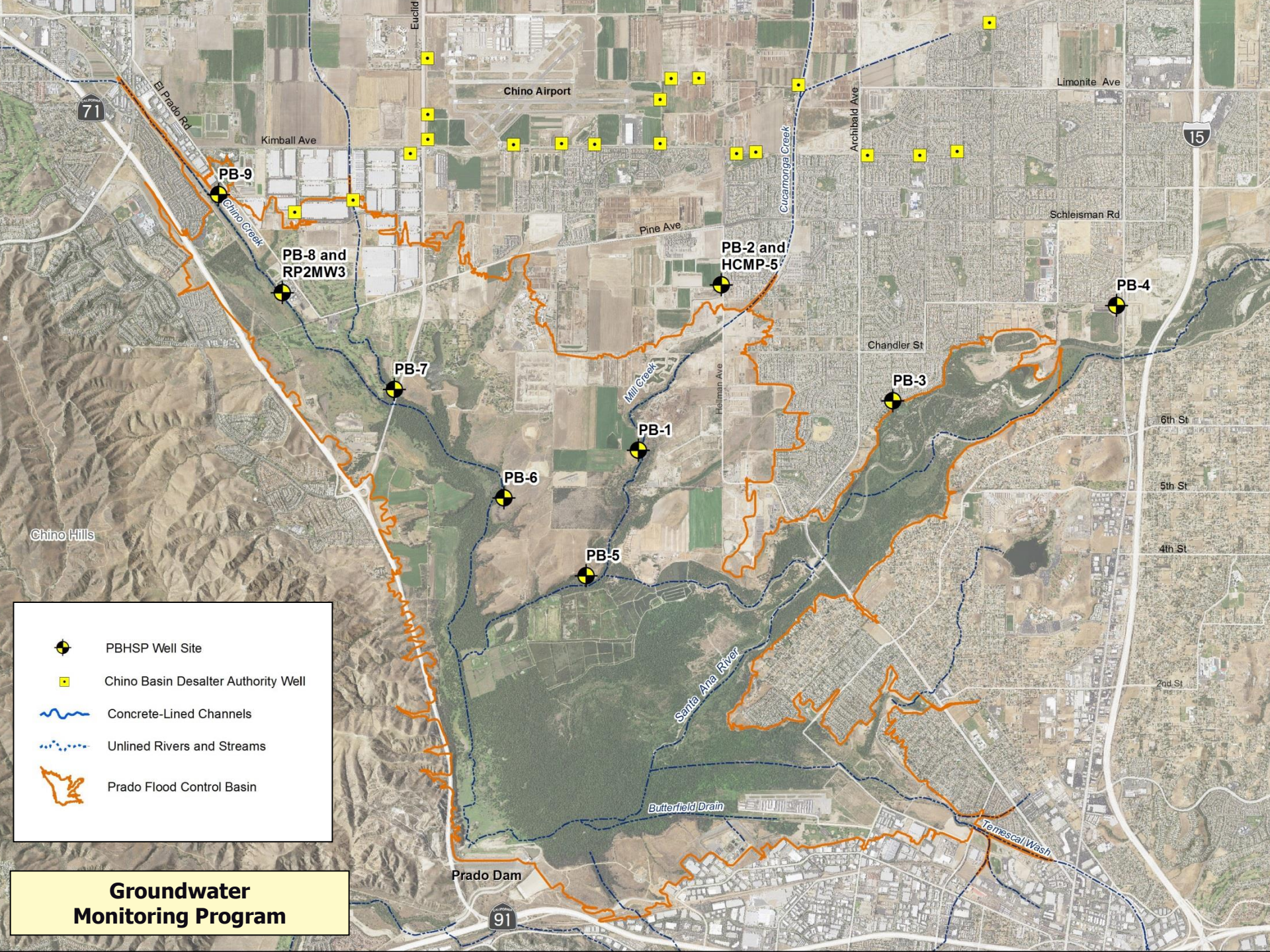
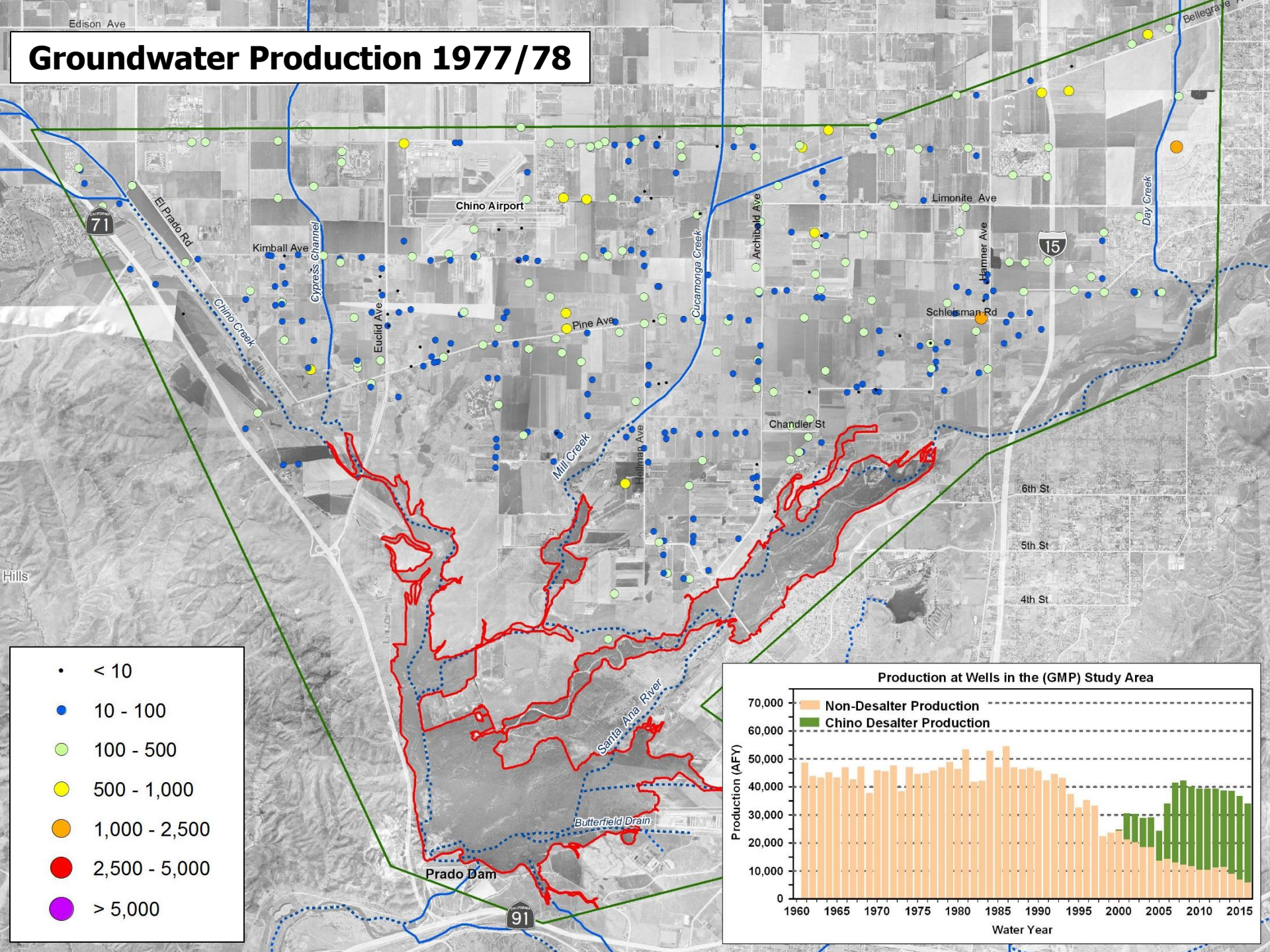
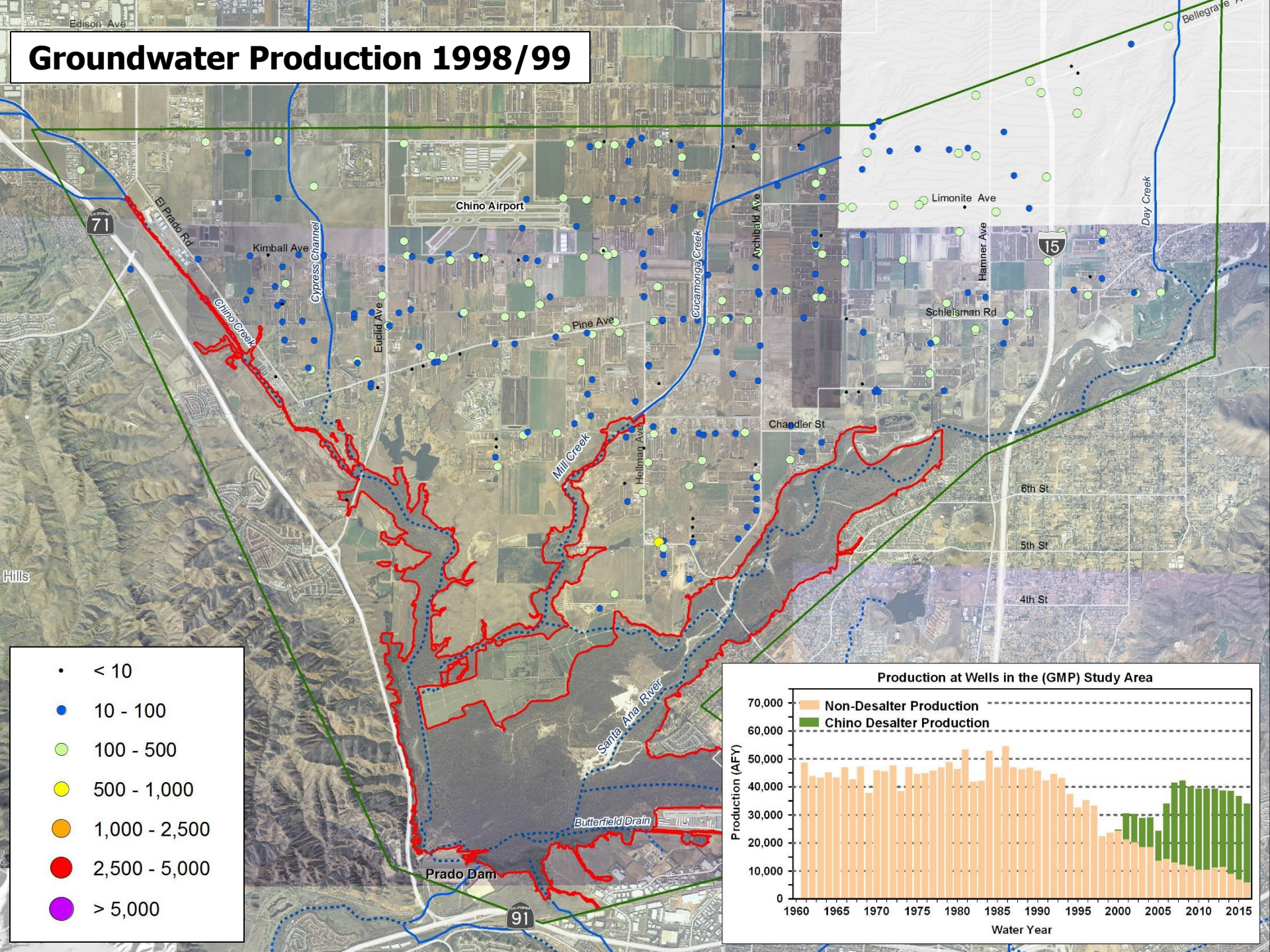
II-7
II-8
II-9
PB-1
PB-2
PB-3
PB-4
PB-5
PB-6
PB-7
PB-8
PB-9
Groundwater Monitoring Program
Wells with Groundwater Data - Water Year 2015/ 2016
Wells with Production Data
Wells with Water Level Data
Wells with Water Quality Data


PB-9
PB-8 and RP2MW3
PB-7
PB-6
PB-5
PB-1
PB-2 and HCMP-5
PB-3
PB-4
Chino Airport
Kimball Ave
El Prado Rd
Chino Creek
Pine Ave
Euclid
Cucamonga Creek
Archibald Ave
Limonite Ave
Schleisman Rd
Chandler St
Hellman Ave
Mill Creek
6th St
5th St
4th St
2nd St
Chino Hills
Santa Ana River
Butterfield Drain
Temescal Wash
Prado Dam
71
15
91
PBHSP Well Site
Chino Basin Desalter Authority Well
Concrete-Lined Channels
Unlined Rivers and Streams
Prado Flood Control Basin
Groundwater Monitoring Program

