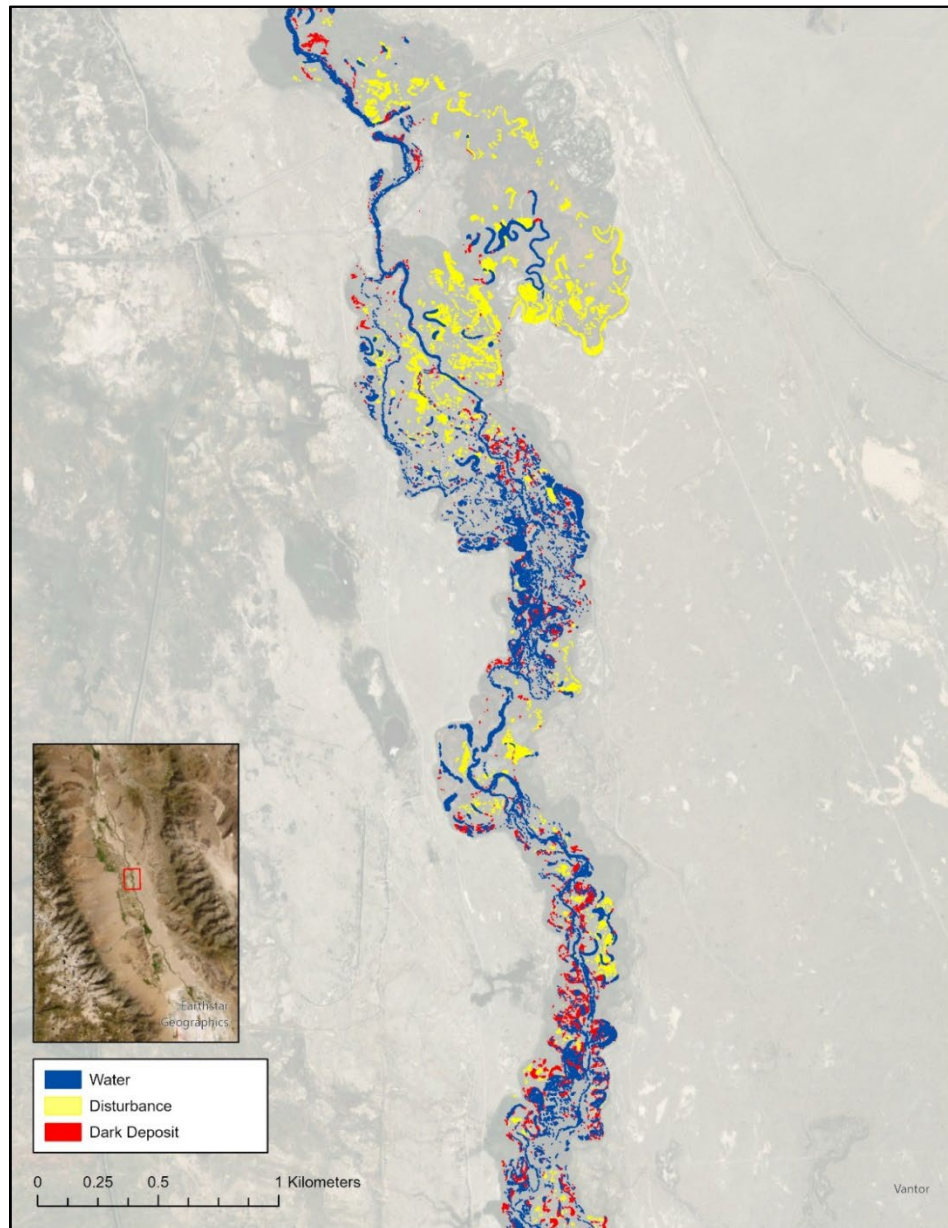


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Lower Owens River Project 2025 Annual Report



April 2, 2026

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ABBREVIATIONS, DEFINITIONS, AND MEMBERSHIP TABLE

1991 EIR	Final Environmental Impact Report regarding water from the Owens Valley to supply the second Los Angeles Aqueduct from 1970-1990, and from 1990 onward pursuant to the Water Agreement.
1997 MOU	1997 Memorandum of Understanding between the City of Los Angeles Department of Water and Power, the County of Inyo, the California Department of Fish and Game, the California State Lands Commission, the Sierra Club, the Owens Valley Committee and Carla Scheidlinger.
2004 EIR	Final Environmental Impact Report & Environmental Impact Statement Lower Owens River Project
2007 Stipulation & Order	2007 Stipulation and Order (Case number: S1CVCV01-29768) resolving issues with 2005 order “Orders Re: Defendants’ Violations of Court Orders.”
AF	Acre feet
BWMA	Blackrock Waterfowl Management Area
CAC	Inyo and Mono Counties Agricultural Commissioner’s Office
CADF	California Department of Food and Agriculture
CEQA	California Environmental Quality Act
cfs	Cubic-feet-per-second
the County	Inyo County
DHA	Delta Habitat Area
EIR	Environmental Impact Report
ET	Evapotranspiration rate
FC	Flood Cycle associated with the Interim Plan for flooding BWMA
HIS	Habitat Indicator Species
ICWD	Inyo County Water Department
IP	Interim Plan. 5-year interim management plan for BWMA & DHA.
LAA	Los Angeles Aqueduct
LADWP	Los Angeles Department of Water & Power
LOR	Lower Owens River
LORP	Lower Owens River Project
MAMP	Lower Owens River Monitoring, Adaptive Management and Reporting Plan

ABBREVIATIONS, DEFINITIONS, AND MEMBERSHIP TABLE (Cont.)

MOU Parties	Los Angeles Department of Water and Power, Inyo County, California Department of Fish and Wildlife, California State Lands Commission, Sierra Club, Owens Valley Committee and Carla Scheidlinger.
OVC	Owens Valley Committee
RAS	Rapid Assessment Survey
RY	Runoff year accounts for peak stream flow and occurs from April 1st and ends the following March 31st.
SC	Sierra Club
SHF	Seasonal Habitat Flow
SLC	California State Lands Commission
Standing Committee	Comprised of elected and appointed officials from the City and County and provide direction to the Inyo/LA Technical Group.
Technical Group	Comprised of Inyo County and City staff who are directed by the Standing Committee.
Water Agreement	Agreement between the County of Inyo and the City of Los Angeles and its Department of Water and Power on a Long-Term Groundwater Management Plan for Owens Valley and Inyo County, administered by the Standing Committee and Technical Group
WY	Water year starts on October 1 and ends the following September 30 and is used to relate the precipitation that falls in the water year to runoff.

Authored by:



The Los Angeles Department of Water and Power
<http://www.ladwp.com/LORP>



Inyo County Water Department
<http://www.inyowater.org/projects/lorp/>

EXECUTIVE SUMMARY

The 2025 Lower Owens River Project (LORP) Annual Report contains the results from the eighteenth year of monitoring along the river. Following the cessation of the Monitoring Methodologies, Adaptative Management, and Reporting Plan (MAMP), in 2022, this report focuses on results related to hydrologic monitoring, water quality monitoring, adaptative management, and associated monitoring as specified in both the 1997 Memorandum of Understanding (MOU) and 2007 Stipulation and Order.

Hydrologic Monitoring

The hydrologic monitoring section describes flow conditions in the LORP regarding attainment with the 2007 Stipulation & Order flow and reporting requirements and 1991 Environmental Impact Report (EIR) goals. For the 2024-25 water year (WY), Los Angeles Department of Water and Power (LADWP) was compliant with all the 2007 Stipulation & Order flow and reporting requirements, aside from a brief non-emergency event on June 8, 2025. The mean flow to the Delta Habitat Area (DHA) was 7.6 cubic-feet-per-second (cfs). Implementation of the Blackrock Waterfowl Management Area (BWMA) Interim Plan (IP) continued. The Owens River Basin Runoff Forecast for the 2024-25 runoff year (RY) was 92% of normal, which, according to the 2004 EIR, called for a 14-day Seasonal Habitat Flow (SHF) with a peak release of 174 cfs. This section also describes flow measurement issues and includes commentary on flow losses and gains through the different reaches of the Lower Owens River (LOR).

Water Quality Monitoring

Water quality was manually monitored at 12 sites along the LOR from the Aqueduct Intake (north) to the Pumpback Station (south). Monitoring occurred from February to September 2025 and focused primarily on dissolved oxygen levels because of their critical importance to the fishery. There were no observed fish kills associated with depressed dissolved oxygen levels along the LOR in 2025. Temporal trends showed dissolved oxygen levels dropping to their lowest measured values in the latter half of June corresponding to the seasonal habitat flow ramped release. Generally, starting at the Intake, dissolved oxygen concentrations declined in a downstream fashion to Reinhackle Springs and then increased downstream below the LOR Islands. Dissolved oxygen levels were recovering at all sites by late summer. Additional parameters monitored were water temperature, specific conductance, and pH. Water temperature increased at all sites as the summer progressed, peaking around 75 °F. Inversely, specific conductance generally decreased through the spring to early summer, then gradually increased or remained relatively stable into September. There was minimal variability in measured pH at all sites for the monitoring period.

LORP Adaptive Management Actions

Following the 2019 LORP Evaluation Report, LADWP and Inyo County Water Department (ICWD) identified a series of adaptive management actions to further improve the project. From late 2023 and mid-2024, LADWP and ICWD conducted work on the following: implementation of a five-year interim flow regime in the DHA and related monitoring, a remote sensing analysis of the river following high flows associated with the historic 2023 runoff, implementation of the BWMA Interim Management and Monitoring Plan, a tree recruitment assessment, a rapid assessment survey (RAS), and noxious species monitoring and treatment.

Lower Owens River Remote Sensing Analysis Post-2023 Runoff

High-resolution aerial imagery was captured in 2024 to document the effects of the large-magnitude hydrological events of 2023 (historic run-off associated with the large snowpack of winter 2022-23 and Hurricane Hilary) on the channel and floodplain of the LOR and to assist in identifying potential sites of woody recruitment. Three features: 1) open water, 2) disturbed ground, and 3) dark surficial deposits that consist of wet and organic soils, were mapped using remote sensing and GIS techniques. Disturbed ground was more frequent and larger in areal extent in the upper reaches, especially above Mazourka Canyon Road while the dark deposits were more common in the lower reaches and the distribution of these features may reflect differing hydraulic processes along the river. The mapped features will help prioritize site visits to verify woody recruitment. Lastly, recommendations are offered to improve future work using remote sensing in similar applications.

Delta Habitat Area Interim Flow Regime and Related Monitoring

Monitoring related to the adherence and effectiveness of the interim flows to the DHA was conducted for RY 2024-25. Based on aerial photos and satellite imagery, vegetation appears to be stressed from the lower flows applied during the growing season. Based on these short-term changes, it would be beneficial to continue this adaptive management approach. Over the long term, it will take time for the aboveground biomass to break down and create open-water habitat. Overall, the interim flows were implemented for three years (2020-2022). In RY 2023-24, high flows associated with the winter 2023 runoff and Hurricane Hilary flooded the DHA for the entire growing season. During RY 2024-25, flows to the DHA were still higher than prescribed in April, but the flows decreased by May. This was the final year operating under the interim plan. A one-year extension to the plan was extended for RY 2025-26 and will expire on March 31, 2026.

Blackrock Waterfowl Management Area Interim Management and Monitoring Plan

Both vegetation and avian surveys occurred in the BWMA in the 2024-25 season as prescribed in the IP. With respect to vegetation, results were positive across all units with little additional encroachment of cattails and tules compared to increases during the water spreading year of 2023 and pre-interim conditions where these species aggressively expanded across all units in a single flood cycle. Minimal expansion of noxious weeds, and an increase in forage plants for waterbirds was also observed this year. Regarding the avian surveys, 69% of all birds identified were habitat indicator species (HIS), and the units continue to show higher numbers of waterfowl relative to pre-IP conditions. Avian monitoring will continue in the 2025-26 season with the IP set to expire on March 31, 2026.

Tree Recruitment

To discern mechanisms that have permitted riparian tree recruitment within the LORP riparian zone, several adaptive management actions were continued in the 2024-25 fiscal period. Fieldwork included an ongoing woody recruitment revisit study that was completed during spring 2025 during which prior RAS riparian tree (*Populus fremontii*, *Salix laevigata*, and *Salix goodingii*) recruitment locations were revisited from events documented between 2007-18. In addition, to recording any new tree recruitment that occurred during and following the historic flows, a RAS was undertaken during the fall of 2024, as sites could not be accessed in 2023. This effort documented seedlings that germinated in summer 2023 above the channel and within the floodplain following high flows, and incidental observations of tree seedlings that germinated in 2024 on a formerly tule (*Scirpus* spp. and *Typha* spp.) dominated surface directly adjacent to the river channel.

Inyo and Mono Counties Agricultural Commissioner's Office and LADWP - Noxious Species Surveillance and Treatment

Monitoring and treatment of weeds within the LORP continued in 2025. Both Inyo and Mono Counties Agricultural Commissioner's Office (CAC) and LADWP treated pepperweed (*Lepidium latifolium*) populations, along with both ICWD and LADWP treating saltcedar (*Tamarix* spp.) at multiple locations in the LORP.

1.0 INTRODUCTION

The LORP is a large-scale habitat restoration project in Inyo County, California, being implemented through a joint effort by the LADWP and Inyo County (County). The LORP was identified in the 1991 EIR as mitigation for impacts related to groundwater pumping by LADWP from 1970 to 1990. The description of the project was augmented in a 1997 *Memorandum of Understanding* (1997 MOU), signed by LADWP, Inyo County, California Department of Fish and Game (CDFG), California State Lands Commission (SLC), Sierra Club (SC), and the Owens Valley Committee (OVC). The MOU specifies the goal of the LORP, timeframe for development and implementation, and specific actions. It also provides certain minimum requirements for the LORP related to flows, locations of facilities, and habitat and biological species to be addressed.

The overall goal of the LORP, as stated in the MOU, is as follows:

“The goal of the LORP is the establishment of a healthy, functioning Lower Owens River riverine-riparian ecosystem, and the establishment of healthy, functioning ecosystems in the other physical features of the LORP, for the benefit of biodiversity and Threatened and Endangered Species, while providing for the continuation of sustainable uses including recreation, livestock grazing, agriculture and other activities.”

The LORP implementation included release of water from the Los Angeles Aqueduct (LAA) to the LOR, flooding of up to approximately 500 acres depending on the WY forecast in the BWMA, enhancement of the DHA, maintenance of several Off-River Lakes and Ponds, modifications to land management practices, and construction of new facilities including a pumpback station to capture a portion of the water released to the river.

The LORP was evaluated under the *California Environmental Quality Act* (CEQA) resulting in the completion and certification of the 2004 LORP EIR.

1.1 Monitoring and Reporting Responsibility

Section 2.10.4 of the 2004 LORP EIR states the County and LADWP will prepare an annual report that includes data, analysis, and recommendations. Specific monitoring procedures are described in the Lower Owens River Monitoring, Adaptive Management and Reporting Plan (MAMP), (Ecosystem Sciences, 2008), with a fifteen-year monitoring period post-implementation of the project (through 2022). Monitoring under the MAMP was completed in 2022; results and synthesis were provided in LADWP and the County’s 2022 LORP Annual Report. Although monitoring under the MAMP is complete, the MOU requires the County and LADWP to continual annual reports describing the environmental conditions of the LORP including any monitoring, analyses, and recommendations for adaptive management. Subsequently, this report describes monitoring, analysis, and recommendations for the LORP based on data collected in the partial years of 2024 and 2025. Specifically, this includes hydrologic monitoring for the project per the requirements

of the 2007 Stipulation & Order, water quality monitoring, and a series of adaptive management measures.

The 2007 Stipulation & Order requires a draft of the annual report be provided to the public and representatives of the Parties identified in the MOU. The 2007 Stipulation & Order states in Section L:

“LADWP and the County will release to the public and to the representatives of the Parties identified in the MOU a draft of the annual report described in Section 2.10.4 of the LORP EIR. The County and LADWP shall conduct a public meeting on the information contained in the draft report. The draft report will be released at least 15 calendar days in advance of the meeting. The public and the Parties will have the opportunity to offer comments on the draft report at the meeting and to submit written comments within a 15-calendar day period following the meeting. Following consideration of the comments submitted the Technical Group will conduct the meeting described in Section 2.10.4 of the EIR.”

The development of this LORP Annual Report is a collaborative effort primarily between the ICWD and LADWP. Personnel from these entities participated in different sections of the report writing, data collection, and analysis. For this report, Sections 1.0 Introduction and 2.0 Hydrologic Monitoring were authored by LADWP, Section 3.0 Water Quality Monitoring was authored by ICWD, Section 4.0 Adaptive Management was co-authored by LADWP, ICWD, and the CAC.

The annual report is available to download from both the LADWP website:

<http://www.ladwp.com/LORP>, and the ICWD website:

<https://www.inyowater.org/projects/lorp>.

This document fulfills the reporting requirements for the LORP Annual Report for 2025.

1.2 References

Ecosystem Sciences. 2008. *Lower Owens River Project – Monitoring, Adaptive Management and Reporting Plan*. Report prepared for Los Angeles Department of Water and Power. 522p.

2.0 HYDROLOGIC MONITORING

2.1 River Flows

On July 12, 2007, a Court Stipulation & Order was issued requiring the LADWP to meet specific flow requirements for the LORP. The flow requirements are listed below:

1. Minimum of 40 cfs released from the Intake at all times.
2. None of the in-river measuring stations have a 15-day running average of less than 35 cfs.
3. The mean daily flow at each of the in-river measuring stations must equal or exceed 40 cfs on at least three individual days out of any continuous 15-day period.
4. The 15-day running average of the in-river flow measuring stations is no less than 40 cfs.

On July 14, 2009, six of the ten original temporary in-river measuring stations were taken out-of-service, while the Below LORP Intake, Mazourka Canyon Road, Reinhackle Springs, and Pumpback Stations remained in service.

The flow data graphs show the LADWP was compliant with the Stipulation & Order, from October 2024 through September 2025, for the four in-river stations (see Appendix 2-1). Although flow at LORP Intake briefly fell below the 40 cfs minimum for approximately 30 minutes on June 8, 2025, the 24-hour average flow that day was 42 cfs.

2.2 Web Posting Requirements

The Stipulation & Order also outlined web posting requirements for the LORP data. LADWP has met all the posting requirements for the daily reports, monthly reports, and real time data.

Daily reports listing the flows for the LORP, BWMA wetted acreage, and Off-River Lakes and Ponds depths are posted each day on the Web at <<http://www.ladwp.com>> under News and Media → Reports → Los Angeles Aqueduct Conditions Reports → LORP Flow Reports.

Monthly reports summarizing each month and listing all raw data for the month are posted to the Web at <<http://www.ladwp.com>> under News and Media → Reports → Los Angeles Aqueduct Conditions Reports → LORP Monthly Reports.

Real time data showing flows at Below LORP Intake, Owens River at Mazourka Canyon Road, Owens River at Reinhackle Springs, and Pumpback Station are posted to the

Web at <<http://www.ladwp.com>> under News and Media → Reports → Los Angeles Aqueduct Conditions Reports → Real Time Data and click on the 'Lower Owens River Project' link. The real time data are preliminary that may contain inaccuracies attributable to equipment issues or other environmental factors and is subject to change after data processing for quality assurance and control.

