



Technical Memorandum

To:	Prado Basin Habitat Sustainability Committee
From:	Watermaster Engineer – Wildermuth Environmental Inc. (WEI)
Date:	February 27, 2019
Subject:	Recommended Scope and Budget of the Prado Basin Habitat Sustainability Program for FY 2019/20

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 significant adverse impacts associated with implementation of the Peace II Agreement. The AMP is implemented under the guidance and 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 calls for annual data analysis and 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 appropriate.

This memorandum describes the recommended activities for the PBHSP for FY 2019/20 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, 2019.
2. Attend a meeting of the PBHSC at 1:00 pm on March 13, 2019 at Watermaster to discuss the proposed scope-of-work and budget for FY 2019/20.
3. Submit comments and suggested revisions on the scope-of-work and budget for FY 2019/20 by March 27, 2019.

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, budget, and schedule

for FY 2019/20 will be included in the *Annual Report for Prado Basin Habitat Sustainability Committee for Water Year 2017/18* that will be finalized in May 2019.

Recommended Scope of Work and Budget – FY 2019/20

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 a 2016 Agreement.¹ Watermaster is responsible for the costs associated with Tasks 1 through 3; IEUA and Watermaster split costs equally for Tasks 4 through 7. The Orange County Water District (OCWD) also is a cost-sharing partner and provides in-kind services for selected sub-tasks.

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

Task 1—Groundwater-Level Monitoring Program. The monitoring of groundwater levels in the Prado Basin is a key component of the PBHSP because 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 in 2015. These wells, plus monitoring wells HCMP-5/1 and RP3-MW3, are monitored for groundwater levels. Figure 1 shows these 18 PBHSP monitoring wells located at nine sites in the Prado Basin along the fringes of the riparian habitat. The 18 monitoring wells are equipped with integrated pressure-transducers/data-loggers that measure and record water-level measurements every 15 minutes. This task includes quarterly field visits to all 18 PBHSP monitoring wells to download data. All data will be checked and uploaded to the PBHSP 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 quality and flow 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.

Since the PBHSP monitoring wells were constructed in 2015, groundwater-quality monitoring has been tailored to discern the groundwater/surface-water interactions that are important to the sustainability of the riparian habitat in Prado Basin. During the current fiscal year 2018/19, a pilot monitoring program was initiated at four monitoring wells at two locations along Chino Creek (PB-7 and PB-8). Probes were installed in the four monitoring wells (and in Chino Creek adjacent to the well locations; see Task 3) to measure and record EC, temperature, and water levels at a 15-minute frequency. Grab samples of groundwater were also collected quarterly for EC, temperature, and general mineral analyses. The purpose of the pilot monitoring program is to determine if the high-frequency data better reveals the groundwater/surface-water interactions and enhances the interpretation of the general mineral data derived from grab sampling. The

¹ 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.

data collected for this pilot monitoring program in 2018/19 is limited, but shows promise, and will be charted and described in the annual report. We recommend continuing the pilot monitoring program in fiscal year 2019/20 to confirm the observations and interpretations derived from the limited data collected to date. The monitoring wells will be visited quarterly to download the data from the probes and collect grab samples for laboratory analyses of the general mineral analytes listed in Table 2. All data will be checked and uploaded to the PBHSP database.

Task 3—Surface-Water Monitoring Program. Surface-water discharge data from the Santa Ana River and the tributaries that cross Prado Basin are evaluated to characterize the influence of surface-water discharge 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.

Tasks 3.1 and 3.2 include the annual collection of the USGS, POTW, and ACOE data for water year 2019, 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.

Surface water-quality data are also collected and analyzed to help characterize groundwater/surface water interactions. During the current fiscal year 2018/19, a pilot monitoring program was initiated at two locations along Chino Creek adjacent to wells PB-7 and PB-8. At these locations, probes were installed in Chino Creek to measure and record EC, temperature, and stage at 15-minute intervals in coordination with the similar high-frequency monitoring at PB-7 and PB-8. Grab samples of surface water were also collected quarterly for EC, temperature, and general mineral analyses. As described above for *Task 2 – Groundwater-Quality Monitoring Program*, the purpose of the pilot monitoring program is to determine if the high-frequency data better reveals the groundwater/surface-water interactions and enhances the interpretation of the general mineral data derived from grab sampling. The data collected for this pilot monitoring program in 2018/19 is limited, but shows promise, and will be charted and described in the annual report. We recommend continuing the pilot monitoring program in fiscal year 2019/20 to confirm the observations and interpretations derived from the limited data collected to date. To continue this monitoring program, two probes will need to be purchased and reinstalled using a different configuration along the creek channel that is more protected from large storm events that destroyed the probes in late 2018 and early 2019. The probes will be visited quarterly to download the data and to collect grab samples for laboratory analyses of the general mineral analytes listed in Table 2. All data will be checked and uploaded to the PBHSP database.