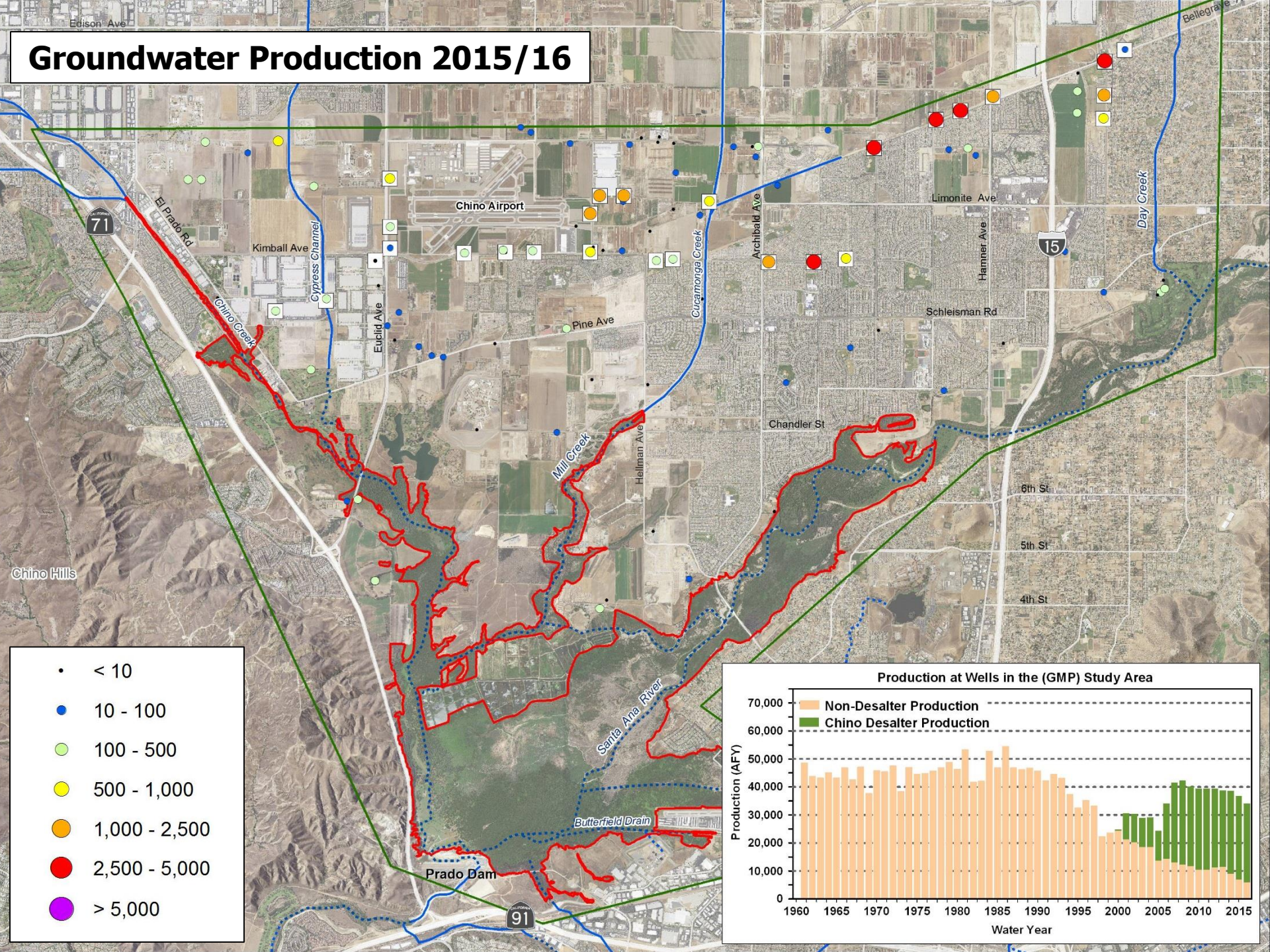
Groundwater Production 1977/78



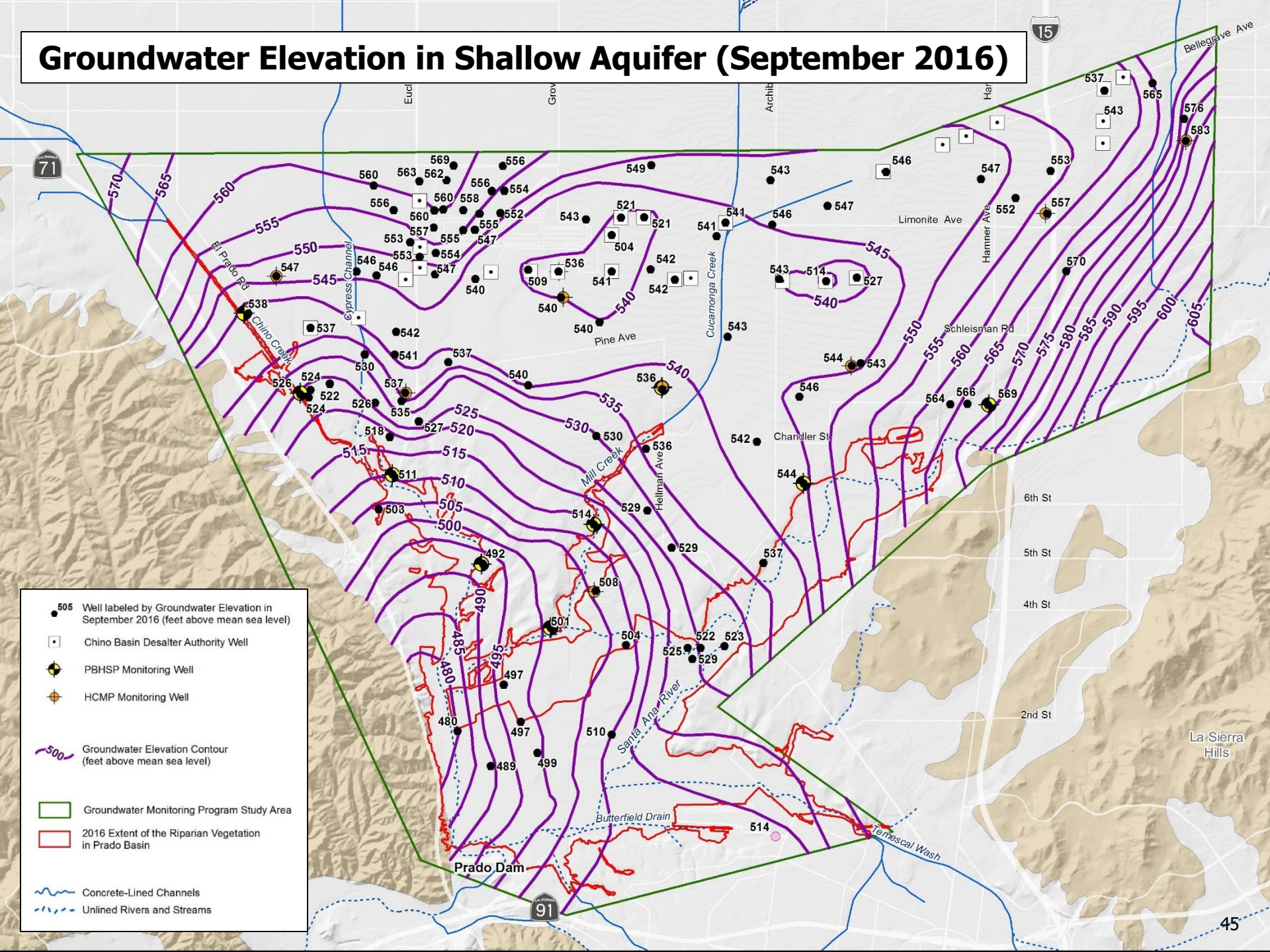
Groundwater Production 1998/99



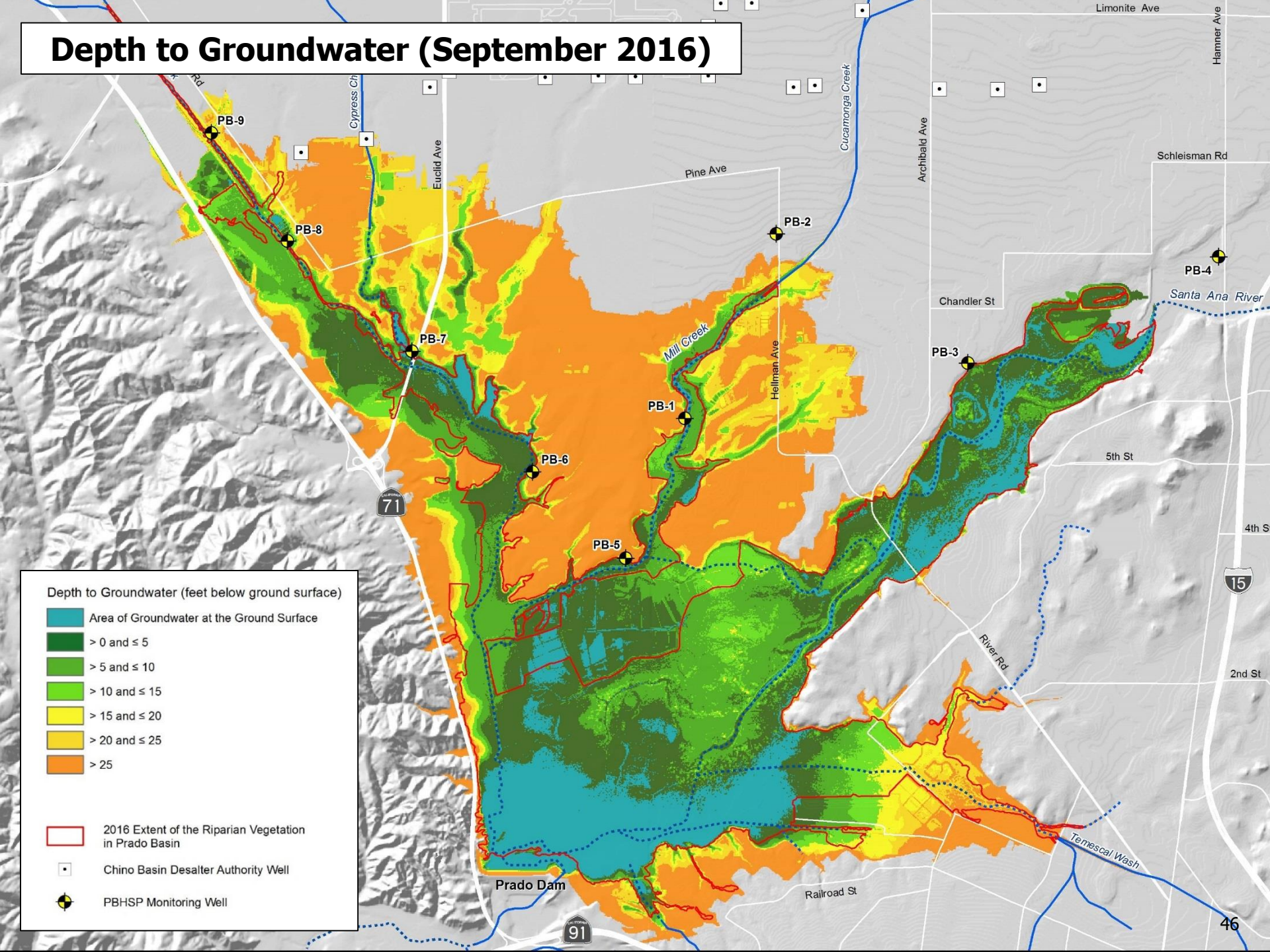
Groundwater Production 2015/16



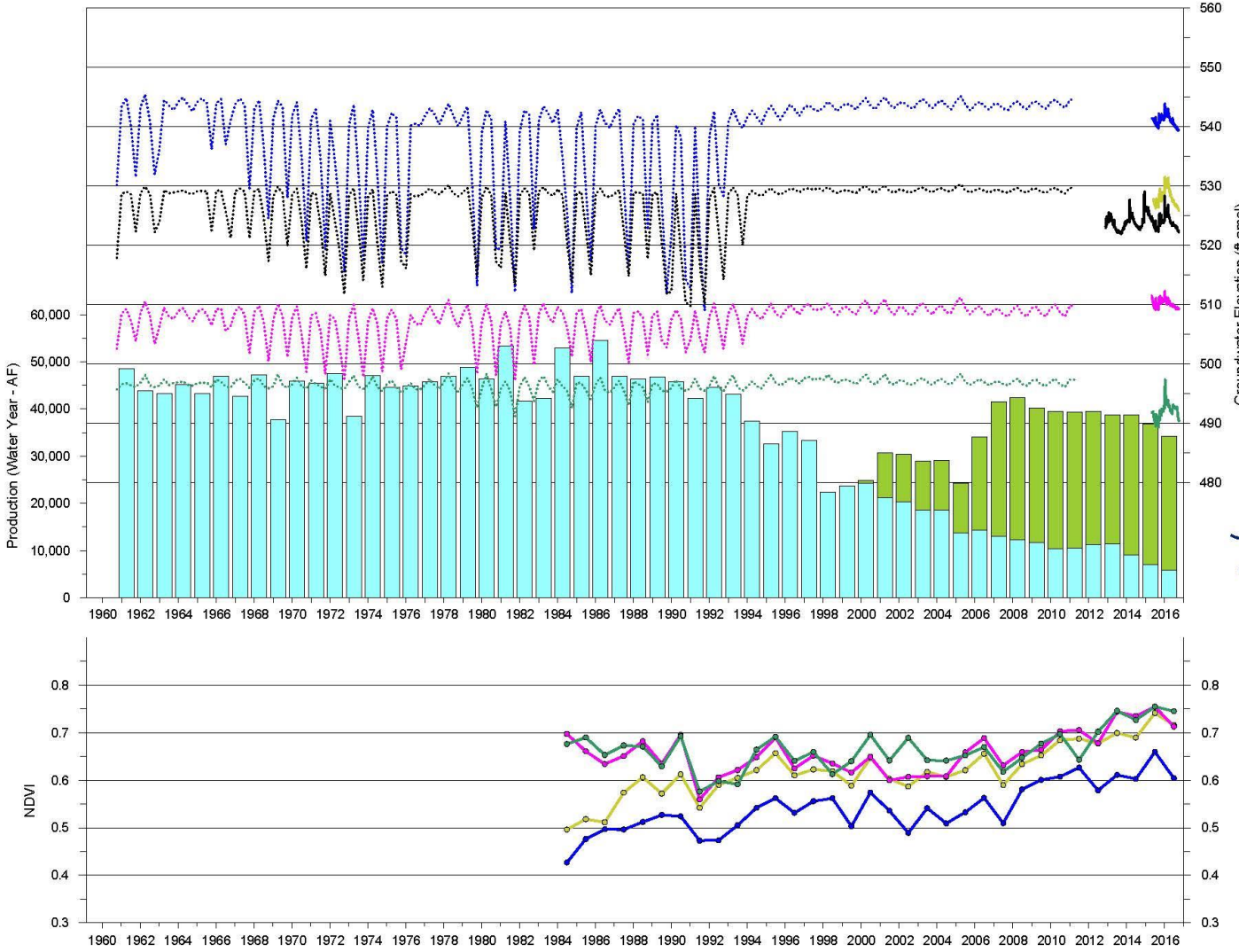
Groundwater Elevation in Shallow Aquifer (September 2016)

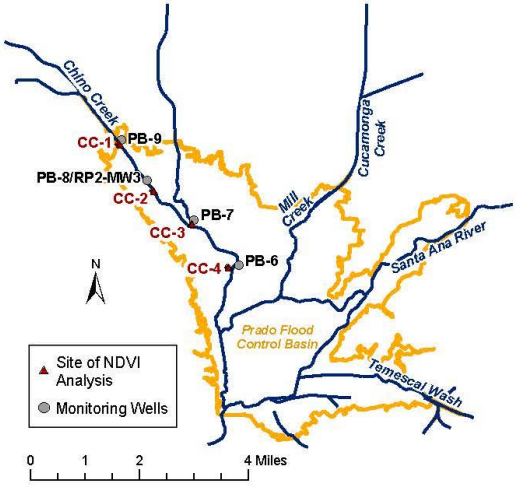


Depth to Groundwater (September 2016)



Groundwater Production/Levels vs. NDVI - Chino Creek





Prepared by:

WEI Wildermuth Environmental, Inc.

