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February 2, 2025
Project No: 20-10008

Bryan Bondy, PG, CHG, Executive Director
Upper Ventura River Groundwater Agency
202 West El Roblar Drive
Ojai, California 93023
Via email: bbondy@uvrgroundwater.org

Subject: Aquatic Groundwater Dependent Ecosystems Annual Data Deliverable and Three-Year Monitoring Report for Water Years 2022-2025
Upper Ventura River Groundwater Agency, Ventura County, California

Dear Mr. Bondy:

Rincon Consultants, Inc. (Rincon) has prepared this report to deliver annual data for Water Year (WY) 2025 (October 1, 2024, through September 30, 2025) for Aquatic Groundwater Dependent Ecosystem (Aquatic GDE) monitoring activities performed at two Aquatic GDEs (Confluence Aquatic Habitat Area [Confluence] and Foster Park Aquatic Habitat Area [Foster Park]) located within the Upper Ventura River Groundwater Basin in Ventura County, California (Figure 1). A summary report is also provided for the three-year monitoring period from WY 2023 through 2025 (October 1, 2022, through September 30, 2025), offering key observations and trends, as well as preliminary conclusions and recommendations for ongoing monitoring.

As outlined in the 2022 Aquatic GDE workplans (Rincon 2022a; Rincon 2022b) and pursuant to the Upper Ventura River Groundwater Agency (UVRGA) Groundwater Sustainability Plan (UVRGA 2022), the purpose of the Aquatic GDE Monitoring Programs is to assess significant and unreasonable impacts that may be caused by groundwater pumping on the Aquatic GDEs.

This report was prepared in accordance with UVRGA's *Monitoring and Data Collection Protocols and Data Quality Control Review Procedures and* is consistent with the previous reporting activities from WYs 2023 and 2024 (Rincon 2024a; Rincon 2025a).

Summary of Monitoring Activities for Water Year 2025

Descriptions of data collected for each of the monitoring program components are provided in Table 1. These components have been implemented since WY 2023 in accordance with the Aquatic GDE monitoring workplans and subsequent amendments.

Table 1 Monitoring Program Components

Monitoring Component	Data Collected
Habitat Mapping	Map aquatic mesohabitats in the Aquatic GDEs
Fish Stranding and Mortality Surveys[1]	Document any observed fish stranding and/or mortality that might occur as streamflow recedes and becomes discontinuous. The extent of wetted and dry portions of the river will also be documented to illustrate areas that can lead to stranding or habitat isolation
Routine Habitat Suitability and Snorkel Surveys	Survey habitat suitability parameters, including sediment type, riparian vegetation/cover, water depth, and various in-stream structure, as well as all species observed, within predetermined pools, riffles, and runs. Steelhead presence/absence will be documented. Fish stranding/mortality will also be documented

Monitoring Component	Data Collected
Water Quality and Flow Monitoring	Continuous dissolved oxygen, pH, temperature, water level, instantaneous discharge, river cross sections and slope
Aerial Photography	Aerial images
Repeat Ground Photography	Photographs of instream and riparian habitat from fixed locations

[1] Completed for the Confluence Aquatic Habitat Area only

Water Quality and Flow Monitoring

In accordance with the Aquatic GDE workplans, field monitoring activities were reinitiated in April 2025 when flow rates receded to levels safe for instream field work following the winter rains of WY 2025. On April 14, 2025, field work was conducted to install water quality data loggers (pH, dissolved oxygen [DO], and temperature) and stream gauges equipped with Solinst Levelogger automated pressure transducers at the upstream and downstream reaches of the Aquatic GDEs. See Figure 1 for locations of data loggers and pressure transducers. The United States Geological Survey (USGS) stream gauge located at Downstream Foster Park (DS Foster Park) (Ventura R NR Ventura – 11118500) is being used for this project and a UVRGA stream gauge was not established at this site. All water quality and level loggers were collecting data by April 25, 2025. There were no adjacent side channels active in the vicinity of the selected monitoring sites in WY 2025. Therefore, recorded water quality results, flow measurements, rating curve development, and derived hydrographs are a comprehensive representation of water quality conditions and flow dynamics within the river at each site.

As completed in previous monitoring years, instantaneous discharge measurements (Figure 2) were collected to support rating curve development for low flows conditions (i.e., below 20 cubic feet per second [cfs]). Rincon developed stage-discharge rating curves for each site using HydroCalc Version 3.0c software (HydroCalc), which utilizes Manning's equation to model flow rates from observed depth of water and channel dimensions (Figure 3 and Figure 4). Manning's roughness coefficients were selected based on substrate type present at each monitoring site.

Calibration of the rating curves involved utilizing field-derived flow measurements, and a best-fit curve was applied to the HydroCalc outputs to establish an equation for calculating discharge rates based on stream depths at the thalweg. See Figure 5, Figure 6, and Figure 7 for Upstream Confluence (US Confluence), Downstream Confluence (DS Confluence), and Upstream Foster Park (US Foster Park) rating curves, respectively. The resulting calculated discharge rates using the best-fit curve equation were used to generate the hydrographs (Figure 8, Figure 9, and Figure 10), While Manning's equation-derived rating curves may exhibit inaccuracies beyond the calibration data range, the pressure transducer-derived depths consistently fell within the established calibration range, resulting in reliable calculated flow rates for low-flow conditions throughout the monitoring period. The hydrograph for DS Foster Park using USGS data is provided in Figure 11.

The hydrograph creation for DS Confluence required a different approach as the level data collected at the site did not correlate with overall reduction in flow over the course of monitoring. While daily data appears to capture diurnal fluctuations, instantaneous flow measurements collected at the site showed that the primary reduction in flow at the site was generally due to a decrease in velocity rather than a change in cross-sectional area. Figure 6 The substrate at this monitoring location is sandy, and extensive algae growth was observed during site visits, which may have impacted the correlation between level and flow. To create the hydrograph shown in Figure 9, a best fit exponential line of the instantaneous flow data was used to interpolate flow data between monthly points on the best fit line using level changes from the transducer data to capture diurnal fluctuations. Level data prior to May 26, 2025, and from October 22, 2025, to the end of the data record were unable to be correlated to flow, as during both time periods level increased while flow decreased.

Figure 12, Figure 13, and Figure 14 present pH, DO, and temperature data and in situ measurements, respectively. As noted in these figures for US Foster Park, wide fluctuations in pH and DO data are likely attributed to the drying of the stream at this monitoring location and are not true representations of the water quality.

Fish Stranding and Mortality, Routine Habitat Suitability, Snorkel Surveys, and Repeat Ground Photography

The specific monitoring locations established in WY 2023 (Rincon 2024a) remained the same in 2025. Observations made by fisheries biologists through WY 2025 indicated that no significant changes to the habitat structure occurred to the Aquatic GDEs. During the routine habitat suitability and snorkel surveys, Rincon documented localized groundwater influence within the Aquatic GDEs. These areas were identified by the change in temperature along small sections within multiple habitat unit types, particularly in pools where it is easier to detect.

Figure 15 through Figure 21 depict the mesohabitats and snorkel survey locations for the Aquatic GDEs. Table 5 presents snorkel survey data, which includes observations of threespine stickleback (*Gasterosteus aculeatus*), arroyo chub (*Gila orcuttii*), common carp (*Cyprinus carpio*), and one unknown fish species that was too small to identify. Southern California steelhead (*Oncorhynchus mykiss irideus* pop. 10) and Pacific lamprey (*Entosphenus tridentatus*) were not observed during the surveys; however, Pacific lamprey ammocetes were observed during non-project related surveys within Foster Park Aquatic GDE (Rincon 2024b; S. Howard, personal communication, September 23, 2025).

During WY 2025, more frequent observations were made during low flow conditions to assess whether fish stranding and/or mortality is occurring within the Confluence Aquatic GDE area. Rincon conducted four fish stranding and mortality surveys in the Confluence Aquatic GDE during months with receding streamflow. While no fish mortality was observed during the WY, three isolated pools containing stranded fish were documented during the surveys, one of which was documented to have localized groundwater influence. Repeat ground photography can be found in the ArcGIS Online Web Map (Attachment 1).

Aerial Photography

Aerial photography collected during WYs 2023 through 2025 for the South Santa Ana and Foster Park Riparian GDE Units is provided in Figure 22 and Figure 23. These Riparian GDE Units cover a larger area and include the Aquatic GDEs. The figures present orthomosaic raster images collected using a drone flown along predesignated flight paths. This aerial photography is accessible through the ArcGIS Online Web Map (Attachment 1), which allows the viewer to zoom into specific locations with fine scale resolution. These data offer a clear illustration of the Aquatic GDE extents and changing conditions over the WY 2025.

WY 2025 Monitoring Data Transmittal

Attachment 1 provides the ArcGIS Online Web Map used to maintain the biological field monitoring data collected using electronic tablets with ArcGIS Collector software and high accuracy GPS devices. Table 2 provides a summary of the ArcGIS Online web map layers and features. This geodatabase stores and presents all Aquatic GDE monitoring data except for the water quality and flow monitoring components. Attachment 2 provides the excel files of raw and processed data for water quality and flow monitoring, including quality assurance and control notes along with time series charts for data visualization and assessment. Attachment 3 presents the Report Figures referenced above and in the following section.

Table 2 Monitoring Summary Water Year 2025

Monitoring Component	Date Collected	Raw Data Transmittal Location
Habitat Mapping	Completed prior to WY 2025 (November 22 -23, 2022 and July 24-26, 2023)	Attachment 1 ArcGIS Online UVRGA Aquatic GDE Monitoring Web Map
Fish Stranding and Mortality Surveys[1]	July 22, August 26, and September 26, 2025	Attachment 1 ArcGIS Online UVRGA Aquatic GDE Monitoring Web Map
Routine Habitat Suitability and Snorkel Surveys	February 3, June 17, and September 10, 2025	Attachment 1 ArcGIS Online UVRGA Aquatic GDE Monitoring Web Map
Water Quality and Flow Monitoring	Continuous data loggers installed April 14, 2025 **Cross Sections:** August 26 and August 27, 2025 **In Situ Water Quality and Data Downloads:** May 29, 2025, June 4, 2025, June 26, 2025, July 25, 2025, August 26, 2025, August 27, 2025, September 26, 2025, October 22, 2025, and November 11, 2025 **Instantaneous Discharge:** April 14, 2025, May 29, 2025, June 4, 2025, June 26, 2025, July 25, 2025, August 26, 2025, August 27, 2025, September 26, 2025, October 22, 2025, and November 11, 2025	Attachment 2 **Excel file for water quality monitoring component:** *UVRGA_Water_Quality Data_WY 2025.xlsx* **Sheets included:** *"In Situ," "pH"," DO", "Charts for Report"* **Excel sheets for flow monitoring component:** *UVRGA_Flow_Data_WY 2025.xlsx* **Sheets included:** *"Field Flow Rate Summary" and individual monitoring location sheets for "Rating Curves," "Hydrographs" (stage and calculated flow), and "Morphology" (cross section and slope)*
Aerial Photography	February 3, 2025, June 16, 2025, and September 21, 2025	Attachment 1 ArcGIS Online UVRGA Aquatic GDE Monitoring Web Map
Repeat Ground Photography	Photos collected concurrently with all field visits	Attachment 1 ArcGIS Online UVRGA Aquatic GDE Monitoring Web Map

Table 3 ArcGIS Online Layer Description

Monitoring Component	Web Map Layer/Feature Name	Layer Description
Habitat Mapping	"*Habitat Data*"	Habitat mapping data points are provided to indicate mesohabitats that were identified within the Confluence and Foster Park Aquatic GDEs during initial and follow-up habitat mapping events
Routine Habitat Suitability and Snorkel Surveys	"*Habitat Data*"	Routine habitat survey data points present the applicable habitat suitability parameter data for mesohabitats that were both randomly identified monitoring locations and selected "bias" sites deemed as important aquatic habitat areas
	"Snorkel Data"	Snorkel survey data points present observations and pertinent information for mesohabitats that were both randomly identified monitoring locations and selected "bias" sites deemed as important aquatic habitat areas
	"Cross Section Point and Misc. Bio Point"	Presents snorkel points used to collect field notes for follow-up snorkel surveys and cross section elevations used to provide elevations of the wetted area where the LiDAR was not able to obtain
Water Quality and Flow Monitoring	*"Data Logger Location"*	Data logger location presents the locations of DO, pH, temperature, and/or water level data loggers
Aerial Photography	*"Master Aerial Photography"*	Aerial photography presents orthomosaic raster images collected using a drone flown along predesignated flight paths spanning both the Confluence and Foster Park Aquatic GDEs
	"DEM and Hillshade"	DEM/hillshade presents digital elevation model data and hillshade data that were developed for UVRGA under a separate Work Order, and which will be used to assess changing GDE conditions
Repeat Ground Photography	"*Habitat Data*" & *"Snorkel Survey"*	Repeat ground photographs are included at designated photo monitoring locations. Photographs are also collected for each routine survey and snorkel survey monitoring location

[1] Completed for the Confluence Aquatic Habitat Area only

Three-Year Monitoring Summary

Table 4 provides a summary of the preliminary records from Ventura County's Casitas Dam rain gauge (004A[1]) and preliminary streamflow data from the USGS gauge at Foster Park (1118500) for WYs 2022 through 2025 as well as the average discharge and precipitation between WYs 2000 and 2025. Please note that this data is preliminary and subject to change as further validation and updates are conducted by Ventura County and USGS.

Table 4 Precipitation and Discharge Summaries for Water Years 2023-2025 compared to Water Year 2000-2025 Baseline

Water Year	Total Annual Rainfall (inches)	Average Daily Discharge (cfs)	Average Daily Discharge Range (cfs)	Median Daily Discharge (cfs)
2023	47.93	227	1.06 to 14,500	42.7
2024	35.11	120	14.6 to 3,760	42.1
2025	9.86	12.9	4.00 to 240	11.0
2000-2025[1]	20.92	49.6	0.00 to 20,100	5.67

[1] Average precipitation and discharge conditions between 2000 and 2025

Over the past three years, implementation of the Foster Park and Confluence Aquatic GDE monitoring workplans has created a robust dataset and framework for understanding hydrologic and ecological conditions of the Aquatic GDEs and how these conditions vary over time. Initial efforts in WYs 2023 and 2024 resulted in data collection during high and moderate flow periods, which offered insights into habitat composition, connectivity, and ecological function. As the monitoring program was implemented, key insights and lessons were learned and incorporated into the monitoring program through an adaptive management approach. These updates were formally documented through workplan amendments adopted on June 13, 2024, (Rincon 2024c; Rincon 2024d) and September 11, 2025 (Rincon 2025b; Rincon 2025c).

The following sections provide an overview of the key trends and findings, as well as recommendations for ongoing monitoring and assessment activities to inform management decisions pertaining to Aquatic GDEs.

Precipitation and Discharge Conditions

WYs 2023 and 2024 demonstrated sustained above-average precipitation and discharge conditions whereas WY 2025 was characterized by below-average conditions (Table 4; Figure 24 through Figure 27). However, it is noted that average daily discharge is a misleading indicator because it is strongly influenced by peak flow rates, which have little bearing on matters relevant to the GSP. Thus, the median daily discharge is a more relevant indicator for comparisons across years. During WY 2025 the median daily discharge was almost double that of the 2000-2025 period, indicating that discharge was higher than a typical year. The higher than typical median flow despite low rainfall during WY 2025 was the result of antecedent conditions, i.e., a prior wet year.