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 (via outside professional services) to acquire a high-resolution air photo (three-inch pixel) of the Prado Basin during summer 2019. The cost for the air photo is shared with OCWD.
- Catalog and review the 2019 high-resolution air photo in ArcGIS and digitize the extent of the riparian habitat.
- Collect, review, and upload the Landsat NDVI data for water year 2019.

The 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 United States Bureau of Reclamation (USBR) and OCWD once every three years. The last field survey was conducted in the summer of 2016. During the current fiscal year, the PBHSP scope included working with a biological expert with experience in groundwater-dependent ecosystems to review the field-survey methods used thus far in the PBHSP and provide recommendations for modifications to the field surveys.

Task 4.4 is to conduct field surveys at the 40 sites monitored in 2016 to continue the time-series of field measurements of the quality of the riparian vegetation at these sites. The field surveys will be performed by the USBR staff. Assistance from the OCWD staff, as needed, will be provided as in-kind services. This may include completing the same scope as past field surveys performed by the USBR and OCWD but may include implementing new monitoring methods that are recommended by the biological expert. The location of the field survey sites are shown on Figure 1.

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 2018/19 (October 2018 – September 2019), and the 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 2019. 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 2018/19*. 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 2020 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 2020/21* will be submitted to the PBHSC in February 2020. A PBHSC meeting will be conducted in March 2020 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.

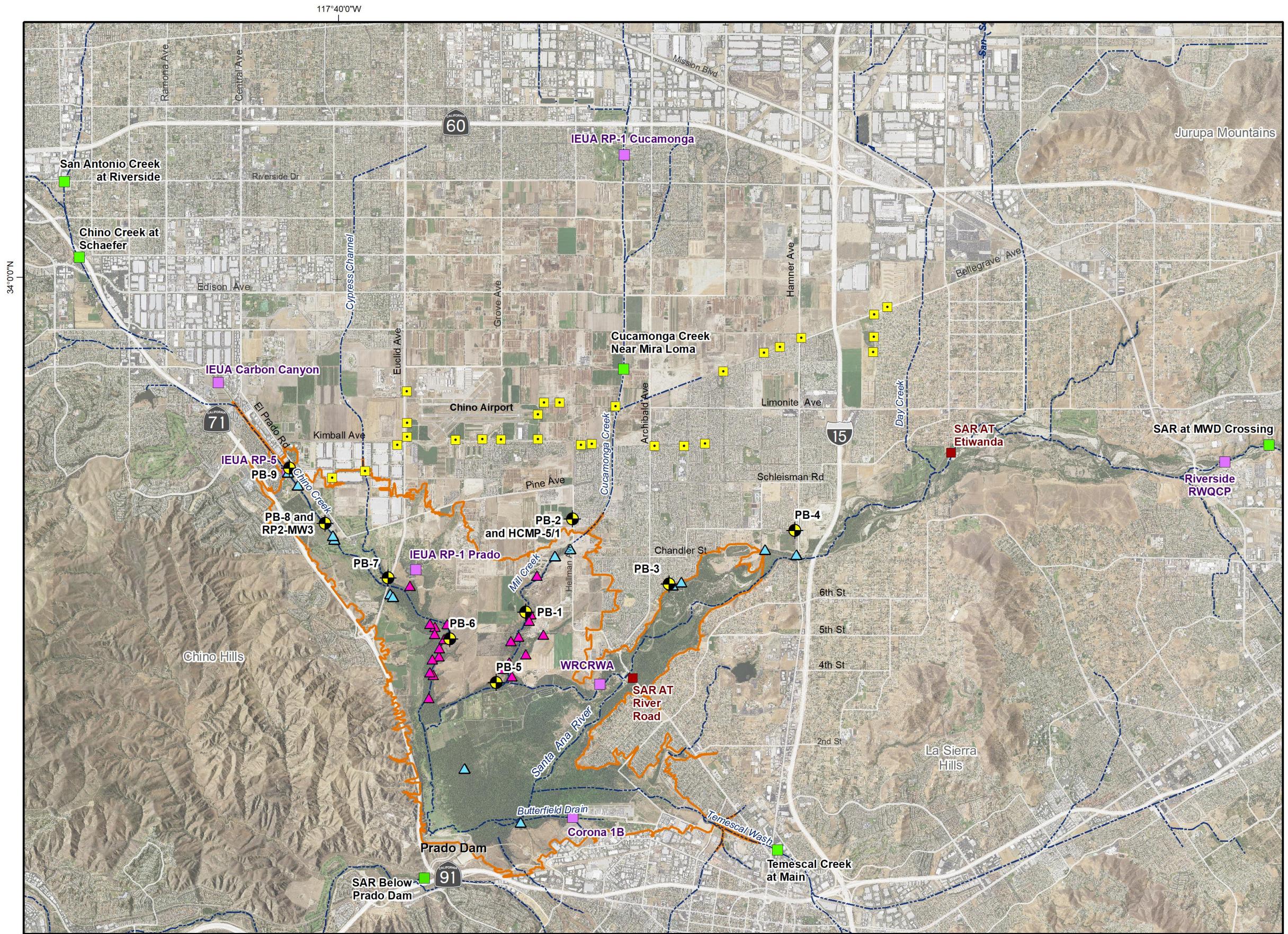
Table 1
Work Breakdown Structure and Cost Estimate
Prado Basin Habitat Sustainability Program -- FY 2019/20

