



## Technical Memorandum

<b>To:</b>	<b>Prado Basin Habitat Sustainability Committee</b>
<b>From:</b>	<b>Watermaster Engineer – Wildermuth Environmental Inc. (WEI)</b>
<b>Date:</b>	<b>February 27, 2018</b>
<b>Subject:</b>	<b>Recommended Scope and Budget of the Prado Basin Habitat Sustainability Program for FY 2018/19</b>

### Background and Purpose

Pursuant to the Mitigation Measure 4.4-3 of the Peace II Subsequent Environmental Impact Report (SEIR), the Chino Basin Watermaster (Watermaster) and the Inland Empire Utility Agency (IEUA) implement an Adaptive Management Plan (AMP) as a contingency measure to ensure that the riparian habitat in the Prado Basin will not incur unforeseeable significant adverse effects as a result of Peace II Agreement implementation. The AMP is implemented under the supervision of the Prado Basin Habitat Sustainability Committee (PBHSC), which is comprised of representatives from all interested Prado Basin stakeholders.

The AMP calls for the implementation of a monitoring and reporting program, called the Prado Basin Habitat Sustainability Program (PBHSP). The PBHSP is an effort to monitor the extent and quality of the riparian habitat, as well as the factors that could potentially affect the riparian habitat which include, but are not limited to, groundwater levels, surface-water discharge, weather events, climatic changes, pests, and wildfire.

The AMP also calls for data analysis and annual reporting. The annual report describes the results and interpretations of the monitoring data, and makes recommendations for adjustments to the monitoring program for the following fiscal year, as may be necessary.

This memorandum describes the recommended activities for the PBHSP for FY 2018/19 in the form of a proposed scope-of-work and budget. Members of the PBHSC are being asked to:

1. Review this memorandum by March 13, 2018.
2. Attend a meeting of the PBHSC at 1:30pm on March 13, 2018 at IEUA to discuss the proposed scope-of-work and budget for FY 2018/19.
3. Submit comments and suggested revisions to scope-of-work and budget for FY 2018/19 by March 27, 2018.

The final scope-of-work and budget recommended by the PBHSC will go through the IEUA and Watermaster budgeting processes for approval. The final scope-of-work, schedule, and budget

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for FY 2018/19 will be included in Section 4 of the *Annual Report for Prado Basin Habitat Sustainability Committee for Water Year 2016/17*.

### Recommended Scope of Work and Budget – FY 2018/19

The proposed scope-of-work and budget is shown in Table 1 as a line-item cost estimate. The costs of the PBHSP are shared between the Watermaster and IEUA per the 2016 Agreement<sup>1</sup>. Watermaster is responsible for the costs associated with Tasks 1 through 3; and IEUA and Watermaster split costs 50/50 for Tasks 4 through 7. The Orange County Water District also is a cost-sharing partner and provides in-kind services for selected sub-tasks.

The proposed scope-of-work is described below by major task:

**Task 1—Groundwater-Level Monitoring Program.** The monitoring of groundwater levels in the Prado Basin is a key component of the PBHSP, as declining water levels could be a factor related to Peace II implementation that adversely impacts riparian vegetation. Sixteen monitoring wells were installed specifically for the PBHSP during fiscal year 2014/15. These wells, plus monitoring wells HCMP-5/1 and RP3-MW3, are monitored for groundwater levels. These 18 PBHSP monitoring wells are located at nine sites in the Prado Basin along the fringes of the riparian habitat (see Figure 1). The 18 monitoring wells are equipped with pressure transducers that record water-level measurements every 15 minutes. This task includes quarterly field visits to all 18 PBHSP monitoring wells to download the transducer data, and processing, checking, and uploading of the data to the database. This task is consistent with the work performed during the previous fiscal year.

**Task 2—Groundwater-Quality Monitoring Program.** Groundwater-quality data are analyzed along with groundwater-level data, model-generated groundwater-flow directions, and surface-water chemistry data to help characterize groundwater/surface-water interactions in the Prado Basin and determine the source of the shallow groundwater that is available for consumptive use by the riparian vegetation.