Author: RT
Date: 20170404
Filename: Prod_GWLs_ChinoCreek.grf

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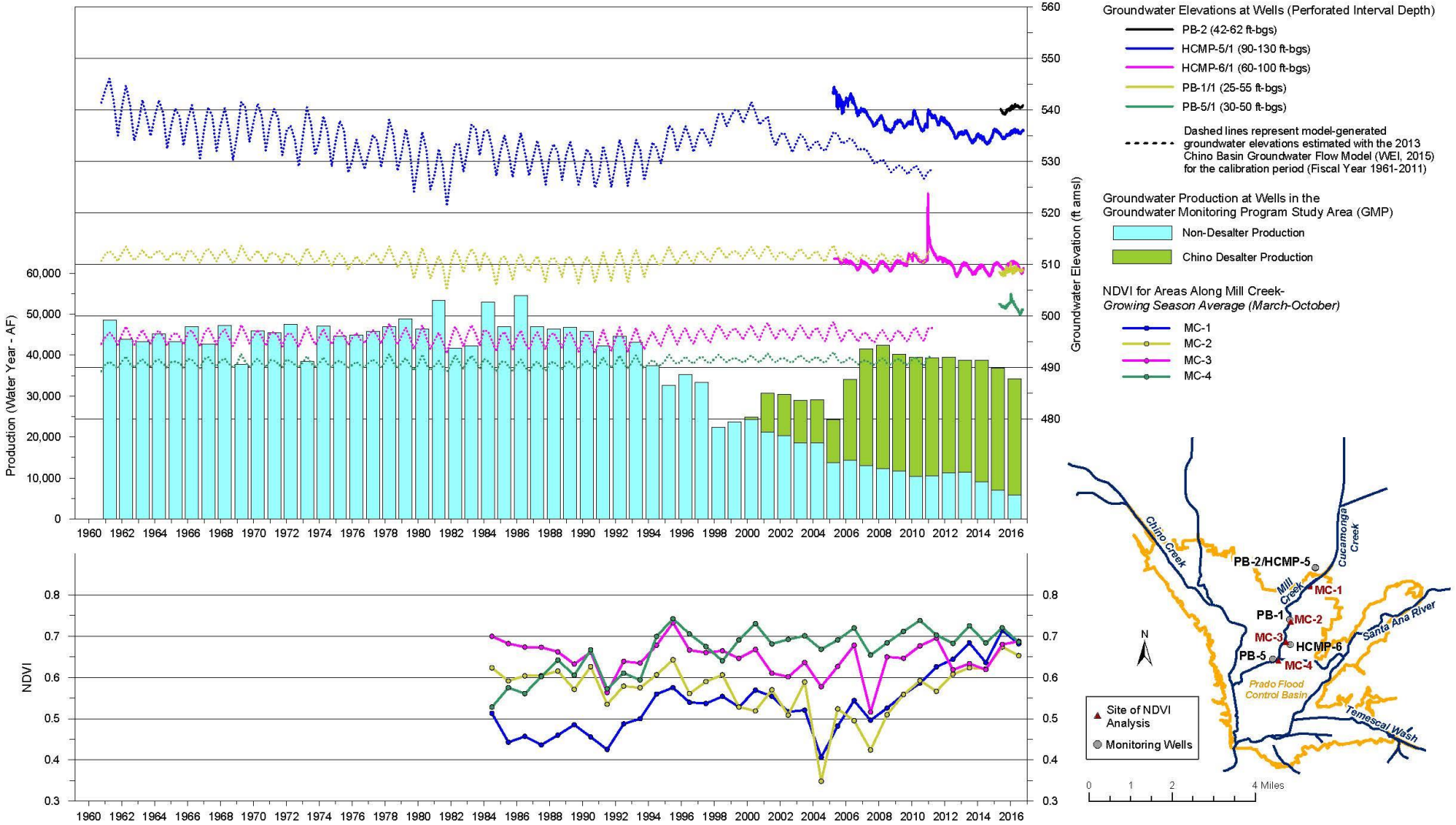
Groundwater Production and Groundwater Levels versus NDVI
Chino Creek Area for 1960-2016

Figure 3-9a

Groundwater Production/Levels vs. NDVI – Mill Creek



Prepared by:

WEI Wildermuth Environmental, Inc.

Author: RT
Date: 20170329
Filename: Flows_WLs_MillCreek.grf

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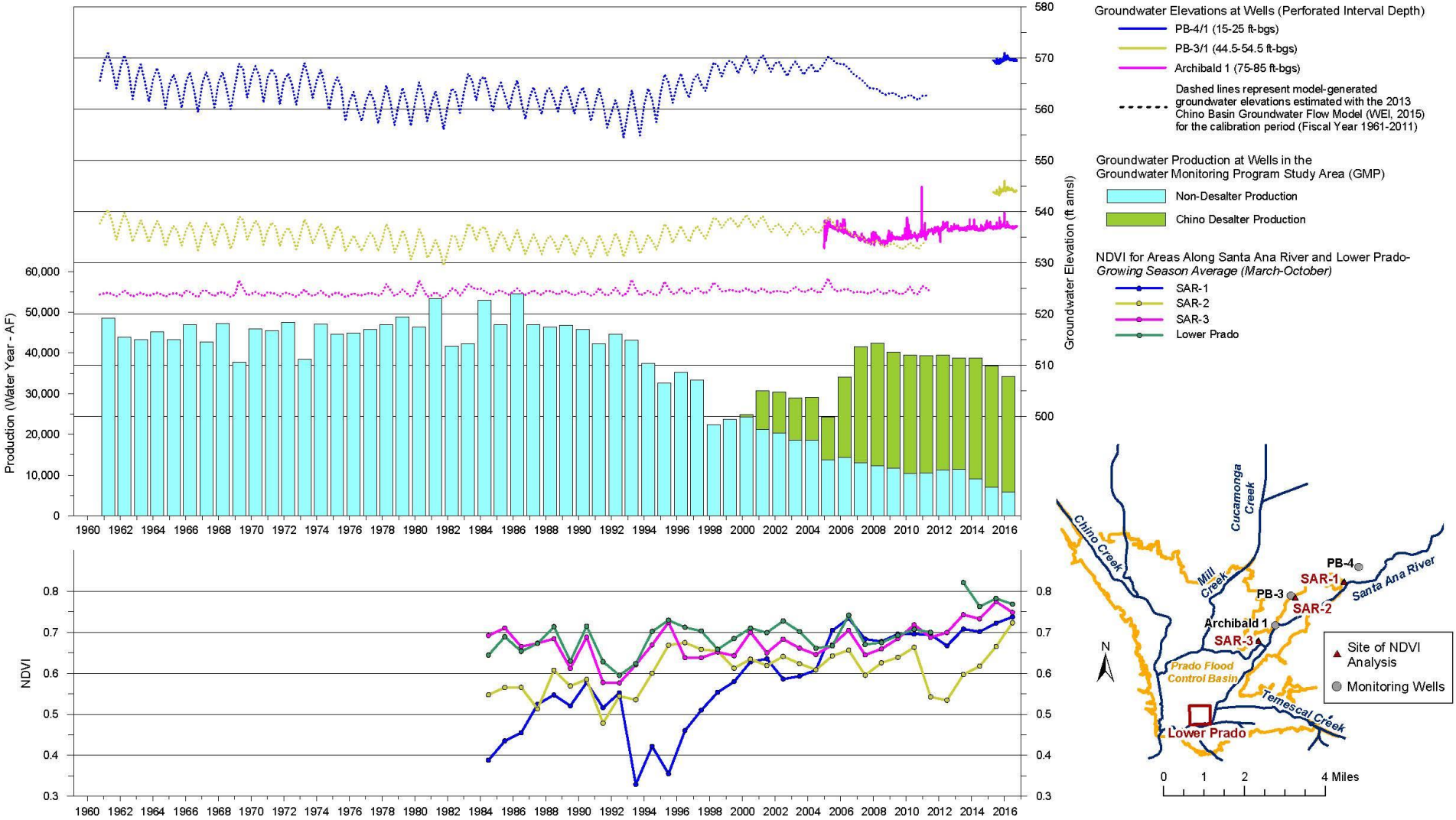
Groundwater Production and Groundwater Levels versus NDVI
Mill Creek Area for 1960-2016

Figure 3-9b

Groundwater Production/Levels vs. NDVI – Santa Ana River



Prepared by:

WEI Wildermuth Environmental, Inc.

Author: RT
Date: 20170404
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2016 Annual Report
Prado Basin Habitat Sustainability Committee

Groundwater Production and Groundwater Levels versus NDVI
Santa Ana River and Lower Prado Area for 1960-2016

Figure 3-9c

Conclusions and Recommendations

Groundwater vs. Riparian Habitat

- With exception of two locations, groundwater levels have remained stable across the Prado Basin and appear unaffected by Peace II implementation

- Two exceptions: northern reaches of Mill Creek and SAR
  - +/- 10 feet of groundwater level change since early 1990s
  - No observed degradation of riparian habitat

- Recommendations:
  - Continue monitoring program with no change in scope

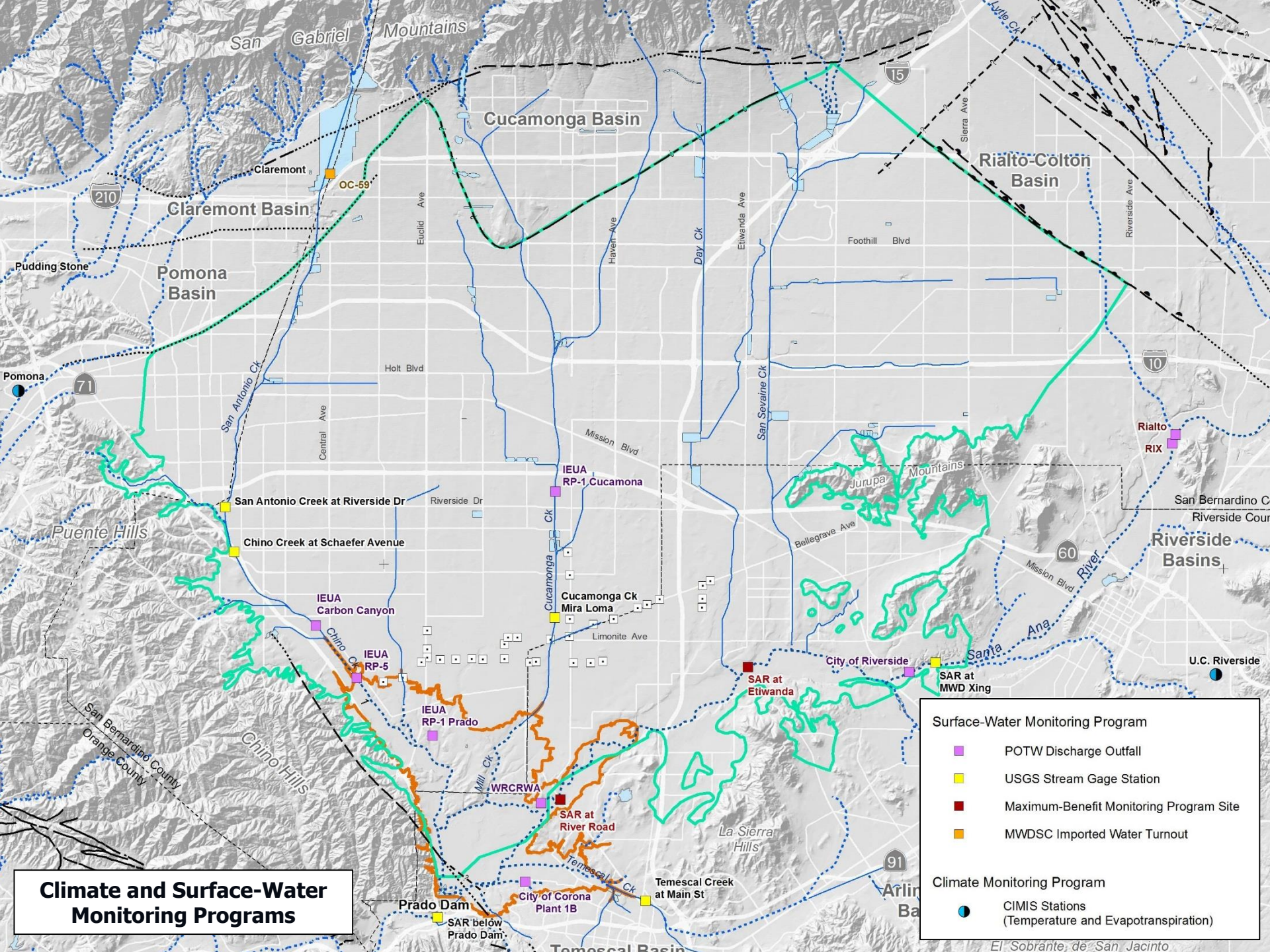

San Gabriel Mountains
Cucamonga Basin
Rialto-Colton Basin
Claremont
OC-59
Claremont Basin
Pudding Stone
Pomona Basin
Pomona
Holt Blvd
Foothill Blvd
Mission Blvd
Riverside Dr
Limonite Ave
Bellegrave Ave
Jurupa Mountains
Rialto
RIX
San Bernardino C
Riverside Coun
Riverside Basins
U.C. Riverside
Puente Hills
Chino Hills
San Bernardino County
Orange County
La Sierra Hills
Arlington Basin
Temescal Basin
El Sobrante de San Jacinto
Euclid Ave
Haven Ave
Day Ck
Etiwanda Ave
Sierra Ave
Riverside Ave
Central Ave
San Antonio Ck
San Sevaine Ck
Cucamonga Ck
Mill Ck
Temescal Ck
Santa Ana River
Lytle Ck
San Antonio Creek at Riverside Dr
Chino Creek at Schaefer Avenue
IEUA RP-1 Cucamona
IEUA Carbon Canyon
IEUA RP-5
IEUA RP-1 Prado
Cucamonga Ck Mira Loma
WRCRWA
SAR at River Road
SAR at Etiwanda
City of Riverside
SAR at MWD Xing
City of Corona Plant 1B
Temescal Creek at Main St
Prado Dam
SAR below Prado Dam
Surface-Water Monitoring Program
POTW Discharge Outfall
USGS Stream Gage Station
Maximum-Benefit Monitoring Program Site
MWDSC Imported Water Turnout
Climate Monitoring Program
CIMIS Stations
(Temperature and Evapotranspiration)
Climate and Surface-Water Monitoring Programs