2.3 Measurement Issues

LORP in-river flows at Mazourka and Reinhackle gaging stations are measured using *Sontek* SW acoustic flow meters (the Intake and Pumpback stations use a combination of other measuring devices, see below for description). The acoustic flow meters are located in the main channel of the LOR and are mounted on the bottom of concrete flumes at these stations. These devices are generally accurate, and final records for these stations generally fall within normal water measurement standards of +/- 10%.

The *Sontek* meters' measurement accuracy is affected by factors that influence river stage and flow velocity, including vegetation growth and sediment build up. To account for these environmental changes, LADWP manually meters the flows at these stations to check the accuracy of the *Sontek* meters at least once per month. Each time current metering is performed, a 'shift' is applied to the station to account for the difference in flow determined by the current metering. If a fundamental change in the flow curve is observed, then a new index is created from the current metering data and downloaded to the meter. To maintain flow measurement accuracy, all meters on the LORP are calibrated at least once per month following the 2007 Stipulation & Order.

A commentary on each station along the LORP is as follows:

Below LORP Intake

Measurement Device: Langemann Gate

The Langemann Gate regulates and records the flow rate at the Intake accurately and reliability provided the gate does not become submerged, which occurs on rare occasions when flow reaches approximately 250 cfs. To measure flows during periods of submergence, LADWP conducts daily current metering reads at the Intake, utilizing acoustic doppler current profiling equipment for measurement accuracy.

LORP at Mazourka Canyon Road

Measurement Devices: *Sontek* SW Meter

The station utilizes a single *Sontek* SW flow meter in a concrete measuring section, and flow measurement has been accurate.

LORP at Reinhackle Springs

Measurement Device: Sontek SW Meter

The station utilizes a single *Sontek* SW flow meter in a concrete measuring section, and flow measurement has been accurate.

LORP at Pumpback Station

Measurement Devices: Pumpback Station Discharge Meter, Langemann Gate, Weir

Flow at the Pumpback Station is calculated by adding the Pumpback Station flow, Langemann Gate Release to Delta flow, and Weir to Delta flow. In most flow conditions, these stations have proven to be accurate. However, during the higher flows, the Weir and/or the Langemann Gate can become submerged, thus lowering the measurement accuracy of the submerged device.

2.4 Flows to the Delta Habitat Area

Based upon a review of the flow to Brine Pool and flow to Delta data, and after filtering out unintended spillage at the Pumpback Station to average a flow of 6 to 9 cfs, planned flows to the Delta were set to the following approximate schedule (per the LORP EIR, section 2.4):

- October 1 to November 30 4 cfs
- December 1 to February 28 3 cfs
- March 1 to April 30 4 cfs
- May 1 to September 30 7.5 cfs

Additionally, pulse flows were scheduled to be released to the Delta (LORP EIR, section 2.4):

- Period 1: March - April 10 days at 25 cfs
- Period 2: June - July 10 days at 20 cfs
- Period 3: September 10 days at 25 cfs
- Period 4: November - December 5 days at 30 cfs

Through adaptive management efforts, a new Delta flow schedule was implemented in April 2020 for a 5-year trial period, which was extended for an additional year and will expire March 31, 2026. This interim schedule incorporates base and pulse flows into one schedule:

- October 1 to October 15 11 cfs
- October 16 to October 31 8 cfs
- November 1 to November 30 7 cfs
- December 1 to February 28 6 cfs
- March 1 to March 31 10 cfs
- April 1 to May 15 13 cfs
- May 16 to August 31 3 cfs
- September 1 to September 30 11 cfs

Figure 2-1 shows actual Langemann flow released to the Delta for the 2024-25 WY along with the interim flow schedule. Figure 2-2 shows total releases (Langemann and Weir) to the Delta for the 2024-25 WY, which resulted in an average daily flow of 7.6 cfs.

Unintended flows are released to the Delta when the total river flow at Pumpback Station exceeds the maximum allowed flowrate of the Pumpback Station due to natural (example: rainstorms) or operational (example: pump/Langemann maintenance or SHF) causes. Flows over the weir are generally unintended flows while flows over the Langemann Gate are scheduled flows.

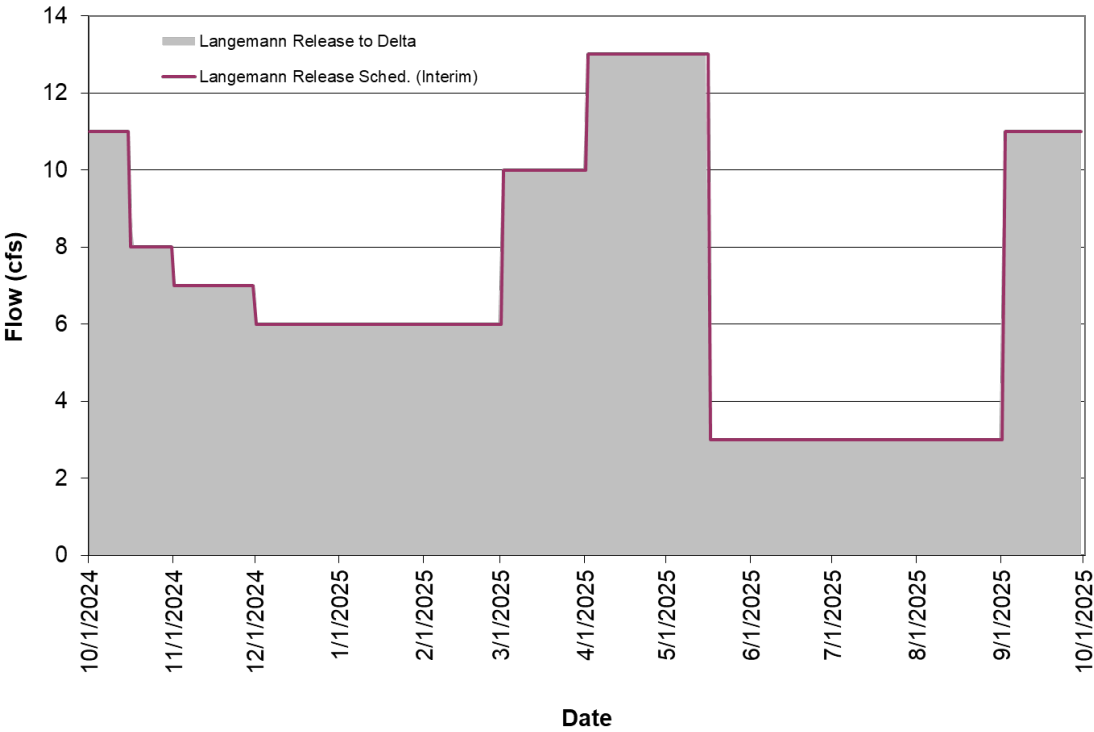


Figure 2-1. Langemann release to Delta

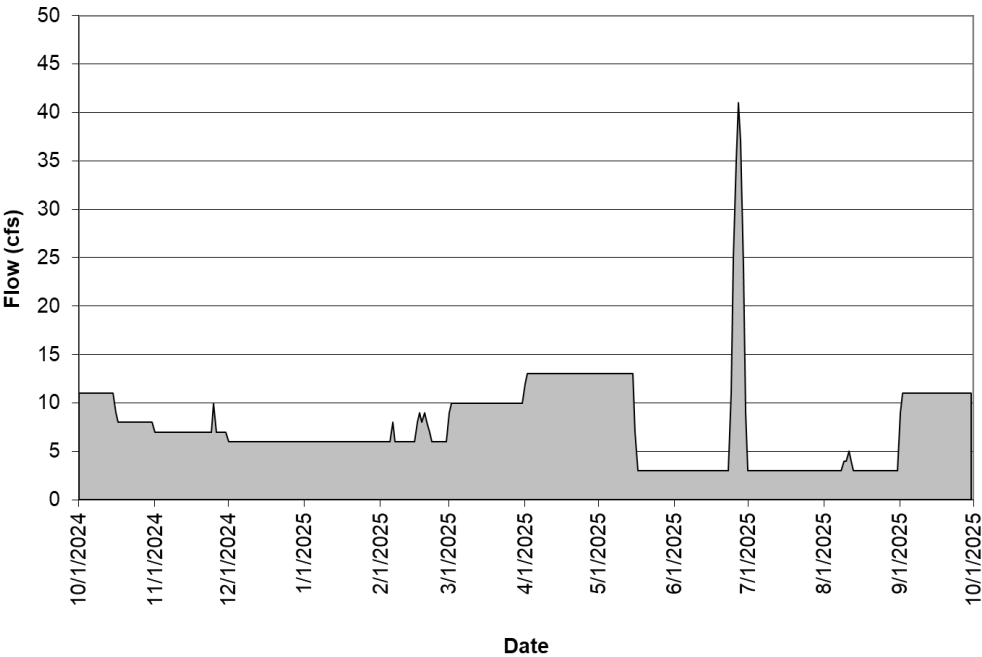


Figure 2-2. Langemann and weir release to Delta.

Off-River Lakes and Ponds

The BWMA and Off-River Lakes and Ponds Hydrologic Data Reporting Plan requires the Upper Twin Lake, Lower Twin Lake, and Goose Lake to be maintained between 1.5 and 3.0 feet on their respective staff gauges, and for Billy Lake to be maintained full (i.e., at an elevation that maintains outflow from the lake). Staff gages measured between 2.02 and 2.81 feet stage height for the 2024-25 WY (Figure 2-3).

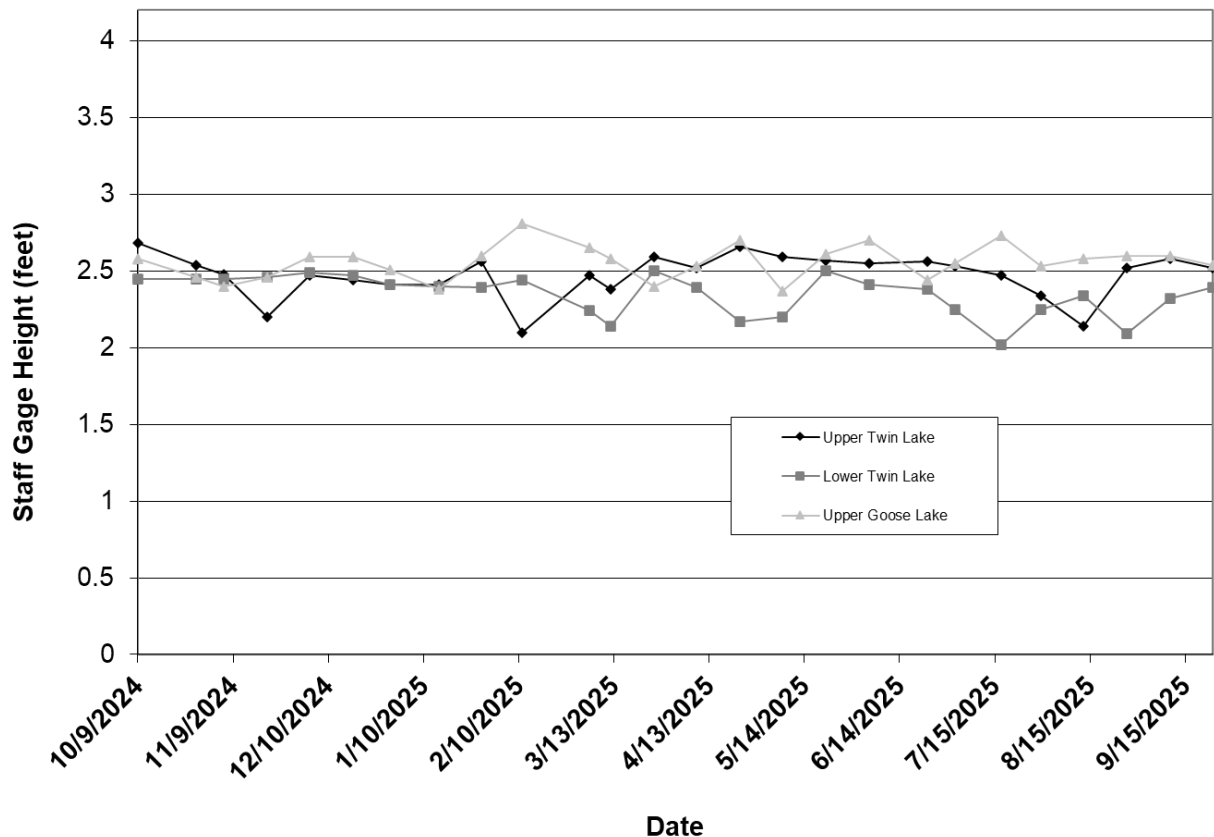


Figure 2-3. Off-River lakes and ponds staff gages.

Billy Lake

Due to the topography of Billy Lake in relation to the Billy Lake Return station, whenever the Billy Lake Return station is showing flow, Billy Lake is full. The LADWP maintains Billy Lake by monitoring the Billy Lake Return station, which had a daily average flow of 1.2 cfs for the year (see Table 2-1 and Appendix 2-2).

Table 2-1. Daily LORP flows – WY 2024-25.

Station Name	Average Flow (cfs)	Maximum Flow (cfs)	Minimum Flow (cfs)
Below River Intake	61	168	42
Blackrock Return Ditch	1.2	3.4	0.0
Goose Lake Return	0	0	0
Billy Lake Return	1.2	2.0	0.6
Mazourka Canyon Road	61	141	39
Locust Ditch Return	0	6	0
Georges Ditch Return	0	6	0
Reinhackle Springs	60	128	40
Alabama Gates Return	0	0	0
At Pumpback Station	49	89	30
Pump Station Return to LAA/OL	42	48	27
Langemann Gate to Delta	7	13	3
Weir to Delta	1	38	0

Thibaut Pond

Thibaut Pond is contained completely within the Thibaut Unit of the BWMA. Each day the Thibaut Pond acreage is posted to the web in the LORP daily reports.

2.5 Blackrock Waterfowl Management Area

The BWMA is operated on the RY schedule, which differs from the schedule of the other components of the LORP included in Chapter 2, which are operated on the WY schedule. Flows for the BWMA are set based upon previous data relationships between inflows to an area and the resulting wetted acreage measurements during each of the four seasons based on evapotranspiration (ET) rates.

The seasons are defined as:

Spring	April 16 – May 31
Summer	June 1 – August 15
Fall	August 16 – October 15
Winter	October 16 – April 15

At the end of the 2012-13 RY, wetted acreage measurements were collected eight times per year, once in the middle of each season and once at the end of each season. Starting with the 2013-14 RY, only the middle of each season measurements have been collected. The end-of-season measurements were discontinued because they added little information compared to the middle-of-season measurements and required extensive personnel resources for taking the measurements. Measurements are obtained through satellite imagery and processing and verified through field observations.

With the adoption of the five-year IP, starting in 2021, measurements are only to be collected for the Fall and Winter seasons when flows occur. No flows are released in the Spring and Summer season. The target wetted acreage is 500 acres, based on the average of measurements taken on or around November 1 and March 1. If wetted acreages results were higher or lower than the target, releases in future years would be adjusted accordingly to better hit the target number.

Table 2-2. BWMA wetted acreage.

<u>Winterton Unit</u>				<u>Thibaut Unit</u>			
ET Season	Read Date	Wetted Acreage	Average Inflow (cfs)	ET Season	Read Date	Wetted Acreage	Average Inflow (cfs)
Fall '24	11/6/2024	138	2.3	Fall '24	11/3/2024	226	6.0
Winter '24-'25	3/1/2025	237	3.2	Winter '24-'25	3/1/2025	212	2.7
Fall '25	11/1/2025	173	5.7	Fall '25	11/1/2025	171	6.5*
<u>Drew Unit</u>				<u>Waggoner Unit</u>			
ET Season	Read Date	Wetted Acreage	Average Inflow (cfs)	ET Season	Read Date	Wetted Acreage	Average Inflow (cfs)
Fall '24	N/A	N/A	OFF	Fall '24	11/3/2024	145	8.0
Winter '24-'25	N/A	N/A	OFF	Winter '24-'25	3/1/2025	185	2.5
Fall '25	N/A	N/A	OFF	Fall '25	11/1/2025	150	7.5*

Notes:

*Estimated average inflow

No flows are released during the Spring and Summer.

2.6 BWMA Results for April 2024 to March 2025

In accordance with the IP, the waterfowl wetted acreage target was 500 acres.

On September 15, 2024, the Fall 2024 season began with flows being sent out to Thibaut, Winterton, and Waggoner Units. Wetted acreage surveys completed for the Fall 2024 season measured a total of 509 acres.

On November 1, 2024, flows to those three units were adjusted for the Winter season. On March 1, 2025, ICWD, using remote sensing analysis, estimated the spring wetted acreages of the Thibaut, Winterton, and Waggoner Units combined measured 634 acres for the Winter 2024-25 season.

On March 1, 2025, flows to Thibaut, Winterton, and Waggoner Units were turned off.

The average waterfowl wetted acreage for the 2024-25 RY was 572 acres.

2.6.1 BWMA Results for April 2025 to March 2026

In accordance with the IP, the waterfowl wetted acreage goal was 500 acres.

On September 15, 2025, flows for the Fall 2025 season were set. Flow to Thibaut Unit was set to 6.5 cfs, Winterton Unit was set to 5.5 cfs, and Waggoner Unit was set to 7.5 cfs.

Wetted acreage surveys completed for the Fall 2025 season measured a total of 494 acres. Thibaut measured 171 acres, Winterton measured 173 acres, and Waggoner measured 150 acres.

The spring wetted acreage measurement will take place in early March 2026; the average totals of the Fall and Spring measurements will be the recorded wetted acreage for the 2025-26 RY.

2.7 Assessment of River Flow Gains and Losses

This section describes river flow gains and losses for all reaches in the LOR from the LORP Intake to the Pumpback Station during the 2024-25 WY. The reaches referred to in this report indicate areas of river between specified permanent gaging stations. This analysis is an attempt at understanding flow losses and gains in the LOR so that estimates of future water requirements can be made.

2.7.1 River Flow Loss or Gain by Month and Year

Flow losses or gains can vary over time as presented in Table 2-3. ET falls during late fall and winter and increases during the spring and summer plant growing seasons. Thus, the river can lose water to ET during certain periods of the year and maintain or gain water during other periods of the year. December through March are winter periods with low ET that result in gains from increased flows from water stored in the shallow

aquifer where groundwater levels are higher than adjacent river levels. Other incoming winter water sources such as local intermittent runoff from precipitation also result in flow increases.

Table 2-3. Average monthly river flow losses/gains from the Intake to the Pumpback station during the 2024-25 WY.

	<u>Month</u>	<u>Flow (cfs)</u>	<u>Acre-Feet-Per-Day</u>
2024	OCT	-14	-28
	NOV	-4	-7
	DEC	-1	-1
2025	JAN	+1	+2
	FEB	+6	+11
	MAR	+3	+6
	APR	-4	-8
	MAY	-7	-15
	JUN	-34	-67
	JUL	-48	-96
	AUG	-39	-78
	SEP	-29	-57
	AVG MONTH	-14 cfs	-28 AcFt

For the entire river, the overall gain or loss is calculated by subtracting total inflows at the Intake and augmentation spillgates from Pumpback Station outflow. Inflows from the Intake were 44,010-acre feet (AF), inflows from augmentation spillgates were 2,166 AF, and outflows from the Pumpback Station were 35,830 AF. This yields a total loss of 10,346 AF for the year, a daily average of approximately 14.3 cfs between the Intake and the Pumpback Station. Water loss during the 2024-25 WY represents 22% of the total released flow from the Intake and augmentation spillgates into the river channel.