Quarterly groundwater-quality grab samples have been collected over the previous three fiscal years at the 18 PBHSP monitoring wells since they were constructed. These data were analyzed for the current annual report. The analysis suggests that the Santa Ana River is a losing reach from PB-4 to about River Road, and that the source of the shallow groundwater along this reach is recharge from the Santa Ana River. However, the analysis was inconclusive along Chino Creek and Mill Creek. It appears that the groundwater/surface-water interactions along these creeks are more complex, and that the current water-quality monitoring program is not sufficient to

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<sup>1</sup> Agreement Between Chino Basin Watermaster and Inland Empire Utilities Agency Regarding Reimbursement of the Peace II Subsequent Environmental Impact Report Mitigation Measure 4.4.5 (Prado Basin Habitat Sustainability Program). Signed September 2016.

definitively characterize the interactions. We recommend discontinuing the current groundwater-quality monitoring procedures immediately in fiscal year 2017-18, and performing a pilot test of a high-frequency water-quality monitoring program at two groundwater monitoring sites (four wells)—one site located along Chino Creek and one site located along Mill Creek. Each well will be equipped with probes that measure and record EC, temperature, and water levels at a 15-minute frequency. The wells will be visited quarterly to download the data from the probes, measure water levels, and collect grab samples for laboratory analyses of TDS and general mineral analytes listed in Table 2. The high-frequency data may better reveal the groundwater/surface-water interactions and enhance the interpretation of the TDS and general mineral data that has been derived from grab sampling. This task also includes quarterly processing, checking, and uploading of the water-quality data into the database.

Conducting this pilot test, instead of continuing the quarterly groundwater-quality monitoring for general mineral chemistry, translates into a \$25,015 reduction in cost from the previous fiscal year for Task 2.

**Task 3—Surface-Water Monitoring Program.** Surface-water discharge data are evaluated in the vicinity of the Prado Basin to characterize trends, and to determine if these trends contribute to impacts on the riparian habitat. The surface-water monitoring program utilizes publicly-available data sets which include: the USGS daily discharge measurements at six sites along the Santa Ana River and its tributaries; daily discharge and water-quality data from Publicly-Owned Treatment Works (POTWs) that are tributary to Prado Basin; US Army Corps of Engineers (ACOE) daily measurements of reservoir elevation and releases from the reservoir at Prado Dam; and Watermaster’s quarterly surface-water-quality monitoring at two sites along the Santa Ana River. The locations of these surface-water monitoring sites are shown on Figure 1.

Task 3.1 and 3.2 includes the annual collection of the USGS, POTW, and ACOE data for water year 2018 (October 2017 – September 2018), and the processing, checking, and uploading of these data to the PBHSP database. These tasks do not include the processing, checking, and uploading of the Watermaster-collected Santa Ana River data, which is performed for another Watermaster task. Collecting this surface-water data is consistent with the work performed during the previous fiscal year.

The surface-water data were analyzed along with groundwater-quality data for the current annual report to help characterize groundwater/surface water interactions. However, as described in Task 2 above, the analysis was inconclusive along Chino Creek and Mill Creek. Additionally, there are no recent surface-water-quality data along Chino Creek and Mill Creek except for the POTW discharge water-quality data. Starting in fiscal year 2018/19, we

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recommend collecting quarterly surface-water-quality grab samples at two sites—one site along Chino Creek and one site along Mill Creek (near the two groundwater monitoring sites where the proposed pilot test is to be conducted for Task 2 above). Task 3.3 includes conducting quarterly surface-water-quality sampling at two surface-water sites and laboratory analyses for TDS, nitrate, and general mineral analytes listed in Table 2. These data will be used to better characterize groundwater/surface-water interactions along these creeks. Task 3.4 is for the quarterly processing, checking, and uploading of the surface-water-quality data into the database. Collecting Task 3.3 and 3.4 will increase the cost of Task 3 by \$11,495 compared to last fiscal year.

**Task 4—Riparian Habitat Monitoring Program.** Monitoring the extent and quality of the riparian habitat in the Prado Basin is a fundamental component of the PBHSP to characterize how the riparian habitat changes over time. To characterize the impacts of Peace II implementation on the riparian habitat, if any, it is necessary to understand the long-term historical trends of its extent and quality and the factors that have affected it. The riparian habitat monitoring program consists of both regional and site-specific components.

The regional monitoring of riparian habitat is performed via two independent methods that complement each other: mapping and analysis of the riparian habitat using (i) air photos and (ii) the normalized distribution vegetation index (NDVI) derived from the Landsat remote-sensing program. Tasks 4.1, 4.2, and 4.3 are for the collection of data for the regional monitoring of the riparian habitat, and include the following:

- Perform a custom flight (outside professional) to acquire a high-resolution air photo (three-inch pixel) of the Prado Basin during summer 2018. The cost for the air photo is shared with the Orange County Water District (OCWD).
- Catalog and import the 2018 high-resolution air photo to ArcGIS, and digitize the extent of the riparian habitat.
- Collect, review, and upload the Landsat NDVI data for water year 2018.