Figure 3-10
Annual Precipitation in the Chino Basin - Water Years 1896-2016

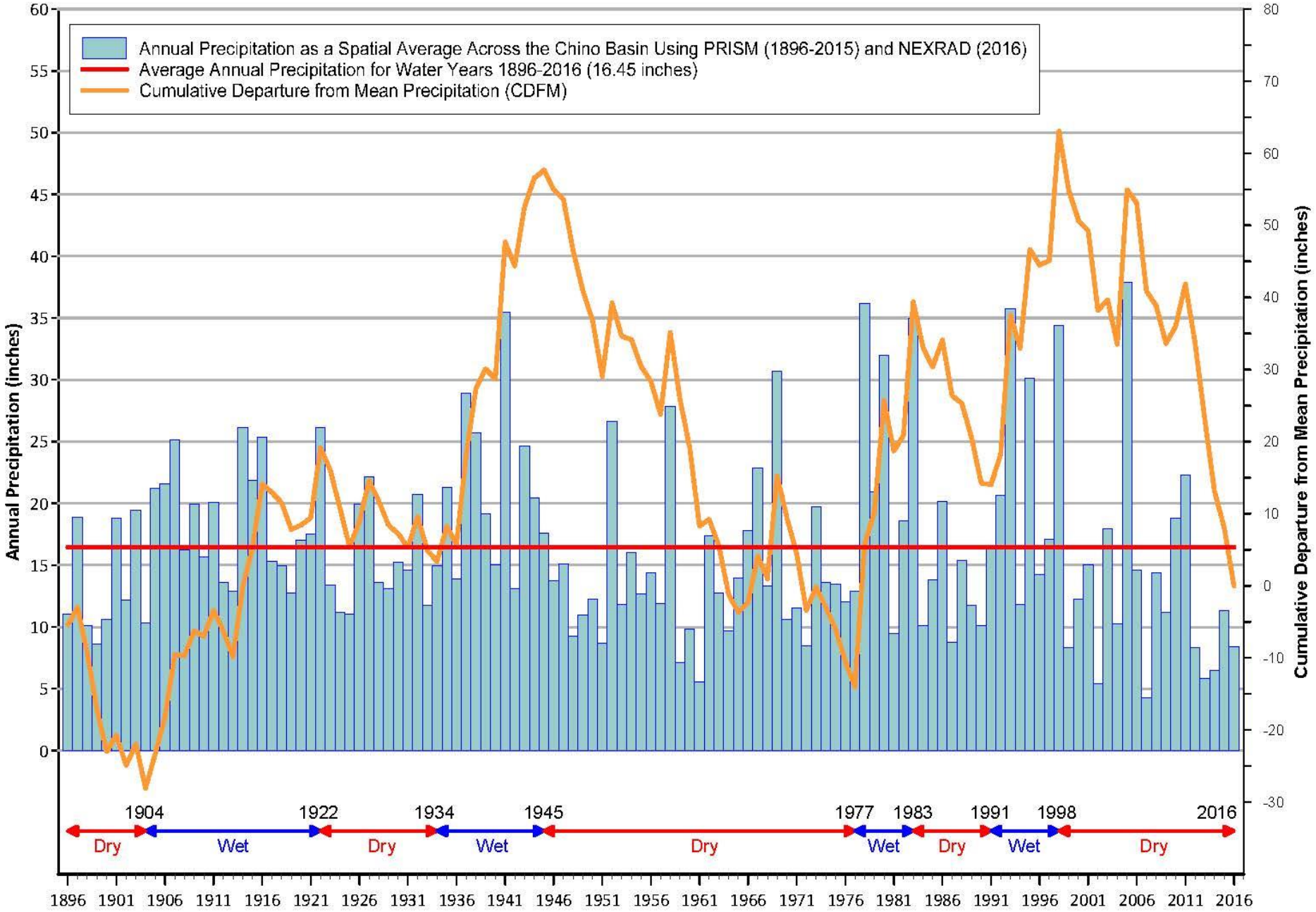
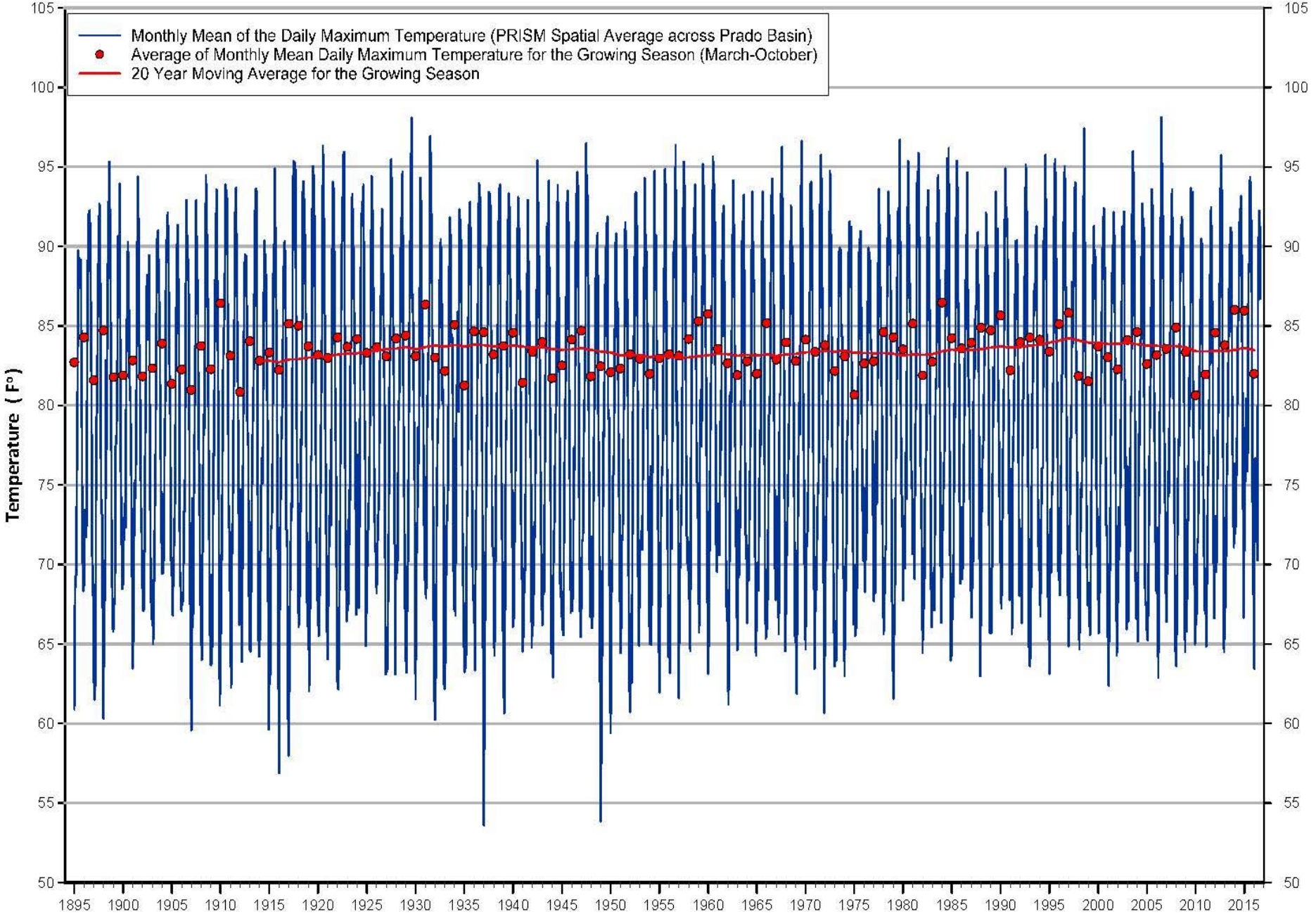
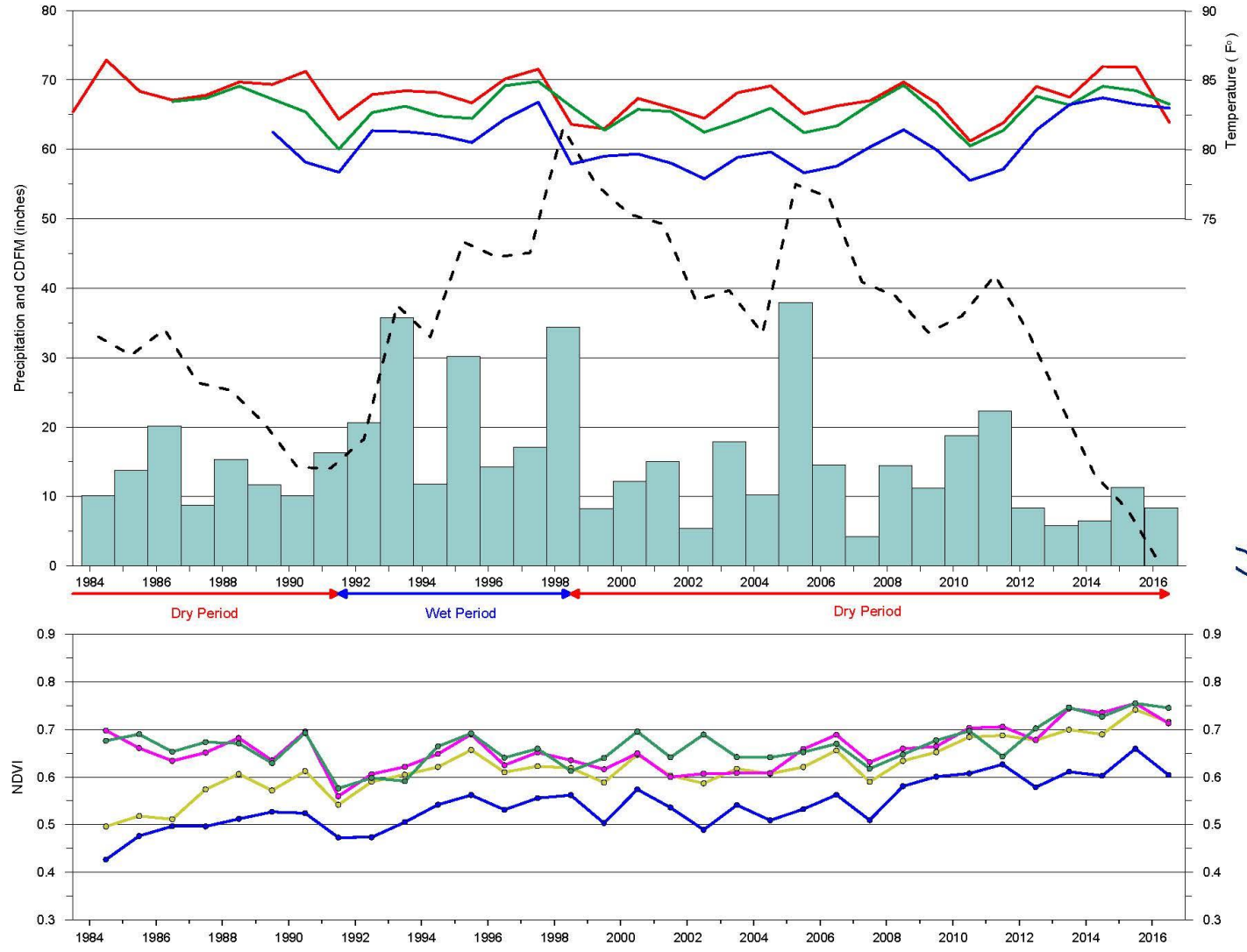


Figure 3-11a
Monthly Maximum Temperature in Prado Basin - 1895-2016



Climate vs. NDVI- Chino Creek



Precipitation

Cumulative Departure from Mean Precipitation (CDFM) (PRISM Spatial Average for Chino Basin)

Annual Precipitation - PRISM Spatial Average for Chino Basin

Temperature

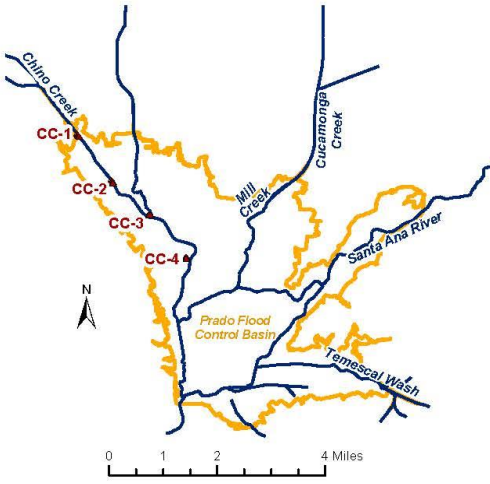
Average of Monthly Mean Daily Maximum Temperature for the Growing Season (March-October)

Average Daily Maximum Temperature for the Growing Season (March-October) at U.C. Riverside CIMIS Station

Average Daily Maximum Temperature for the Growing Season (March-October) at Pomona CIMIS Station

NDVI for Areas Along Chino Creek-
Growing Season Average (March-October)

CC-1
CC-2
CC-3
CC-4



Prepared by:
WEI Wildermuth Environmental, Inc.