Following a period of heavy winter storms in January 2023 and ongoing storm activity, elevated discharge conditions maintained continuous connectivity within the Confluence and Foster Park Aquatic GDEs through WY 2023. No mesohabitat fragmentation or pool isolation was observed, indicating that discharge remained well above thresholds associated with hydrologic recession or habitat contraction.

[1] https://vcwatershed.net/fws/reports/rain-season-report#

WY 2024 was also marked by above-average precipitation and elevated discharge. However, flows declined below those observed during WY 2023 resulting in localized pool isolation in the upstream reach of the Confluence GDE. This pattern was corroborated by 2024 orthoimagery, which showed the seasonal activation and subsequent drying of braided side channels in both the US Confluence and US Foster Park areas Aquatic GDEs in the Spring and Fall of 2024, respectively.

Stream discharge in WY 2023 and WY 2024 remained higher than the proposed monitoring triggers defined in the 2025 workplan amendments (Rincon 2025b; Rincon 2025c). Thus, monitoring was limited during these water years. In WY 2025, surface water conditions receded, and monitoring of low-flow conditions was possible starting in June through the start of WY 2026. During WY 2025, low-flow conditions, pool isolations, and the drying of mesohabitat units were observed. However, visual observations during WY 2025 did not indicate any adverse ecological effects as low-flow conditions progressed throughout the year. This suggests that there are pools present with potential ISW conditions that may offer refuge habitat during low flows in the Aquatic GDEs.

Aquatic Habitat Conditions

During WYs 2023 through 2025, the mainstem channels continued to convey the dominant proportion of discharge. Throughout the monitoring period, water quality variables exhibited expected diurnal cycling and remained within ranges considered protective for native aquatic organisms. Visual observations made during the routine habitat and snorkel surveys indicated generally good aquatic habitat conditions persisted throughout the 3-year monitoring period. Southern California steelhead were not observed during surveys in any year. No indirect evidence of their presence, including redds or ammocoetes, was documented during routine monitoring. However, Pacific lamprey ammocoetes were observed in Foster Park in 2025 during a non-project related survey (S. Howard, personal communication, September 23, 2025). In addition, observations of steelhead have been made elsewhere in the Ventura River (S. Howard, personal communication, September 23, 2025), suggesting that these species may be returning to the Ventura River following a period of absence through the previous drought periods of the 2010's.

The WYs 2023 to 2025 monitoring data captures a transition from uniformly high-flow conditions (WY 2023) to the early stages of hydrologic recession and habitat segmentation (WY 2024) to the low-flow conditions and habitat segmentation throughout both Aquatic GDEs (WY 2025).

Restructuring of the Mesohabitat

As discussed in the 2023 Water Year Monitoring Report an initial mesohabitat mapping occurred in Fall 2022 (Rincon 2024a). During the 2022 initial mapping survey, fisheries biologists observed low-flow conditions, and there was habitat segmentation and isolated pools throughout both Aquatic GDEs. A notable observation was that two main channel pools (one in Foster Park Aquatic GDE and one in Confluence Aquatic GDE) had substantially lower temperatures compared to the rest of the watershed, suggesting a connection of groundwater to the surface water. These pools were tentatively selected for routine habitat surveys and snorkel surveys to evaluate habitat suitability for aquatic organisms, as well as to understand the potential influence that interconnected surface water (ISW) may have on aquatic habitat conditions.

Following the flooding events in January 2023, the channel geometry was altered and the mesohabitats within both Aquatic GDEs were reset. Bank-to-bank and wetted widths expanded, and bars and riparian vegetation were scoured, creating braided conditions. A second mesohabitat mapping event was conducted for both Aquatic GDEs in late July 2023. During this survey, widespread alterations were observed, and the influence of ISW was less pronounced during subsequent habitat and snorkel surveys due to elevated surface water flows. Of the two main channel pools identified for

monitoring in the Confluence and Foster Park Aquatic GDE during the initial mapping event, biologists continued to observe groundwater discharge influence and ISW conditions in the Confluence GDE. However, routine habitat and snorkel surveys detected groundwater discharge and ISW conditions in several new mesohabitat units throughout both Aquatic GDEs.

Aquatic Habitat Refuges

WY 2023 and WY 2024 informed our understanding of mesohabitat conditions and seasonal variability during elevated flow conditions. In WY 2025, data were collected during low-flow conditions when flows became discontinuous, and habitat isolation occurred (specifically isolation of pools). These conditions allowed Rincon to assess habitat suitability in defined pools that offer refuge for aquatic organisms during low flow conditions. As flow receded, the habitat conditions within isolated pools sustained lower water temperatures and demonstrated visibly lower turbidity.

Observational data collected within isolated pools during low-flow conditions in WY 2025 indicated the presence of groundwater connection and ISW conditions. Monitoring data also indicate that these pools with potential ISW conditions may offer refuge habitat conditions during low flows in the Ventura River, even as flows become discontinuous, mesohabitat units are isolated, and surrounding ambient conditions deteriorate.

Conclusions

The purpose of the monitoring programs conducted at Foster Park and Confluence are to develop datasets that allow UVRGA to evaluate:

- The appropriateness of the GSP minimum threshold for ISW depletion in the Foster Park Aquatic GDE, and to inform long-term monitoring needs.
- Whether the depletion of ISW is causing significant and unreasonable effects in the Confluence Aquatic GDE, determine whether sustainable management criteria are needed, and to inform potential long-term monitoring needs.

Two of the three years of data collection occurred during high to moderate flow conditions. Data collected during these years (WYs 2023 and 2024) provides important information that reflects habitat suitability and species presence and absence during elevated flow conditions. During times of reduced baseflow, Rincon biologists and watershed scientists observed changing conditions of the aquatic mesohabitats as wetted areas diminished and pools became isolated.

Together, the moderate-to-high and receding flow observations and data offer valuable comparison to the low flow conditions observed in late WY 2025. Data collected during the low-flow conditions of WY 2025 suggest that isolated pools may offer refuge habitat conditions during low flows in the Ventura River, even as flows become discontinuous, mesohabitat units are isolated, and surrounding ambient conditions deteriorate. These areas will be important to monitor during future low-flow conditions to determine habitat suitability and ascertain the impacts of depletion of ISW on these potential refuge areas. With limited data collected during low flow conditions, the conditions of these potential refuge areas are not clearly understood. Additional monitoring would support assessment of how long suitable habitat conditions are sustained during low flow and whether surface flow/discharge measurements are the appropriate metric to indicate habitat suitability and assess potential impacts.

In addition, southern California steelhead were not observed during routine surveys throughout the three-year monitoring period. Rincon biologists anticipate that the Foster Park and Confluence Aquatic GDEs could be used for localized summer refuge, supporting juveniles and occasional adults. These conditions are supported by deep pools with hyporheic exchange (ISW or groundwater-surface water

exchange) and reaches with intact riparian canopy and physical cover (e.g., undercut banks, rootwads or large woody debris, boulder or bedrock structure, complex pool geometry) that offer thermal and predation protection. While these Aquatic GDEs support localized refuge, they primarily function as a seasonal migration corridor and not summer rearing habitat. In light of this, the fact that observations were only possible during one season of low flow conditions, and considering no steelhead were observed, additional monitoring that focuses on these habitat refuge areas (i.e., pools) is needed to answer the questions posed in the GSP.

In summary, stranding of sensitive species was not observed in either Aquatic GDE area and pools were observed that may provide viable holdover habitat during dry periods such that stranding may not lead to substantial stress and/or mortality. However, only one period of low flow conditions occurred during the three-year monitoring period, so the data collected are insufficient to address the questions posed in the GSP.

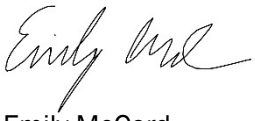
Recommendations

Based on the conclusions reached from three years of monitoring, and as outlined in the 2025 workplan amendments, Rincon recommends continued monitoring activities to focus monitoring efforts on low flow conditions, (Rincon 2025b; Rincon 2025c). These recent amendments to the Aquatic GDE workplans include:

- Flow- and condition-based monitoring triggers for snorkel and habitat surveys in Confluence and Foster Park that target data collection as flows recede below 12.7 cfs and within the following ranges: 5.0 to 7.0 cfs and 3.0 to 5.0 cfs. These targeted surveys at the established flow triggers provide data for specific flow ranges that are currently missing from the monitoring program's dataset. Few surveys have been completed at or below 7cfs and5 cfs (between WY 2023 and 2025). The 5.0 to 7.0 cfs flow range is important for data collection as flows recede and change the habitat suitability conditions and flows below 5.0 cfs are when many riffles and runs are expected to dry and pool isolation is likely to occur. Together, data collected within these flow triggers will support habitat suitability assessment and the ability to determine what types of impacts, if any, may occur.
- Targeted continuous water quality monitoring in areas of habitat refuge (e.g., pools) of the Aquatic GDEs during low flow conditions. These pools are deeper than the surrounding habitat features and have been documented and mapped throughout the 3-year monitoring period. A characteristic of these pools, which is important to aquatic species, is their cooler water temperatures when compared to the ambient, shallower surface water. While continuous water quality monitoring occurs at two established sites in each of the Aquatic GDEs, targeted continuous water quality monitoring at these potential habitat refuge areas will support UVRGA's understanding of these refuge areas and consideration of potential significant and unreasonable effects. The water quality conditions in these potential refuge areas are of particular importance when flows recede and/or when channel conditions are shallow across the Aquatic GDE (e.g., during braided or spread-out flows).

We appreciate Rincon's opportunity to support this project. Please do not hesitate to contact us if you have any questions.

Sincerely,
Rincon Consultants, Inc.



Emily McCord
Senior Watershed Scientist

Charleen Rode
Senior Aquatic Biologist

Kiernan Brtalik
Director Watershed Sciences

Attachments

Attachment 1 ArcGIS Online UVRGA Aquatic GDE Monitoring Web Map (https://experience.arcgis.com/experience/1154e1f8252444a1972d831cff528df7)
Attachment 2 Water Quality and Flow Data (provided electronically)
Attachment 3 Report Figures

References

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Attachment 1

ArcGIS Online UVRGA Aquatic GDE Monitoring Web Map
(https://experience.arcgis.com/experience/1154e1f8252444a1972d831cff528df7)

Attachment 2

Water Quality and Flow Data (provided electronically)

Attachment 3

Report Figures

Figure 1 Habitat Area Aquatic GDEs

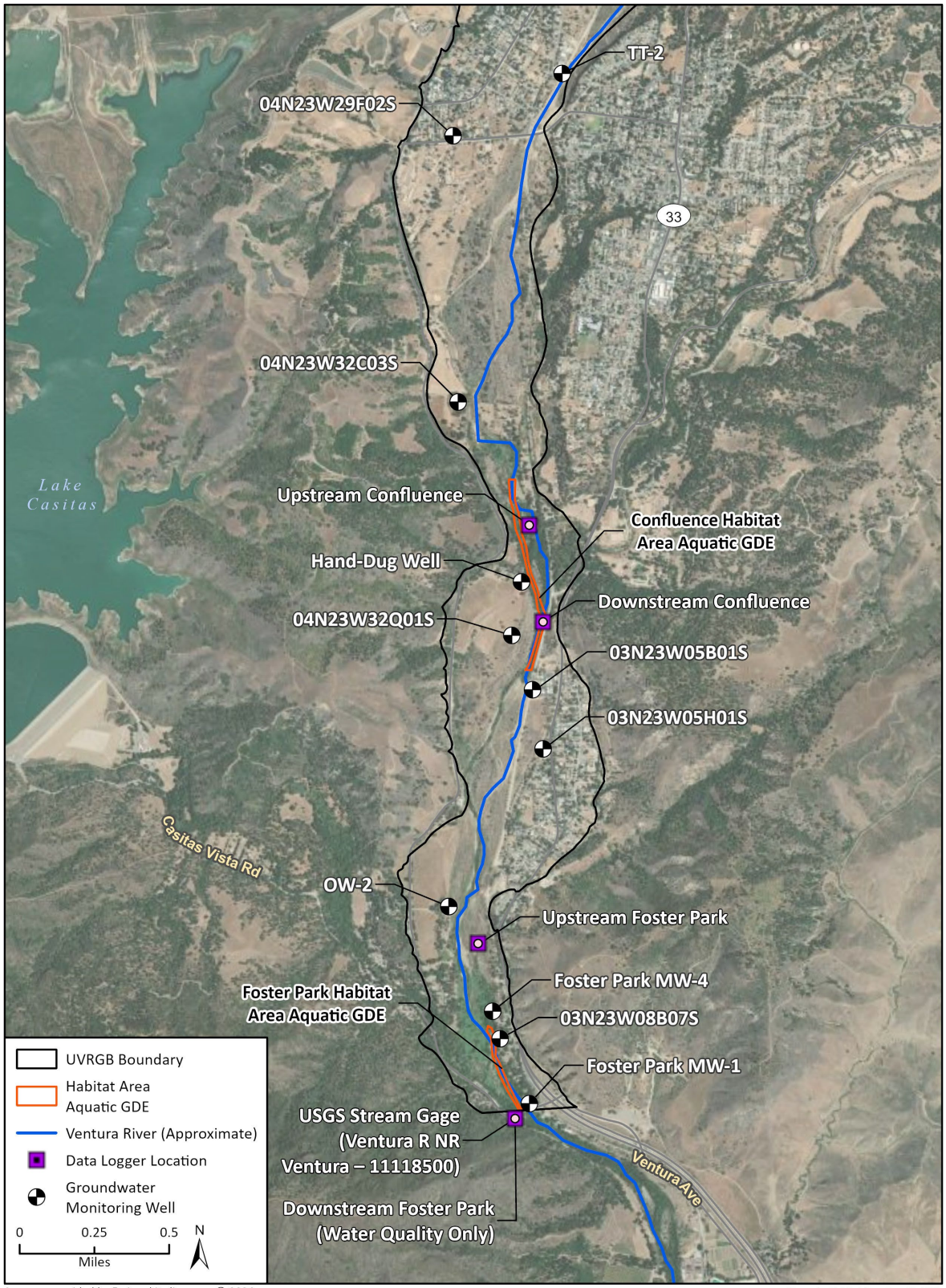

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Figure 1 – Habitat Area Aquatic GDEs
Aquatic GDE Assessment Figures