Task 4.4 is for research and refinement of the regional monitoring methods, as-needed. This includes coordination with OCWD and others to research and identify regional monitoring methods of the riparian habitat that can complement and validate the NDVI data. This includes review of a pilot study that the OCWD is conducting at two transects in Prado Basin during 2018 using infrared imagery collected from drones to analyze vegetation health.

Site-specific monitoring of the riparian habitat consists of periodic field surveys of the riparian vegetation at selected locations. These surveys provide an independent measurement of

vegetation quality that can be used to “ground truth” the regional monitoring of the riparian habitat. To date, the field surveys have been conducted by USBR and OCWD staff once every three years. The upcoming *Annual Report of the PBHSC for Fiscal Year 2016/17* will be finalized in June 2018, and will include a literature review of field-survey methods that are favorable for ground truthing the NDVI results. No field surveys are planned for FY 2018/19.

Task 4.5 is for research and refinement of the site-specific monitoring methods. This includes effort to identify and contract with a biological expert with experience in groundwater-dependent ecosystems to review the field-survey methods used thus far for the PBHSP, perform independent research, and provide recommendations for field surveys and/or other site-specific monitoring methods for the PBHSP.

Task 4.6 is for planning and coordination for the next field survey that is scheduled for Summer 2019. This may include completing the same scope as past field surveys performed by the USBR and OCWD, or implementing new monitoring methods that are recommended by the biological expert in Task 4.5.

**Task 5 – Climate Monitoring Program.** Climatic data are evaluated in the vicinity of the Prado Basin to characterize trends, and to determine if these trends contribute to impacts on the riparian habitat. The climate monitoring program utilizes publicly-available data sets. Two types of datasets are compiled: time-series data measured at weather stations and spatially-gridded datasets. Task 5 includes the annual collection of the time-series data and spatially-gridded datasets for water year 2018 (October 2017 – September 2018), and the processing, checking, and uploading of the data to the PBHSP database. The scope of this task is consistent with the work performed for the previous fiscal year.

**Task 6—Prepare Annual Report of the PBHSC.** This task involves the analysis of the data sets generated by the PBHSP through water year 2018. The results and interpretations generated from the data analysis will be documented in the *Annual Report for Prado Basin Habitat Sustainability Committee for Water Year 2017/18*. This task includes the effort to prepare an administrator draft report for Watermaster and IEUA staff review, a draft report for the review by the PBHSC, and a final report including comments and responses. A PBHSC meeting will be conducted in May 2019 to review the draft report and facilitate comments on the report. The scope of this task is consistent with the work performed for the previous fiscal year.

**Task 7—Project Management and Administration.** This task includes the effort to prepare the PBHSP scope, schedule, and budget for the subsequent fiscal year. A draft *Technical Memorandum Recommended Scope and Budget of the Prado Basin Habitat Sustainability Program for FY 2019/20* will be submitted to the PBHSC in February/March 2019. A PBHSC

meeting will be conducted in March 2019 to review the draft recommended scope and budget and facilitate comments. Also included in this task is project administration, including management of staffing and monthly financial reporting. The scope of this task is consistent with the work performed for the previous fiscal year.

**Table 1**  
**Work Breakdown Structure and Cost Estimate**  
*Prado Basin Habitat Sustainability Program -- FY 2018/19*