Task Description	No. of sites	Labor Total		Other Costs						Notes	Totals						
		Person Days	Total	Travel	Equip. Rental	Lab	Outside Pro	Equip	Total		Recommended Budget 2019/20	Budget 2018/19	Budget 2017/18 (Spent)	Budget 2016/17 (Spent)	Difference 2018/19 to 2019/20	IEUA Share 2019/20	CBWM Share 2019/20
Task 1: Groundwater Level Monitoring Program		11.4	\$13,438						\$782		\$14,220	\$13,638	\$12,644	\$11,600	\$582	-	\$14,220
1.1 Collect Transducer Data from PBHSP Wells (Quarterly)	18	5.0	\$4,952	\$590	\$192				\$782		\$5,734						
1.2 Collect, Check, and Upload Transducer Data from PBHSP Wells (Quarterly)	18	6.4	\$8,486						\$0		\$8,486						
Task 2: Groundwater Quality Monitoring Program		6.6	\$11,422						\$4,092		\$15,514	\$24,040	\$43,468	\$67,422	-\$8,525	-	\$15,514
2.1 Collect, Check, and Upload High-Frequency Probe Data from Pilot Monitoring Program (Quarterly)	4	4.0	\$4,576						\$0		\$4,576						
2.2 Collect, Check, and Upload Grab Sample General Mineral Chemistry Data (Quarterly)	4	6.6	\$6,846	\$472	\$820	\$2,800			\$4,092		\$10,938						
Task 3: Surface Water Monitoring Program		2.7	\$27,375						\$6,183		\$33,558	\$14,973	\$4,166	\$3,800	\$18,585	-	\$33,558
3.1 Collect, Check, and Upload Surface Water Discharge and Quality Data from POTWs, and Dam Level data from the ACOE (Annual)		1.9	\$2,477						\$0		\$2,477						
3.2 Collect, Check, and Upload Surface Water Discharge and Quality Data from USGS gaging stations (Annual)		0.8	\$1,061						\$0		\$1,061						
3.3 Install Probes in Chino Creek for High-Frequency Monitoring of EC and Temperature in Surface Water		7.0	\$9,898	\$95				\$4,000	\$4,095		\$13,993						
3.4 Collect, Check, and Upload High-Frequency Probe Data for Chino Creek from Pilot Monitoring Program (Quarterly)	2	6.8	\$6,970	\$472	\$108				\$580		\$7,550						
3.5 Field and Lab Data for Chino Creek from Pilot Monitoring Program (Quarterly)	2	6.8	\$6,970		\$108	\$1,400			\$1,508		\$8,478						
Task 4: Riparian Habitat Monitoring Program		14.5	\$24,044						\$56,000		\$80,044	\$56,194	\$46,902	\$145,927	\$23,850	\$40,022.00	\$40,022.00
4.1 Perform a Custom Flight to Acquire a High-Resolution 2019 Air Photo of the Prado Basin		0.8	\$1,314				\$10,000		\$10,000	1	11,314						
4.2 Catalog, Check, and Review the Extent of the Riparian Vegetation in the 2019 Air Photo of the Prado Basin		4.0	\$6,792						\$0		6,792						
4.3 Collect, Check, and Upload 2019 Landsat NDVI Data to the PBHSP Database		5.8	\$8,650						\$0		\$8,650						
4.4 Conduct the Site-Specific Monitoring Event for Summer 2019		4.0	\$7,288				\$46,000		\$46,000		\$53,288						
Task 5: Climate Monitoring Program		1.3	\$1,980						\$0		\$1,980	\$1,779	\$1,505	\$1,700	\$201	\$990.00	\$990.00
5.1 Collect, Check, and Upload Climatic Data (Annual)		1.3	\$1,980						\$0		\$1,980						
Task 6: Prepare Annual Report of the PBHSC		60.3	\$100,224						\$210		\$100,434	\$95,957	\$95,115	\$203,473	\$4,477	\$50,217.00	\$50,217.00
6.1 Analyze Data and Prepare Admin Draft Report for CBWM/IEUA		44.0	\$73,008						\$0		\$73,008						
6.2 Meet with CBWM/IEUA to Review Admin Draft Report		3.0	\$5,536	\$105					\$105		\$5,641						
6.3 Incorporate CBWM/IEUA Comments and Prepare Draft Report: Submit Draft Report to PBHSC		5.0	\$7,536						\$0		\$7,536						
6.4 Meet with PBHSC to Review Draft Report		3.0	\$5,536	\$105					\$105		\$5,641						
6.5 Incorporate PBHSC Comments and Finalize Report		5.3	\$8,608						\$0		\$8,608						
Task 7: Project Management and Administration		11.8	\$21,570						\$105		\$21,675	\$20,387	\$18,052	\$23,395	\$1,288	\$10,837.30	\$10,837.30
7.1 Prepare Scope and Budget for FY 2020/21		4.0	\$7,288						\$0		\$7,288						
7.2 Meet with PBHSC to Review Scope and Budget for FY 2020/21		3.0	\$5,536	\$105					\$105		\$5,641						
7.3 Project Administration and Financial Reporting		4.8	\$8,746						\$0		\$8,746						
Totals		225	\$200,053	\$1,354	\$1,036	\$4,200	\$56,000	\$4,000	\$67,372		\$267,425	\$226,968	\$221,852	\$457,317	\$40,457	\$102,066	\$165,359