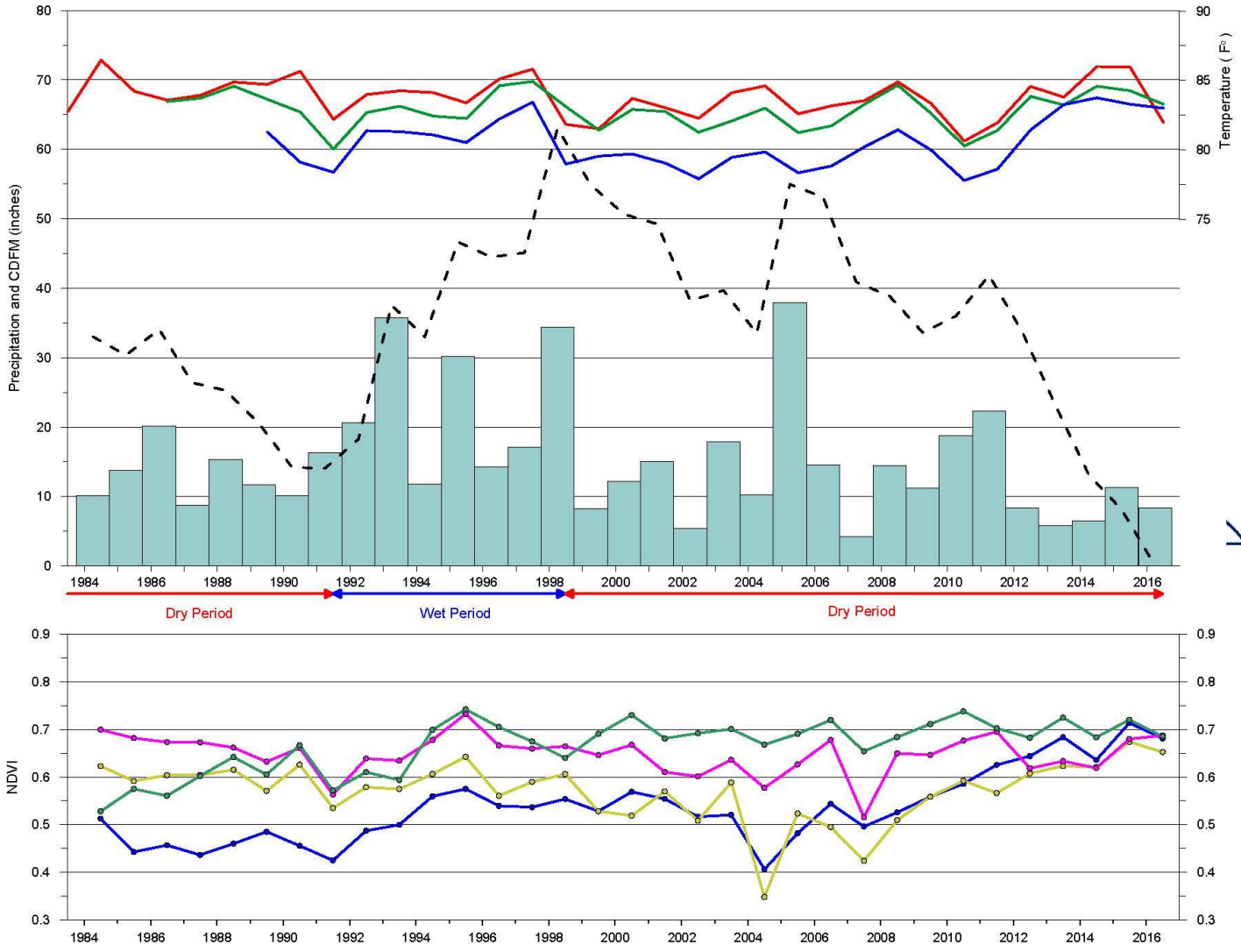
Author: RT
Date: 20170410
Filename: CDFM_Temp_NDVI_ChinoCreek.grf

2016 Annual Report
Prado Basin Habitat Sustainability Committee

Climate versus NDVI
Chino Creek Area for 1984-2016

Figure 3-12a

Climate vs. NDVI - Mill Creek



Precipitation

Cumulative Departure from Mean Precipitation (CDFM) (PRISM Spatial Average for Chino Basin)

Annual Precipitation - PRISM Spatial Average for Chino Basin

Temperature

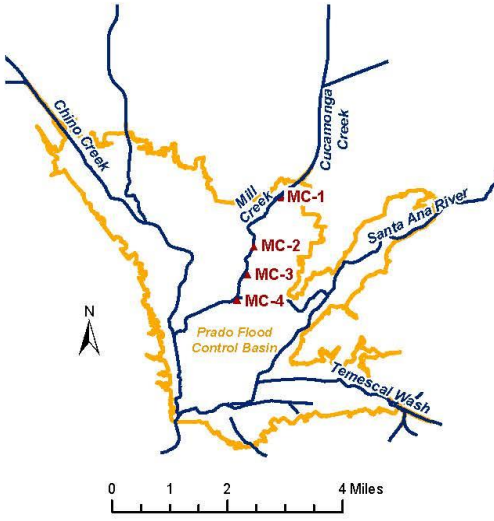
Average of Monthly Mean Daily Maximum Temperature for the Growing Season (March-October)

Average Daily Maximum Temperature for the Growing Season (March-October) at U.C. Riverside CIMIS Station

Average Daily Maximum Temperature for the Growing Season (March-October) at Pomona CIMIS Station

NDVI for Areas Along Mill Creek-
Growing Season Average (March-October)

MC-1
MC-2
MC-3
MC-4



Prepared by:
WEI
Wildermuth Environmental, Inc.

Author: RT
Date: 20170410
Filename: CDFM_Temp_NDVI_ChinoCreek.grf

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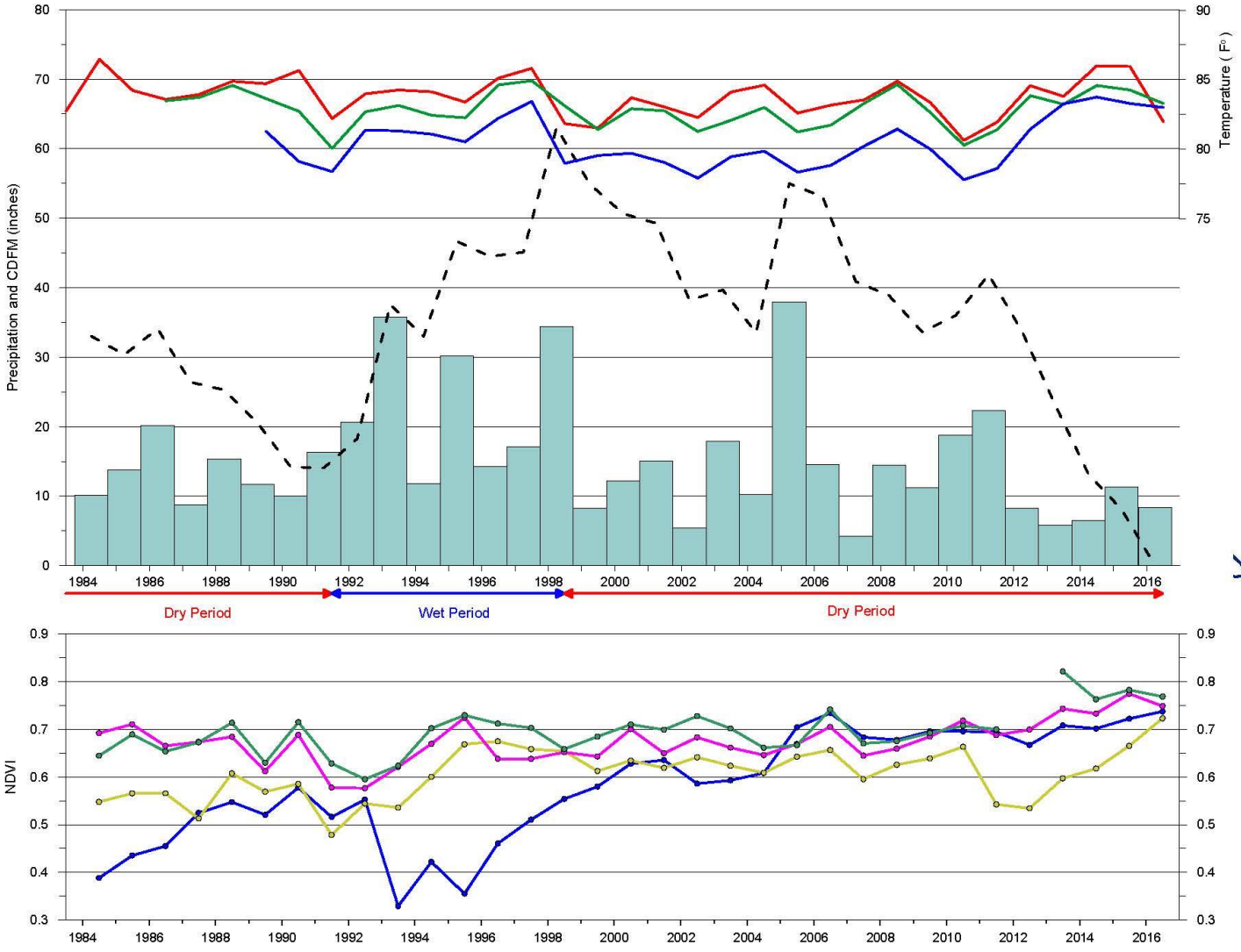
Prado Basin Habitat Sustainability Committee

Climate versus NDVI
Mill Creek Area for 1984-2016

Figure 3-12b

Climate vs. NDVI – Santa Ana River



Precipitation

Cumulative Departure from Mean Precipitation (CDFM) (PRISM Spatial Average for Chino Basin)

Annual Precipitation - PRISM Spatial Average for Chino Basin

Temperature

Average of Monthly Mean Daily Maximum Temperature for the Growing Season (March-October)

Average Daily Maximum Temperature for the Growing Season (March-October) at U.C. Riverside CIMIS Station

Average Daily Maximum Temperature for the Growing Season (March-October) at Pomona CIMIS Station

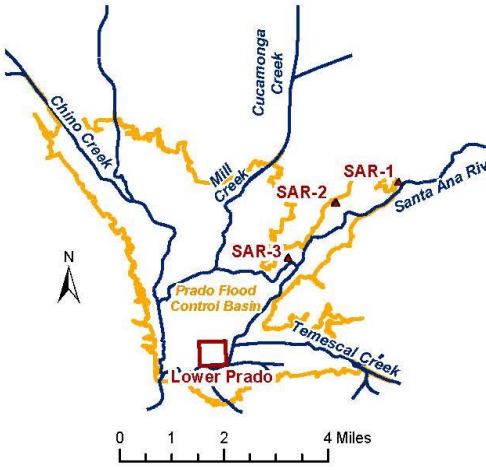
NDVI for Areas Along Santa Ana River and Lower Prado-
Growing Season Average (March-October)

SAR-1

SAR-2

SAR-3

Lower Prado



Prepared by:

WEI Wildermuth Environmental, Inc.

Author: RT
Date: 20170410
Filename: CDFM_Temp_NDVI_ChinoCreek.grf

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Prado Basin Habitat Sustainability Committee