2.7.2 Flow Loss or Gain by River Reach during the Winter Period

From December 2024 to March 2025, an average flow of 44 cfs was released into the LORP from the Intake. An additional 3 cfs was provided from augmentation ditches for a total accumulated release of 47 cfs. The average flow reaching the Pumpback Station was 49 cfs, an increase of 2 cfs during the period. Typically, during the winter ET is low and any “make water” coming into the river is additive.

The river reach from the Intake to the Mazourka Canyon Road gaging station gained an average of 2 cfs, Mazourka Canyon Road to the Reinhackle gaging station gained 5 cfs, and Reinhackle to the Pumpback Station lost 5 cfs (see Table 2-4).

Table 2-4. Winter flow losses/gains, December 2024 to March 2025

Recording Station	Average Flow (cfs)	Gain or Loss (cfs)	Accumulative (cfs)
Intake	44	N/A	N/A
Mazourka	49	+2	+2
Reinhackle	54	+5	+7
Pumpback	49	-5	+2

Note: All numbers are rounded to the nearest whole value.

Calculations include augmentation and return flows in appropriate reaches, see Appendix 2-2 for all flows.

2.7.3 Flow Loss or Gain by River Reach during the Summer Period

During the summer period of June 2025 to September 2025, an average flow of 84 cfs was released into the LORP from the Intake. An additional 3 cfs was provided from augmentation ditches for a total accumulated release of 87 cfs. The effects of ET are observed during the summer period by a high total flow loss (-38) between the Intake and the Pumpback Station. The largest flow losses occurred in the Reinhackle to Pumpstation reach (-23 cfs) (see Table 2-5).

Table 2-5. Summer flow losses/gains, June 2025 to September 2025

Recording Station	Average Flow (cfs)	Gain or Loss (cfs)	Accumulative (cfs)
Intake	84	N/A	N/A
Mazourka	78	-8	-8
Reinhackle	73	-7	-15
Pumpback	50	-23	-38

Note: All numbers are rounded to the nearest whole value.

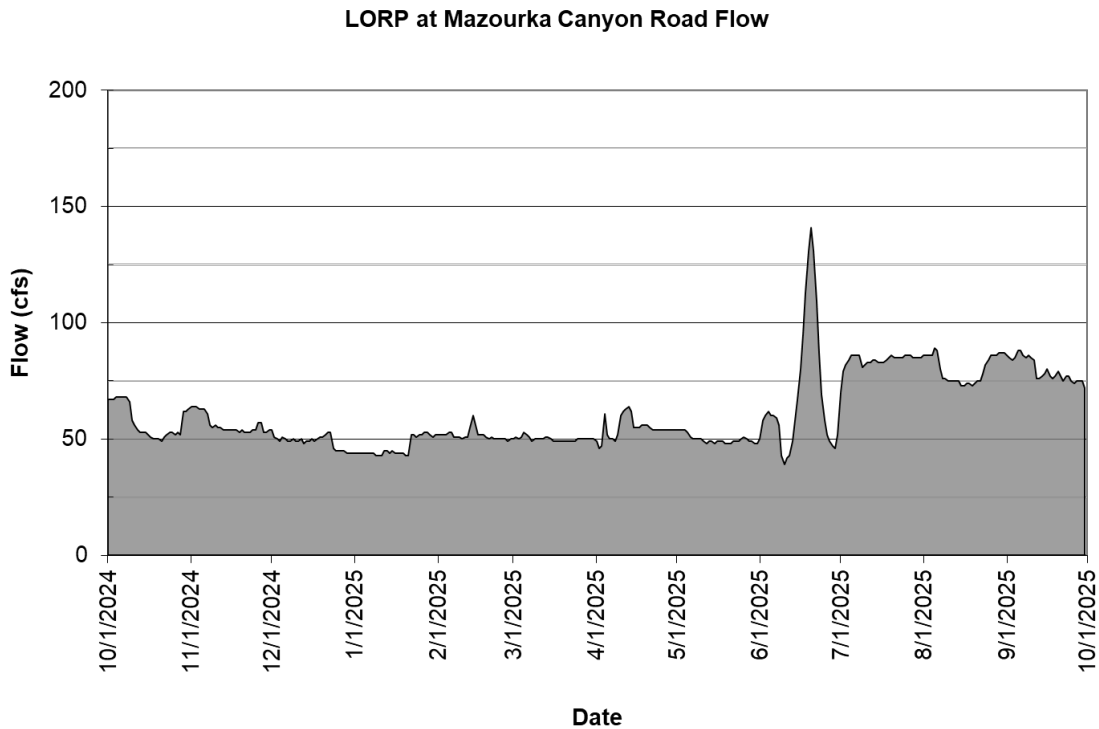
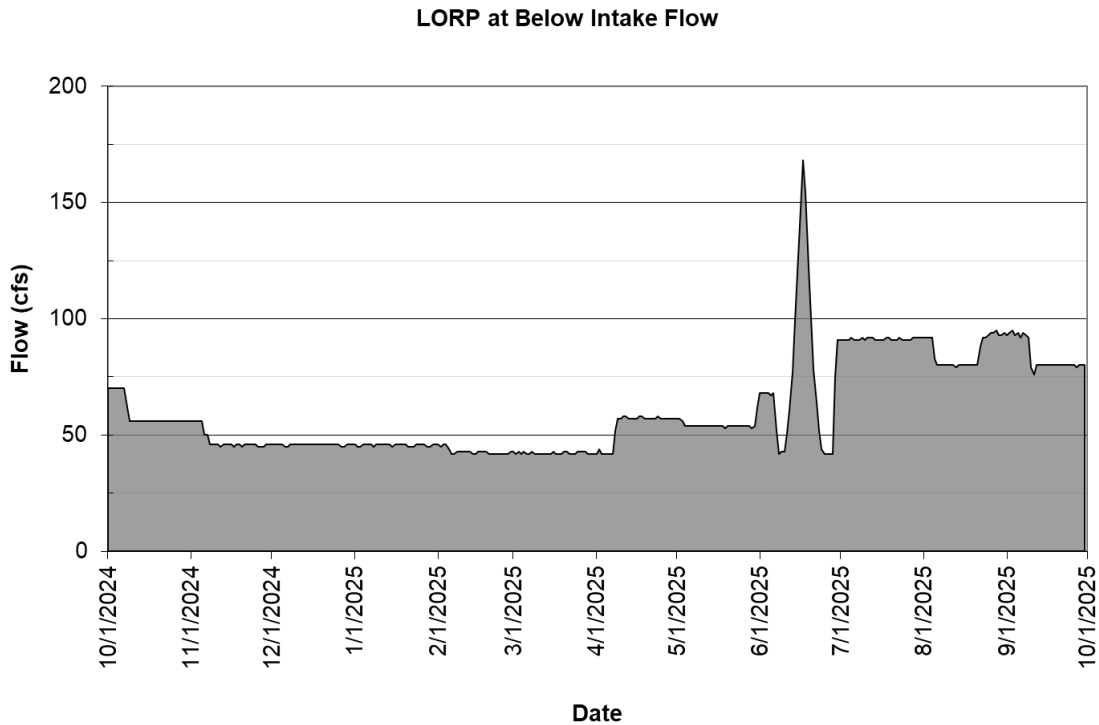
Calculations include augmentation and return flows in appropriate reaches, see Appendix 2-2 for all flows.

2.8 Seasonal Habitat Flow

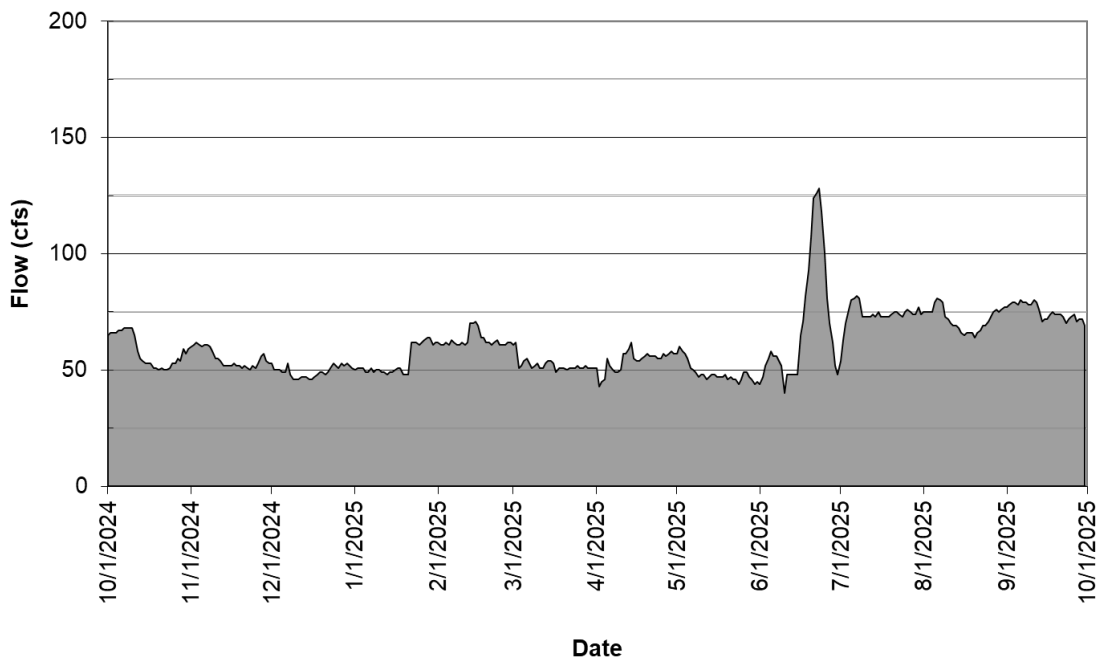
The Owens River Basin Runoff Forecast for the 2024-2025 RY was 92% of normal, which, according to the 2004 EIR, calls for a 14-day SHF with a peak release of 174 cfs. Flows from LORP Intake were ramped up, over a period of seven days, to a peak of 174 cfs on

June 17, 2025, before ramping back down over another seven days. Hydrographs and tabular daily flow- rates, from the LORP Intake, are provided in Appendices 2-1 & 2-2.

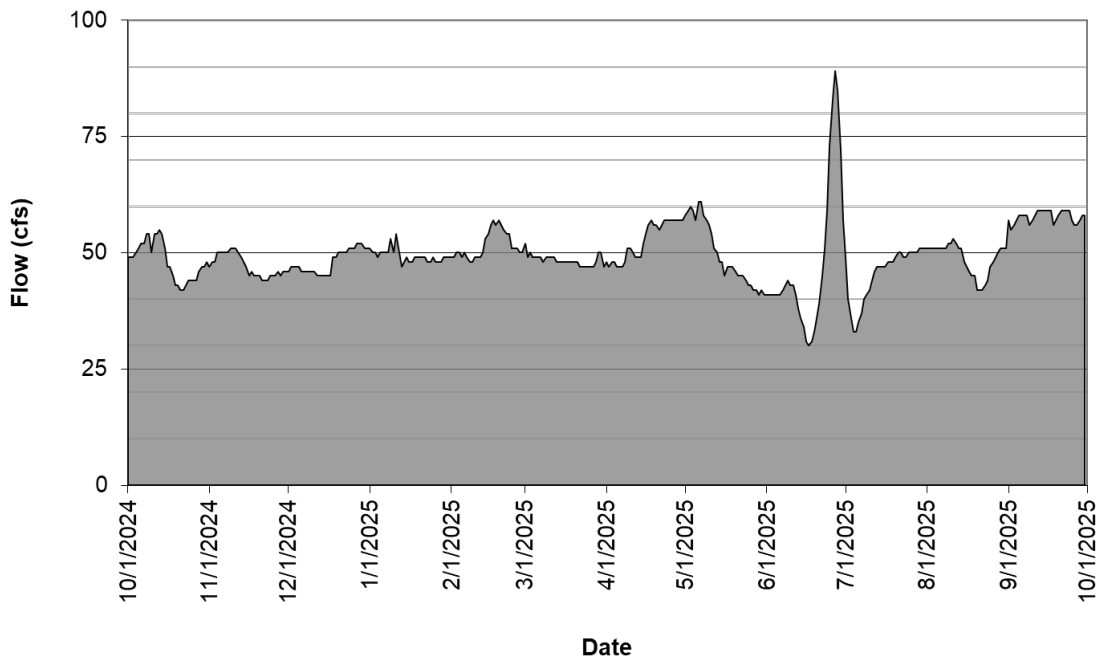
2.9 Appendix 2-1. LORP hydrographs.



LORP at Reinhackle Springs Flow



LORP at Pumpback Station Flow



2.10 Appendix 2-2. Tabular LORP daily flows.

Flow Gaging Station	Below River Intake	Blackrock Ditch Return	Goose Lake Return	Billy Lake Return	Mazourka Canyon Road	Locust Ditch Return	Georges Ditch Return	Reinhackle Springs	Alabama Gates Return	At Pumpback Station	Pump Station	Langeman n Gate to Delta	Weir to Delta	In Channel Average Flow
Date														
10/1/2024	70.0	1.1	0.0	1.2	67.0	0.0	0.1	65.0	0.0	49.0	38.0	11.0	0.0	62.8
10/2/2024	70.0	1.3	0.0	1.3	67.0	0.0	0.1	66.0	0.0	49.0	38.0	11.0	0.0	63.0
10/3/2024	70.0	1.3	0.0	1.3	67.0	0.0	0.2	66.0	0.0	49.0	38.0	11.0	0.0	63.0
10/4/2024	70.0	1.3	0.0	1.4	68.0	0.0	0.5	66.0	0.0	50.0	39.0	11.0	0.0	63.5
10/5/2024	70.0	1.1	0.0	1.4	68.0	0.0	0.3	67.0	0.0	51.0	40.0	11.0	0.0	64.0
10/6/2024	70.0	1.1	0.0	1.4	68.0	0.0	0.2	67.0	0.0	52.0	41.0	11.0	0.0	64.3
10/7/2024	70.0	1.1	0.0	1.5	68.0	0.0	0.2	68.0	0.0	52.0	41.0	11.0	0.0	64.5
10/8/2024	64.0	1.1	0.0	1.2	68.0	0.0	0.5	68.0	0.0	54.0	43.0	11.0	0.0	63.5
10/9/2024	56.0	1.1	0.0	1.3	66.0	0.0	0.4	68.0	0.0	54.0	43.0	11.0	0.0	61.0
10/10/2024	56.0	1.1	0.0	1.4	58.0	0.0	0.3	68.0	0.0	50.0	39.0	11.0	0.0	58.0
10/11/2024	56.0	1.1	0.0	1.2	56.0	0.0	0.2	65.0	0.0	54.0	43.0	11.0	0.0	57.8
10/12/2024	56.0	1.1	0.0	1.0	54.0	0.0	0.2	58.0	0.0	54.0	43.0	11.0	0.0	55.5
10/13/2024	56.0	1.1	0.0	0.8	53.0	0.0	0.2	55.0	0.0	55.0	44.0	11.0	0.0	54.8
10/14/2024	56.0	1.0	0.0	0.9	53.0	0.0	0.1	54.0	0.0	54.0	43.0	11.0	0.0	54.3
10/15/2024	56.0	1.1	0.0	1.0	53.0	0.0	0.1	53.0	0.0	51.0	40.0	11.0	0.0	53.3
10/16/2024	56.0	1.0	0.0	0.9	52.0	0.0	0.2	53.0	0.0	47.0	38.0	9.0	0.0	52.0
10/17/2024	56.0	1.0	0.0	0.8	51.0	0.0	0.5	53.0	0.0	47.0	39.0	8.0	0.0	51.8
10/18/2024	56.0	1.0	0.0	1.1	50.0	0.0	1.1	51.0	0.0	45.0	37.0	8.0	0.0	50.5
10/19/2024	56.0	1.1	0.0	1.2	50.0	0.0	1.3	51.0	0.0	43.0	35.0	8.0	0.0	50.0
10/20/2024	56.0	1.1	0.0	1.2	50.0	0.0	0.3	50.0	0.0	43.0	35.0	8.0	0.0	49.8
10/21/2024	56.0	1.2	0.0	1.1	49.0	0.0	0.2	51.0	0.0	42.0	34.0	8.0	0.0	49.5
10/22/2024	56.0	1.2	0.0	0.8	51.0	0.0	0.2	50.0	0.0	42.0	34.0	8.0	0.0	49.8
10/23/2024	56.0	1.3	0.0	0.9	52.0	0.0	0.4	50.0	0.0	43.0	35.0	8.0	0.0	50.3
10/24/2024	56.0	1.4	0.0	1.3	53.0	0.0	0.3	51.0	0.0	44.0	36.0	8.0	0.0	51.0
10/25/2024	56.0	1.3	0.0	1.3	53.0	0.0	0.6	53.0	0.0	44.0	36.0	8.0	0.0	51.5
10/26/2024	56.0	1.3	0.0	1.0	52.0	0.0	0.8	53.0	0.0	44.0	36.0	8.0	0.0	51.3
10/27/2024	56.0	1.2	0.0	1.3	53.0	0.0	1.0	55.0	0.0	44.0	36.0	8.0	0.0	52.0
10/28/2024	56.0	1.1	0.0	1.0	52.0	0.0	0.4	54.0	0.0	46.0	38.0	8.0	0.0	52.0
10/29/2024	56.0	1.2	0.0	1.5	62.0	0.0	0.2	59.0	0.0	47.0	39.0	8.0	0.0	56.0
10/30/2024	56.0	1.7	0.0	1.3	62.0	0.0	0.3	57.0	0.0	47.0	39.0	8.0	0.0	55.5
10/31/2024	56.0	1.8	0.0	1.2	63.0	0.0	0.6	59.0	0.0	48.0	40.0	8.0	0.0	56.5

Notes: These measurements are not on the main channel of the Owens River, therefore highlighted columns are not included in average calculations.