Figure 2 Instantaneous Discharge Measurements

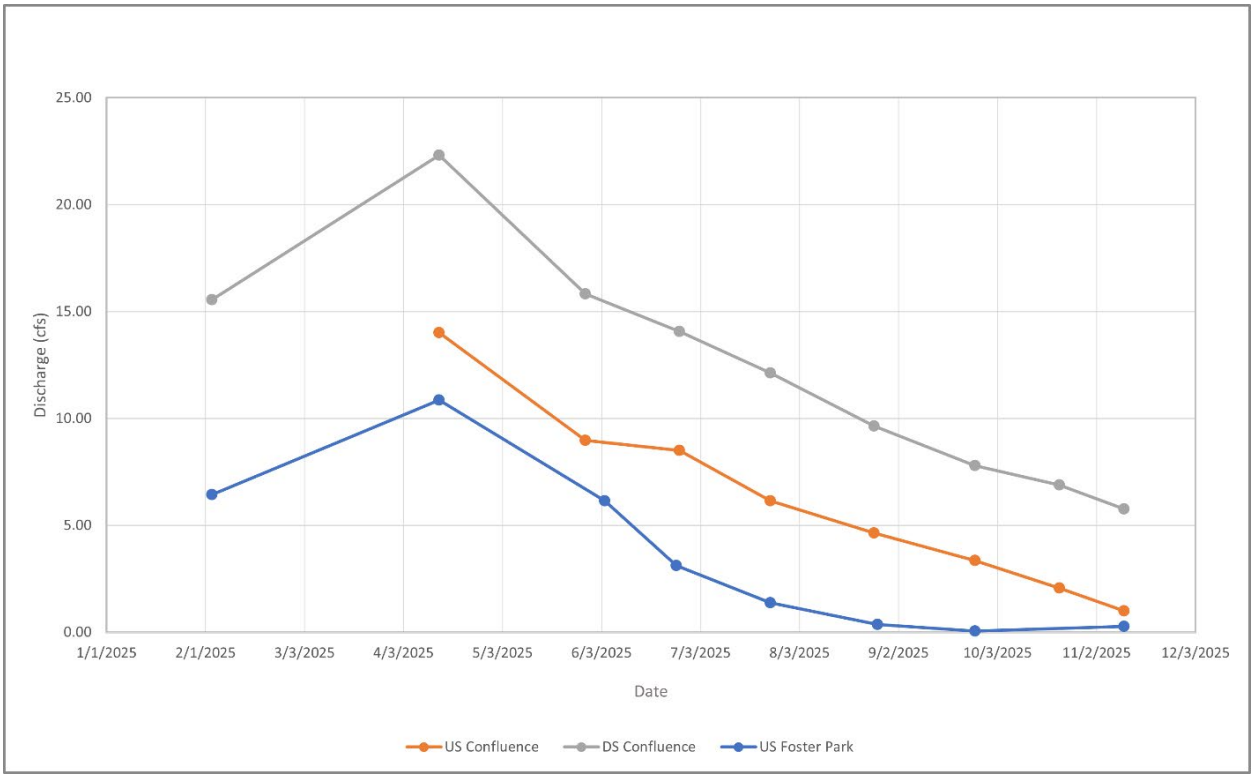


Figure 3 Channel Cross Sections

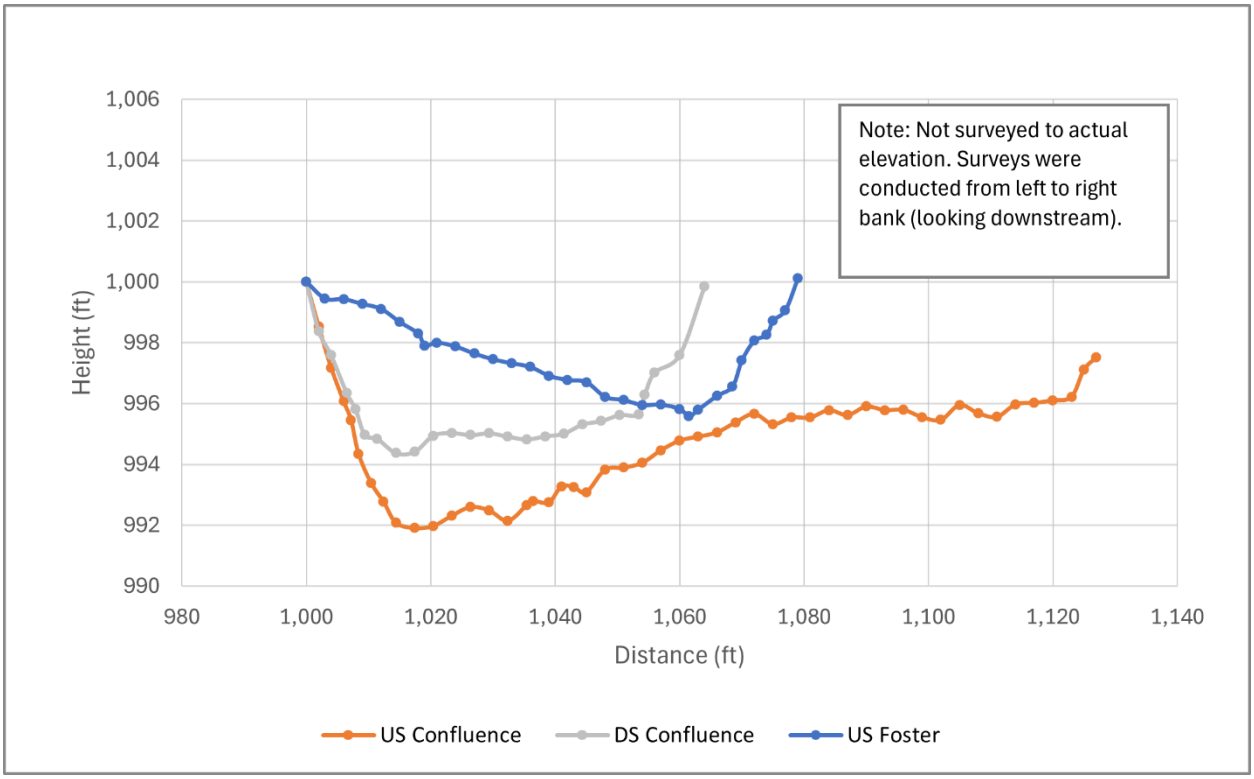


Figure 4 Channel Slope

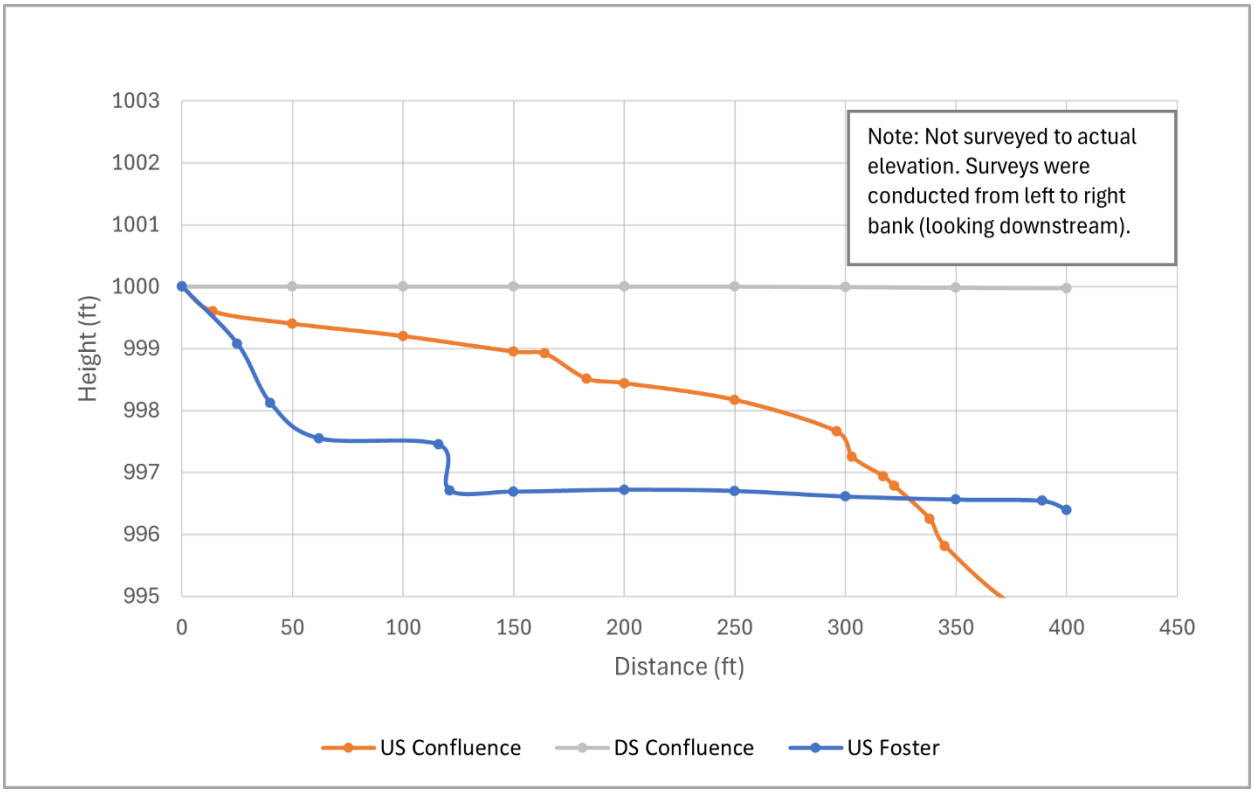


Figure 5 Upstream Confluence Rating Curve

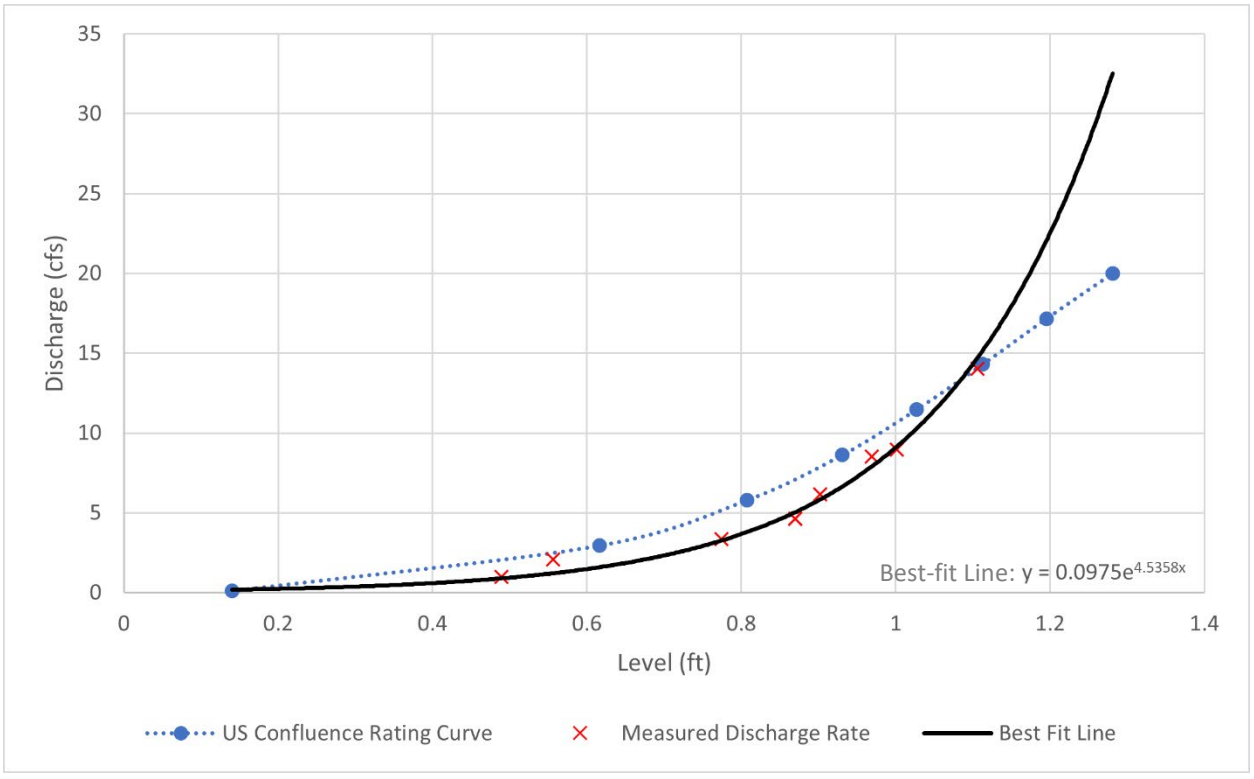
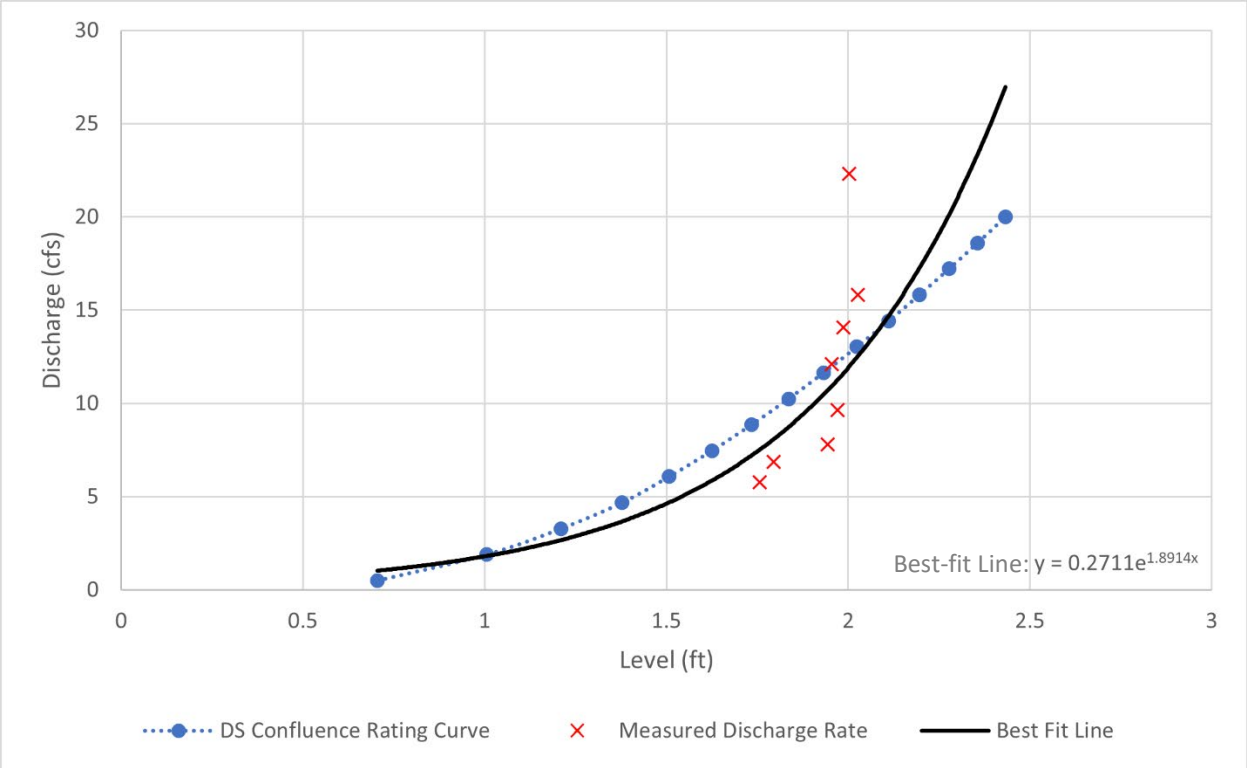
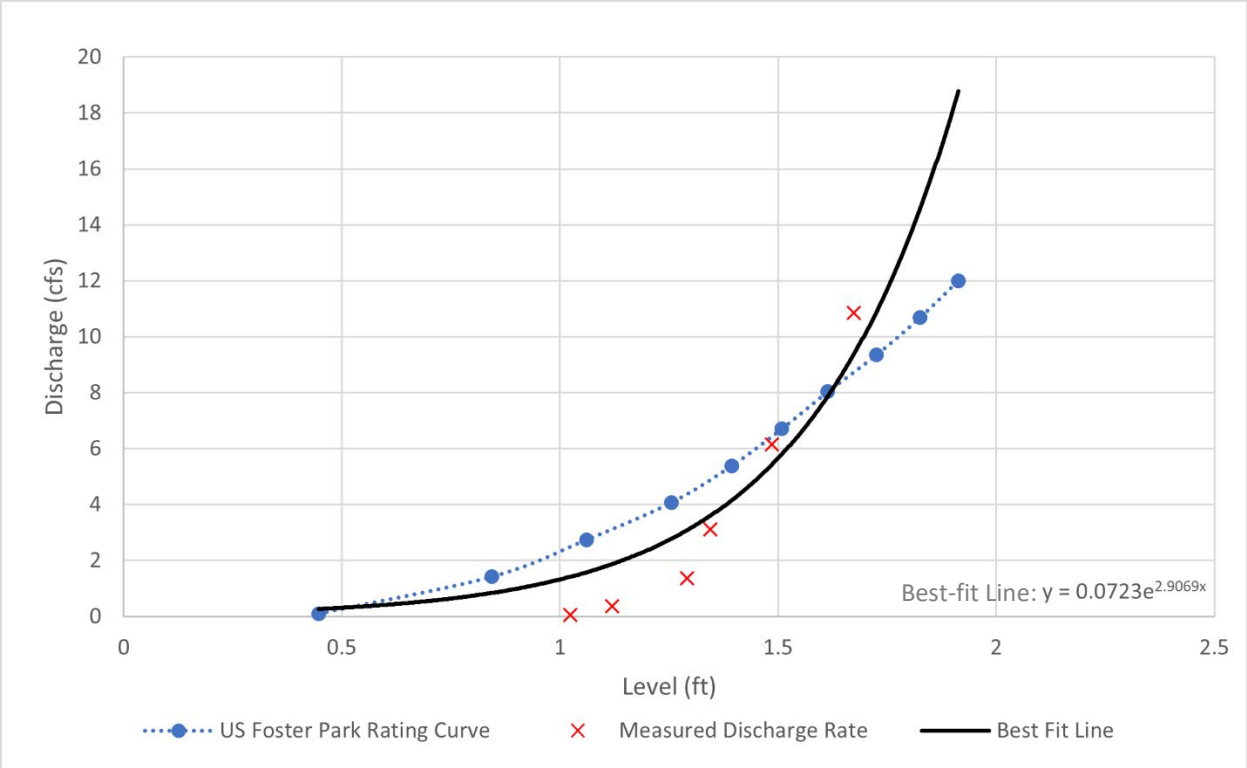