Climate versus NDVI
Santa Ana River and Lower Prado Area for 1984-2016

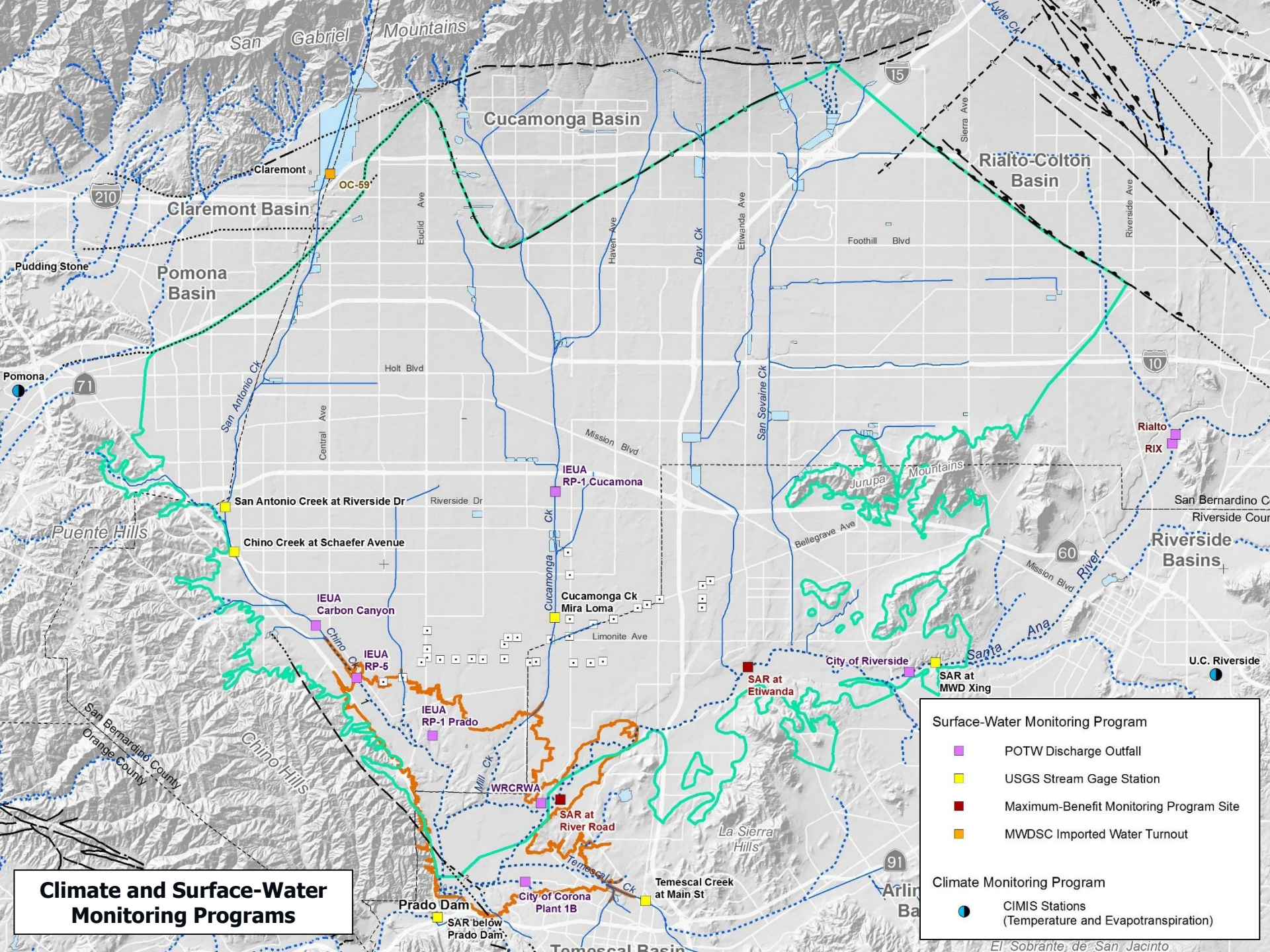
Figure 3-12c

Conclusions and Recommendations

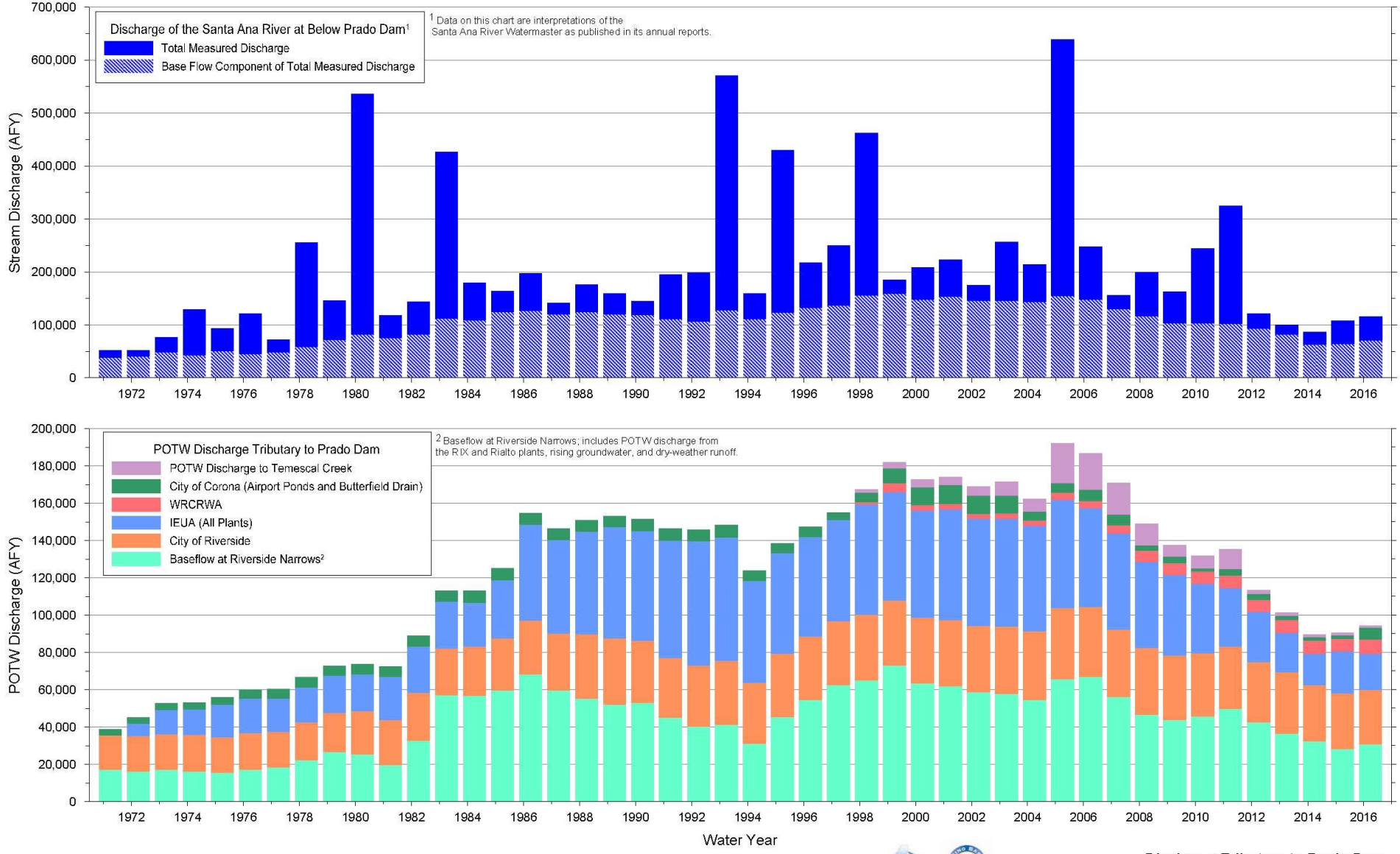
Climatic vs. Riparian Habitat

- 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

- Recommendations:
  - Continue monitoring program with no change in scope


San Gabriel Mountains
Cucamonga Basin
Rialto-Colton Basin
Claremont
OC-59
Claremont Basin
Pudding Stone
Pomona Basin
Pomona
Holt Blvd
Foothill Blvd
Mission Blvd
Riverside Dr
Limonite Ave
Bellegrave Ave
Jurupa Mountains
Rialto
RIX
San Bernardino C
Riverside Coun
Riverside Basins
U.C. Riverside
Puente Hills
Chino Hills
San Bernardino County
Orange County
La Sierra Hills
Arlington Basin
Temescal Basin
El Sobrante de San Jacinto
Euclid Ave
Haven Ave
Day Ck
Etiwanda Ave
Sierra Ave
Riverside Ave
Central Ave
San Antonio Ck
San Sevaine Ck
Cucamonga Ck
Mill Ck
Temescal Ck
Santa Ana River
Lytle Ck
San Antonio Creek at Riverside Dr
Chino Creek at Schaefer Avenue
IEUA RP-1 Cucamona
IEUA Carbon Canyon
IEUA RP-5
IEUA RP-1 Prado
Cucamonga Ck Mira Loma
WRCRWA
SAR at River Road
SAR at Etiwanda
City of Riverside
SAR at MWD Xing
City of Corona Plant 1B
Temescal Creek at Main St
Prado Dam
SAR below Prado Dam
Surface-Water Monitoring Program
POTW Discharge Outfall
USGS Stream Gage Station
Maximum-Benefit Monitoring Program Site
MWDSC Imported Water Turnout
Climate Monitoring Program
CIMIS Stations
(Temperature and Evapotranspiration)
Climate and Surface-Water Monitoring Programs

Surface-Water Discharge



Prepared by:

WEI
Wildermuth Environmental, Inc.

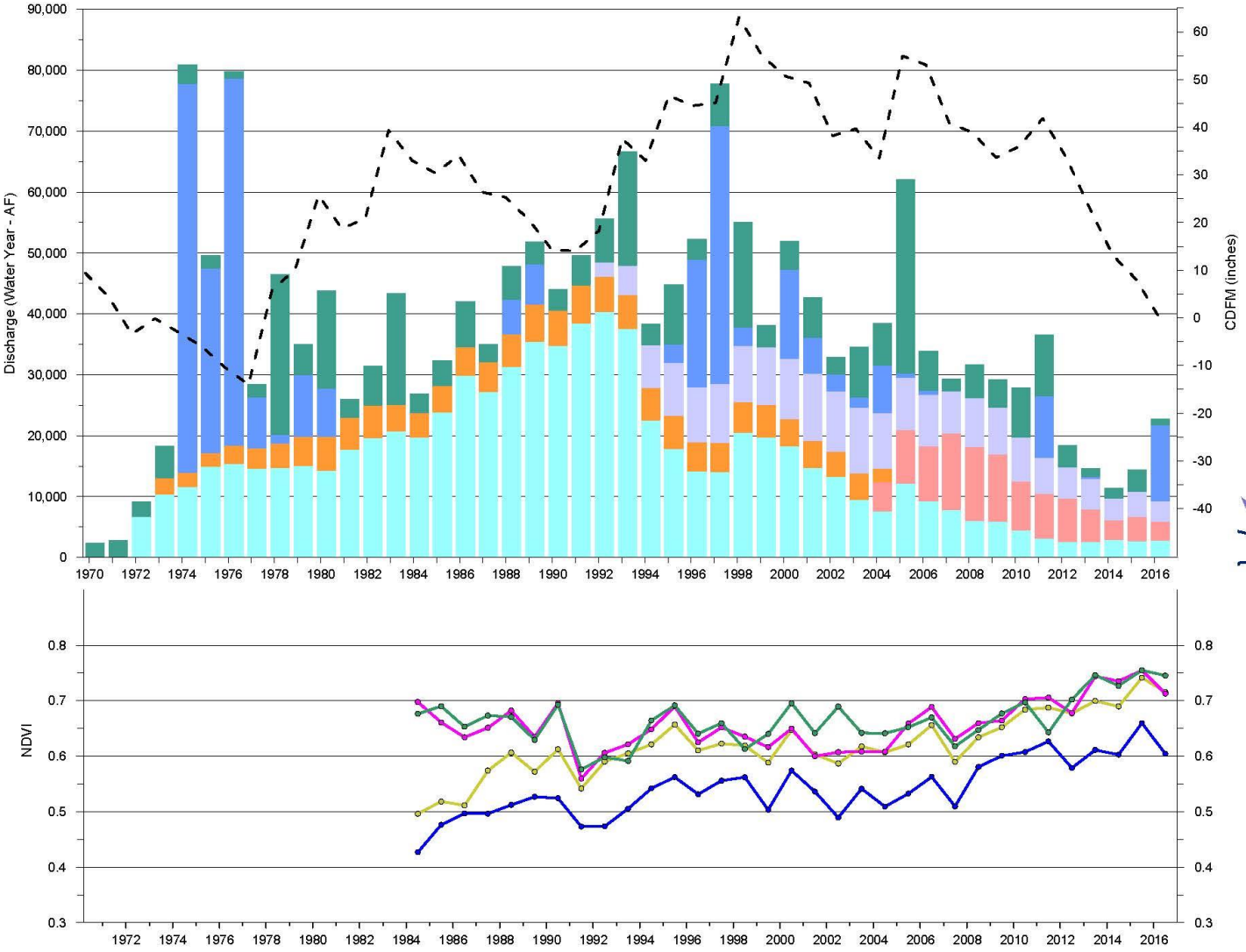
Author: VMW/RT
Date: 20170410
Filename: SW Discharge_Prado.grf

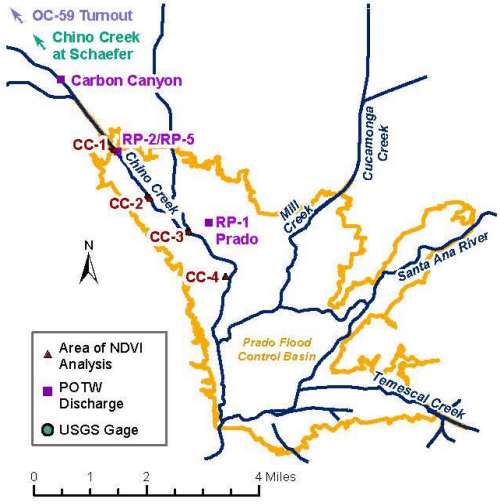
2016 Annual report
Prado Basin Habitat Sustainability Committee

Discharge Tributary to Prado Dam
Water Year 1960-2016

Figure 3-13

Surface Water Discharge vs. NDVI; Chino Creek





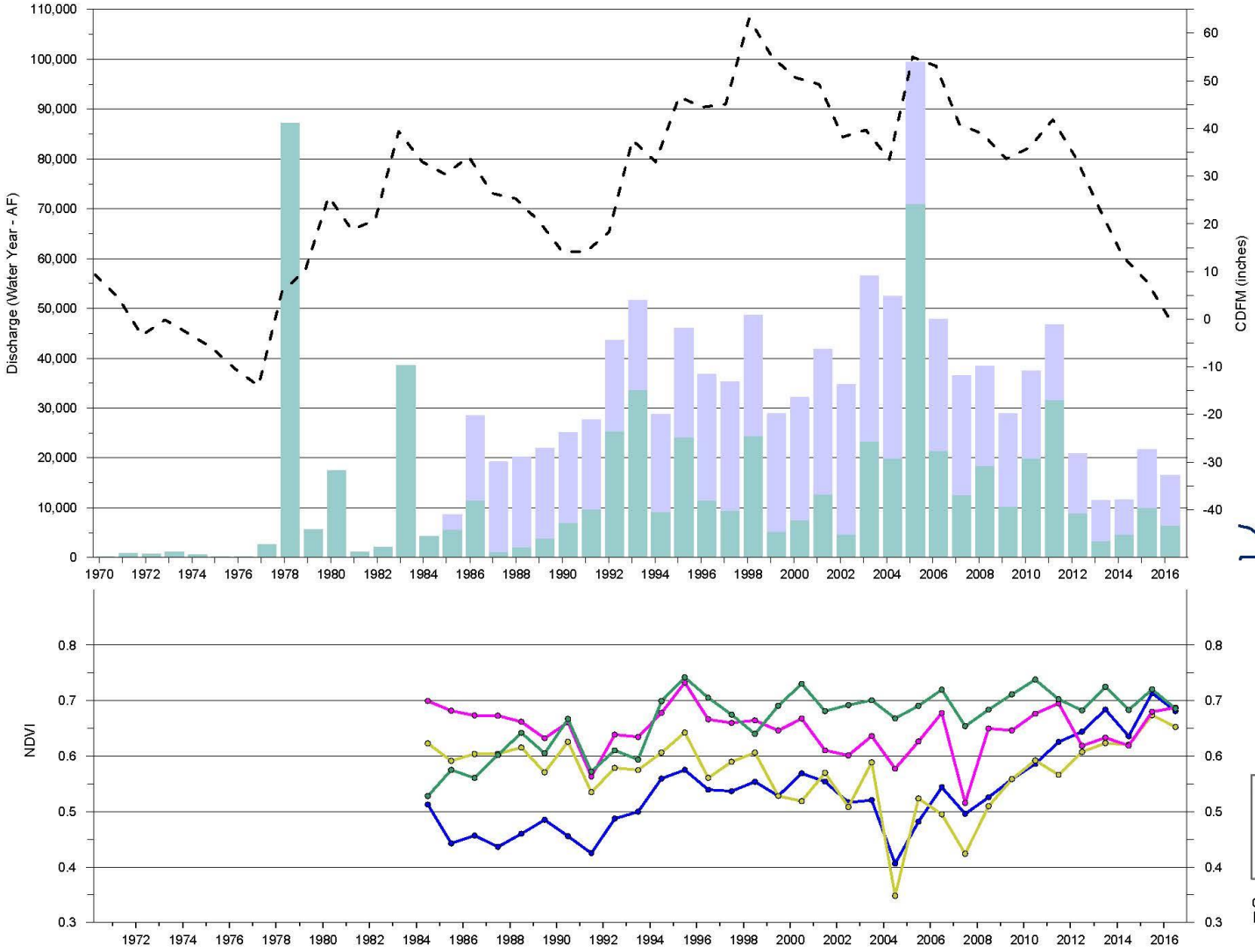
Prepared by:
WEI Wildermuth Environmental, Inc.

Author: RT
Date: 20170410
Filename: SW Discharge_NDVI_Chino Creek.grf

Surface-Water Discharge versus NDVI
Chino Creek Area for 1971-2016

Figure 3-14a

Surface Water Discharge vs. NDVI – Mill Creek



Mill Creek Discharge

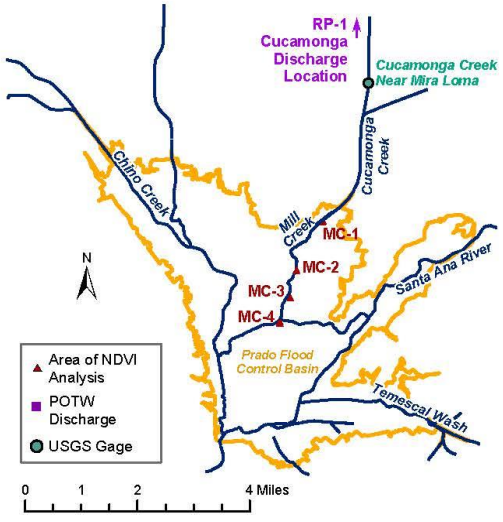
- IEUA RP-1 Cucamonga Effluent
- USGS Gage - Cucamonga Creek near Mira Loma less RP-1 Cucamonga Effluent

NDVI for Areas Along Mill Creek-
Growing Season Average (March-October)

- MC-1
- MC-2
- MC-3
- MC-4

Precipitation

- Cumulative Departure from Mean Precipitation (CDFM) (PRISM Spatial Average for Chino Basin)



Prepared by:
WEI Wildermuth Environmental, Inc.