Flow Gaging Station	Below River Intake	Blackrock Ditch Return	Goose Lake Return	Billy Lake Return	Mazourka Canyon Road	Locust Ditch Return	Georges Ditch Return	Reinhackle Springs	Alabama Gates Return	At Pumpback Station	Pump Station	Langeman n Gate to Delta	Weir to Delta	In Channel Average Flow
Date														
11/1/2024	56.0	1.5	0.0	1.6	64.0	0.0	0.4	60.0	0.0	47.0	40.0	7.0	0.0	56.8
11/2/2024	56.0	1.2	0.0	1.4	64.0	0.0	0.4	61.0	0.0	48.0	41.0	7.0	0.0	57.3
11/3/2024	56.0	1.5	0.0	1.5	64.0	0.0	0.4	62.0	0.0	48.0	41.0	7.0	0.0	57.5
11/4/2024	56.0	1.8	0.0	1.4	63.0	0.0	0.3	61.0	0.0	50.0	43.0	7.0	0.0	57.5
11/5/2024	56.0	1.8	0.0	1.2	63.0	0.0	0.4	60.0	0.0	50.0	43.0	7.0	0.0	57.3
11/6/2024	50.0	1.8	0.0	1.1	63.0	0.0	0.3	61.0	0.0	50.0	43.0	7.0	0.0	56.0
11/7/2024	50.0	1.8	0.0	1.1	61.0	0.0	0.2	61.0	0.0	50.0	43.0	7.0	0.0	55.5
11/8/2024	46.0	1.9	0.0	0.9	56.0	0.0	0.2	60.0	0.0	50.0	43.0	7.0	0.0	53.0
11/9/2024	46.0	1.9	0.0	0.8	55.0	0.0	0.4	58.0	0.0	51.0	44.0	7.0	0.0	52.5
11/10/2024	46.0	1.8	0.0	1.1	56.0	0.0	0.4	55.0	0.0	51.0	44.0	7.0	0.0	52.0
11/11/2024	46.0	1.6	0.0	0.8	55.0	0.0	0.4	55.0	0.0	51.0	44.0	7.0	0.0	51.8
11/12/2024	45.0	1.3	0.0	1.1	55.0	0.0	0.3	54.0	0.0	50.0	43.0	7.0	0.0	51.0
11/13/2024	46.0	1.1	0.0	1.2	54.0	0.0	0.4	52.0	0.0	49.0	42.0	7.0	0.0	50.3
11/14/2024	46.0	1.1	0.0	1.2	54.0	0.0	0.6	52.0	0.0	48.0	41.0	7.0	0.0	50.0
11/15/2024	46.0	1.0	0.0	1.2	54.0	0.0	0.6	52.0	0.0	47.0	40.0	7.0	0.0	49.8
11/16/2024	46.0	1.2	0.0	1.2	54.0	0.0	0.5	52.0	0.0	45.0	38.0	7.0	0.0	49.3
11/17/2024	45.0	1.3	0.0	1.2	54.0	0.0	0.5	53.0	0.0	46.0	39.0	7.0	0.0	49.5
11/18/2024	46.0	1.2	0.0	1.2	54.0	0.0	0.5	52.0	0.0	45.0	38.0	7.0	0.0	49.3
11/19/2024	46.0	1.1	0.0	1.3	53.0	0.0	0.4	52.0	0.0	45.0	38.0	7.0	0.0	49.0
11/20/2024	45.0	1.1	0.0	1.2	54.0	0.0	0.4	51.0	0.0	45.0	38.0	7.0	0.0	48.8
11/21/2024	46.0	1.1	0.0	1.3	53.0	0.0	0.3	52.0	0.0	44.0	37.0	7.0	0.0	48.8
11/22/2024	46.0	1.1	0.0	1.3	53.0	0.0	0.3	51.0	0.0	44.0	37.0	7.0	0.0	48.5
11/23/2024	46.0	1.0	0.0	1.3	53.0	0.0	0.3	50.0	0.0	44.0	37.0	7.0	0.0	48.3
11/24/2024	46.0	1.0	0.0	1.0	54.0	0.0	0.5	52.0	0.0	45.0	38.0	7.0	0.0	49.3
11/25/2024	46.0	1.2	0.0	1.2	54.0	0.0	0.4	51.0	0.0	45.0	35.0	7.0	3.0	49.0
11/26/2024	45.0	1.5	0.0	1.4	57.0	0.0	0.4	53.0	0.0	45.0	38.0	7.0	0.0	50.0
11/27/2024	45.0	1.4	0.0	1.4	57.0	0.0	0.3	56.0	0.0	46.0	39.0	7.0	0.0	51.0
11/28/2024	45.0	1.4	0.0	1.3	53.0	0.0	0.3	57.0	0.0	45.0	38.0	7.0	0.0	50.0
11/29/2024	46.0	1.4	0.0	1.2	53.0	0.0	0.4	54.0	0.0	46.0	39.0	7.0	0.0	49.8
11/30/2024	46.0	1.4	0.0	1.2	54.0	0.0	0.6	53.0	0.0	46.0	39.0	7.0	0.0	49.8

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Flow Gaging Station	Below River Intake	Blackrock Ditch Return	Goose Lake Return	Billy Lake Return	Mazourka Canyon Road	Locust Ditch Return	Georges Ditch Return	Reinhackle Springs	Alabama Gates Return	At Pumpback Station	Pump Station	Langeman n Gate to Delta	Weir to Delta	In Channel Average Flow
Date														
12/1/2024	46.0	1.4	0.0	1.2	54.0	0.0	0.6	53.0	0.0	46.0	40.0	6.0	0.0	49.8
12/2/2024	46.0	1.3	0.0	1.3	51.0	0.0	0.6	50.0	0.0	47.0	41.0	6.0	0.0	48.5
12/3/2024	46.0	1.3	0.0	1.2	50.0	0.0	0.5	50.0	0.0	47.0	41.0	6.0	0.0	48.3
12/4/2024	46.0	1.2	0.0	1.1	49.0	0.0	0.5	50.0	0.0	47.0	41.0	6.0	0.0	48.0
12/5/2024	46.0	1.1	0.0	1.4	51.0	0.0	0.3	49.0	0.0	47.0	41.0	6.0	0.0	48.3
12/6/2024	45.0	1.0	0.0	1.3	50.0	0.0	2.0	49.0	0.0	46.0	40.0	6.0	0.0	47.5
12/7/2024	45.0	1.1	0.0	1.0	49.0	0.0	2.2	53.0	0.0	46.0	40.0	6.0	0.0	48.3
12/8/2024	46.0	1.2	0.0	1.0	49.0	0.0	0.2	48.0	0.0	46.0	40.0	6.0	0.0	47.3
12/9/2024	46.0	1.2	0.0	1.2	50.0	0.0	0.5	46.0	0.0	46.0	40.0	6.0	0.0	47.0
12/10/2024	46.0	1.2	0.0	1.1	49.0	0.0	0.5	46.0	0.0	46.0	40.0	6.0	0.0	46.8
12/11/2024	46.0	1.2	0.0	1.2	49.0	0.0	0.5	46.0	0.0	46.0	40.0	6.0	0.0	46.8
12/12/2024	46.0	1.2	0.0	1.2	50.0	0.0	0.5	47.0	0.0	45.0	39.0	6.0	0.0	47.0
12/13/2024	46.0	1.2	0.0	1.1	48.0	0.0	0.4	47.0	0.0	45.0	39.0	6.0	0.0	46.5
12/14/2024	46.0	1.2	0.0	0.9	49.0	0.0	0.4	47.0	0.0	45.0	39.0	6.0	0.0	46.8
12/15/2024	46.0	1.2	0.0	0.9	49.0	0.0	0.4	46.0	0.0	45.0	39.0	6.0	0.0	46.5
12/16/2024	46.0	1.2	0.0	1.2	50.0	0.0	0.4	46.0	0.0	45.0	39.0	6.0	0.0	46.8
12/17/2024	46.0	1.1	0.0	1.2	49.0	0.0	0.4	47.0	0.0	45.0	39.0	6.0	0.0	46.8
12/18/2024	46.0	1.1	0.0	1.2	50.0	0.0	0.4	48.0	0.0	49.0	43.0	6.0	0.0	48.3
12/19/2024	46.0	1.4	0.0	1.2	51.0	0.0	0.4	49.0	0.0	49.0	43.0	6.0	0.0	48.8
12/20/2024	46.0	1.5	0.0	1.2	51.0	0.0	0.4	49.0	0.0	50.0	44.0	6.0	0.0	49.0
12/21/2024	46.0	1.6	0.0	1.2	52.0	0.0	0.3	48.0	0.0	50.0	44.0	6.0	0.0	49.0
12/22/2024	46.0	1.6	0.0	1.1	53.0	0.0	0.3	49.0	0.0	50.0	44.0	6.0	0.0	49.5
12/23/2024	46.0	1.4	0.0	1.3	53.0	0.0	0.3	51.0	0.0	50.0	44.0	6.0	0.0	50.0
12/24/2024	46.0	1.1	0.0	1.2	46.0	0.0	0.3	53.0	0.0	51.0	45.0	6.0	0.0	49.0
12/25/2024	46.0	1.0	0.0	1.2	45.0	0.0	0.3	52.0	0.0	51.0	45.0	6.0	0.0	48.5
12/26/2024	46.0	1.0	0.0	1.1	45.0	0.0	0.3	51.0	0.0	51.0	45.0	6.0	0.0	48.3
12/27/2024	45.0	1.1	0.0	1.3	45.0	0.0	0.9	53.0	0.0	52.0	46.0	6.0	0.0	48.8
12/28/2024	45.0	1.2	0.0	1.2	45.0	0.0	0.2	52.0	0.0	52.0	46.0	6.0	0.0	48.5
12/29/2024	46.0	1.2	0.0	1.0	44.0	0.0	0.3	53.0	0.0	52.0	46.0	6.0	0.0	48.8
12/30/2024	46.0	1.1	0.0	1.0	44.0	0.0	0.3	52.0	0.0	51.0	45.0	6.0	0.0	48.3
12/31/2024	46.0	1.1	0.0	1.1	44.0	0.0	0.3	51.0	0.0	51.0	45.0	6.0	0.0	48.0

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Flow Gaging Station	Below River Intake	Blackrock Ditch Return	Goose Lake Return	Billy Lake Return	Mazourka Canyon Road	Locust Ditch Return	Georges Ditch Return	Reinhackle Springs	Alabama Gates Return	At Pumpback Station	Pump Station	Langeman n Gate to Delta	Weir to Delta	In Channel Average Flow
Date														
1/1/2025	46.0	1.3	0.0	1.2	44.0	0.0	0.2	50.0	0.0	51.0	45.0	6.0	0.0	47.8
1/2/2025	45.0	1.3	0.0	1.2	44.0	0.0	0.3	51.0	0.0	50.0	44.0	6.0	0.0	47.5
1/3/2025	45.0	1.4	0.0	1.2	44.0	0.0	0.5	51.0	0.0	50.0	44.0	6.0	0.0	47.5
1/4/2025	46.0	1.3	0.0	1.1	44.0	0.0	0.4	51.0	0.0	49.0	43.0	6.0	0.0	47.5
1/5/2025	46.0	1.3	0.0	1.2	44.0	0.0	0.4	49.0	0.0	50.0	44.0	6.0	0.0	47.3
1/6/2025	46.0	1.3	0.0	1.3	44.0	0.0	0.3	49.0	0.0	50.0	44.0	6.0	0.0	47.3
1/7/2025	46.0	1.3	0.0	1.3	44.0	0.0	0.3	51.0	0.0	50.0	44.0	6.0	0.0	47.8
1/8/2025	45.0	1.2	0.0	1.4	44.0	0.0	0.3	49.0	0.0	50.0	44.0	6.0	0.0	47.0
1/9/2025	46.0	1.2	0.0	1.4	43.0	0.0	0.3	50.0	0.0	53.0	47.0	6.0	0.0	48.0
1/10/2025	46.0	1.2	0.0	1.4	43.0	0.0	0.3	50.0	0.0	50.0	44.0	6.0	0.0	47.3
1/11/2025	46.0	1.3	0.0	1.4	43.0	0.0	0.3	49.0	0.0	54.0	48.0	6.0	0.0	48.0
1/12/2025	46.0	1.3	0.0	1.4	45.0	0.0	0.3	49.0	0.0	51.0	45.0	6.0	0.0	47.8
1/13/2025	46.0	1.3	0.0	1.4	45.0	0.0	0.2	48.0	0.0	47.0	41.0	6.0	0.0	46.5
1/14/2025	46.0	1.3	0.0	1.4	44.0	0.0	0.2	49.0	0.0	48.0	42.0	6.0	0.0	46.8
1/15/2025	45.0	1.3	0.0	1.3	45.0	0.0	0.2	49.0	0.0	49.0	43.0	6.0	0.0	47.0
1/16/2025	46.0	1.3	0.0	1.1	44.0	0.0	0.5	50.0	0.0	48.0	42.0	6.0	0.0	47.0
1/17/2025	46.0	1.3	0.0	1.2	44.0	0.0	0.5	51.0	0.0	48.0	42.0	6.0	0.0	47.3
1/18/2025	46.0	2.0	0.0	1.2	44.0	0.0	0.4	51.0	0.0	49.0	43.0	6.0	0.0	47.5
1/19/2025	46.0	1.1	0.0	1.2	44.0	0.0	0.4	48.0	0.0	49.0	43.0	6.0	0.0	46.8
1/20/2025	46.0	1.1	0.0	1.2	43.0	0.0	0.3	48.0	0.0	49.0	43.0	6.0	0.0	46.5
1/21/2025	45.0	1.3	0.0	1.1	43.0	0.0	0.3	48.0	0.0	49.0	43.0	6.0	0.0	46.3
1/22/2025	45.0	1.2	0.0	1.1	52.0	0.0	0.3	62.0	0.0	49.0	43.0	6.0	0.0	52.0
1/23/2025	45.0	1.1	0.0	1.1	52.0	0.0	0.2	62.0	0.0	48.0	42.0	6.0	0.0	51.8
1/24/2025	46.0	1.1	0.0	1.2	51.0	0.0	0.3	62.0	0.0	48.0	42.0	6.0	0.0	51.8
1/25/2025	46.0	1.4	0.0	1.1	52.0	0.0	0.3	61.0	0.0	49.0	43.0	6.0	0.0	52.0
1/26/2025	46.0	1.2	0.0	1.1	52.0	0.0	0.3	62.0	0.0	48.0	42.0	6.0	0.0	52.0
1/27/2025	46.0	1.0	0.0	1.1	53.0	0.0	0.5	63.0	0.0	48.0	42.0	6.0	0.0	52.5
1/28/2025	45.0	0.9	0.0	1.1	53.0	0.0	0.4	64.0	0.0	48.0	42.0	6.0	0.0	52.5
1/29/2025	45.0	1.3	0.0	1.1	52.0	0.0	0.3	64.0	0.0	49.0	43.0	6.0	0.0	52.5
1/30/2025	46.0	1.7	0.0	1.1	51.0	0.0	0.3	61.0	0.0	49.0	43.0	6.0	0.0	51.8
1/31/2025	46.0	1.3	0.0	1.2	52.0	0.0	0.5	62.0	0.0	49.0	43.0	6.0	0.0	52.3

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Flow Gaging Station	Below River Intake	Blackrock Ditch Return	Goose Lake Return	Billy Lake Return	Mazourka Canyon Road	Locust Ditch Return	Georges Ditch Return	Reinhackle Springs	Alabama Gates Return	At Pumpback Station	Pump Station	Langeman n Gate to Delta	Weir to Delta	In Channel Average Flow
Date														
2/1/2025	46.0	1.2	0.0	1.2	52.0	0.0	0.4	62.0	0.0	49.0	43.0	6.0	0.0	52.3
2/2/2025	45.0	1.0	0.0	1.3	52.0	0.0	0.4	61.0	0.0	49.0	43.0	6.0	0.0	51.8
2/3/2025	46.0	1.2	0.0	1.1	52.0	0.0	0.5	61.0	0.0	50.0	44.0	6.0	0.0	52.3
2/4/2025	46.0	1.7	0.0	1.2	52.0	0.0	0.5	62.0	0.0	50.0	44.0	6.0	0.0	52.5
2/5/2025	44.0	0.8	0.0	1.2	53.0	0.0	0.5	61.0	0.0	49.0	43.0	6.0	0.0	51.8
2/6/2025	42.0	0.9	0.0	1.4	53.0	0.0	0.5	63.0	0.0	50.0	42.0	6.0	2.0	52.0
2/7/2025	42.0	1.0	0.0	1.3	51.0	0.0	0.4	62.0	0.0	49.0	43.0	6.0	0.0	51.0
2/8/2025	43.0	1.2	0.0	1.4	51.0	0.0	0.3	61.0	0.0	48.0	42.0	6.0	0.0	50.8
2/9/2025	43.0	1.0	0.0	1.4	51.0	0.0	0.2	61.0	0.0	48.0	42.0	6.0	0.0	50.8
2/10/2025	43.0	1.2	0.0	1.4	50.0	0.0	0.2	62.0	0.0	49.0	43.0	6.0	0.0	51.0
2/11/2025	43.0	1.7	0.0	1.3	51.0	0.0	0.4	61.0	0.0	49.0	43.0	6.0	0.0	51.0
2/12/2025	43.0	1.2	0.0	1.2	51.0	0.0	0.2	62.0	0.0	49.0	43.0	6.0	0.0	51.3
2/13/2025	43.0	1.0	0.0	1.3	55.0	0.0	0.6	70.0	0.0	50.0	44.0	6.0	0.0	54.5
2/14/2025	42.0	1.3	0.0	1.3	60.0	0.0	0.5	70.0	0.0	53.0	47.0	6.0	0.0	56.3
2/15/2025	42.0	1.7	0.0	1.5	56.0	0.0	0.3	71.0	0.0	54.0	48.0	6.0	0.0	55.8
2/16/2025	43.0	1.1	0.0	1.4	52.0	0.0	0.7	69.0	0.0	56.0	48.0	6.0	2.0	55.0
2/17/2025	43.0	1.0	0.0	1.3	52.0	0.0	0.2	64.0	0.0	57.0	48.0	6.0	3.0	54.0
2/18/2025	43.0	1.1	0.0	1.2	52.0	0.0	0.5	64.0	0.0	56.0	48.0	6.0	2.0	53.8
2/19/2025	43.0	1.2	0.0	1.0	51.0	0.0	0.4	62.0	0.0	57.0	48.0	6.0	3.0	53.3
2/20/2025	42.0	0.8	0.0	0.8	50.0	0.0	0.3	62.0	0.0	56.0	48.0	6.0	2.0	52.5
2/21/2025	42.0	1.1	0.0	1.6	51.0	0.0	0.5	61.0	0.0	55.0	48.0	6.0	1.0	52.3
2/22/2025	42.0	1.2	0.0	1.7	50.0	0.0	0.5	62.0	0.0	54.0	48.0	6.0	0.0	52.0
2/23/2025	42.0	1.2	0.0	1.5	50.0	0.0	0.4	63.0	0.0	54.0	48.0	6.0	0.0	52.3
2/24/2025	42.0	1.1	0.0	1.6	50.0	0.0	0.4	61.0	0.0	51.0	45.0	6.0	0.0	51.0
2/25/2025	42.0	1.0	0.0	1.5	50.0	0.0	0.8	61.0	0.0	51.0	45.0	6.0	0.0	51.0
2/26/2025	42.0	1.0	0.0	1.0	50.0	0.0	0.6	61.0	0.0	51.0	45.0	6.0	0.0	51.0
2/27/2025	42.0	1.2	0.0	0.9	49.0	0.0	0.7	62.0	0.0	50.0	44.0	6.0	0.0	50.8
2/28/2025	43.0	1.2	0.0	1.3	50.0	0.0	0.5	62.0	0.0	50.0	44.0	6.0	0.0	51.3