Figure 6 Downstream Confluence Rating Curve[2]



[2] The measured discharge rate of 15.56 cfs, collected on February 3, 2025, cannot be displayed on Figure 6 because continuous flow monitoring did not commence until April 14, 2025, so there is no corresponding Level (ft) measurement to plot this measured discharge rate.

Figure 7 Upstream Foster Park Rating Curve[3]



[3] The measured discharge rate of 6.44 cfs, collected on February 3, 2025, cannot be displayed on Figure 7 because continuous flow monitoring did not commence until April 14, 2025, so there is no corresponding Level (ft) measurement to plot this measured discharge rate. The measured discharge rate of 0.27 cfs, collected on November 11, 2025, cannot displayed on Figure 7 because it was collected from a location downstream of where the cross section (Figure 3) and channel slope (Figure 4) surveys were completed due to the original monitoring location going dry, therefore, is not applicable to the rating curve.

Figure 8 Upstream Confluence Hydrograph

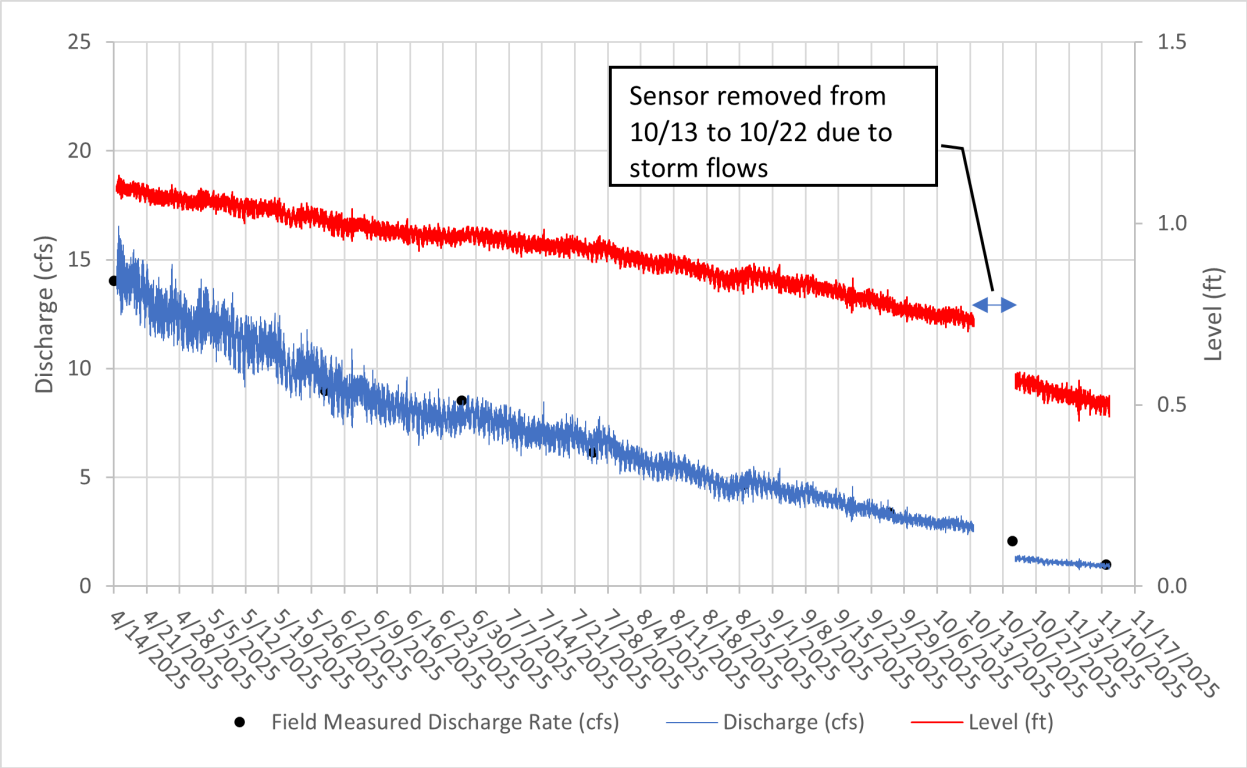
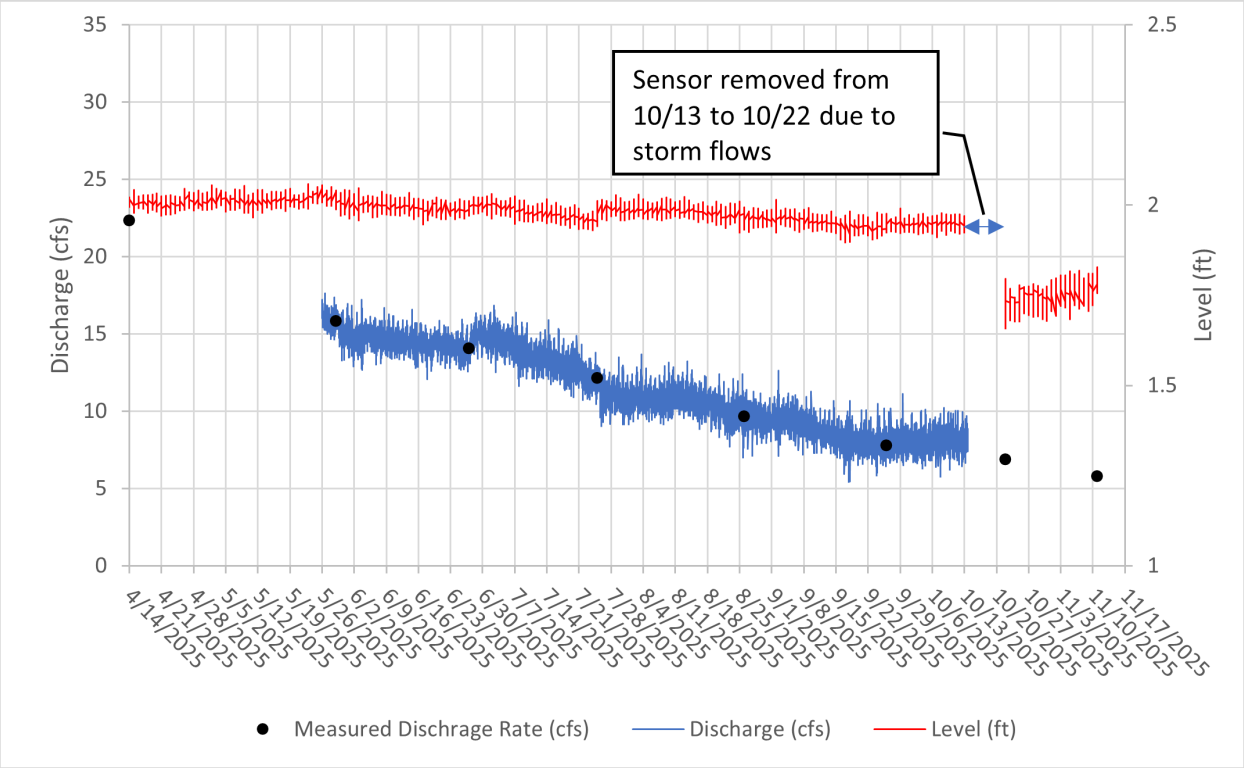


Figure 9 Downstream Confluence Hydrograph[4]



[4] Level data was unable to be correlated to discharge for data from April 14, 2025, to May 25, 2025, and October 22, 2025, to November 11, 2025, as flow during these time periods decreased while levels increased.

Figure 10 Upstream Foster Park Hydrograph

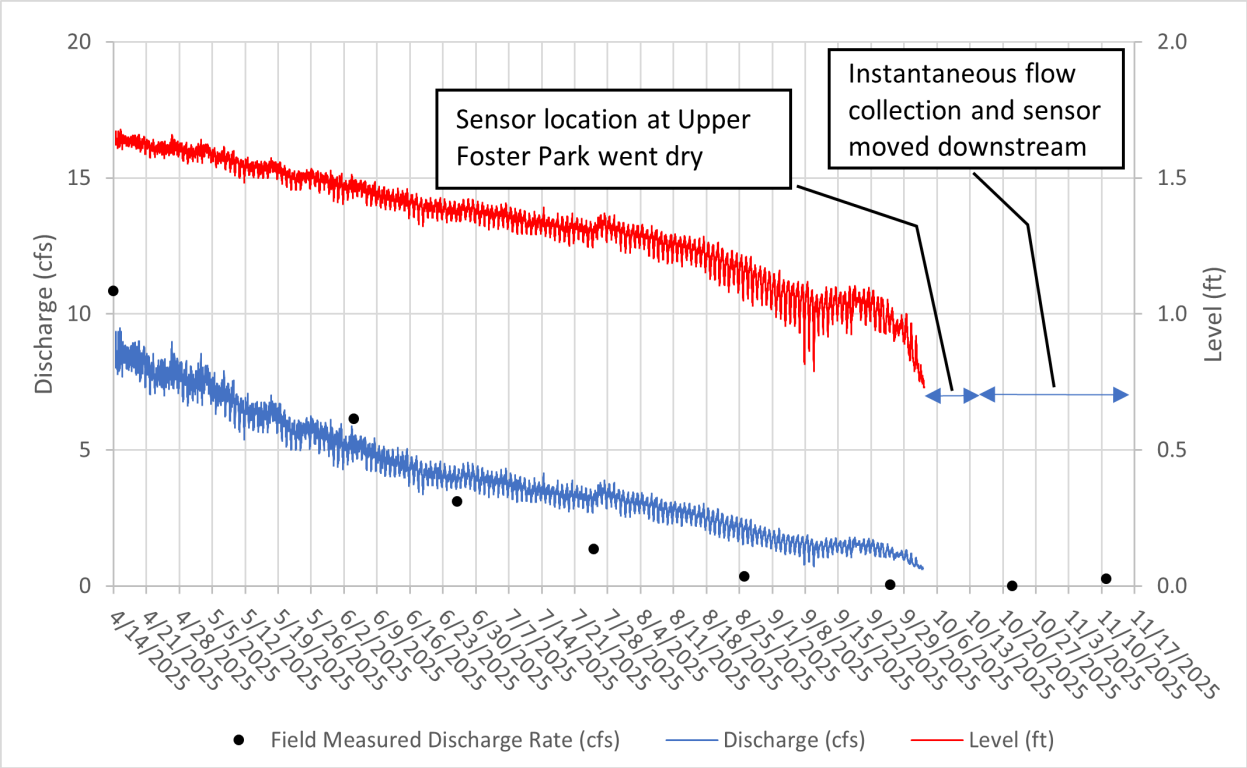


Figure 11 Downstream Foster Park Hydrograph - USGS Site: Ventura R NR Ventura – 11118500 (Preliminary Data)