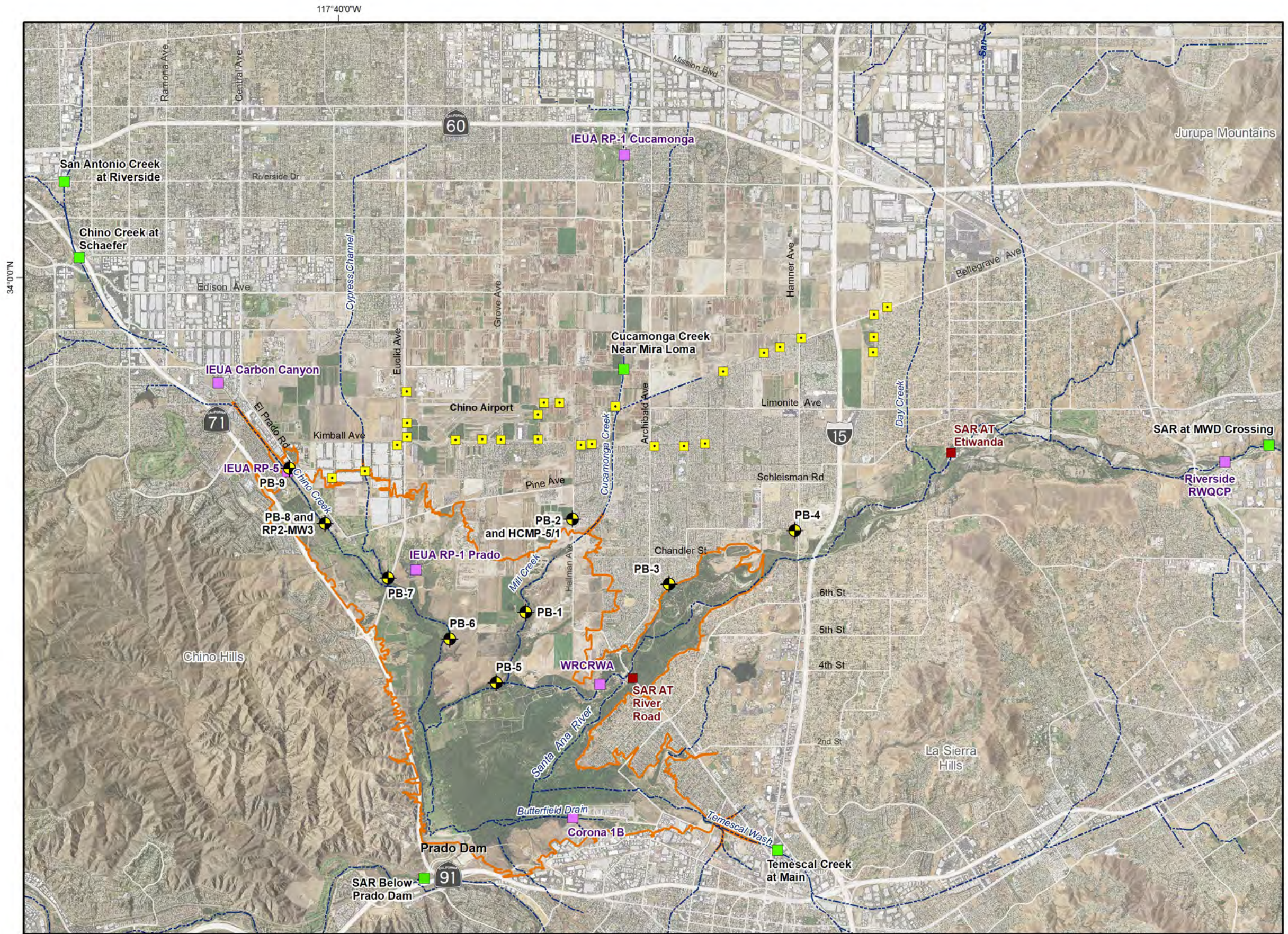
Task Description	Labor Total			Other Costs		Notes	Totals						
	No. of sites	Person Days	Total	Total	Recommended Budget 2018/19		Budget 2017/18	Budget 2016/17 (Spent)	Difference 2017/18 to 2018/19	Difference 2016/17 to 2018/19	IEUA Share 2018/19	CBWM Share 2018/19	
<b>Task 1: Groundwater Level Monitoring Program</b>		<b>11.4</b>	<b>\$12,856</b>	<b>\$782</b>			<b>\$13,638</b>	<b>\$11,931</b>	<b>\$11,600</b>	<b>\$1,707</b>	<b>\$2,038</b>	<b>-</b>	<b>\$13,638</b>
1.1 Collect Transducer Data from PBHSP Wells (Quarterly)	18	5.0	\$4,792	\$782			\$5,574						
1.2 Collect, Check, and Upload Transducer Data from PBHSP Wells (Quarterly)	18	6.4	\$8,064	\$0			\$8,064						
<b>Task 2: Groundwater Quality Monitoring Program</b>		<b>6.6</b>	<b>\$13,612</b>	<b>\$10,428</b>			<b>\$24,040</b>	<b>\$49,055</b>	<b>\$67,422</b>	<b>-\$25,015</b>	<b>-\$43,382</b>	<b>-</b>	<b>\$24,040</b>
2.1 Initiate a Pilot Test of High-Frequency Water Quality Monitoring using EC and Temperature Probes	4	3.3	\$3,879	\$6,336			\$10,215						
2.2 Collect, Check, and Upload High-Frequency Probe Data from Pilot Monitoring Program (Quarterly)	4	2.4	\$3,123	\$0			\$3,123						
2.3 Collect, Check, and Upload Grab Sample General Mineral Chemistry Data (Quarterly)	4	6.6	\$6,610	\$4,092			\$10,702						
<b>Task 3: Surface Water Monitoring Program</b>		<b>2.8</b>	<b>\$12,940</b>	<b>\$2,033</b>			<b>\$14,973</b>	<b>\$3,744</b>	<b>\$3,800</b>	<b>\$11,229</b>	<b>\$11,173</b>	<b>-</b>	<b>\$14,973</b>
3.1 Collect, Check, and Upload Surface Water Discharge and Quality Data from POTWs, and Dam Level data from the ACOE (Annual)		2.0	\$2,470	\$0			\$2,470						
3.2 Collect, Check, and Upload Surface Water Discharge and Quality Data from USGS gaging stations (Annual)		0.8	\$1,008	\$0			\$1,008						
3.3 Design and Conduct a Surface Water-Quality Monitoring at Chino and Mill Creeks (Quarterly)	2	7.0	\$6,793	\$2,033			\$8,826						
3.4 Check and Upload Grab Surface Water Quality Field and Lab Data (Quarterly)	2	2.0	\$2,669	\$0			\$2,669						
<b>Task 4: Riparian Habitat Monitoring Program</b>		<b>22.5</b>	<b>\$31,138</b>	<b>\$20,000</b>			<b>\$56,194</b>	<b>\$50,342</b>	<b>\$145,927</b>	<b>\$5,852</b>	<b>-\$89,733</b>	<b>\$28,097.2</b>	<b>\$28,097.2</b>