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Flow Gaging Station	Below River Intake	Blackrock Ditch Return	Goose Lake Return	Billy Lake Return	Mazourka Canyon Road	Locust Ditch Return	Georges Ditch Return	Reinhackle Springs	Alabama Gates Return	At Pumpback Station	Pump Station	Langeman n Gate to Delta	Weir to Delta	In Channel Average Flow
Date														
3/1/2025	43.0	1.1	0.0	0.9	50.0	0.0	0.5	61.0	0.0	52.0	43.0	9.0	0.0	51.5
3/2/2025	42.0	1.4	0.0	1.0	51.0	0.0	0.5	62.0	0.0	49.0	39.0	10.0	0.0	51.0
3/3/2025	43.0	1.9	0.0	1.1	50.0	0.0	0.5	51.0	0.0	50.0	40.0	10.0	0.0	48.5
3/4/2025	42.0	2.1	0.0	1.7	51.0	0.0	0.4	52.0	0.0	49.0	39.0	10.0	0.0	48.5
3/5/2025	43.0	1.4	0.0	1.9	53.0	0.0	0.6	54.0	0.0	49.0	39.0	10.0	0.0	49.8
3/6/2025	42.0	1.4	0.0	1.6	52.0	0.0	0.6	55.0	0.0	49.0	39.0	10.0	0.0	49.5
3/7/2025	42.0	1.4	0.0	1.6	51.0	0.0	0.5	53.0	0.0	49.0	39.0	10.0	0.0	48.8
3/8/2025	43.0	1.4	0.0	1.6	49.0	0.0	0.4	51.0	0.0	48.0	38.0	10.0	0.0	47.8
3/9/2025	42.0	1.3	0.0	1.6	50.0	0.0	0.4	52.0	0.0	49.0	39.0	10.0	0.0	48.3
3/10/2025	42.0	1.3	0.0	1.5	50.0	0.0	0.4	53.0	0.0	49.0	39.0	10.0	0.0	48.5
3/11/2025	42.0	1.2	0.0	1.3	50.0	0.0	0.4	51.0	0.0	49.0	39.0	10.0	0.0	48.0
3/12/2025	42.0	1.1	0.0	1.2	50.0	0.0	0.4	51.0	0.0	49.0	39.0	10.0	0.0	48.0
3/13/2025	42.0	1.2	0.0	1.2	51.0	0.0	0.4	53.0	0.0	48.0	38.0	10.0	0.0	48.5
3/14/2025	42.0	1.3	0.0	1.2	51.0	0.0	0.4	54.0	0.0	48.0	38.0	10.0	0.0	48.8
3/15/2025	42.0	0.9	0.0	1.3	50.0	0.0	0.4	54.0	0.0	48.0	38.0	10.0	0.0	48.5
3/16/2025	43.0	0.7	0.0	1.3	49.0	0.0	0.5	53.0	0.0	48.0	38.0	10.0	0.0	48.3
3/17/2025	42.0	0.9	0.0	1.4	49.0	0.0	0.4	49.0	0.0	48.0	38.0	10.0	0.0	47.0
3/18/2025	42.0	1.1	0.0	1.2	49.0	0.0	0.3	51.0	0.0	48.0	38.0	10.0	0.0	47.5
3/19/2025	42.0	1.0	0.0	1.2	49.0	0.0	0.5	51.0	0.0	48.0	38.0	10.0	0.0	47.5
3/20/2025	43.0	0.8	0.0	1.4	49.0	0.0	0.4	51.0	0.0	48.0	38.0	10.0	0.0	47.8
3/21/2025	43.0	0.6	0.0	1.3	49.0	0.0	0.4	50.0	0.0	48.0	38.0	10.0	0.0	47.5
3/22/2025	42.0	0.7	0.0	1.2	49.0	0.0	0.5	51.0	0.0	47.0	37.0	10.0	0.0	47.3
3/23/2025	42.0	0.7	0.0	1.2	49.0	0.0	0.4	51.0	0.0	47.0	37.0	10.0	0.0	47.3
3/24/2025	42.0	0.9	0.0	1.2	49.0	0.0	0.3	51.0	0.0	47.0	37.0	10.0	0.0	47.3
3/25/2025	43.0	1.3	0.0	1.2	50.0	0.0	0.5	52.0	0.0	47.0	37.0	10.0	0.0	48.0
3/26/2025	43.0	1.4	0.0	1.4	50.0	0.0	0.3	51.0	0.0	47.0	37.0	10.0	0.0	47.8
3/27/2025	43.0	1.3	0.0	1.3	50.0	0.0	0.5	51.0	0.0	47.0	37.0	10.0	0.0	47.8
3/28/2025	43.0	1.0	0.0	1.0	50.0	0.0	0.6	52.0	0.0	48.0	38.0	10.0	0.0	48.3
3/29/2025	42.0	1.0	0.0	1.0	50.0	0.0	0.5	51.0	0.0	50.0	40.0	10.0	0.0	48.3
3/30/2025	42.0	1.2	0.0	1.6	50.0	0.0	0.4	51.0	0.0	50.0	40.0	10.0	0.0	48.3
3/31/2025	42.0	0.8	0.0	2.0	50.0	0.0	0.4	51.0	0.0	47.0	37.0	10.0	0.0	47.5

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Flow Gaging Station	Below River Intake	Blackrock Ditch Return	Goose Lake Return	Billy Lake Return	Mazourka Canyon Road	Locust Ditch Return	Georges Ditch Return	Reinhackle Springs	Alabama Gates Return	At Pumpback Station	Pump Station	Langeman n Gate to Delta	Weir to Delta	In Channel Average Flow
Date														
4/1/2025	42.0	1.1	0.0	1.6	49.0	0.0	0.4	51.0	0.0	48.0	36.0	12.0	0.0	47.5
4/2/2025	44.0	1.3	0.0	1.5	46.0	0.0	0.3	43.0	0.0	47.0	34.0	13.0	0.0	45.0
4/3/2025	42.0	1.2	0.0	1.4	47.0	0.0	0.6	45.0	0.0	48.0	35.0	13.0	0.0	45.5
4/4/2025	42.0	1.0	0.0	1.3	61.0	0.0	0.5	46.0	0.0	48.0	35.0	13.0	0.0	49.3
4/5/2025	42.0	1.0	0.0	1.3	52.0	0.0	0.5	55.0	0.0	47.0	34.0	13.0	0.0	49.0
4/6/2025	42.0	1.1	0.0	1.5	50.0	0.0	0.5	52.0	0.0	47.0	34.0	13.0	0.0	47.8
4/7/2025	42.0	1.1	0.0	1.5	50.0	0.0	0.5	50.0	0.0	47.0	34.0	13.0	0.0	47.3
4/8/2025	52.0	1.2	0.0	1.5	49.0	0.0	0.6	49.0	0.0	48.0	35.0	13.0	0.0	49.5
4/9/2025	57.0	1.2	0.0	1.6	52.0	0.0	0.5	49.0	0.0	51.0	38.0	13.0	0.0	52.3
4/10/2025	57.0	1.3	0.0	1.6	60.0	0.0	0.4	50.0	0.0	51.0	38.0	13.0	0.0	54.5
4/11/2025	58.0	1.2	0.0	1.5	62.0	0.0	0.3	57.0	0.0	50.0	37.0	13.0	0.0	56.8
4/12/2025	58.0	1.2	0.0	1.6	63.0	0.0	0.3	57.0	0.0	49.0	36.0	13.0	0.0	56.8
4/13/2025	57.0	1.3	0.0	1.5	64.0	0.0	0.3	59.0	0.0	49.0	36.0	13.0	0.0	57.3
4/14/2025	57.0	1.4	0.0	1.5	62.0	0.0	0.3	62.0	0.0	49.0	36.0	13.0	0.0	57.5
4/15/2025	57.0	1.1	0.0	1.4	55.0	0.0	0.2	55.0	0.0	52.0	39.0	13.0	0.0	54.8
4/16/2025	57.0	1.2	0.0	1.3	55.0	0.0	0.2	54.0	0.0	54.0	41.0	13.0	0.0	55.0
4/17/2025	58.0	1.4	0.0	1.3	55.0	0.0	0.1	54.0	0.0	56.0	43.0	13.0	0.0	55.8
4/18/2025	58.0	1.0	0.0	1.1	56.0	0.0	0.1	55.0	0.0	57.0	44.0	13.0	0.0	56.5
4/19/2025	57.0	1.0	0.0	1.3	56.0	0.0	0.2	56.0	0.0	56.0	43.0	13.0	0.0	56.3
4/20/2025	57.0	1.1	0.0	1.4	56.0	0.0	0.3	57.0	0.0	56.0	43.0	13.0	0.0	56.5
4/21/2025	57.0	1.2	0.0	1.4	55.0	0.0	0.3	56.0	0.0	55.0	42.0	13.0	0.0	55.8
4/22/2025	57.0	1.2	0.0	1.4	54.0	0.0	0.2	56.0	0.0	56.0	43.0	13.0	0.0	55.8
4/23/2025	57.0	1.5	0.0	1.4	54.0	0.0	0.3	56.0	0.0	57.0	44.0	13.0	0.0	56.0
4/24/2025	58.0	1.5	0.0	1.5	54.0	0.0	0.4	55.0	0.0	57.0	44.0	13.0	0.0	56.0
4/25/2025	57.0	1.3	0.0	1.0	54.0	0.0	0.3	55.0	0.0	57.0	44.0	13.0	0.0	55.8
4/26/2025	57.0	1.2	0.0	1.0	54.0	0.0	0.2	57.0	0.0	57.0	44.0	13.0	0.0	56.3
4/27/2025	57.0	1.2	0.0	1.6	54.0	0.0	0.1	56.0	0.0	57.0	44.0	13.0	0.0	56.0
4/28/2025	57.0	1.1	0.0	1.6	54.0	0.0	0.2	57.0	0.0	57.0	44.0	13.0	0.0	56.3
4/29/2025	57.0	1.1	0.0	1.6	54.0	0.0	0.3	58.0	0.0	57.0	44.0	13.0	0.0	56.5
4/30/2025	57.0	1.2	0.0	1.5	54.0	0.0	0.2	57.0	0.0	57.0	44.0	13.0	0.0	56.3

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Date														
5/1/2025	57.0	1.3	0.0	1.4	54.0	0.0	0.3	57.0	0.0	58.0	45.0	13.0	0.0	56.5
5/2/2025	57.0	1.2	0.0	1.6	54.0	0.0	0.2	60.0	0.0	59.0	46.0	13.0	0.0	57.5
5/3/2025	56.0	1.2	0.0	1.6	54.0	0.0	0.1	58.0	0.0	60.0	47.0	13.0	0.0	57.0
5/4/2025	54.0	1.1	0.0	1.5	54.0	0.0	0.1	57.0	0.0	59.0	46.0	13.0	0.0	56.0
5/5/2025	54.0	1.1	0.0	1.6	53.0	0.0	0.2	55.0	0.0	57.0	44.0	13.0	0.0	54.8
5/6/2025	54.0	1.1	0.0	1.6	51.0	0.0	0.2	51.0	0.0	61.0	48.0	13.0	0.0	54.3
5/7/2025	54.0	1.2	0.0	1.5	50.0	0.0	0.1	50.0	0.0	61.0	48.0	13.0	0.0	53.8
5/8/2025	54.0	1.1	0.0	1.4	50.0	0.0	0.2	49.0	0.0	58.0	45.0	13.0	0.0	52.8
5/9/2025	54.0	1.1	0.0	1.4	50.0	0.0	0.2	47.0	0.0	57.0	44.0	13.0	0.0	52.0
5/10/2025	54.0	1.4	0.0	1.3	50.0	0.0	0.1	48.0	0.0	56.0	43.0	13.0	0.0	52.0
5/11/2025	54.0	1.9	0.0	0.9	49.0	0.0	0.3	48.0	0.0	54.0	41.0	13.0	0.0	51.3
5/12/2025	54.0	1.4	0.0	0.8	48.0	0.0	0.1	46.0	0.0	51.0	38.0	13.0	0.0	49.8
5/13/2025	54.0	1.1	0.0	1.1	49.0	0.0	0.1	47.0	0.0	50.0	37.0	13.0	0.0	50.0
5/14/2025	54.0	1.3	0.0	1.1	49.0	0.0	0.1	48.0	0.0	48.0	35.0	13.0	0.0	49.8
5/15/2025	54.0	1.1	0.0	1.1	48.0	0.0	0.3	48.0	0.0	48.0	35.0	13.0	0.0	49.5
5/16/2025	54.0	1.2	0.0	1.2	49.0	0.0	0.2	47.0	0.0	45.0	38.0	7.0	0.0	48.8
5/17/2025	54.0	1.1	0.0	1.3	49.0	0.0	0.2	47.0	0.0	47.0	44.0	3.0	0.0	49.3
5/18/2025	54.0	1.1	0.0	1.1	49.0	0.0	0.1	47.0	0.0	47.0	44.0	3.0	0.0	49.3
5/19/2025	53.0	1.1	0.0	1.1	48.0	0.0	0.1	48.0	0.0	47.0	44.0	3.0	0.0	49.0
5/20/2025	54.0	1.3	0.0	1.1	48.0	0.0	0.1	46.0	0.0	46.0	43.0	3.0	0.0	48.5
5/21/2025	54.0	1.2	0.0	1.1	48.0	0.0	0.1	47.0	0.0	45.0	42.0	3.0	0.0	48.5
5/22/2025	54.0	1.1	0.0	1.1	49.0	0.0	0.0	46.0	0.0	45.0	42.0	3.0	0.0	48.5
5/23/2025	54.0	1.4	0.0	0.9	49.0	0.0	0.0	46.0	0.0	45.0	42.0	3.0	0.0	48.5
5/24/2025	54.0	2.1	0.0	1.0	49.0	0.0	0.0	44.0	0.0	44.0	41.0	3.0	0.0	47.8
5/25/2025	54.0	3.4	0.0	1.0	50.0	0.0	0.0	46.0	0.0	43.0	40.0	3.0	0.0	48.3
5/26/2025	54.0	2.7	0.0	1.0	51.0	0.0	0.2	49.0	0.0	43.0	40.0	3.0	0.0	49.3
5/27/2025	54.0	2.2	0.0	1.2	50.0	0.0	1.5	49.0	0.0	42.0	39.0	3.0	0.0	48.8
5/28/2025	54.0	1.9	0.0	1.1	49.0	0.0	0.1	47.0	0.0	42.0	39.0	3.0	0.0	48.0
5/29/2025	53.0	1.3	0.0	1.0	49.0	0.0	0.0	46.0	0.0	41.0	38.0	3.0	0.0	47.3
5/30/2025	54.0	1.1	0.0	0.8	48.0	0.0	0.0	44.0	0.0	42.0	39.0	3.0	0.0	47.0
5/31/2025	62.0	1.0	0.0	1.0	48.0	0.0	0.4	45.0	0.0	41.0	38.0	3.0	0.0	49.0

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Date														
6/1/2025	68.0	0.9	0.0	1.0	50.0	0.0	0.3	44.0	0.0	41.0	38.0	3.0	0.0	50.8
6/2/2025	68.0	1.1	0.0	0.6	58.0	0.0	0.1	47.0	0.0	41.0	38.0	3.0	0.0	53.5
6/3/2025	68.0	0.9	0.0	0.6	60.0	0.0	0.1	52.0	0.0	41.0	38.0	3.0	0.0	55.3
6/4/2025	68.0	1.0	0.0	0.7	62.0	0.0	0.0	55.0	0.0	41.0	38.0	3.0	0.0	56.5
6/5/2025	67.0	1.2	0.0	1.0	60.0	0.0	0.1	58.0	0.0	41.0	38.0	3.0	0.0	56.5
6/6/2025	68.0	1.4	0.0	1.2	60.0	0.0	0.2	56.0	0.0	41.0	38.0	3.0	0.0	56.3
6/7/2025	52.0	2.1	0.0	1.2	59.0	0.0	0.3	56.0	0.0	42.0	39.0	3.0	0.0	52.3
6/8/2025	42.0	2.2	0.0	1.0	56.0	0.0	1.2	54.0	0.0	43.0	40.0	3.0	0.0	48.8
6/9/2025	43.0	2.0	0.0	0.7	43.0	0.0	0.1	52.0	0.0	44.0	41.0	3.0	0.0	45.5
6/10/2025	43.0	1.9	0.0	0.8	39.0	0.0	0.1	40.0	0.0	43.0	40.0	3.0	0.0	41.3
6/11/2025	51.0	1.7	0.0	0.9	42.0	0.0	0.4	48.0	0.0	43.0	40.0	3.0	0.0	46.0
6/12/2025	61.0	1.0	0.0	0.9	43.0	0.0	0.2	48.0	0.0	41.0	38.0	3.0	0.0	48.3
6/13/2025	77.0	0.2	0.0	1.0	49.0	0.0	0.2	48.0	0.0	38.0	35.0	3.0	0.0	53.0
6/14/2025	99.0	0.0	0.0	0.8	58.0	0.0	0.8	48.0	0.0	36.0	33.0	3.0	0.0	60.3
6/15/2025	120.0	1.0	0.0	0.7	67.0	0.0	0.7	48.0	0.0	34.0	31.0	3.0	0.0	67.3
6/16/2025	147.0	0.8	0.0	1.1	80.0	0.0	0.6	65.0	0.0	31.0	28.0	3.0	0.0	80.8
6/17/2025	168.0	0.8	0.0	1.0	95.0	0.0	0.5	71.0	0.0	30.0	27.0	3.0	0.0	91.0
6/18/2025	154.0	1.2	0.0	1.0	113.0	2.5	3.7	82.0	0.0	31.0	28.0	3.0	0.0	95.0
6/19/2025	122.0	1.2	0.0	0.9	131.0	4.0	5.3	93.0	0.0	33.0	30.0	3.0	0.0	94.8
6/20/2025	100.0	1.3	0.0	1.0	141.0	4.2	4.3	107.0	0.0	36.0	33.0	3.0	0.0	96.0
6/21/2025	78.0	1.2	0.0	0.8	131.0	4.5	6.2	124.0	0.0	39.0	36.0	3.0	0.0	93.0
6/22/2025	64.0	1.1	0.0	0.8	109.0	4.8	5.9	126.0	0.0	45.0	42.0	3.0	0.0	86.0
6/23/2025	52.0	1.1	0.0	1.3	87.0	4.8	5.4	128.0	0.0	51.0	48.0	3.0	0.0	79.5
6/24/2025	44.0	1.2	0.0	1.3	69.0	5.2	5.2	118.0	0.0	59.0	48.0	3.0	8.0	72.5
6/25/2025	42.0	1.1	0.0	1.3	58.0	5.5	5.1	100.0	0.0	73.0	48.0	3.0	22.0	68.3
6/26/2025	42.0	1.1	0.0	1.2	52.0	5.5	4.9	81.0	0.0	83.0	48.0	3.0	32.0	64.5
6/27/2025	42.0	1.4	0.0	1.2	49.0	5.6	4.9	70.0	0.0	89.0	48.0	3.0	38.0	62.5
6/28/2025	42.0	1.5	0.0	1.2	47.0	2.6	3.2	62.0	0.0	85.0	48.0	3.0	34.0	59.0
6/29/2025	75.0	1.4	0.0	1.2	46.0	0.1	0.1	52.0	0.0	72.0	48.0	3.0	21.0	61.3
6/30/2025	91.0	1.3	0.0	1.2	52.0	0.0	0.2	48.0	0.0	57.0	48.0	3.0	6.0	62.0