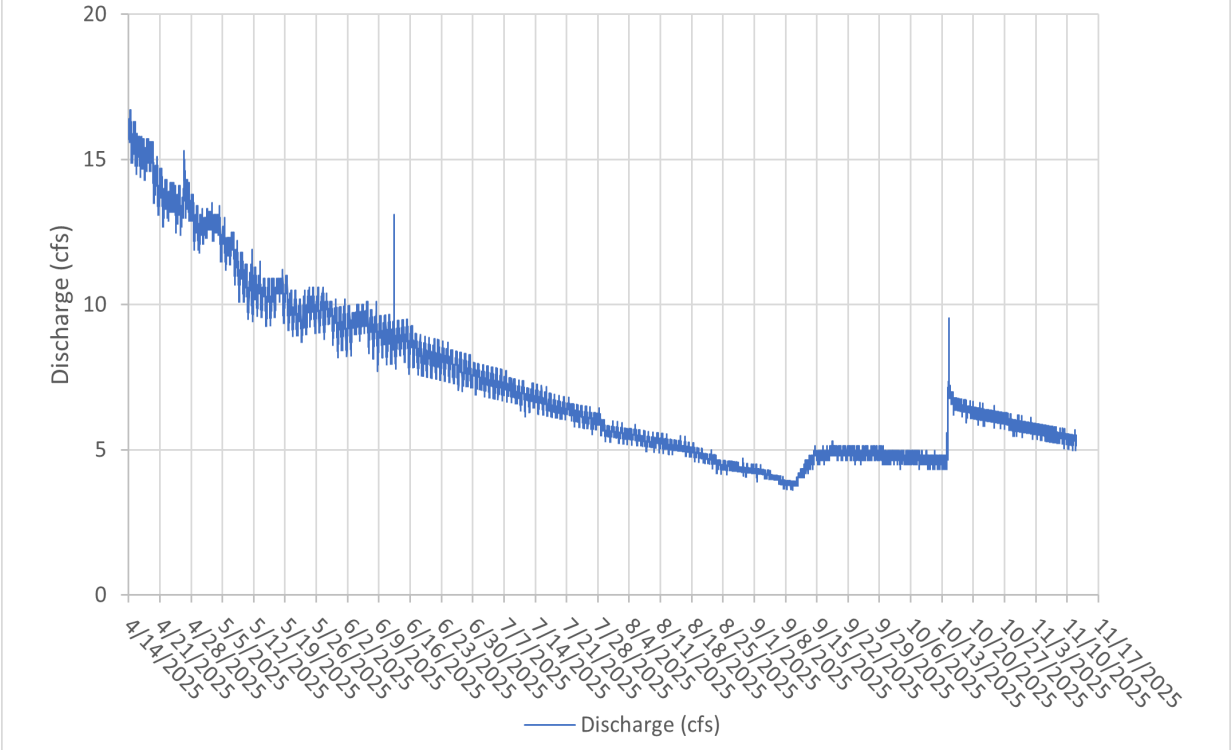
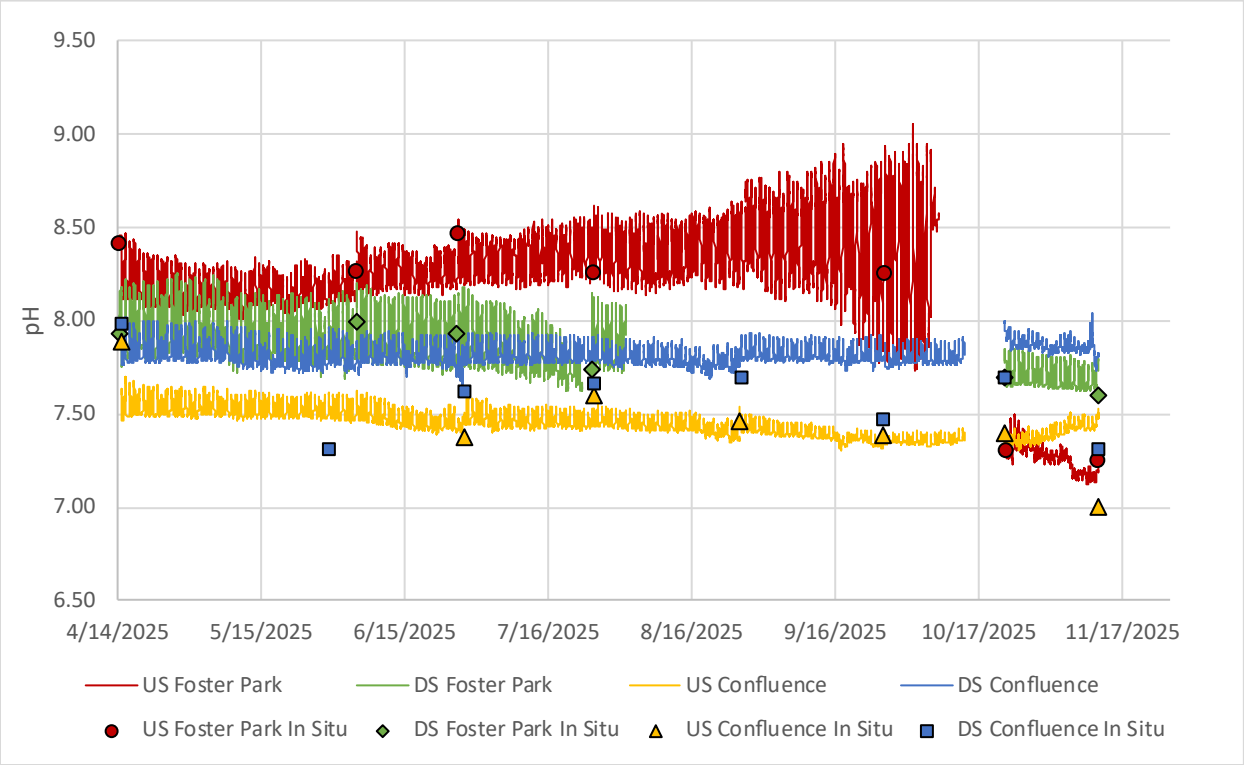
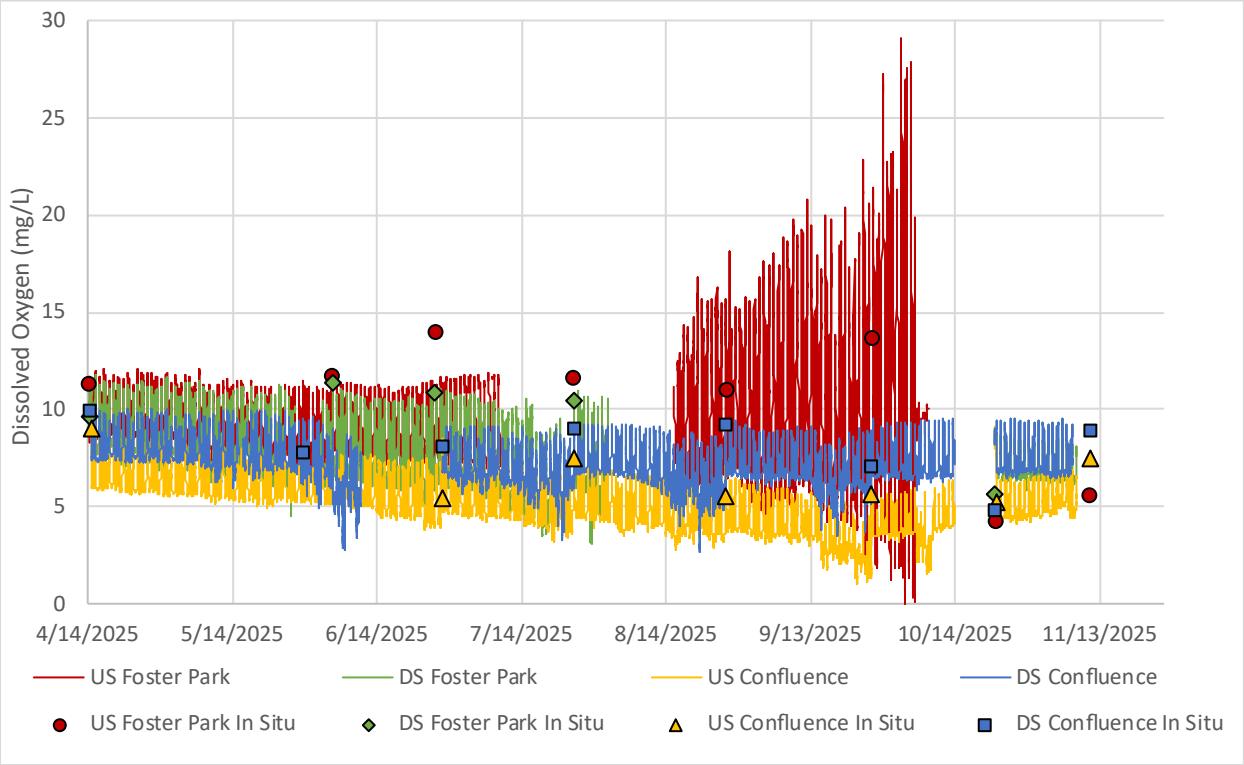


Figure 12 pH Data Logger and In Situ Measurements[5]



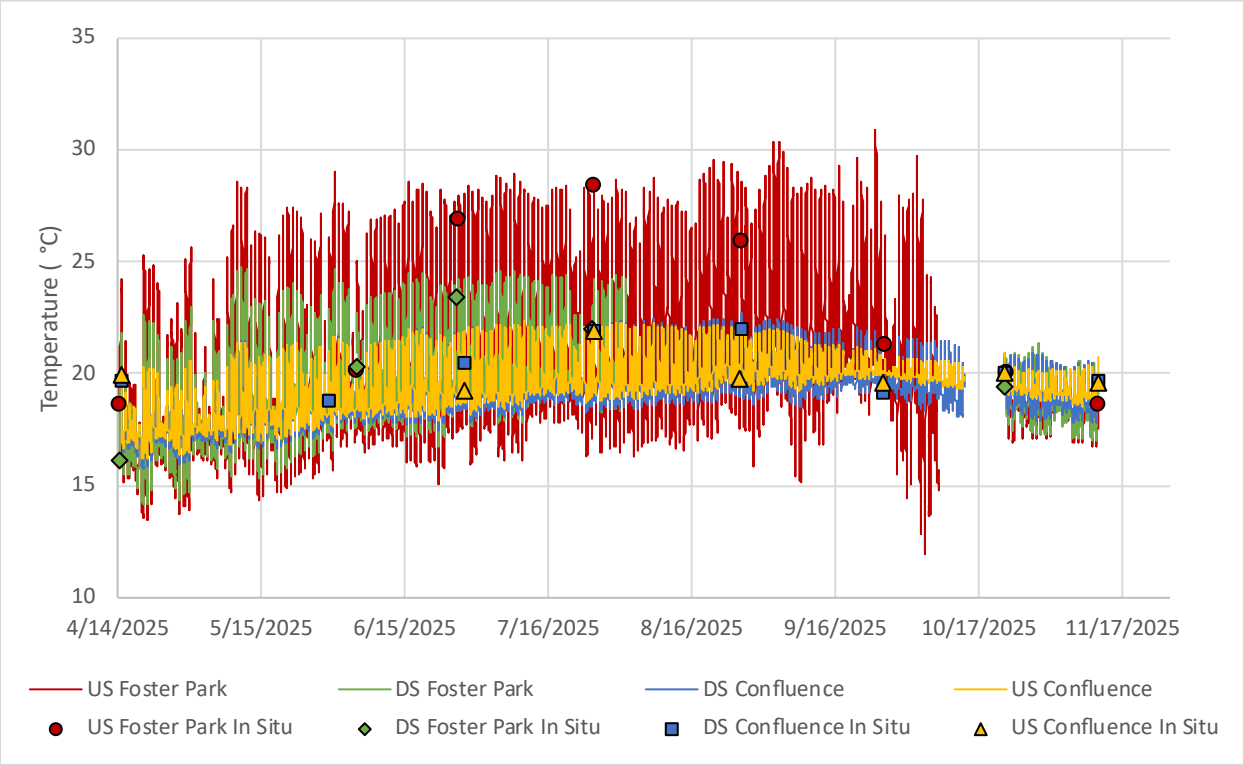
[5] Sonde data missing for various dates for Figure 12 due to sensor fouling or removal. Full QA/QC narrative provided in Attachment 2. Additionally, the increased variance in diurnal fluctuations observed in the US Foster Park pH data are likely attributed to the drying of the stream at this monitoring location.

Figure 13 Dissolved Oxygen Data Logger and In Situ Measurements[6]



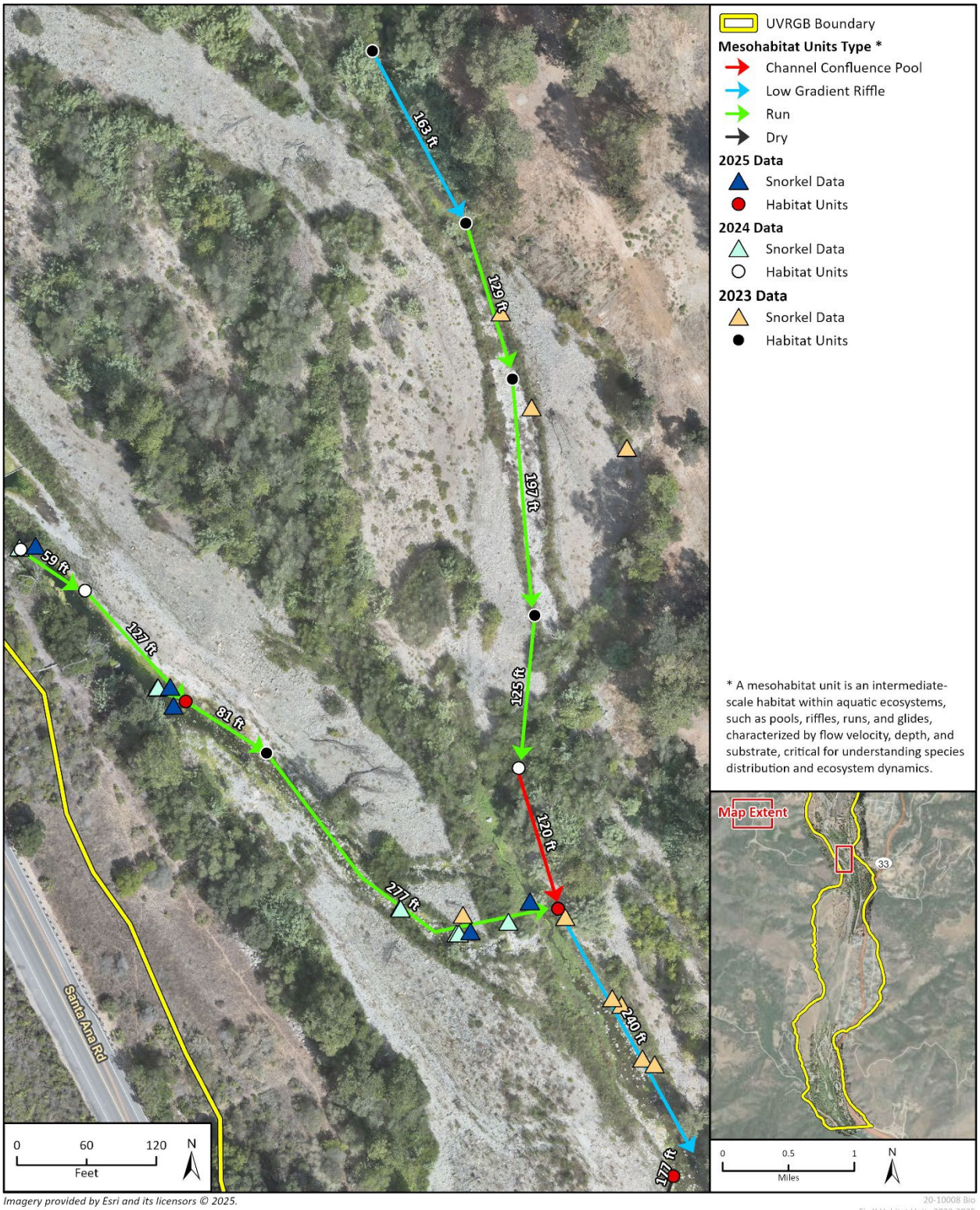
[6] Sonde data missing for various dates for Figure 13 due to sensor fouling or removal. Full QA/QC narrative provided in Attachment 2. Additionally, the increased variance in diurnal fluctuations observed in the US Foster Park DO data are likely attributed to the drying of the stream at this monitoring location.

Figure 14 Water Temperature Data Logger and In Situ Measurements[7]



[7] Sonde data missing for various dates for Figure 14 due to sensor removal. Full QA/QC narrative provided in Attachment 2.