Author: RT
Date: 20170410
Filename: SW Discharge_NDVI_Mill Creek.grf

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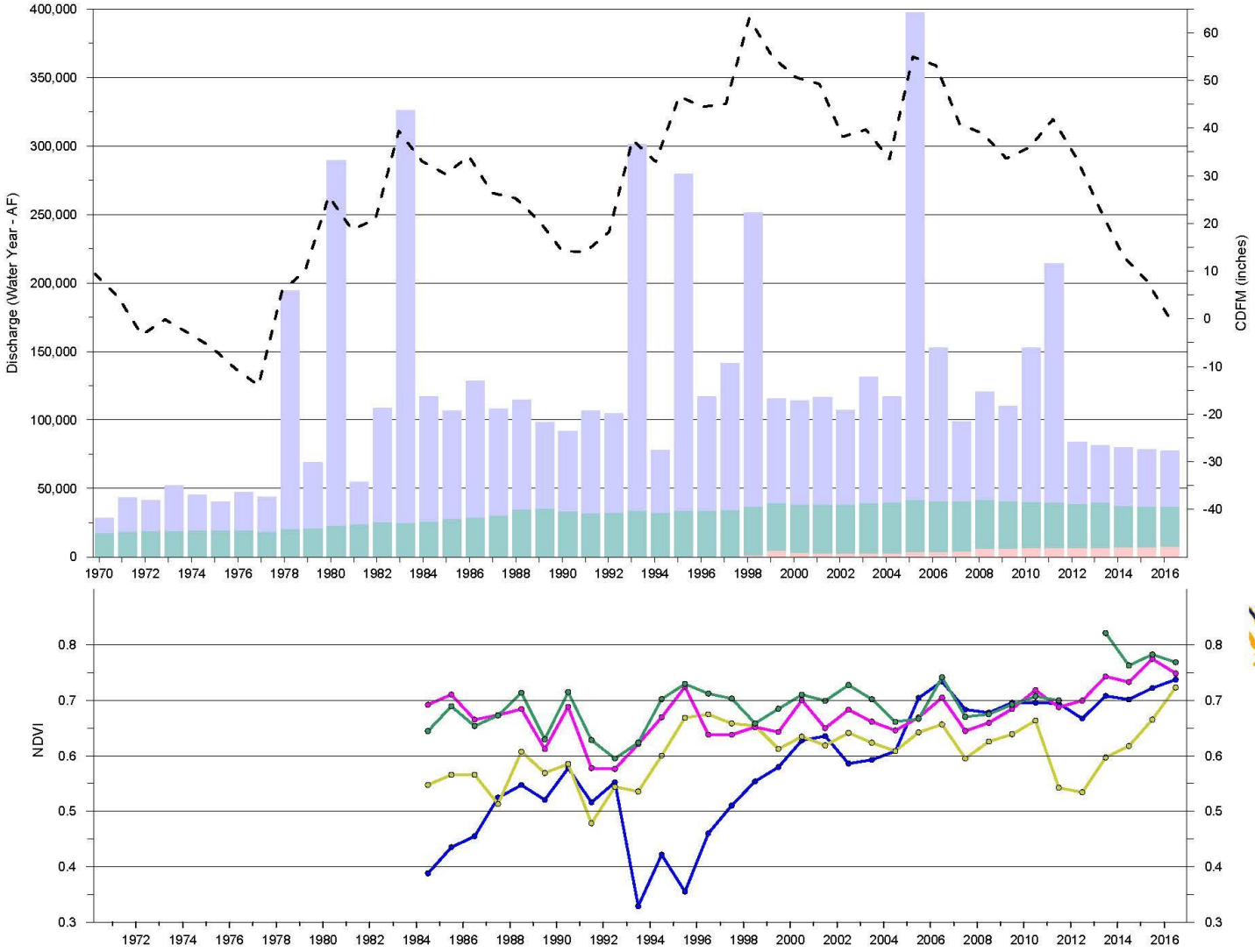
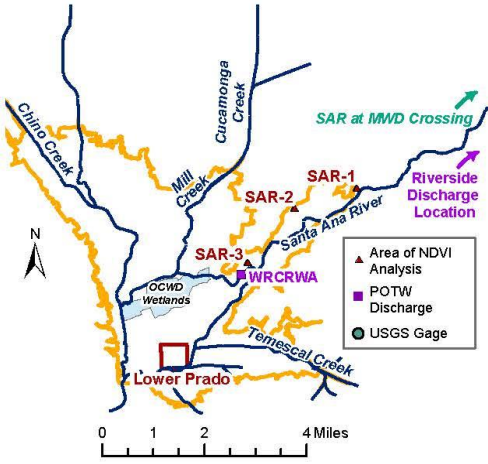
Prado Basin Habitat Sustainability Committee

Surface-Water Discharge versus NDVI
Mill Creek Area for 1971-2016

Figure 3-14b

Surface Water Discharge vs. NDVI; Santa Ana River





Prepared by:
WEI Wildermuth Environmental, Inc.

Author: RT
Date: 20170410
Filename: SW Discharge_NDVI_SAR and LP.grf

2016 Annual Report
Prado Basin Habitat Sustainability Committee

Surface-Water Discharge versus NDVI
Santa Ana River and Lower Prado Area for 1971-2016

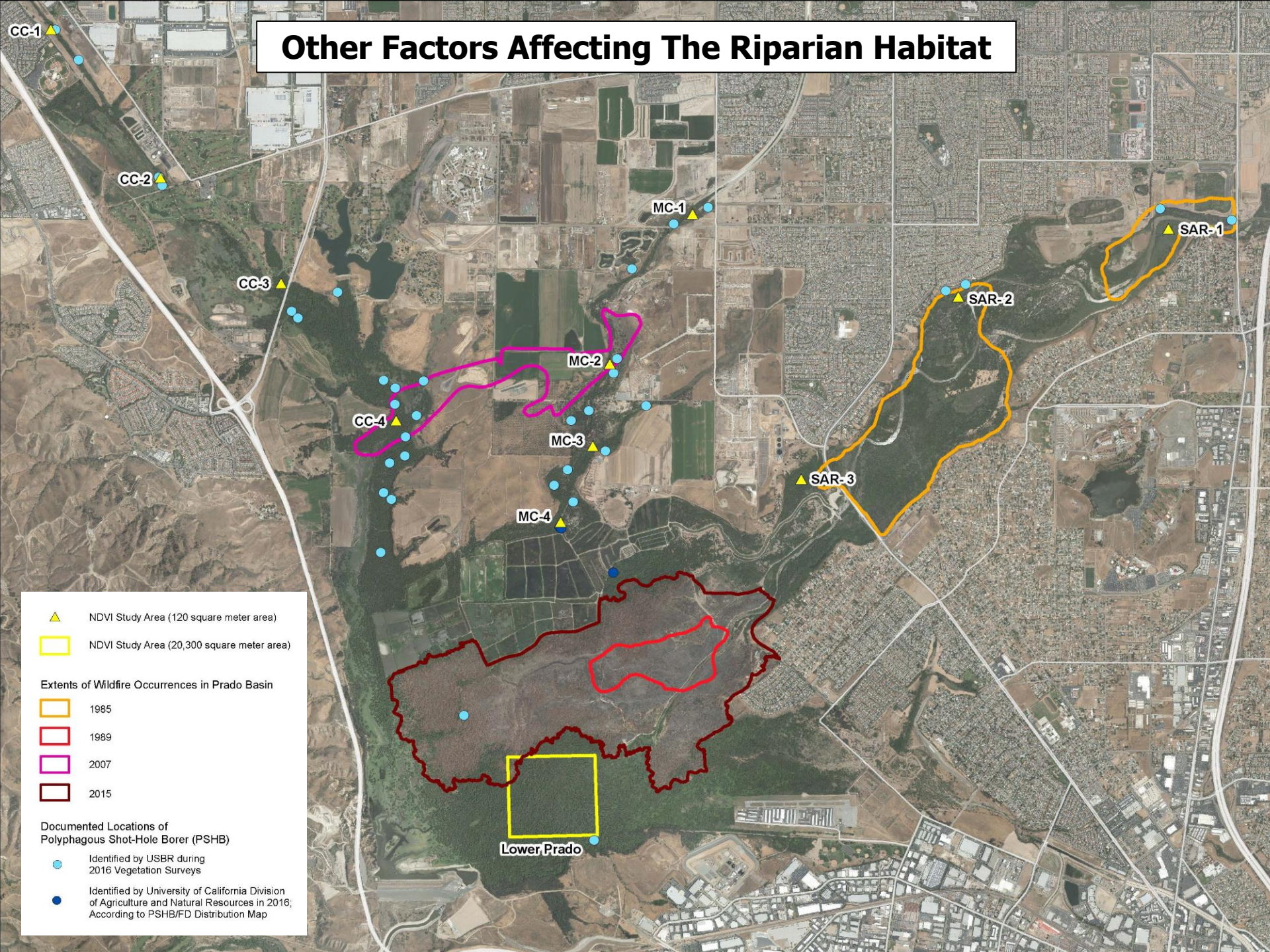
Figure 3-14c

Conclusions and Recommendations

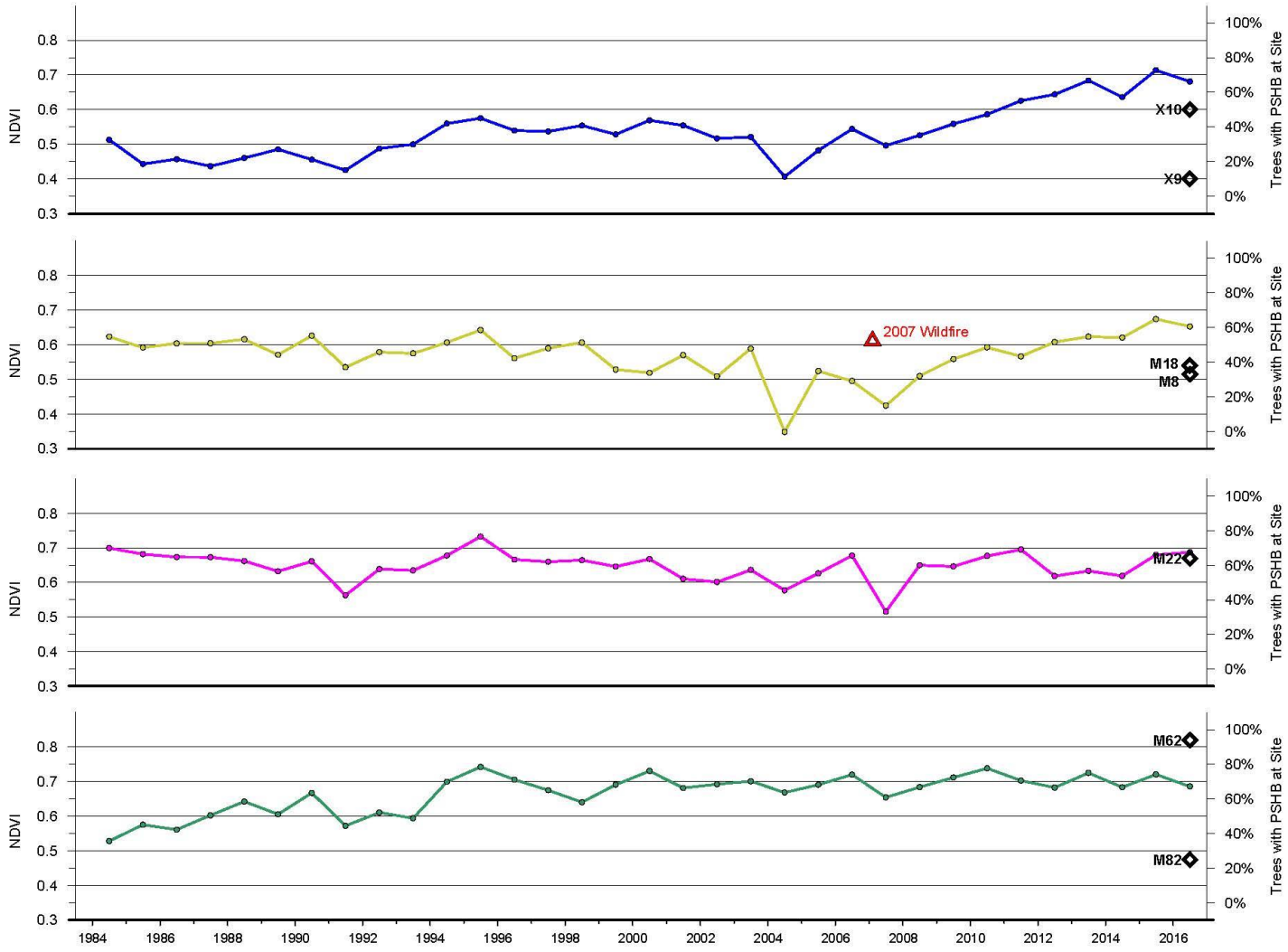
Surface-Water Discharge vs. Riparian Habitat

- Discharge in the SAR and its tributaries has declined since 2005
  - → Dry conditions and reductions in POTW discharge
- The riparian habitat has experienced no trend in degradation that correlates with the reduction in stream discharge, and may have improved in the northern reaches of Chino Creek, Mill Creek and the SAR
- Recommendations:
  - Continue monitoring program with no change in scope
  - Analyze stream discharge on a growing-season time-step

Other Factors Affecting The Riparian Habitat



Other Factors vs. NDVI – Mill Creek

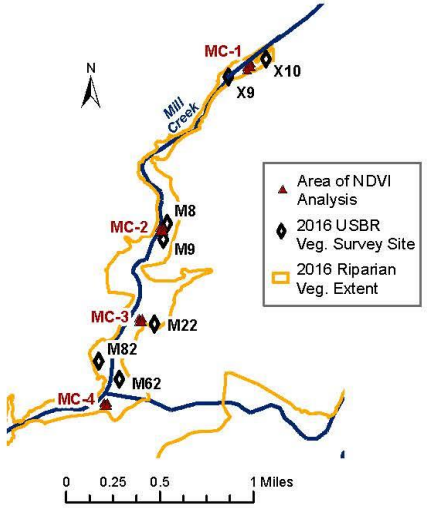


NDVI for Areas Along Mill Creek - Annual Average for the Growing Season (March-October)

- MC-1
- MC-2
- MC-3
- MC-4

Other Factors

- 2016 USBR Vegetation Survey Site- Percentage of Trees at Each Site with Noted Presence of Polyphagous Shot Hole Borer (PSHB)
- Occurence of Wildfire in NDVI Area



Other Factors That Can Affect Riparian Habitat versus NDVI
Mill Creek Area for 1984-2016