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Date														
7/1/2025	91.0	1.2	0.0	1.2	70.0	0.0	0.1	54.0	0.0	49.0	46.0	3.0	0.0	66.0
7/2/2025	91.0	1.2	0.0	1.2	79.0	0.0	0.1	63.0	0.0	40.0	37.0	3.0	0.0	68.3
7/3/2025	91.0	1.2	0.0	1.0	82.0	0.0	0.2	70.0	0.0	36.0	33.0	3.0	0.0	69.8
7/4/2025	91.0	1.3	0.0	0.9	84.0	0.0	0.1	76.0	0.0	33.0	30.0	3.0	0.0	71.0
7/5/2025	92.0	1.2	0.0	1.3	86.0	0.0	0.1	80.0	0.0	33.0	30.0	3.0	0.0	72.8
7/6/2025	91.0	1.1	0.0	1.3	86.0	0.0	0.1	81.0	0.0	35.0	32.0	3.0	0.0	73.3
7/7/2025	91.0	1.1	0.0	1.1	86.0	0.0	0.0	82.0	0.0	37.0	34.0	3.0	0.0	74.0
7/8/2025	91.0	1.0	0.0	0.9	86.0	0.0	0.0	81.0	0.0	40.0	37.0	3.0	0.0	74.5
7/9/2025	92.0	1.2	0.0	0.9	81.0	0.0	0.0	73.0	0.0	41.0	38.0	3.0	0.0	71.8
7/10/2025	91.0	1.5	0.0	1.0	82.0	0.0	0.0	73.0	0.0	42.0	39.0	3.0	0.0	72.0
7/11/2025	92.0	1.6	0.0	1.1	83.0	0.0	0.0	73.0	0.0	44.0	41.0	3.0	0.0	73.0
7/12/2025	92.0	1.7	0.0	0.9	83.0	0.0	0.0	73.0	0.0	46.0	43.0	3.0	0.0	73.5
7/13/2025	92.0	1.6	0.0	1.1	84.0	0.0	0.0	74.0	0.0	47.0	44.0	3.0	0.0	74.3
7/14/2025	91.0	1.3	0.0	1.1	84.0	0.0	0.0	73.0	0.0	47.0	44.0	3.0	0.0	73.8
7/15/2025	91.0	1.1	0.0	1.0	83.0	0.0	0.0	75.0	0.0	47.0	44.0	3.0	0.0	74.0
7/16/2025	91.0	1.0	0.0	1.1	83.0	0.0	0.0	73.0	0.0	47.0	44.0	3.0	0.0	73.5
7/17/2025	91.0	1.2	0.0	0.9	83.0	0.0	0.0	73.0	0.0	48.0	45.0	3.0	0.0	73.8
7/18/2025	92.0	1.3	0.0	0.8	84.0	0.0	0.0	73.0	0.0	48.0	45.0	3.0	0.0	74.3
7/19/2025	92.0	1.1	0.0	1.1	85.0	0.0	0.1	73.0	0.0	48.0	45.0	3.0	0.0	74.5
7/20/2025	91.0	1.0	0.0	1.0	86.0	0.0	0.1	74.0	0.0	49.0	46.0	3.0	0.0	75.0
7/21/2025	91.0	0.7	0.0	0.9	85.0	0.0	0.0	75.0	0.0	50.0	47.0	3.0	0.0	75.3
7/22/2025	91.0	1.1	0.0	1.1	85.0	0.0	0.0	75.0	0.0	50.0	47.0	3.0	0.0	75.3
7/23/2025	92.0	1.2	0.0	0.9	85.0	0.0	0.0	74.0	0.0	49.0	46.0	3.0	0.0	75.0
7/24/2025	91.0	1.0	0.0	0.7	85.0	0.0	0.0	73.0	0.0	49.0	46.0	3.0	0.0	74.5
7/25/2025	91.0	0.9	0.0	1.0	86.0	0.0	0.0	75.0	0.0	50.0	47.0	3.0	0.0	75.5
7/26/2025	91.0	1.2	0.0	1.2	86.0	0.0	0.1	76.0	0.0	50.0	47.0	3.0	0.0	75.8
7/27/2025	91.0	1.2	0.0	1.2	86.0	0.0	0.0	75.0	0.0	50.0	47.0	3.0	0.0	75.5
7/28/2025	92.0	1.1	0.0	1.2	85.0	0.0	0.0	74.0	0.0	50.0	47.0	3.0	0.0	75.3
7/29/2025	92.0	1.1	0.0	1.2	85.0	0.0	0.0	74.0	0.0	51.0	48.0	3.0	0.0	75.5
7/30/2025	92.0	1.1	0.0	1.1	85.0	0.0	0.0	77.0	0.0	51.0	48.0	3.0	0.0	76.3
7/31/2025	92.0	1.1	0.0	1.1	85.0	0.0	0.0	74.0	0.0	51.0	48.0	3.0	0.0	75.5

Notes: These measurements are not on the main channel of the Owens River, therefore highlighted columns are not included in average calculations.

Flow Gaging Station	Below River Intake	Blackrock Ditch Return	Goose Lake Return	Billy Lake Return	Mazourka Canyon Road	Locust Ditch Return	Georges Ditch Return	Reinhackle Springs	Alabama Gates Return	At Pumpback Station	Pump Station	Langeman n Gate to Delta	Weir to Delta	In Channel Average Flow
Date														
8/1/2025	92.0	1.1	0.0	1.1	86.0	0.0	0.2	75.0	0.0	51.0	48.0	3.0	0.0	76.0
8/2/2025	92.0	1.1	0.0	1.0	86.0	0.0	0.1	75.0	0.0	51.0	48.0	3.0	0.0	76.0
8/3/2025	92.0	1.1	0.0	1.0	86.0	0.0	0.1	75.0	0.0	51.0	48.0	3.0	0.0	76.0
8/4/2025	92.0	1.1	0.0	1.0	86.0	0.0	0.1	75.0	0.0	51.0	48.0	3.0	0.0	76.0
8/5/2025	83.0	1.1	0.0	1.1	89.0	0.0	0.0	79.0	0.0	51.0	48.0	3.0	0.0	75.5
8/6/2025	80.0	1.0	0.0	1.1	88.0	0.0	0.0	81.0	0.0	51.0	48.0	3.0	0.0	75.0
8/7/2025	80.0	0.6	0.0	1.2	80.0	0.0	0.0	80.0	0.0	51.0	48.0	3.0	0.0	72.8
8/8/2025	80.0	1.1	0.0	1.2	76.0	0.0	0.0	79.0	0.0	51.0	48.0	3.0	0.0	71.5
8/9/2025	80.0	1.5	0.0	1.2	76.0	0.0	0.0	73.0	0.0	52.0	48.0	3.0	1.0	70.3
8/10/2025	80.0	1.5	0.0	1.1	75.0	0.0	0.0	72.0	0.0	52.0	48.0	3.0	1.0	69.8
8/11/2025	80.0	1.4	0.0	1.1	75.0	0.0	0.0	70.0	0.0	53.0	48.0	3.0	2.0	69.5
8/12/2025	80.0	1.3	0.0	0.9	75.0	0.0	0.0	69.0	0.0	52.0	48.0	3.0	1.0	69.0
8/13/2025	79.0	1.3	0.0	0.7	75.0	0.0	0.5	69.0	0.0	51.0	48.0	3.0	0.0	68.5
8/14/2025	80.0	1.3	0.0	1.0	75.0	0.0	0.2	68.0	0.0	51.0	48.0	3.0	0.0	68.5
8/15/2025	80.0	1.3	0.0	1.1	73.0	0.0	0.1	66.0	0.0	48.0	45.0	3.0	0.0	66.8
8/16/2025	80.0	1.3	0.0	1.1	73.0	0.0	0.1	65.0	0.0	47.0	44.0	3.0	0.0	66.3
8/17/2025	80.0	1.2	0.0	1.1	74.0	0.0	0.1	66.0	0.0	46.0	43.0	3.0	0.0	66.5
8/18/2025	80.0	1.2	0.0	1.1	74.0	0.0	0.1	66.0	0.0	45.0	42.0	3.0	0.0	66.3
8/19/2025	80.0	1.2	0.0	1.0	73.0	0.0	0.2	66.0	0.0	45.0	42.0	3.0	0.0	66.0
8/20/2025	80.0	1.1	0.0	1.1	74.0	0.0	0.1	64.0	0.0	42.0	39.0	3.0	0.0	65.0
8/21/2025	80.0	1.1	0.0	1.1	75.0	0.0	0.1	66.0	0.0	42.0	39.0	3.0	0.0	65.8
8/22/2025	88.0	1.1	0.0	1.2	75.0	0.0	0.0	67.0	0.0	42.0	39.0	3.0	0.0	68.0
8/23/2025	92.0	1.1	0.0	1.2	78.0	0.0	0.0	69.0	0.0	43.0	40.0	3.0	0.0	70.5
8/24/2025	92.0	1.0	0.0	1.1	82.0	0.0	0.0	69.0	0.0	44.0	41.0	3.0	0.0	71.8
8/25/2025	93.0	1.0	0.0	1.0	84.0	0.0	0.2	71.0	0.0	47.0	44.0	3.0	0.0	73.8
8/26/2025	94.0	1.0	0.0	1.0	86.0	0.0	0.1	73.0	0.0	48.0	45.0	3.0	0.0	75.3
8/27/2025	94.0	1.0	0.0	1.2	86.0	0.0	0.3	75.0	0.0	49.0	46.0	3.0	0.0	76.0
8/28/2025	95.0	0.9	0.0	1.3	86.0	0.0	0.2	76.0	0.0	50.0	47.0	3.0	0.0	76.8
8/29/2025	93.0	0.9	0.0	1.3	87.0	0.0	0.1	75.0	0.0	51.0	48.0	3.0	0.0	76.5
8/30/2025	93.0	0.9	0.0	1.4	87.0	0.0	0.3	76.0	0.0	51.0	48.0	3.0	0.0	76.8
8/31/2025	94.0	0.9	0.0	1.3	87.0	0.0	0.2	77.0	0.0	51.0	48.0	3.0	0.0	77.3

Notes: These measurements are not on the main channel of the Owens River, therefore highlighted columns are not included in average calculations.

Flow Gaging Station	Below River Intake	Blackrock Ditch Return	Goose Lake Return	Billy Lake Return	Mazourka Canyon Road	Locust Ditch Return	Georges Ditch Return	Reinhackle Springs	Alabama Gates Return	At Pumpback Station	Pump Station	Langeman n Gate to Delta	Weir to Delta	In Channel Average Flow
Date														
9/1/2025	93.0	0.8	0.0	1.3	86.0	0.0	0.1	77.0	0.0	57.0	48.0	8.0	1.0	78.3
9/2/2025	94.0	0.8	0.0	1.2	85.0	0.0	0.1	78.0	0.0	55.0	44.0	11.0	0.0	78.0
9/3/2025	95.0	0.8	0.0	1.2	84.0	0.0	0.3	79.0	0.0	56.0	45.0	11.0	0.0	78.5
9/4/2025	93.0	0.7	0.0	1.1	85.0	0.0	0.3	79.0	0.0	57.0	46.0	11.0	0.0	78.5
9/5/2025	94.0	0.7	0.0	1.2	88.0	0.0	0.2	78.0	0.0	58.0	47.0	11.0	0.0	79.5
9/6/2025	92.0	0.7	0.0	1.1	88.0	0.0	0.2	80.0	0.0	58.0	47.0	11.0	0.0	79.5
9/7/2025	94.0	0.7	0.0	1.1	86.0	0.0	0.2	79.0	0.0	58.0	47.0	11.0	0.0	79.3
9/8/2025	93.0	0.9	0.0	1.1	85.0	0.0	0.1	79.0	0.0	58.0	47.0	11.0	0.0	78.8
9/9/2025	92.0	1.5	0.0	1.1	86.0	0.0	0.1	78.0	0.0	56.0	45.0	11.0	0.0	78.0
9/10/2025	79.0	1.1	0.0	1.3	85.0	0.0	0.1	78.0	0.0	57.0	46.0	11.0	0.0	74.8
9/11/2025	76.0	1.6	0.0	1.4	84.0	0.0	0.2	80.0	0.0	58.0	47.0	11.0	0.0	74.5
9/12/2025	80.0	1.5	0.0	1.3	76.0	0.0	0.2	79.0	0.0	59.0	48.0	11.0	0.0	73.5
9/13/2025	80.0	1.3	0.0	1.1	76.0	0.0	0.3	76.0	0.0	59.0	48.0	11.0	0.0	72.8
9/14/2025	80.0	1.2	0.0	1.1	77.0	0.0	0.3	71.0	0.0	59.0	48.0	11.0	0.0	71.8
9/15/2025	80.0	1.0	0.0	1.1	78.0	0.0	0.2	72.0	0.0	59.0	48.0	11.0	0.0	72.3
9/16/2025	80.0	0.8	0.0	1.1	80.0	0.0	0.2	72.0	0.0	59.0	48.0	11.0	0.0	72.8
9/17/2025	80.0	1.2	0.0	1.1	77.0	0.0	0.2	74.0	0.0	59.0	48.0	11.0	0.0	72.5
9/18/2025	80.0	1.4	0.0	1.1	76.0	0.0	0.1	75.0	0.0	56.0	45.0	11.0	0.0	71.8
9/19/2025	80.0	1.5	0.0	1.2	77.0	0.0	0.2	74.0	0.0	57.0	46.0	11.0	0.0	72.0
9/20/2025	80.0	1.5	0.0	1.4	79.0	0.0	0.2	74.0	0.0	58.0	47.0	11.0	0.0	72.8
9/21/2025	80.0	1.3	0.0	1.2	77.0	0.0	0.1	74.0	0.0	59.0	48.0	11.0	0.0	72.5
9/22/2025	80.0	1.1	0.0	1.4	75.0	0.0	0.2	73.0	0.0	59.0	48.0	11.0	0.0	71.8
9/23/2025	80.0	1.1	0.0	1.2	77.0	0.0	0.2	70.0	0.0	59.0	48.0	11.0	0.0	71.5
9/24/2025	80.0	1.0	0.0	0.9	77.0	0.0	0.3	72.0	0.0	59.0	48.0	11.0	0.0	72.0
9/25/2025	80.0	1.0	0.0	1.3	75.0	0.0	0.3	73.0	0.0	57.0	46.0	11.0	0.0	71.3
9/26/2025	80.0	1.2	0.0	1.3	74.0	0.0	0.2	74.0	0.0	56.0	45.0	11.0	0.0	71.0
9/27/2025	79.0	1.2	0.0	1.2	75.0	0.0	0.1	71.0	0.0	56.0	45.0	11.0	0.0	70.3
9/28/2025	80.0	1.2	0.0	1.2	75.0	0.0	0.2	72.0	0.0	57.0	46.0	11.0	0.0	71.0
9/29/2025	80.0	1.3	0.0	1.2	75.0	0.0	0.3	72.0	0.0	58.0	47.0	11.0	0.0	71.3
9/30/2025	80.0	1.2	0.0	1.2	72.0	0.0	0.3	69.0	0.0	58.0	47.0	11.0	0.0	69.8

Notes: These measurements are not on the main channel of the Owens River, therefore highlighted columns are not included in average calculations.

3.0 WATER QUALITY MONITORING

3.1 Introduction and Methods

There is a tradeoff in flow management of the LORP: implementing a spring flow aimed at cottonwood (*Populus* spp.) and willow (*Salix* spp.) recruitment, in June, can create lethally low dissolved oxygen (DO) levels for fish. The degree to which antecedent flows and consequent sediment transport interact with temperature and biological oxygen demand of the system during pulse flows has historically been monitored somewhat sporadically, mostly in years where seasonal habitat flows were released. In recent years, ICWD staff have more frequently collected manual water quality measurements in the LOR and continued the empirical record in 2025 by collecting these data with a focus on the higher June Seasonal Habitat Flow (SHF) ramped release. An *In-Situ AquaTROLL 400* multi-parameter probe was used to collect instantaneous water temperature (Temp), DO, specific conductance (Sp Cond), and pH measurements at 12 sites on the LOR (including off-river Billy Lake), from the Aqueduct Intake to the Pumpback Station (Figure 3-1). The primary objective, as in past years, was to observe changes in DO levels coupled with LOR flows and to document whether DO levels were lowered to ranges that produce fish stress or mortality.

As documented and discussed in previous LORP Annual Report water quality sections (2008, 2009, 2010, 2014, 2015, 2017, 2019, 2023, & 2024), changes in flow can mobilize sediments, increasing biologic oxygen demand from aerobic microbial decomposition of suspended sediments and release of hydrogen sulfide from disturbed channel-bed “muck”. This increased biological oxygen demand, especially during periods of elevated water temperature, can lower DO levels in the water column to critical levels. Fish stress and mortality have been observed in previous years (e.g., 2010, 2014, & 2017) when DO levels fell below 1 mg/L.