Figure 15 Confluence Aquatic GDE Habitat and Snorkel Survey Locations



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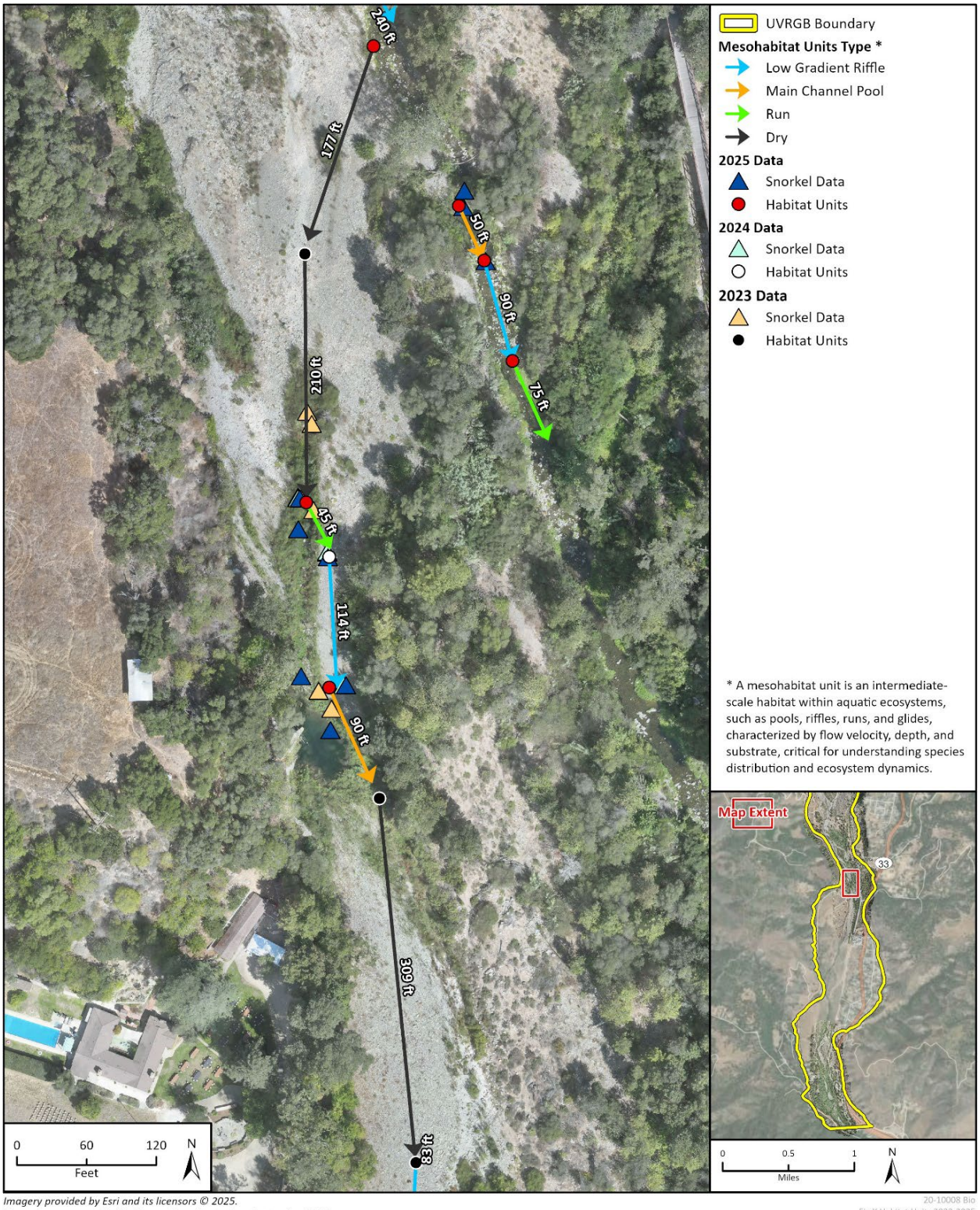
20-10008 Bio
Fig X Habitat Units 2023-2025

Figure 16 Confluence Aquatic GDE Habitat and Snorkel Survey Locations



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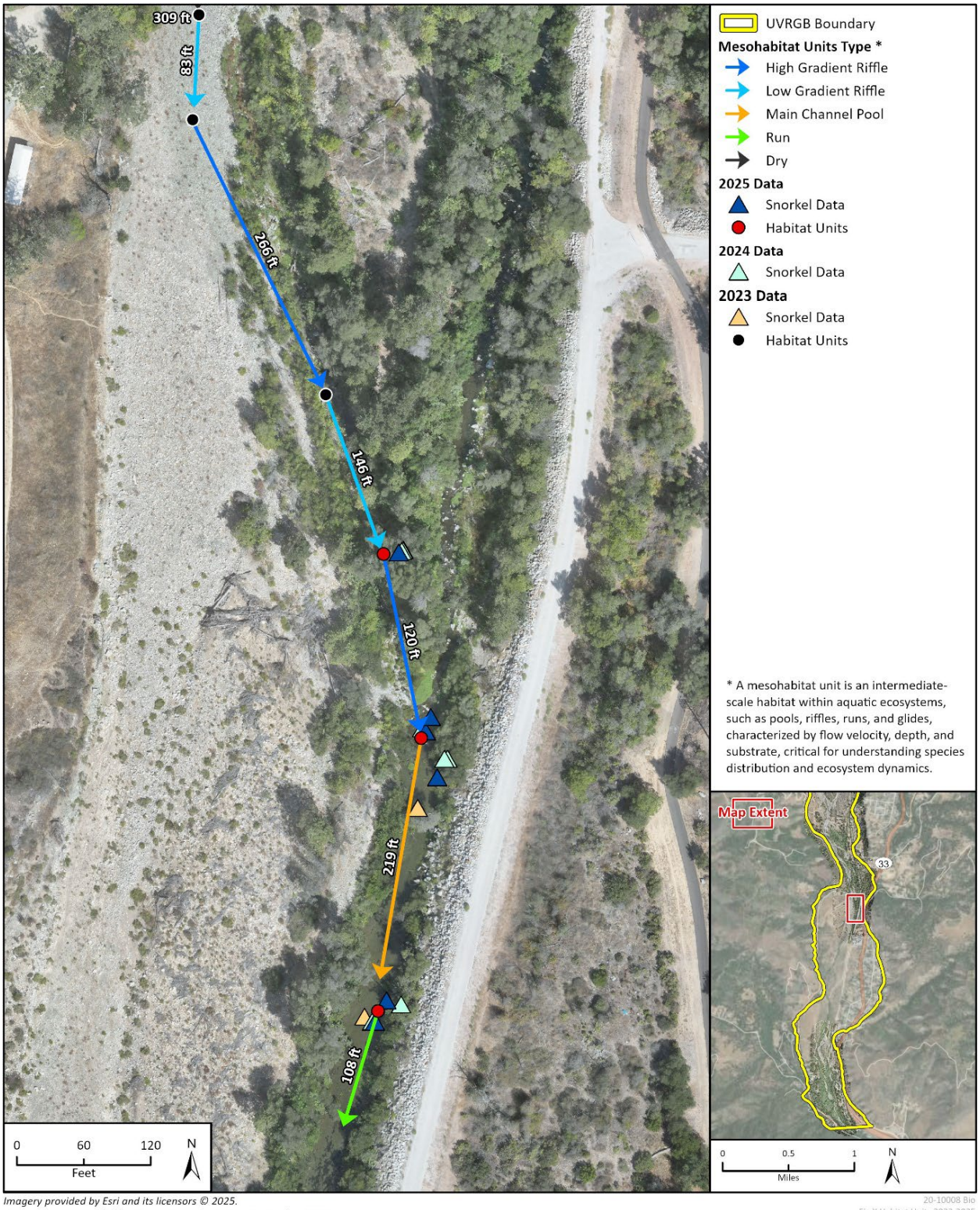
20-10008 Bio
Fig X Habitat Units 2023-2025

Figure 17 Confluence Aquatic GDE Habitat and Snorkel Survey Locations



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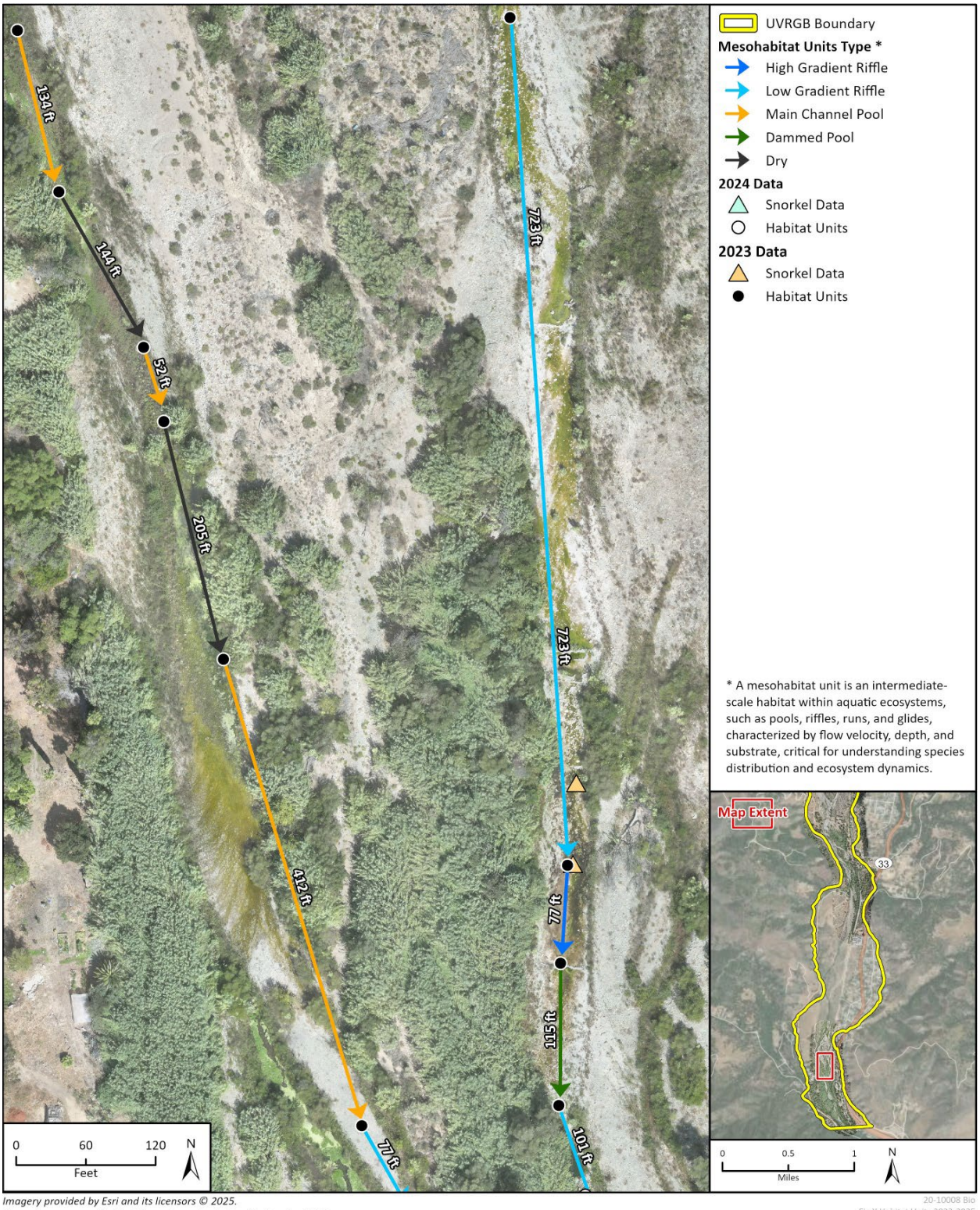
20-10008 Bio
Fig X Habitat Units 2023-2025

Figure 18 Foster Park Aquatic GDE Habitat and Snorkel Survey Locations



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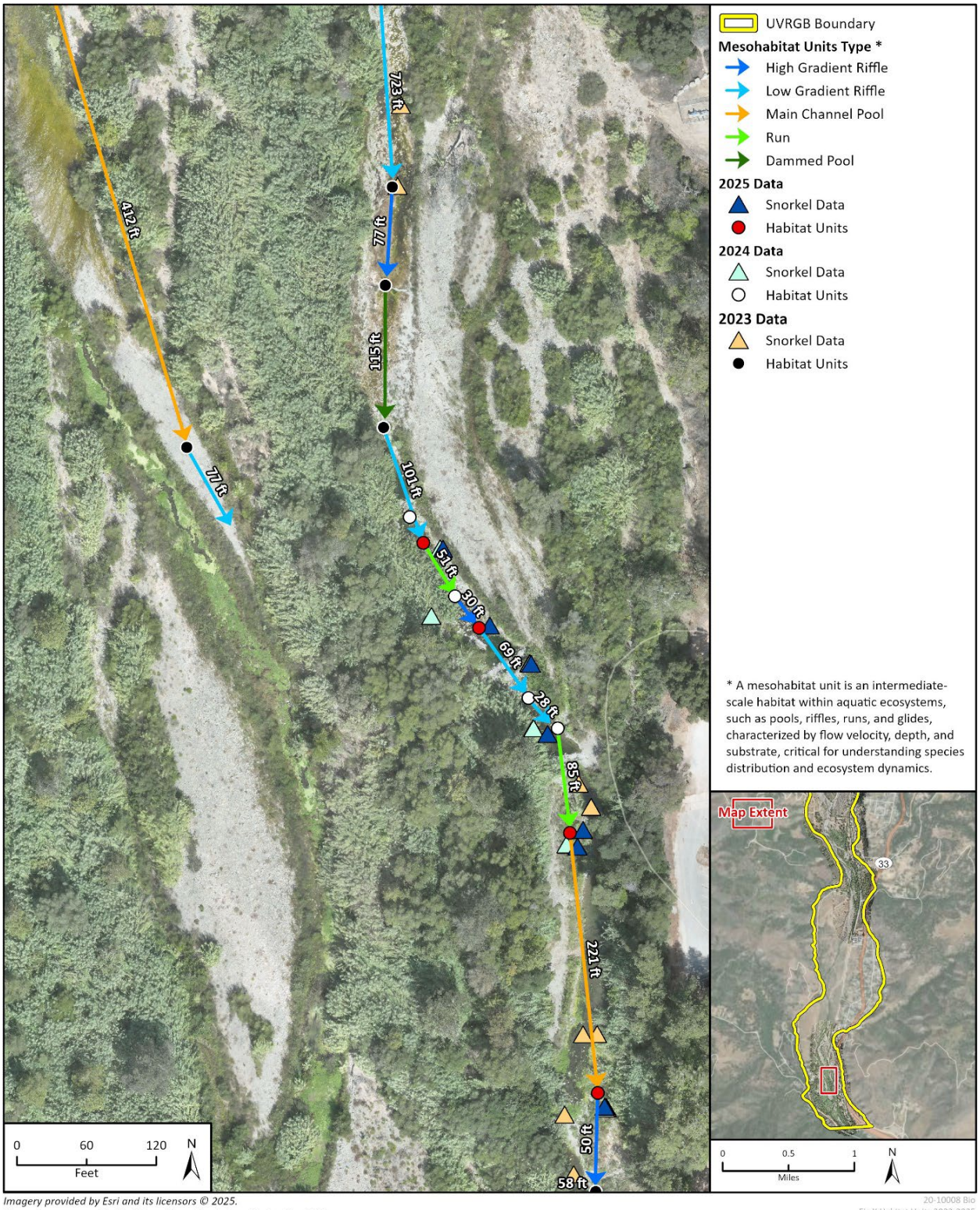
20-10008 Bio
Fig X Habitat Units 2023-2025