4.1 Perform a Custom Flight to Acquire a High-Resolution 2018 Air Photo of the Prado Basin		0.8	\$1,224	\$10,000	1		\$11,224						
4.2 Catalog, Check, and Digitize the Extent of the Riparian Vegetation in the 2018 Air Photo of the Prado Basin		3.7	\$5,234	\$0			\$5,234						
4.3 Collect, Check, and Upload 2018 Landsat NDVI Data to the PBHSP Database		5.0	\$7,240	\$0			\$7,240						
4.4 Research and Refine Regional Monitoring Methods		4.0	\$7,008	\$0			\$7,008						
4.5 Research and Refine Site-Specific Monitoring Methods		6.0	\$10,432	\$10,000			\$20,432						
4.6 Plan and Coordinate the Site-Specific Monitoring Event for Summer 2019		3.0	\$5,056	\$0			\$5,056						
<b>Task 5: Climate Monitoring Program</b>		<b>1.0</b>	<b>\$1,479</b>	<b>\$300</b>			<b>\$1,779</b>	<b>\$1,756</b>	<b>\$1,700</b>	<b>\$23</b>	<b>\$79</b>	<b>\$889.60</b>	<b>\$889.60</b>
5.1 Collect, Check, and Upload Climatic Data (Annual)		1.0	\$1,479	\$300			\$1,779						
<b>Task 6: Prepare Annual Report of the PBHSC</b>		<b>61.0</b>	<b>\$95,747</b>	<b>\$210</b>			<b>\$95,957</b>	<b>\$91,082</b>	<b>\$203,473</b>	<b>\$4,875</b>	<b>-\$107,516</b>	<b>\$47,978.6</b>	<b>\$47,978.6</b>
6.1 Analyze Data and Prepare Admin Draft Report for CBWM/IEUA		44.7	\$70,007	\$0			\$70,007						
6.2 Meet with CBWM/IEUA to Review Admin Draft Report		3.0	\$5,216	\$105			\$5,321						
6.3 Incorporate CBWM/IEUA Comments and Prepare Draft Report: Submit Draft Report to PBHSC		5.0	\$7,152	\$0			\$7,152						
6.4 Meet with PBHSC to Review Draft Report		3.0	\$5,216	\$105			\$5,321						
6.5 Incorporate PBHSC Comments and Finalize Report		5.3	\$8,156	\$0			\$8,156						
<b>Task 7: Project Management and Administration</b>		<b>11.8</b>	<b>\$20,282</b>	<b>\$105</b>			<b>\$20,387</b>	<b>\$19,033</b>	<b>\$23,395</b>	<b>\$1,354</b>	<b>-\$3,008</b>	<b>\$10,193.30</b>	<b>\$10,193.30</b>
7.1 Prepare Scope and Budget for FY 2019-20		4.0	\$6,848	\$0			\$6,848						
7.2 Meet with PBHSC to Review Scope and Budget for FY 2019/20		3.0	\$5,216	\$105			\$5,321						
7.3 Project Administration and Financial Reporting		4.8	\$8,218	\$0			\$8,218						
<b>Totals</b>		<b>232</b>	<b>\$188,054</b>	<b>\$33,858</b>			<b>\$226,968</b>	<b>\$226,943</b>	<b>\$457,317</b>	<b>\$25</b>	<b>-\$230,349</b>	<b>\$87,159</b>	<b>\$139,810</b>