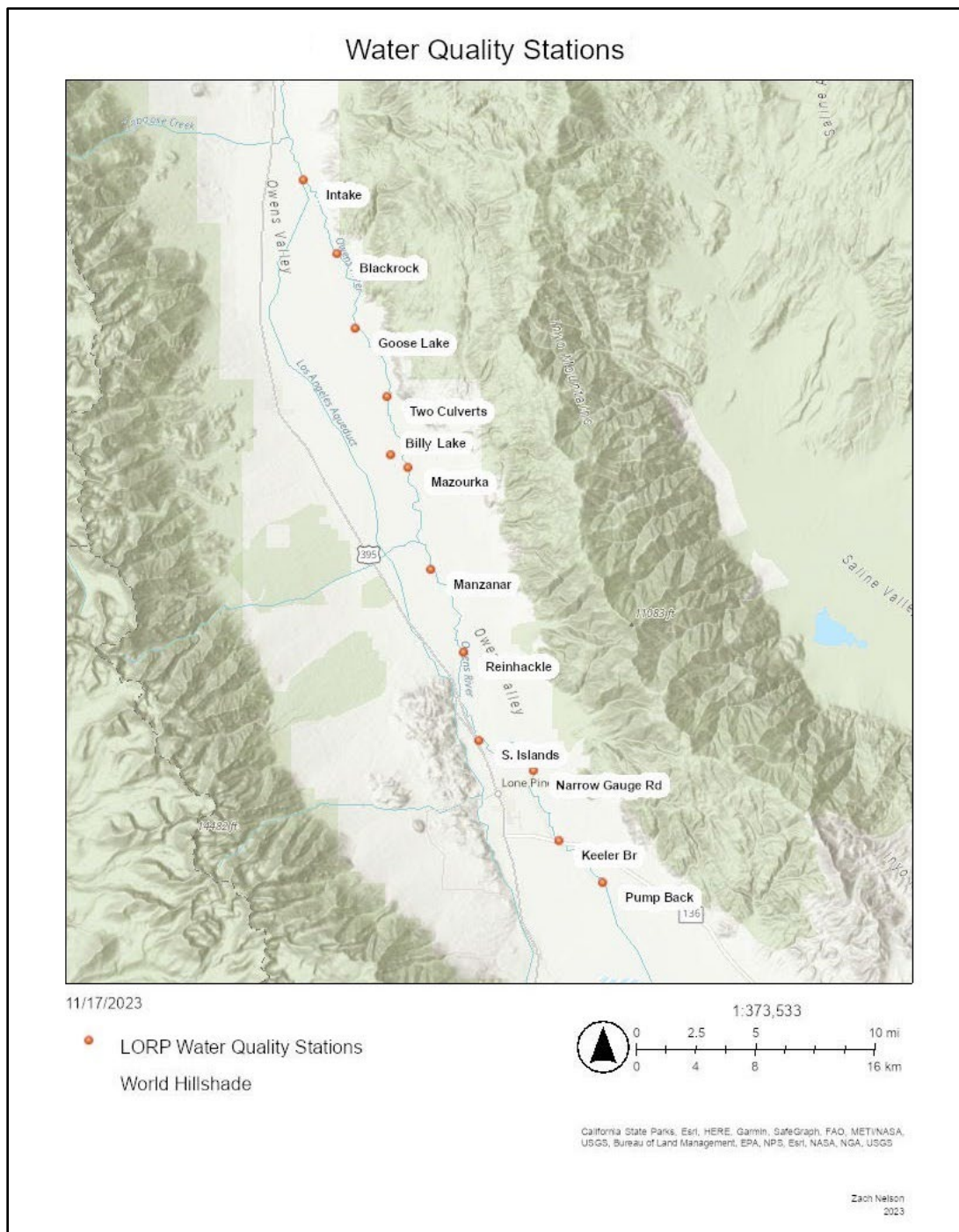
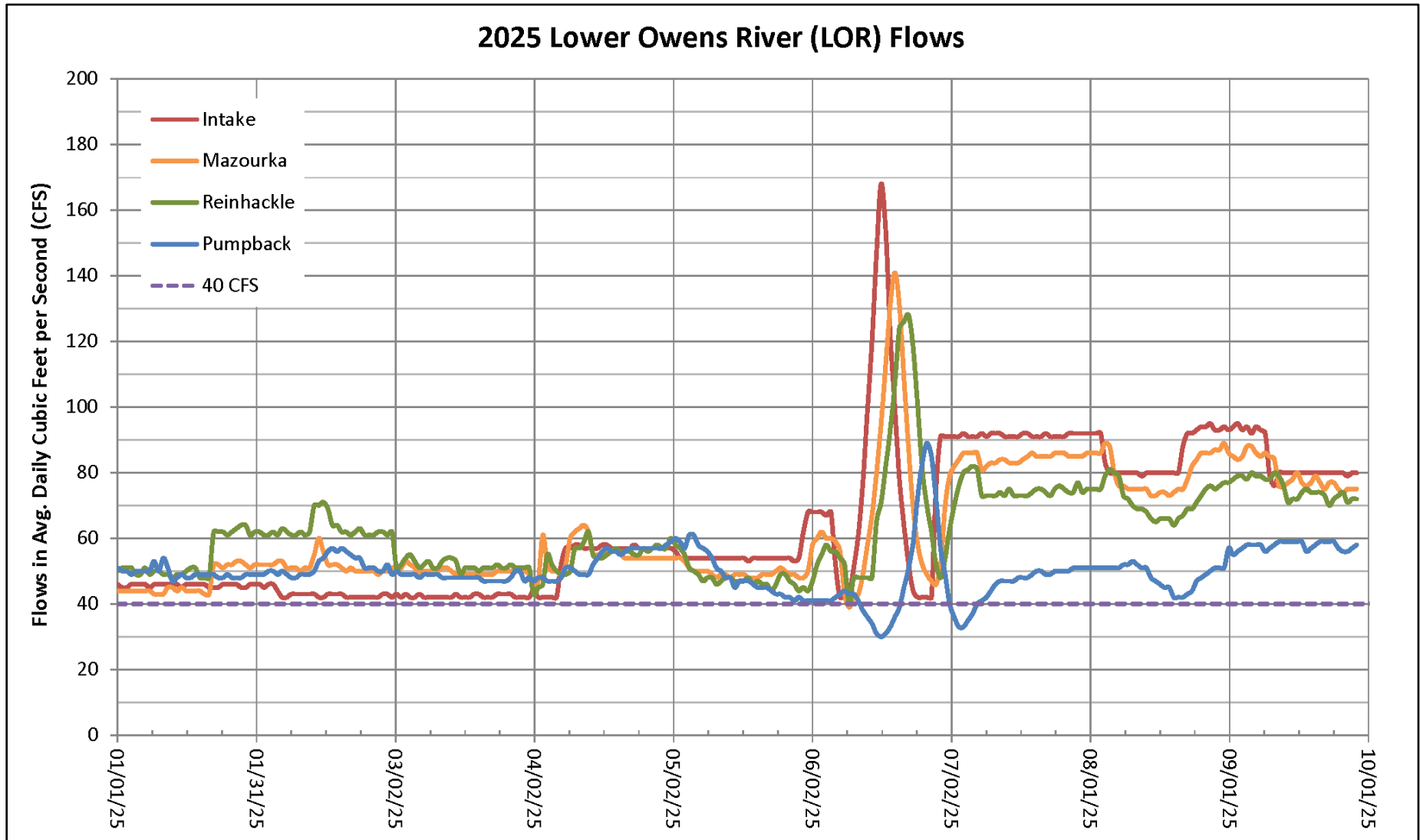


Figure 3-1. 2025 Water quality measuring stations on Lower Owens River.

3.2 Results and Discussion

The distinct peak in flow in the 2024-25 LOR during the runoff season is the SHF ramped release that occurred in mid-June (Figure 3-2). Gauged average daily flow did not exceed 170 cfs during the period of record from January through September 2025.



Data source: LADWP Daily LORP Flow Reports. <https://www.ladwp.com/who-we-are/water-system/los-angeles-aqueduct/la-aqueduct-conditions-reports/lorp-flow-reports>

Figure 3-2. Lower Owens River Flow from January through September 2025.

In June 2025, the SHF was conducted with a maximum average daily flow of 168 cfs at the Aqueduct Intake (Figure 3-3). Note that a maximum release of approximately 174 cfs was sustained for 24 hours but spanned two days from June 17 to June 18, so the average daily flow shown on Figure 3-3 does not accurately depict the instantaneous target peak flow rate that was achieved. A maximum average daily flow of 89 cfs arrived at the Pumpback Station on June 27. The black dashed curve on the figure shows the planned release ramped flow rates at the Intake. The actual flows released at the Intake generally conformed to the planned flow rates.

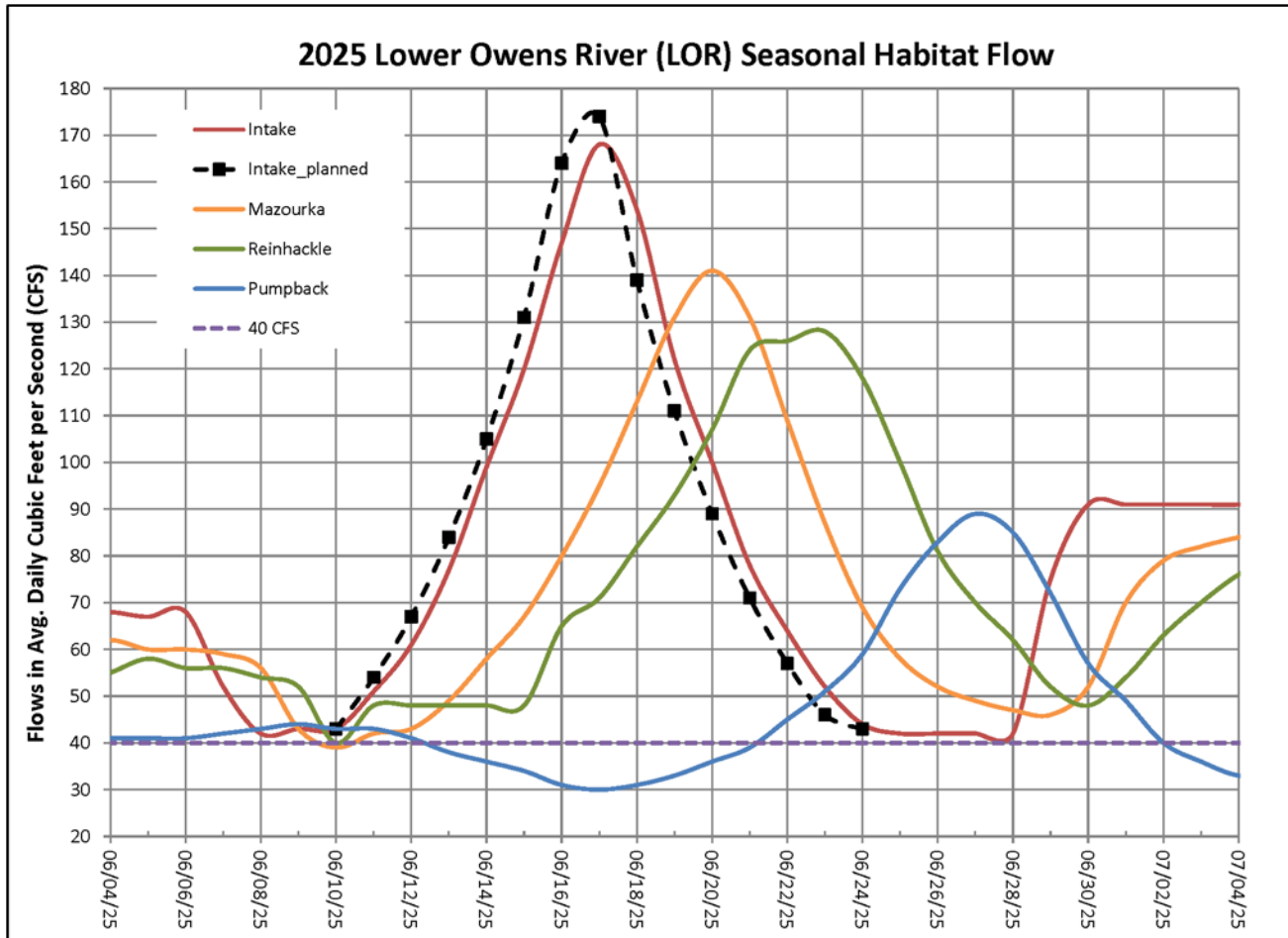


Figure 3-3. 2025 Lower Owens River seasonal habitat flow.

Water temperature and DO exhibited fluctuations related to flows. Measured water temperature from February through September ranged from 42 to 75 degrees Fahrenheit (°F). Dissolved oxygen levels in the LOR ranged from greater than 9 mg/L at the LOR Intake (and five other measured sites downstream) in late February to 1.4 mg/L at Reinhackle Springs in mid-June.

Evidence of fish stress in correlation with low DO measurements was observed at several sites on the LOR in 2023 (historic wet year and high flows) but was not observed in 2025. No fish kills within the LOR were observed by ICWD staff or known to be reported in 2025.

Figures 3-4 through 3-7 show flow (cfs) versus DO (mg/L) and pH (top graph in the set) and temperature (°F) and specific conductance (µS/cm; bottom graph in the set) for the Intake, Mazourka Bridge, Reinhackle Springs, and Keeler Bridge, respectively. Although 12 sites along the LOR were measured, these four sites best represent the trends in measured parameters observed during the 2025 measurement season; discussion is therefore limited to these sites. However, data from all 12 sites are available upon request to ICWD.

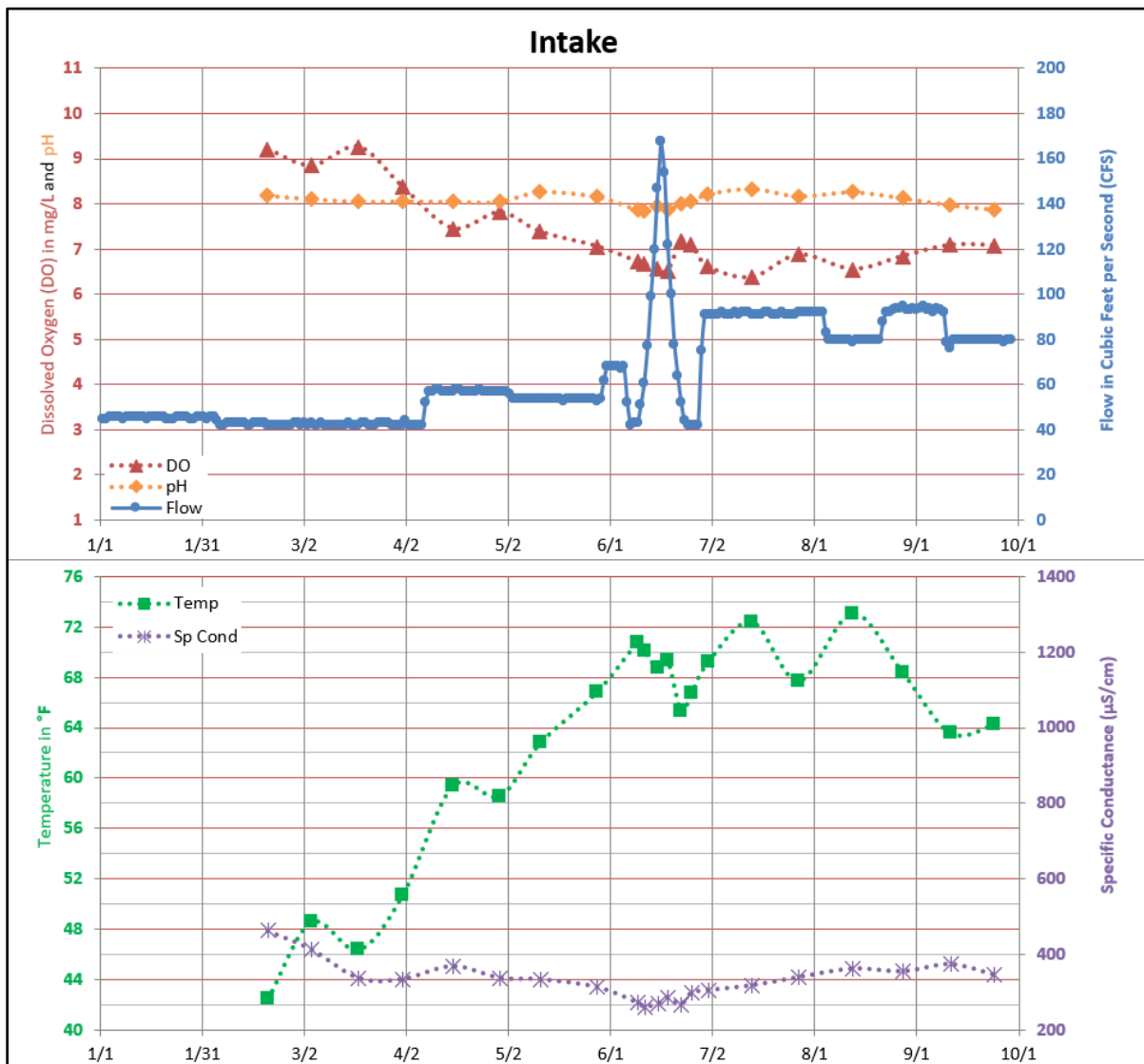


Figure 3-4. 2025 Lower Owens River at the Aqueduct Intake. Flow with DO, pH, temperature and specific conductance measured water quality parameters.

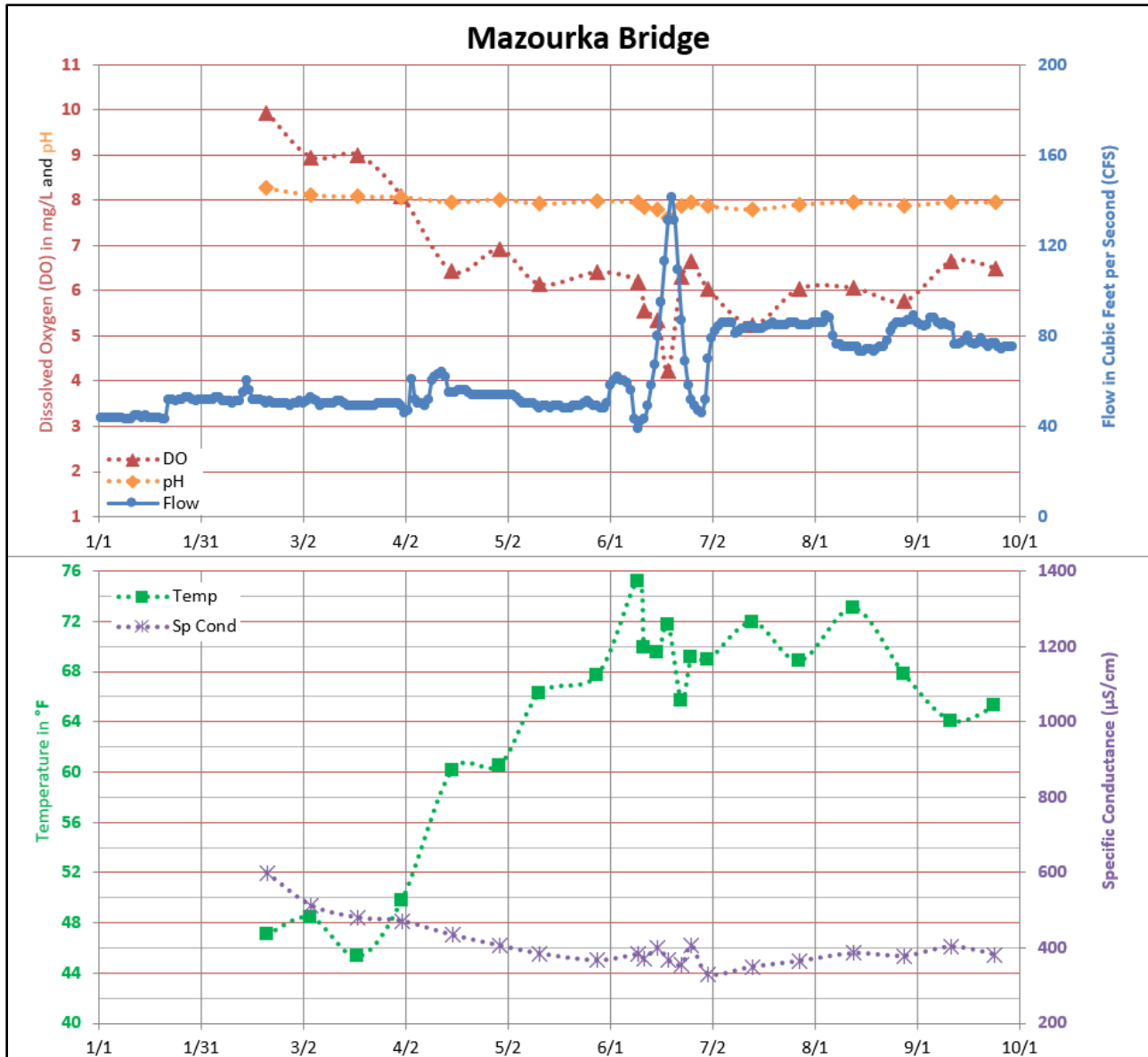


Figure 3-5. 2025 Lower Owens River at Mazourka Bridge. Flow with DO, pH, temperature and specific conductance measured water quality parameters.