Figure 19 Foster Park Aquatic GDE Habitat and Snorkel Survey Locations



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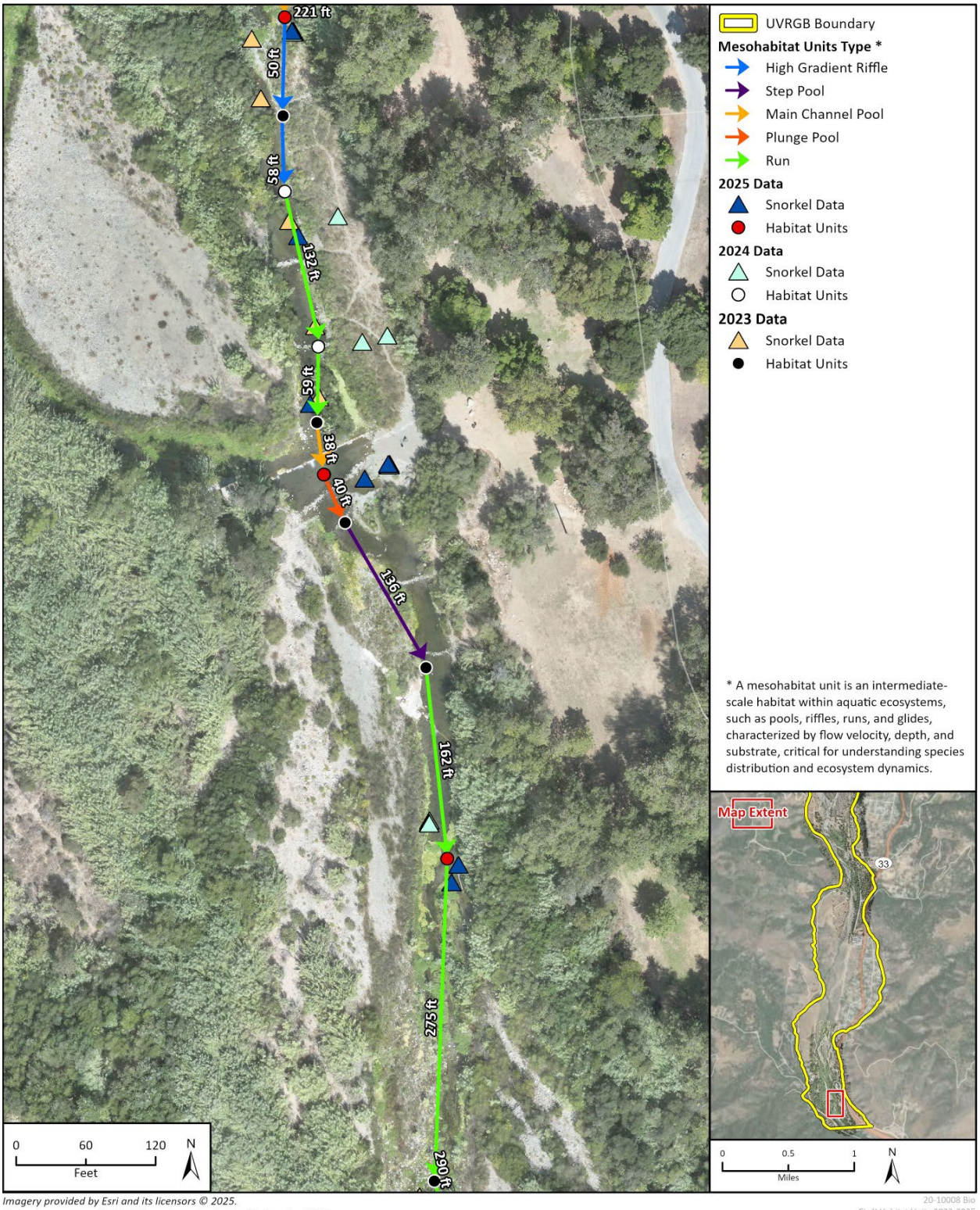
20-10008 Bio
Fig X Habitat Units 2023-2025

Figure 20 Foster Park Aquatic GDE Habitat and Snorkel Survey Locations



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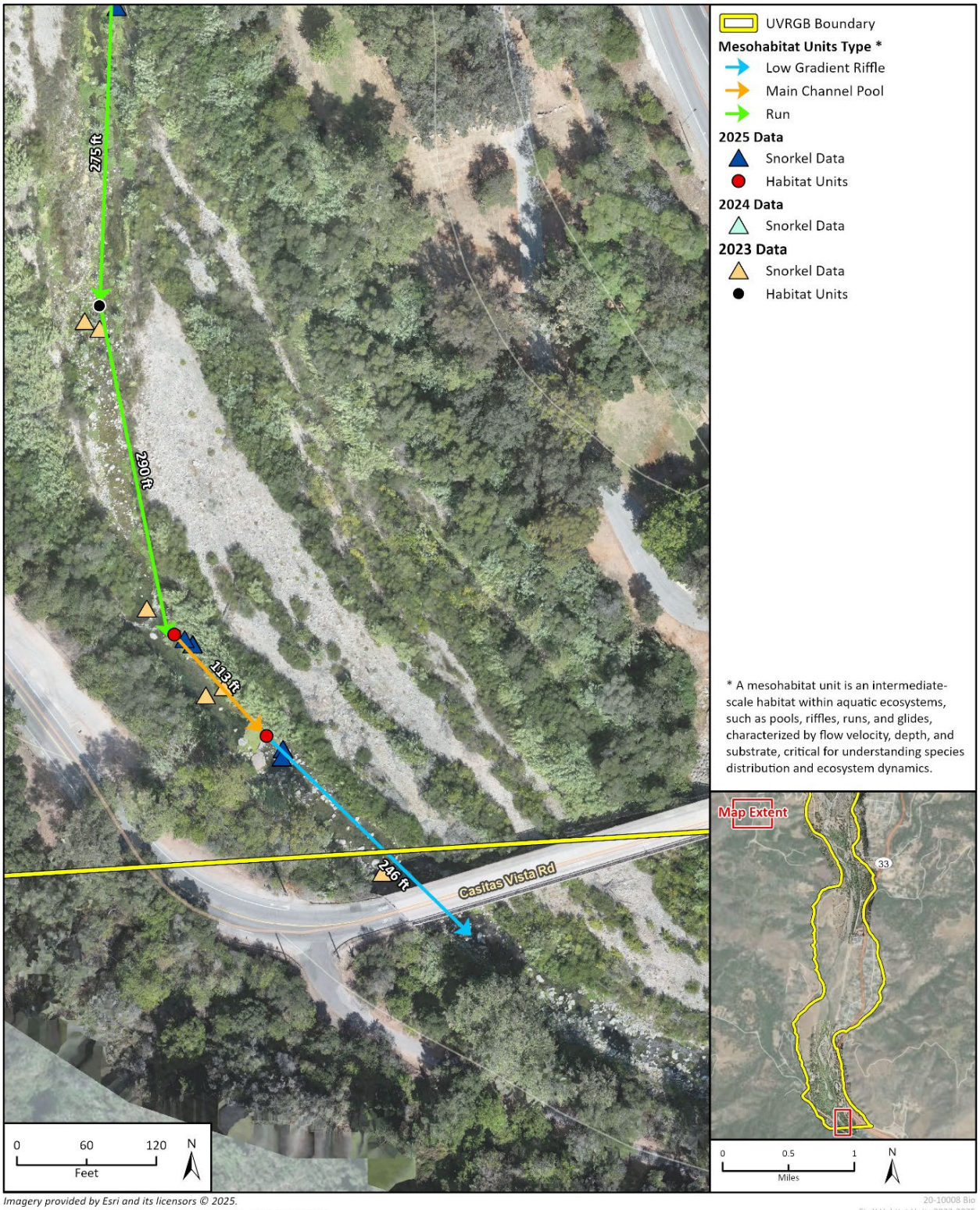
20-10008 Bio
Fig X Habitat Units 2023-2025

Figure 21 Foster Park Aquatic GDE Habitat and Snorkel Survey Locations



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20-10008 Bio
Fig X Habitat Units 2023-2025

Table 5 Snorkel Survey Data Water Year 2025

Point ID	Date	Type	Water Temp (°C)	Macroinvertebrate	Fish Species	Life Stage	Number	Fish Species_1	Life Stage_1	Number_1	Fish Species_2	Life Stage_2	Number2	Fish Notes	Invasive Species
1	2/3/2025	LGR	56	Yes	TSS	adult	7	–	–	–	–	–	–	–	crayfish
2	2/3/2025	MCP	56	Yes	–	–	–	–	–	–	–	–	–	–	crayfish
3	2/3/2025	RUN	56	Yes	–	–	–	–	–	–	–	–	–	–	crayfish
4	2/3/2025	PLP	56	Yes	–	–	–	–	–	–	–	–	–	–	–
5	2/3/2025	RUN	56	Yes	–	–	–	–	–	–	–	–	–	–	–
6	2/3/2025	HGR	56	Yes	–	–	–	–	–	–	–	–	–	–	–
7	2/3/2025	MCP	56	Yes	–	–	–	–	–	–	–	–	–	–	–
8	2/3/2025	RUN	56	Yes	–	–	–	–	–	–	–	–	–	–	–
9	2/3/2025	GR	56	Yes	–	–	–	–	–	–	–	–	–	–	–
10	2/3/2025	RUN	62	Yes	–	–	–	–	–	–	–	–	–	–	crayfish
11	2/3/2025	MCP	62	Yes	–	–	–	–	–	–	–	–	–	–	crayfish
12	2/3/2025	HGR	62	Yes	TSS	adult	2	–	–	–	–	–	–	–	crayfish
13	2/3/2025	MCP	55	Yes	TSS	adult	3300	Arroyo Chub	adult	5	–	–	–	–	–
14	2/3/2025	LGR	62	Yes	TSS	adult	425	–	–	–	–	–	–	–	–
15	2/3/2025	RUN	62	Yes	–	–	–	–	–	–	–	–	–	–	–
16	2/3/2025	LGR	58	Yes	TSS	adult	115	–	–	–	–	–	–	–	–
17	2/3/2025	CCP	58	Yes	TSS	adult	620	–	–	–	–	–	–	–	–
18	2/3/2025	RUN	58	Yes	–	–	–	–	–	–	–	–	–	–	–
19	6/17/2025	LGR	64.5	Yes	TSS	adult	40	Arroyo Chub	juvenile	150	unknown	juvenile	20	-	bullfrog
20	6/17/2025	MCP	64.5	Yes	TSS	adult/juvenile	150	Arroyo Chub	adult/juvenile	400	unknown	juvenile	20	–	–
21	6/17/2025	RUN	64.5	Yes	Arroyo Chub	adult	1	–	–	–	–	–	–	–	–
22	6/17/2025	DMP	66.6	Yes	TSS	adult/juvenile	750	Arroyo Chub	adult/juvenile	250	–	–	–	–	bullfrog, crayfish
23	6/17/2025	RUN	65.1	Yes	TSS	adult/juvenile	950	Arroyo Chub	adult/juvenile	400	–	–	–	–	crayfish
24	6/17/2025	LGR	65.1	Yes	TSS	adult	2	–	–	–	–	–	–	–	–
25	6/17/2025	MCP	65.1	Yes	TSS	adult	620	Arroyo Chub	adult	1750	–	–	–	–	–
26	6/17/2025	LGR	65.1	Yes	TSS	adult	11	Arroyo Chub	adult	35	–	–	–	–	–
27	6/17/2025	RUN	71.4	Yes	TSS	adult/juvenile	20	Arroyo Chub	adult/juvenile	75	–	–	–	–	–
28	6/17/2025	RUN	71.1	Yes	TSS	adult/juvenile	100	Arroyo Chub	adult/juvenile	1250	–	–	–	–	–
29	6/17/2025	MCP	71.1	Yes	TSS	adult	1950	Arroyo Chub	adult	1700	Common Carp	adult	1	–	crayfish
30	6/17/2025	LGR	71.6	Yes	TSS	adult	1	Arroyo Chub	adult	10	–	–	–	–	–
31	6/17/2025	BLP	73/ 68[1]	Yes	TSS	adult	700	Arroyo Chub	adult	1000	Common Carp	adult	1	–	bullfrog
32	6/17/2025	LGR	73.5	Yes	TSS	adult	50	Arroyo Chub	adult	10	–	–	–	–	–
33	6/17/2025	RUN	73.5	Yes	–	–	–	–	–	–	–	–	–	Dry, no fish	–
34	6/17/2025	LGR	71.4	Yes	–	adult	650	Arroyo Chub	adult	330	–	–	–	–	–
35	6/17/2025	RUN	71.4	Yes	TSS	adult	70	Arroyo Chub	adult	300	–	–	–	–	–
36	6/17/2025	MCP	67.9	Yes	TSS	adult	985	Arroyo Chub	adult	450	–	–	–	–	–
37	9/10/2025	LGR	68	Yes	Arroyo Chub	adult/juvenile	1410	TSS	adult/juvenile	670	–	–	–	–	crayfish
38	9/10/2025	MCP	68	Yes	Arroyo Chub	adult/juvenile	2100	TSS	adult/juvenile	530	–	–	–	–	crayfish
39	9/10/2025	RUN	68	Yes	Arroyo Chub	adult	1	–	–	–	–	–	–	–	–

Point ID	Date	Type	Water Temp (°C)	Macroinvertebrate	Fish Species	Life Stage	Number	Fish Species_1	Life Stage_1	Number_1	Fish Species_2	Life Stage_2	Number2	Fish Notes	Invasive Species
40	9/10/2025	PLP	69.9	Yes	Arroyo Chub	adult/juvenile	1000	TSS	adult/juvenile	750	–	–	–	–	–
41	9/10/2025	RUN	71.1	Yes	–	–	–	–	–	–	–	–	–	–	–
42	9/10/2025	HGR	71.1	Yes	–	–	–	–	–	–	–	–	–	–	–
43	9/10/2025	MCP	71.6	Yes	Arroyo Chub	adult/juvenile	5000	TSS	adult/juvenile	1100	-	-	-	-	crayfish
44	9/10/2025	LGR	71.6	Yes	Arroyo Chub	Adult	25	TSS	Adult	5	–	–	–	–	–
45	9/10/2025	RUN	71.6	Yes	Arroyo Chub	adult/juvenile	120	–	–	–	–	–	–	–	–
46	9/10/2025	RUN	70.9	Yes	Arroyo Chub	adult/juvenile	1100	TSS	adult/juvenile	155	–	–	–	–	crayfish
47	9/10/2025	MCP	70.9	Yes	Arroyo Chub	adult/juvenile	1530	TSS	adult/juvenile	725	–	–	–	–	crayfish
48	9/10/2025	HGR	71.2	Yes	TSS	Adult	5	–	–	–	–	–	–	–	–
49	9/10/2025	MCP	71.2	Yes	Arroyo Chub	adult/juvenile	3100	TSS	adult	15	–	–	–	–	bullfrog, crayfish
50	9/10/2025	LGR	71.2	Yes	–	–	–	–	–	–	–	–	–	Overgrown with vegetation	–
51	9/10/2025	RUN	71.2	Yes	–	–	–	–	–	–	–	–	–	Overgrown with vegetation	–
52	9/10/2025	LGR	71.2	Yes	Arroyo Chub	adult	175	TSS	adult	80	–	–	–	–	crayfish
53	9/10/2025	RUN	71.2	Yes	Arroyo Chub	adult	10	–	–	–	–	–	–	–	-
54	9/10/2025	MCP	71.6	Yes	Arroyo Chub	adult/juvenile	2000	–	–	–	–	–	–	–	crayfish