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

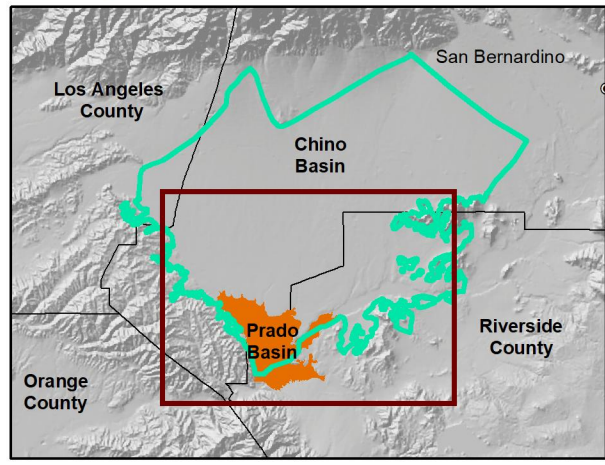
Table 2
Analyte List for the PBHSP

Chemical Parameter	Method Detection Limit	Analysis Method
Alkalinity in CaCO ₃ units	2	SM2320B
Ammonia Nitrogen	0.05	EPA 350.1
Bicarbonate as HCO ₃ <i>Calculated</i>	2	SM2320B
Calcium Total ICAP	1	EPA 200.7
Carbonate as CO ₃ <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 NO ₃ <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 CaCO ₃ by ICP	3	SM 2340B
Total Organic Carbon	0.3	SM5310C/E415.3
Turbidity	0.05	EPA 180.1

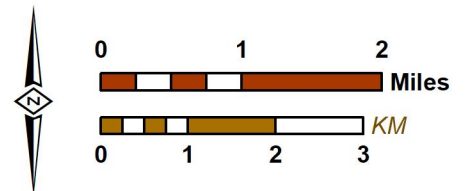


- Groundwater and Surface Water Monitoring Sites**
- PBHSP Well Site (Groundwater Levels and Quality)
 - POTW Discharge Outfall (Discharge and Surface Water Quality)
 - USGS Stream Gage Station (Discharge)
 - Watermaster Santa Ana River Sites - Maximum Benefit Monitoring (Surface Water Quality)
- Vegetation Field Survey Sites**
- Locations Surveyed in 2007, 2013, and 2016
 - Locations Surveyed in 2016
- Other Features**
- Prado Basin Management Zone (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



Prepared by:
 Author: VMW
 Date: 2/26/2019
 File: Figure 1 FY 2019-20 Scope



Prado Basin Habitat Sustainability Program
 Fiscal Year 2019/20 Scope and Budget

Prado Basin Habitat Sustainability Program
Monitoring Sites - Fiscal Year 2019/20

Figure 1