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

**Table 2**  
**Analyte List for Sample Group PBHSP-2018**

<b>Chemical Parameter</b>	<b>Method Detection Limit</b>	<b>Analysis Method</b>
Alkalinity in CaCO3 units	2	SM2320B
Ammonia Nitrogen	0.05	EPA 350.1
Bicarbonate as HCO3 <i>Calculated</i>	2	SM2320B
Calcium Total ICAP	1	EPA 200.7
Carbonate as CO3 <i>Calculated</i>	2	SM2320B
Chloride	1	EPA 300.0
Hydroxide as OH <i>Calculated</i>	2	SM2320B
Magnesium Total ICAP	0.1	EPA 200.7
Nitrate as Nitrogen by IC	0.1	EPA 300.0
Nitrate as NO3 <i>Calculated</i>	0.44	EPA 300.0
Nitrite as Nitrogen by IC	0.05	EPA 300.0
PH (H3=past HT not compliant)	0.1	SM4500-HB
Potassium Total ICAP	1	EPA 200.7
Sodium Total ICAP	1	EPA 200.7
Specific Conductance, 25 C	2	SM2510B
Sulfate	0.5	EPA 300.0
Silica	0.5	EPA 200.7
Total Dissolved Solids (TDS)	10	E160.1/SM2540C
Total Hardness as CaCO3 by ICP	3	SM 2340B
Total Organic Carbon	0.3	SM5310C/E415.3
Turbidity	0.05	EPA 180.1

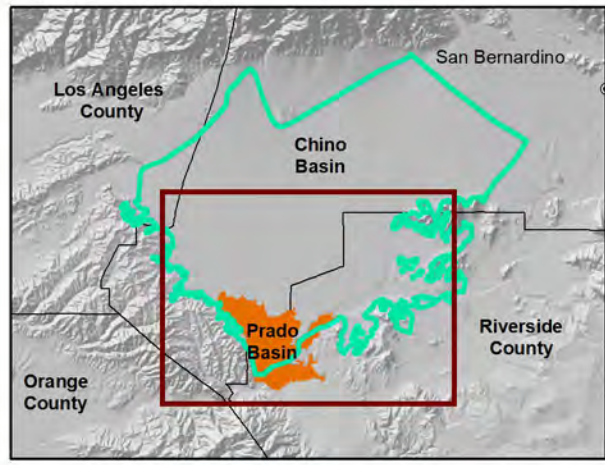




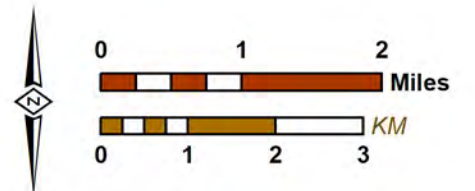
- Groundwater and Surface Water Monitoring Sites**
- PBHSP Well Site (Groundwater Levels and Quality)
  - POTW Discharge Outfall (Discharge and Surface Water Quality)
  - USGS Stream Gage Station (Discharge)
  - Watermaster Santa Ana River Sites - Maximum Benefit Monitoring (Surface Water Quality)

- Other Features**
- Prado Flood Control Basin (Prado Basin)
  - Chino Basin Desalter Authority Well
  - Concrete-Lined Channels
  - Unlined Rivers and Streams

Aerial Photo: USDA, 2014. Mosaic of photos from May 13, 2014 to June 3, 2014



Author: VMW  
Date: 2/14/2018  
File: Figure 1 FY 2017-18 Scope



**Prado Basin Habitat Sustainability Program**  
Fiscal Year 2018/19 Scope, Schedule, and Budget

**Prado Basin Habitat Sustainability Program**  
**Groundwater and Surface Water**  
**Monitoring Sites - Fiscal Year 2018/19**

**Figure 1**