[1] Surface temperature/temperature at 7 feet deep

Notes:

CCP	channel confluence pool
DPL	dammed pool
HGR	high gradient riffle
LGR	low gradient riffle
MCP	main channel pool
PLP	plunge pool
RUN	run
TSS	threespine stickleback

Table 6 Fish Stranding Survey Data Water Year 2025

Isolated Pool #	Length (ft) x Width (ft)	Water Temp (°F)	Fish Species	Number	Fish Species_1	Number_1	Fish Species_2	Number_2	Pool Notes	Invasive Species
7/22/2025										
1	80 ft x 20 ft	68	Arroyo Chub	100+	–	–	–	–	Approximate fish count from bank. Assume hundreds of fish	crayfish, bullfrog
2	100 ft x 15 ft	68	TSS	20	–	–	–	–	Approximate fish count from bank	crayfish
8/26/2025										
1	80 ft x 20 ft	69.3	Arroyo Chub	100+	TSS	50+	–	–	Assume hundreds of fish. 1 SWPT observed	crayfish, bullfrog
2	100 ft x 15 ft	68.3	TSS	50+	MOFI	200+	–	–	Approximate fish count from bank	crayfish
3	25 ft x 5 ft	72.1	TSS	5	–	–	–	–	Limited visibility due to algae growth. Fish caught and identified in aquarium net	crayfish
9/26/2025										
1	80 ft x 20 ft	67.1	Arroyo Chub	3000	TSS	15	–	–	Fish count from 9/10 snorkel survey	crayfish, bullfrog
2	50 ft x 15 ft	68.3	TSS	100+	MOFI	100+	–	–	Approximate fish count from bank. Fish caught and identified in aquarium net	crayfish
3	20 ft x 5 ft	72	TSS	5	–	–	–	–	Approximate fish count from bank. Limited visibility due to algae	bullfrog

Notes:
TSS threespine stickleback
MOFI mosquito fish
SWPT southwestern pond turtle
ft feet

Figure 22 Drone Orthoimagery of South Santa Ana Riparian GDE Unit – February, June, and September 2025

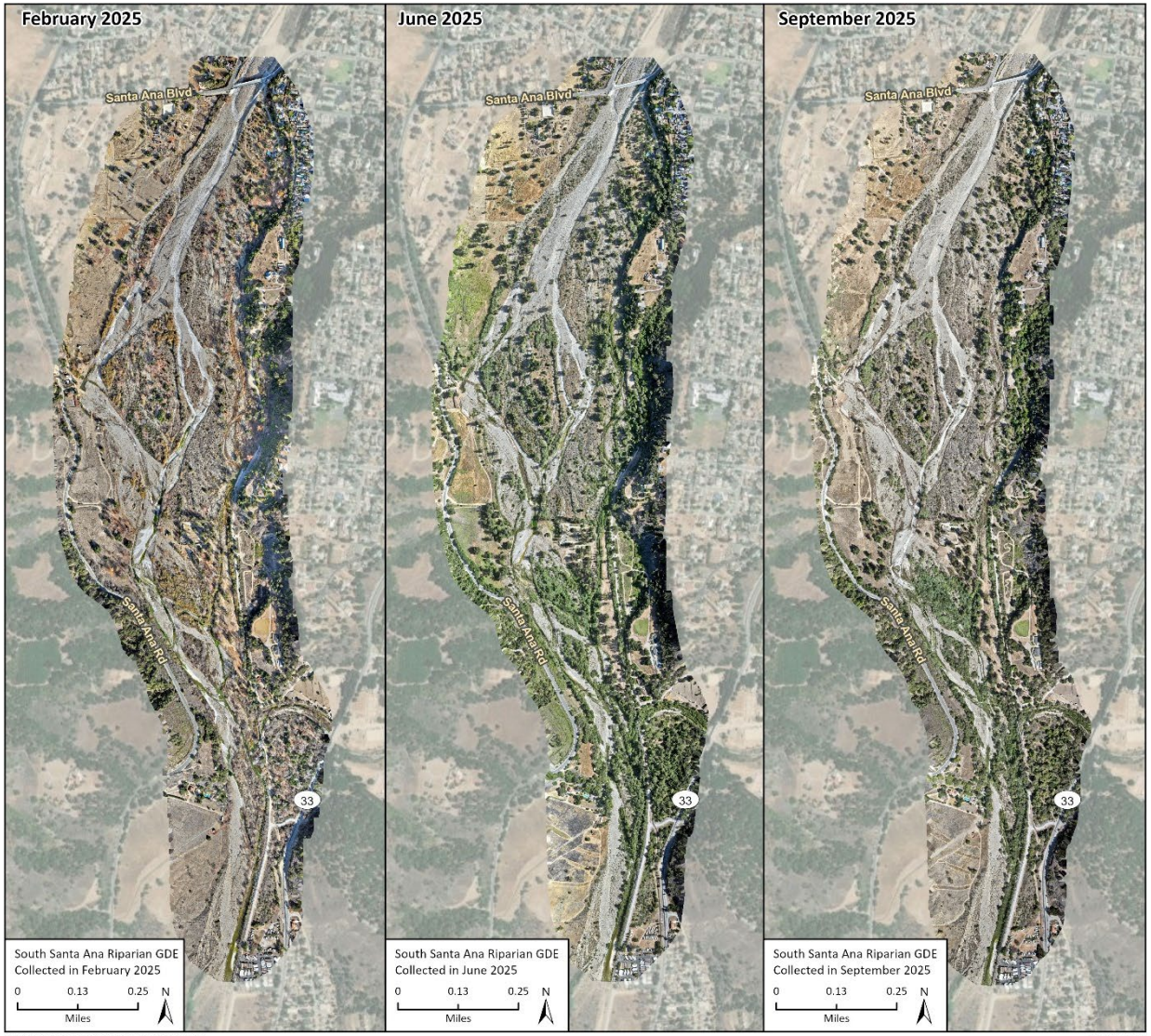

Figure 23 Drone Orthoimagery of Foster Park Riparian GDE Unit – February, June, and September 2025

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Drone imagery provided by Rincon Consultants, 2025.

Figure 24 3-Year Instantaneous Flow Measurements at Upstream Confluence

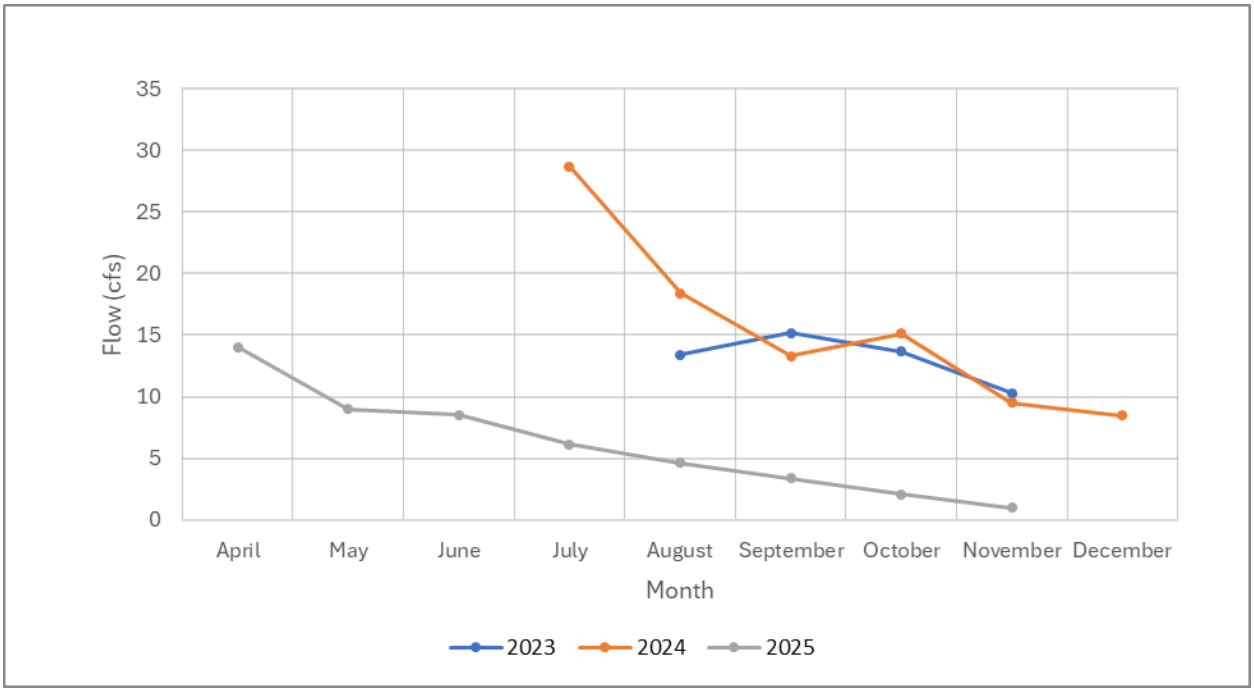

Figure 25 3-Year Instantaneous Flow Measurements at Downstream Confluence

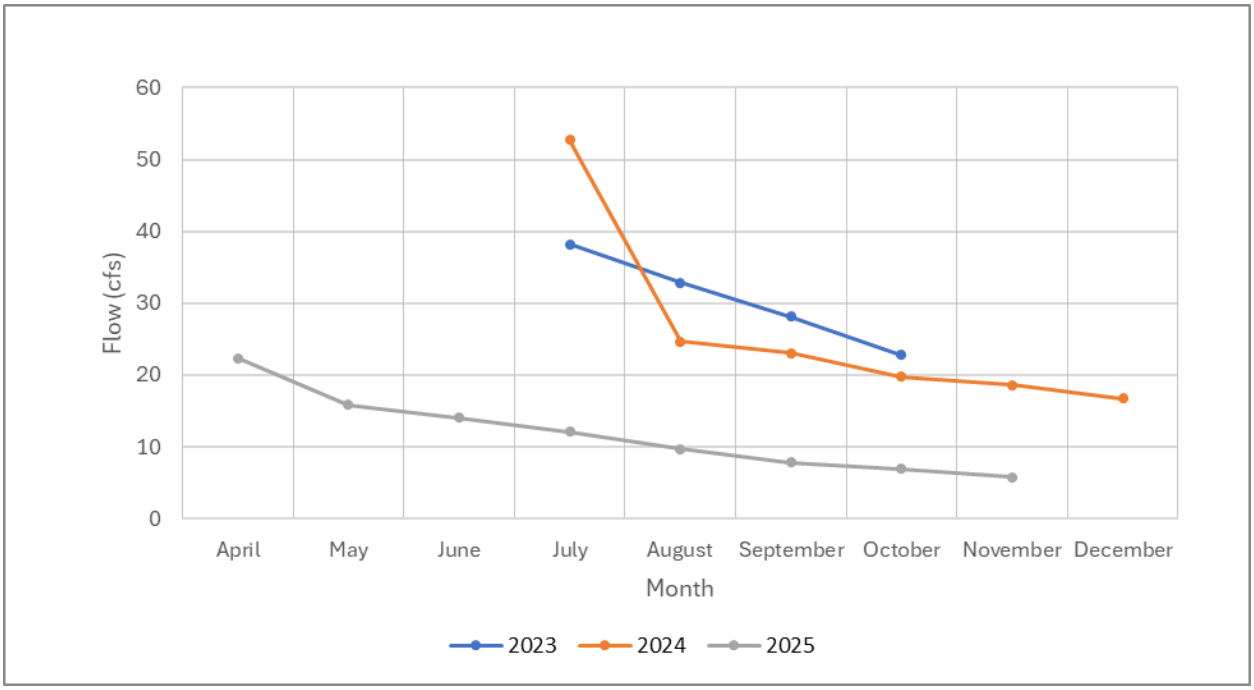

Figure 26 3-Year Instantaneous Flow Measurements at Upstream Foster Park

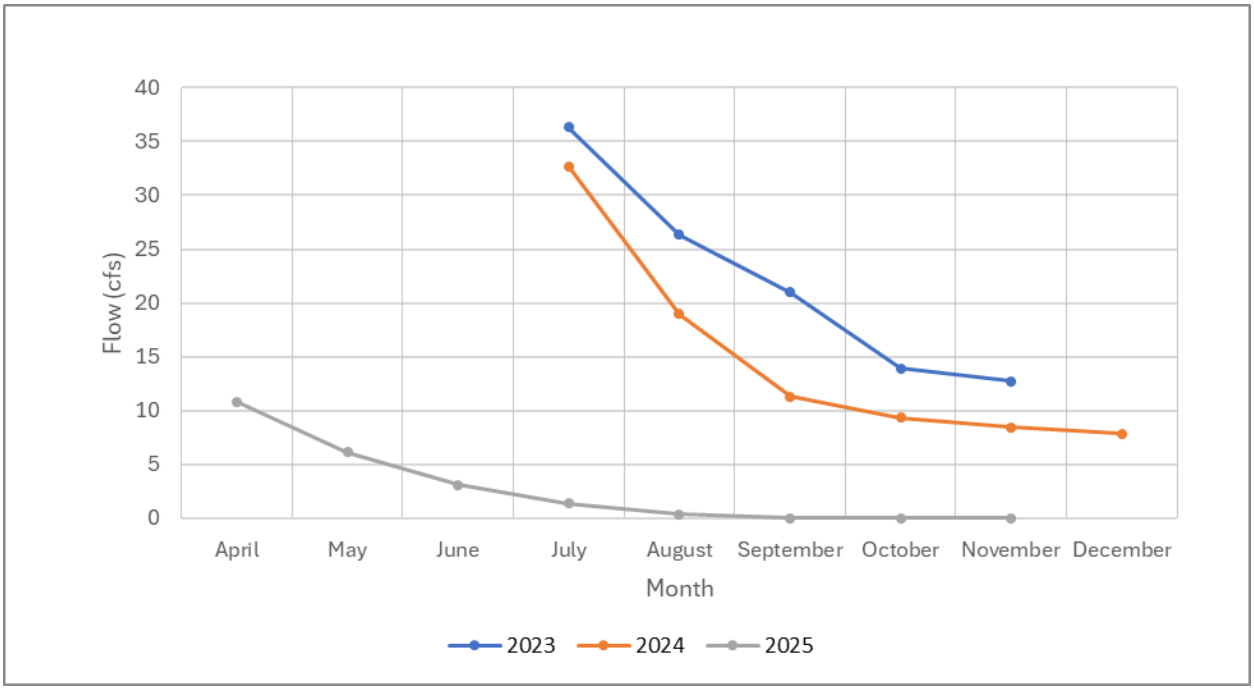

Figure 27 3-Year Average Monthly Flow at USGS Staff Gage 11118500