Figure 3-16b

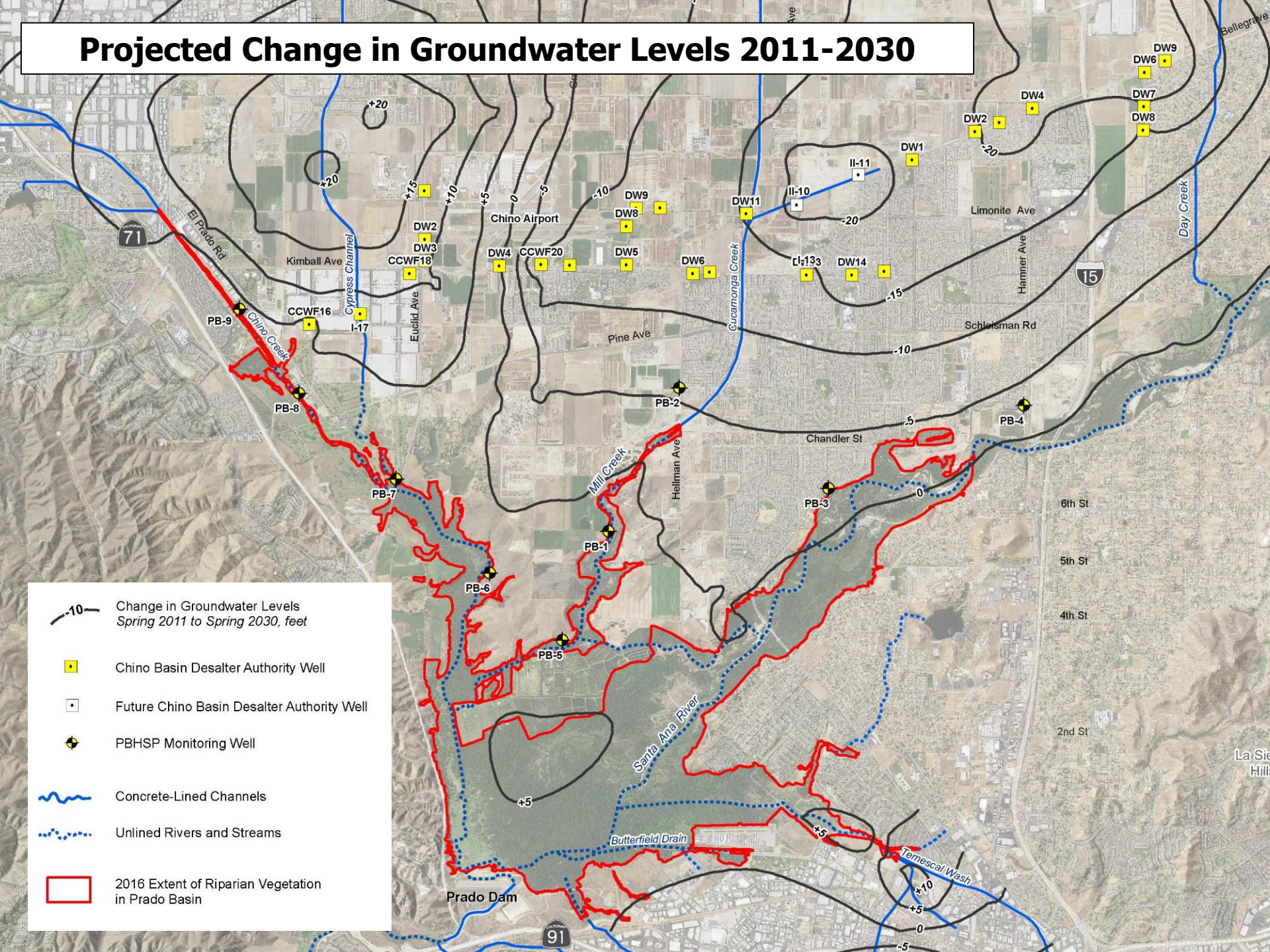
Prepared by:
WEI Wildermuth Environmental, Inc.
Author: RT
Date: 20170420
Filename: Other Factors_NDVI_CC.grf

Conclusions and Recommendations

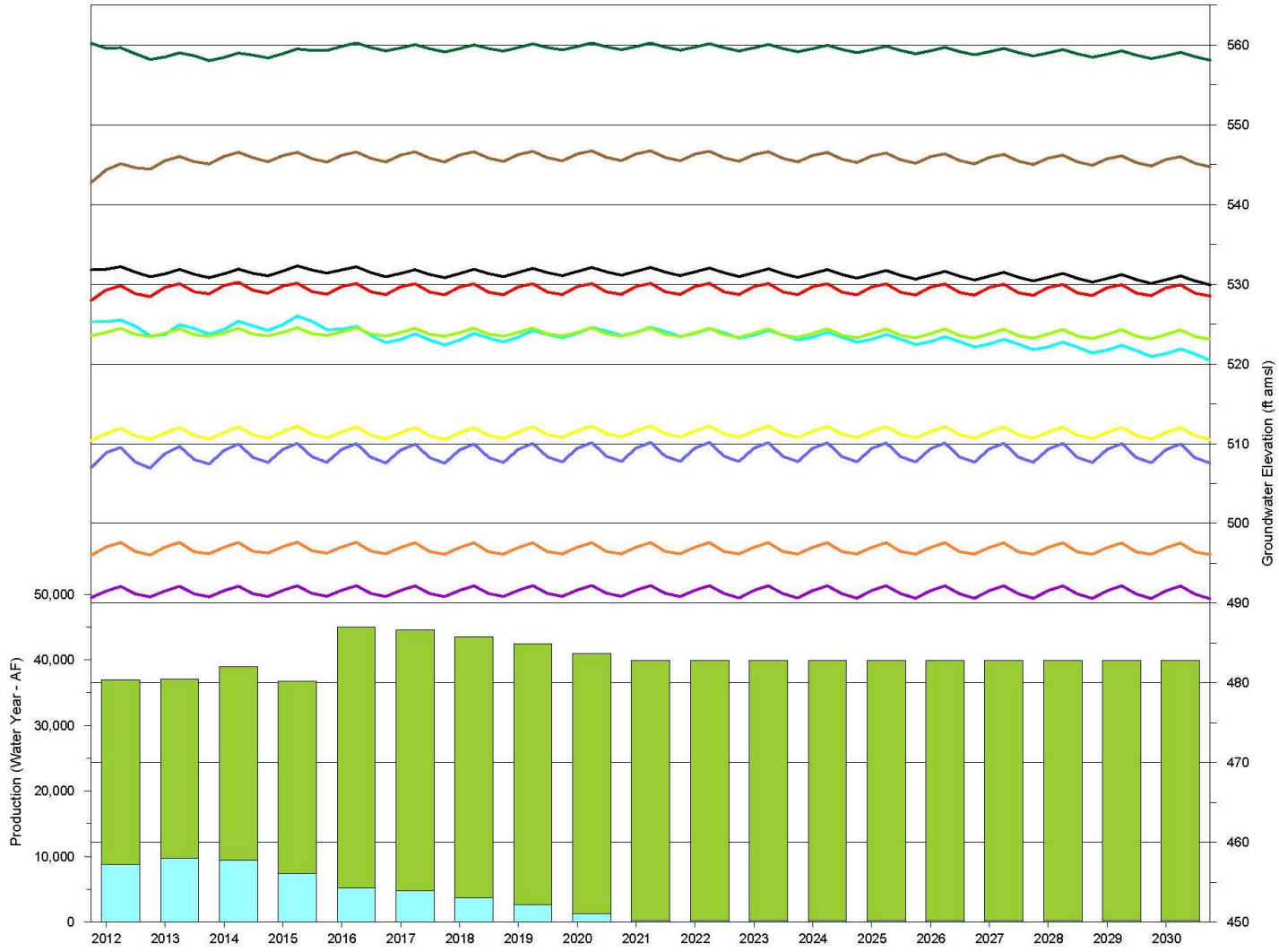
Other Factors vs. Riparian Habitat

- Other factors that have documented adverse impacts on the riparian habitat
  - Wildfire
  - Pests → PSHB (beetle)
- Recommendations:
  - Continue monitoring program with no change in scope

Projected Change in Groundwater Levels 2011-2030



Projected Change in Groundwater Production and Levels 2012-2030



Model Simulated Groundwater Elevations*

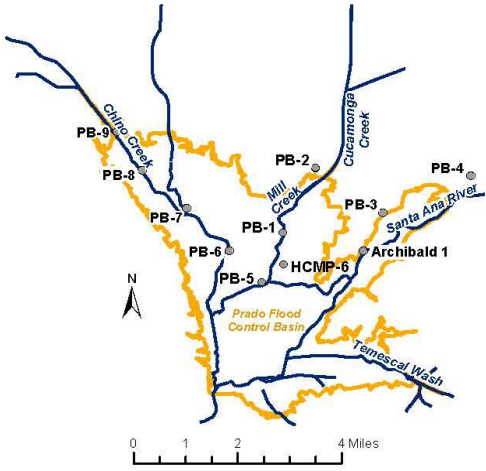
- PB-4
- PB-9
- PB-3
- PB-8
- PB-2
- Archibald 1
- PB-1
- PB-7
- PB-6
- PB-5

Projected Groundwater Production at Wells in the Groundwater Monitoring Program Study Area*

- Non-Desalter Production
- Chino Desalter Production

*Model Simulated Groundwater Elevations and Production from 2013 Chino Basin Groundwater Flow Model for Scenario 5A4 (WEI, 2015)

Well Locations



Prepared by:

WEI Wildermuth Environmental, Inc.

Author: RT
Date: 20160601
Filename: Projected_PROD_GWE_2012-2030.grf

2016 Annual Report
Prado Basin Habitat Sustainability Committee

Projected Groundwater Production and Groundwater Levels *2012-2030*

Figure 3-18

Conclusions and Recommendations

Analysis of Prospective Loss of Riparian Habitat

- Projected changes is groundwater levels in Prado Basin through 2030 are minor (+/- five feet)
- There is one area of concern for prospective loss of riparian habitat
  - Northern reach of Mill Creek
- Recommendations:
  - Continue monitoring of groundwater levels
  - Investigate rooting depths of riparian vegetation
  - Utilize an updated groundwater-flow model to project groundwater-level changes to characterize areas of prospective loss of riparian habitat

Table 1
Work Breakdown Structure, Cost Estimate, and Schedule
PBHSP Monitoring Program -- FY2017-18

Task Description	Labor Total		Other Direct Costs					Notes	Totals				
	Person Days	Total	Travel	Equip. Rental	Lab	Outside Pro	Total		FY 2017-18	FY 2016-17	Difference	IEUA Portion FY 2017-18	CBWM Portion FY 2017-18
Task 1: Groundwater Level Monitoring Program	**10.4**	**$11,152**					**$779**		**$11,931**	**$11,721**	**$210**	-	$11,931
1.1 Collect Transducer Data from PBHSP Wells (Quarterly)	4.8	$4,304	$587	$192			$779		$5,083				
1.2 Collect, Check, and Upload Transducer Data from PBHSP Wells (Quarterly)	5.6	$6,848					$0		$6,848				
Task 2: Groundwater Quality Monitoring Program	**25.6**	**$24,400**					**$24,655**		**$49,055**	**$77,160**	**-$28,105**	-	$49,055
2.1 Collect Groundwater-Quality from PBHSP Wells (Quarterly)	18.4	$15,472	$2,035	$4,120	$18,500		$24,655		$40,127				
2.2 Check and Upload Groundwater Quality Field and Lab Data from PBHSP Wells (Quarterly)	7.2	$8,928					$0		$8,928				
Task 3: Surface Water Monitoring Program	**3.2**	**$3,744**					**$0**		**$3,744**	**$3,230**	**$514**	-	$3,744
3.1 Collect, Check, and Upload Surface Water Discharge and Quality Data from POTWs, and Dam level data from the ACOE (Annual)	2.2	$2,608					$0		$2,608				
3.2 Collect, Check, and Upload Surface Water Discharge and Quality Data from USGS gaging stations (Annual)	1.0	$1,136					$0		$1,136				
Task 4: Riparian Habitat Monitoring Program	**28.8**	**$40,342**					**$10,000**		**$50,342**	**$199,794**	**-$149,452**	$25,171.0	$25,171.0
4.1 Manage and Perform Custom Flight to Collect a High-Resolution Air Photo of the Prado Basin Region	1.0	$1,816				$10,000	$10,000	1	$11,816				
4.2 Collect, Check, Catalog, and Digitize the 2017 Air Photo for Prado Basin Region	4.3	$5,682					$0		$5,682				
4.3 Collect, Check, and Upload 2017 Landsat NDVI Data in the Prado Basin	3.8	$5,262					$0		$5,262				
4.4 Collect, Check, and Upload Historical Landsat NDVI Data in the Prado Basin	12.2	$16,074					$0		$16,074				
4.5 Design a Site-Specific Vegetation Monitoring Program to Ground-Truth NDVI data	7.5	$11,508					$0		$11,508				
Task 5: Climate Monitoring Program	**1.0**	**$1,456**					**$300**		**$1,756**	**$1,368**	**$388**	$878.20	$878.20
5.1 Collect, Check, and Upload Climatic Data (Annual)	1.0	$1,456				$300	$300		$1,756				
Task 6: Prepare Annual Report of the PBHSC	**60.5**	**$90,872**					**$210**		**$91,082**	**$141,436**	**-$50,354**	$45,541.0	$45,541.0
6.1 Analyze Data and Prepare Admin Draft Report for CBWM/IEUA	47.0	$70,308					$0		$70,308				
6.2 Meet with CBWM/IEUA to Review Admin Draft Report	2.5	$4,148	$105				$105		$4,253				
6.3 Incorporate CBWM/IEUA Comments and Prepare Draft Report: Submit Draft Report to PBHSC	5.0	$7,200					$0		$7,200				
6.4 Meet with PBHSC to Review Draft Report	3.0	$4,888	$105				$105		$4,993				
6.5 Incorporate PBHSC Comments and Finalize Report	3.0	$4,328					$0		$4,328				
Task 7: Project Management and Administration	**11.8**	**$18,898**					**$105**		**$19,003**	**$18,444**	**$559**	$9,501.30	$9,501.30
7.1 Ad-Hoc Meetings (one meeting)	3.0	$4,888	$105				$105		$4,993				
7.2 Prepare Scope and Budget for FY 2018-19	4.0	$6,368					$0		$6,368				
7.3 Project Administration and Financial Reporting	4.8	$7,642					$0		$7,642				
Totals	267	$190,864	$2,350	$4,120	$18,500	$10,300	$36,049		$226,913	$453,153	-$226,240	$81,092	$145,822

1- This is half of the cost for the outside professional. OCWD will be paying the other half.

Next Steps

- June 21, 2017 – PBHSC members submit comments and suggested revisions on the draft 2016 Annual Report
- June 30, 2017 – Final 2016 Annual Report
- July 2017 – Annual Report in agenda packet for Watermaster/IEUA meetings

Questions ?