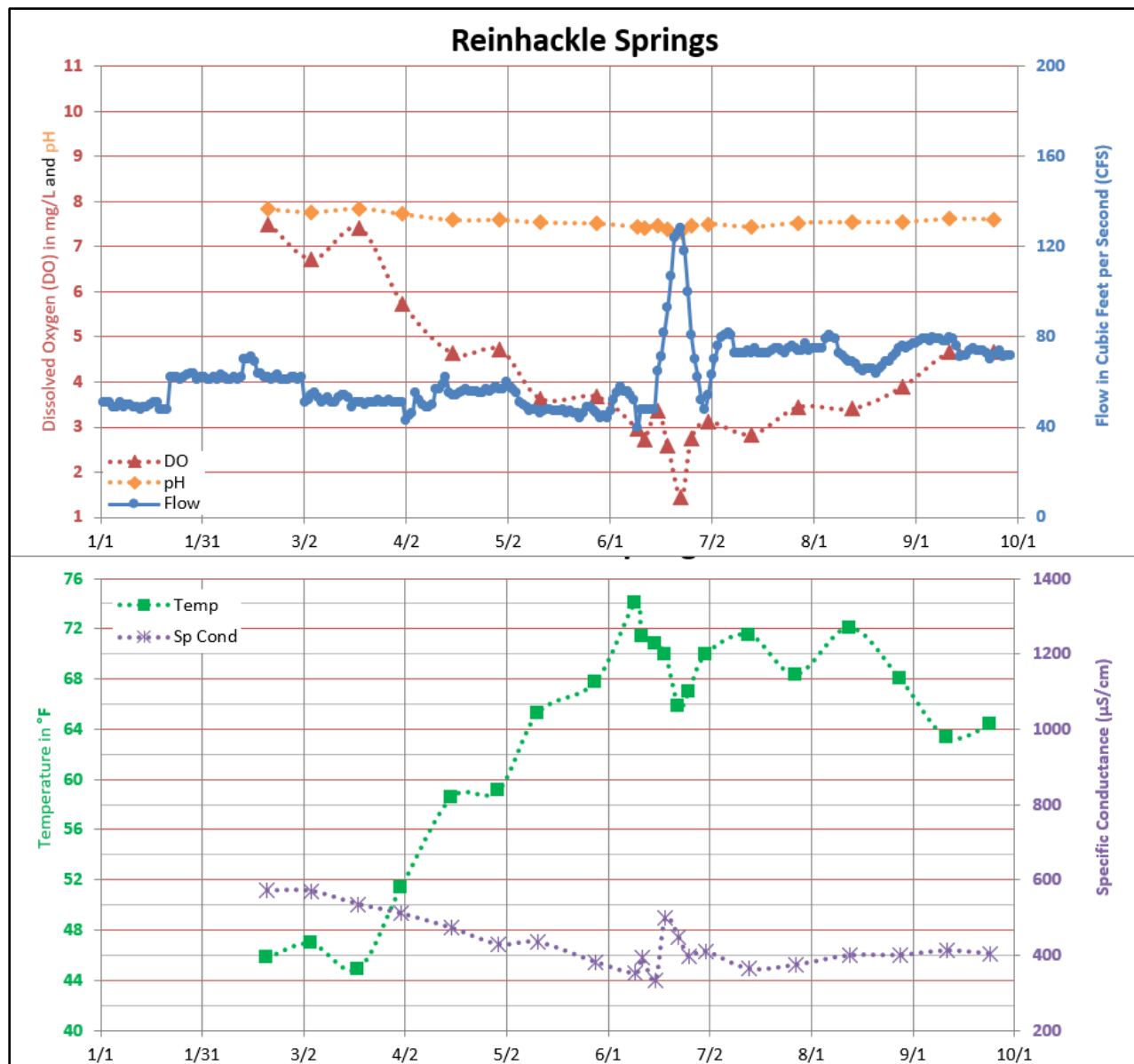


Figure 3-6. Lower Owens River at Reinhackle Springs. Flow with DO, pH, temperature and specific conductance measured water quality parameters.

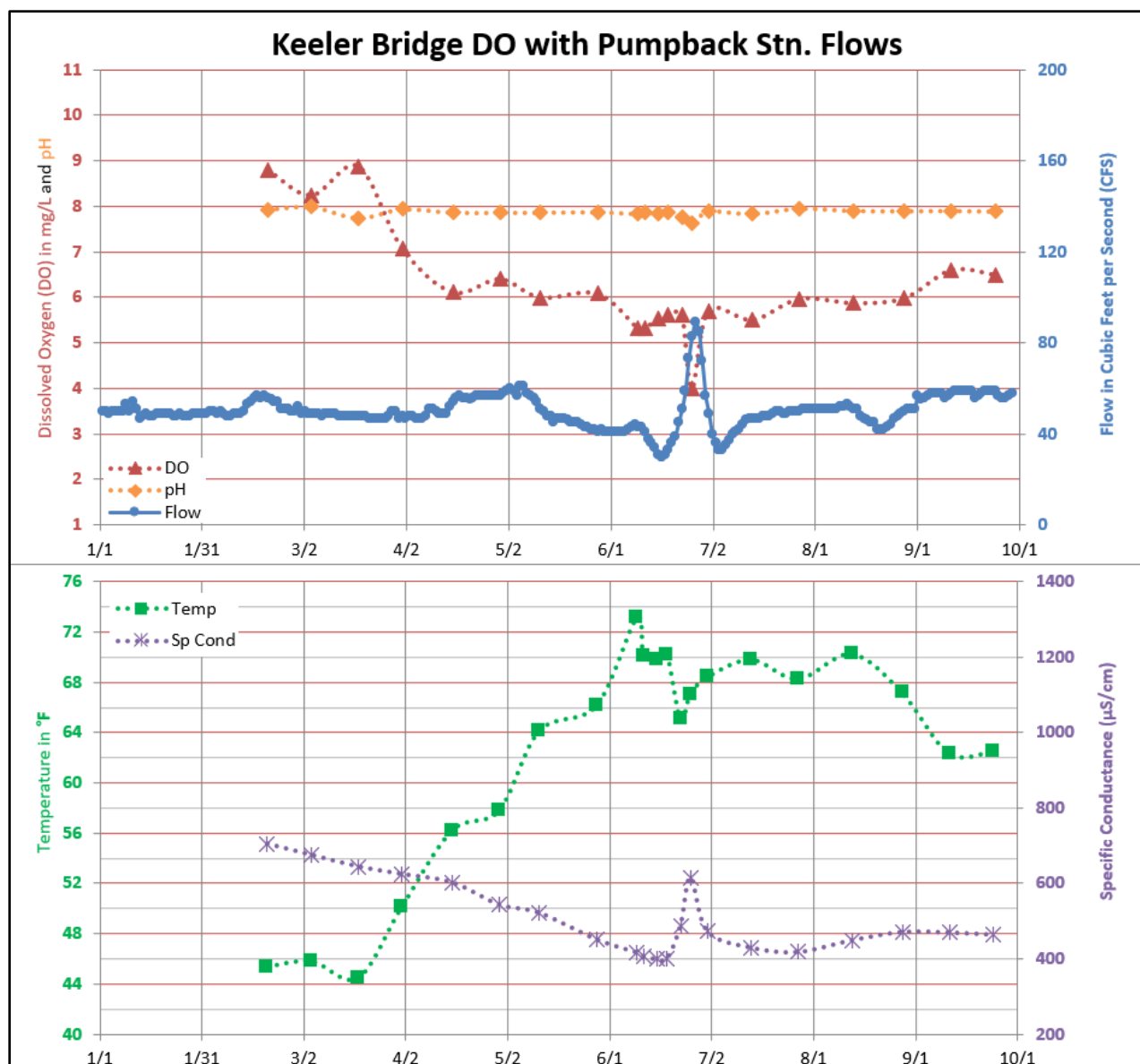


Figure 3-7. Lower Owens River DO, pH, temperature and specific conductance measured water quality parameters at Keeler Bridge with downstream Pumpback Station flow.

DO levels measured within the LOR during the 2025 runoff season were generally higher than those measured in 2024. A characteristic general inverse relationship between temperature and DO was observed, with increasing temperature correlating with decreasing DO. Dissolved oxygen remained relatively low (but not depleted) for most of the summer season in the LOR, with a general trend of decreasing DO with increasing distance south from the Intake to Reinhackle Springs (Figures 3-4 through 3-6). Downstream of Reinhackle, DO measurements trended upward with distance towards Keeler Bridge and the Pumpback Station (Figure 3-7).

Across all LOR measurement sites in 2025, initial decreases in DO correspond most closely to increasing spring water temperatures. Peak summer flow occurred on June 17 at the Intake and 10 days later at the Pumpback Station on June 27 as the SHF pulse moved downstream through the system (Figure 3-3). At the monitoring site with the lowest measured DO (Reinhackle), DO remained below 4 mg/L from around mid-May through the end of August (Figure 3-6). Reinhackle (located upstream of the LOR Islands) represents a mid-LOR low in DO, increasing with distance upstream to the Intake and downstream towards Keeler Bridge.

Additional parameters measured at each site include pH and specific conductance. Measured pH generally fluctuated within a narrow range at each site from 7.2 to 8.3. Measurements of pH indicate the acidity (below 7) or alkalinity (above 7) of the water. Shifts in pH can impact aquatic organisms by altering the solubility of chemicals which can change the nutrient balance in a waterway. Specific conductance ranged from 260 $\mu\text{S}/\text{cm}$ to 714 $\mu\text{S}/\text{cm}$, and generally decreased through the spring to early summer, then gradually increased or remained relatively stable into September (Figures 3-4 through 3-7). A notable specific conductance increase occurred at sites downstream from Mazourka Bridge in correlation to the June SHF. Note that specific conductance is an indication of total dissolved solids (TDS), but TDS cannot be directly calculated from these data. Specific conductance values of 500 and 1,000 $\mu\text{S}/\text{cm}$ approximately correspond to TDS values of 325 and 650 mg/L, respectively.

Quality assurance measures included daily calibration checks for specific conductance and pH. DO field measurements were bracketed at the beginning and end of each field day with a relative control water sample to assess sensor drift throughout the day. Observed drift from the start to end of field days was minor to not detectible.

3.3 References

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- LADWP and County of Inyo. 2009. Lower Owens River Project 2009 Annual Report. Los Angeles Department of Water and Power, Bishop, CA & Inyo County Water Department, Independence, CA. 882 p <https://www.inyowater.org/wp-content/uploads/legacy/LORP/DOCUMENTS/2009LORPAnnualReport.pdf>

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4.0 ADAPTIVE MANAGEMENT

The LORP was implemented in 2006 by the LADWP and is managed jointly by the LADWP and the County. Nearing the end of the LORP's prescribed 15-year monitoring program, the LADWP and the County conducted a comprehensive evaluation of the project in 2019 to assess its status with respect to the goals and requirements defined by the guiding legal documents. Through this evaluation, a series of adaptive management actions were identified and are being pursued. In 2025, the LADWP and the County conducted the following:

- Remote sensing analysis of the physical changes to the river and its floodplain following the 2023 flood.
- Continued implementation of a 5-year interim flow regime in the DHA and related monitoring.
- Continued implementation of a 5-year interim flow regime in the BWMA and related monitoring.
- Continuation of a tree recruitment assessment.
- A rapid biological assessment survey of the river
- Continuation of a noxious species survey and treatment.

A summary of these efforts is provided below. No new adaptive management was proposed for 2025.

4.1 Lower Owens River Remote Sensing Analysis Post-2023 Runoff

4.1.1 Introduction

In 2023, the LOR experienced the highest discharges since the adoption of flows set by the project's 2004 EIR. These high flows were the result of the runoff following the exceptionally large snowpack of 2022-23, which was 296% greater than the April 1st snowpack average for the eastern Sierra Mountains, and intense rainfall brought by Hurricane Hilary in August of 2023 (storm total in Lone Pine, CA = 3.56 inches).

The large runoff associated with snowmelt resulted in flows released from the Intake of over 700 cfs between June 19 and 24, which was a 3.5-fold increase over the 200 cfs maximum seasonal habitat flow (SHF) (Figure 4-1) established by the 1997 MOU. Further, flows over 200 cfs from the Intake were sustained over a two-month period during the spring and summer months. Flows at the Pump Back, which are normally 40 cfs, exceeded 1,100 cfs on August 23 with the occurrence of Hurricane Hilary (Figure 4-1).

Given the unprecedented magnitude and duration of these flows, remote sensing analysis of high resolution, aerial imagery was conducted to determine the physical changes to the river and its floodplain and to help facilitate the identification of potential sites that might support the successful germination of riparian woody species. Specifically, the wetted extent of the river and features associated with the flooding were mapped to provide a qualitative understanding of the river's response to the high flows. The features mapped were:

- 1) open water, which indicates the degree of hydraulic connectivity between the river and its secondary channels and floodplain,
- 2) scour and deposition sites, or disturbance areas, and
- 3) wet sediment or organic features that indicate either exposed, moist soils and/or deposition.

Additionally, the feasibility of using a digital elevation model (DEM), generated from the 2024 aerial imagery, to quantify physical changes to the river channel and floodplain, was also assessed. Lastly, technical recommendations are provided to direct future work.

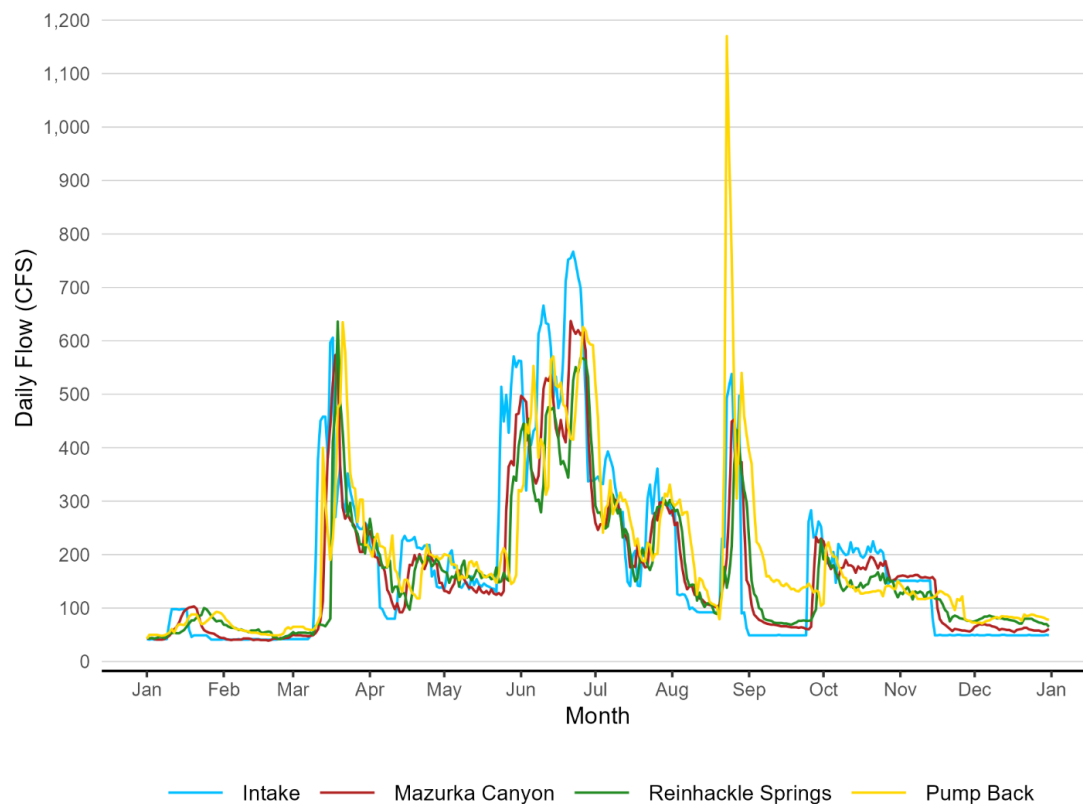


Figure 4-1. LORP daily flows measured at four different gaging stations.

4.1.2 Methods

Imagery

Aerial photography consultants *Focal Flights, LLC*, obtained a high resolution (7 cm x 7 cm), three band (red, green, and blue), (RGB) aerial image for the entirety of the LOR and its adjacent floodplain. Imagery was captured between February 28 and March 8 in 2024, and a digital elevation model (DEM) (2ft x 2ft) was generated through photogrammetry associated with the image. The daily release from the Intake was elevated above 150 cfs until February 21, and flows measured at downstream stations were still elevated during the period of image acquisition. Additionally, ICWD provided high resolution drone photos to facilitate accurate identification of classified features immediately following the aerial imagery capture.

Owing to the large file size of the image, the 2024 image was cropped and divided into 12 individual sections to facilitate processing. Specifically, for each section, individual *GeoTiff* raster images were mosaicked into one raster image and then cropped by the 2023 flooded extent. The 2023 flooded extent was delineated using 10 m resolution, 4 band (R,G,B and near-infrared), (NIR) *Sentinel 2A* T11SLA image taken on March 27, 2023, and T11SMA image taken on April 3, 2023 (Figure 4-2). These images were chosen because the acquisition dates were closest to the actual peak discharge in March, had no cloud obstructions, and because the absence of actively growing vegetation which interferes with the delineation of water using the NIR band.

Pixel-based Classification

The 2024 aerial images were classified to delineate three features previously described following the steps listed below using remote sensing software *ENVI 6.0*. First, mosaicked raster images were filtered (i.e. pixels removed from the image) to simplify the classification process by the masking function. Because pixel RGB values are represented by 8-bit unassigned integers ranging between 1 and 256, thresholds for filtering can be set to exclude extraneous pixels. Water and dark deposit or wet soil/organic features were defined by pixels with RGB values less than or equal to 80 (Table 4-1). Pixels whose red and green values were greater than or equal to 150, and blue values greater than or equal to 120, were defined as candidates for disturbed ground features. Once raster images were filtered, unsupervised classification with 12 classes was performed with the raster whose pixels values were less than or equal to 80 for the water and dark deposit features. The first four or five classes (Classes 1 to 4 or 5)¹ were combined to represent “water.” For wet soil/organic features, which are depicted as dark areas in the image, two classes were initially created: class 6, classes 7 and 8, and classes 9 to 12, and then these two classes were combined into one class

¹ Inclusion of the fifth class occurred because water appeared lighter in some reaches, which could not be delineated effectively by the first four classes.

after visual inspections of classified raster images. For disturbance features associated with either scour or deposition, the masking process was sufficient to delineate these features as they were readily identifiable from the image as light-colored features. Lastly, because of the uncertainty of attributing the processes that generated either scour and deposition features, these were combined into one class.

Post-classification cleanup

Following the filtering and classification process, the individual features were converted into polygon shapefiles to facilitate editing in *ArcGIS Pro*. To reduce isolated small polygons, which often represent shadows cast by vegetation, individual polygons within water features were removed for areas less than 2 m² and 3m² for disturbed ground and dark deposit features. Additionally, for “water” features, holes within a polygon were filled by “Eliminate Polygon Part” tool and rough boundaries were smoothed by the “Smooth Polygon” tool. Non-representative polygons (i.e. alkali crust, shadows, wetland vegetation laid down and covered by dark deposits) that remained following this post-processing were manually removed. Finally, a LADWP, 2022 digital-aerial image that was collected during lower flows (<80 cfs) was used as a guide to identify and remove light-colored pixels representing alkali crust. Lastly, this report defines the mapped features differently than what was originally proposed in the 2024-25 LORP Annual Workplan given the issues discussed with the classification schemes (Table 4-1).

Table 4-1. Summary of features from the 2024-25 Workplan and this report.

Workplan Features	Report Features	Pixel Threshold	Classification	Classes
Sediment	Disturbed Ground	RG $\geq$ 150 B $\geq$ 120	None	None
Sedimented Tules	Dark Deposit Wet Soil/Organic	RGB $\leq$ 80	Unsupervised Classifications with 12 Classes	1 to 4 or 5
Open Water	Water	RGB $\leq$ 80	Unsupervised Classifications with 12 Classes	6 to 12

DEM

A DEM that was generated from the 2024 image was compared to a 2017 Digital Terrain Model (DTM) that was developed by LADWP, to evaluate its potential use in quantifying physical changes to the river and its floodplain post flood. The 2017 DTM (20 cm resolution, NAD 83 Zone 11N) was reprojected and resampled to match pixels from the 2024 DEM (2 ft resolution), (NAD83 HARN, CA State Plane). To evaluate the vertical accuracy of the DEM, 100 control-points on bridges that cross the LOR were established as these sites provide a relatively uniform and flat surface.

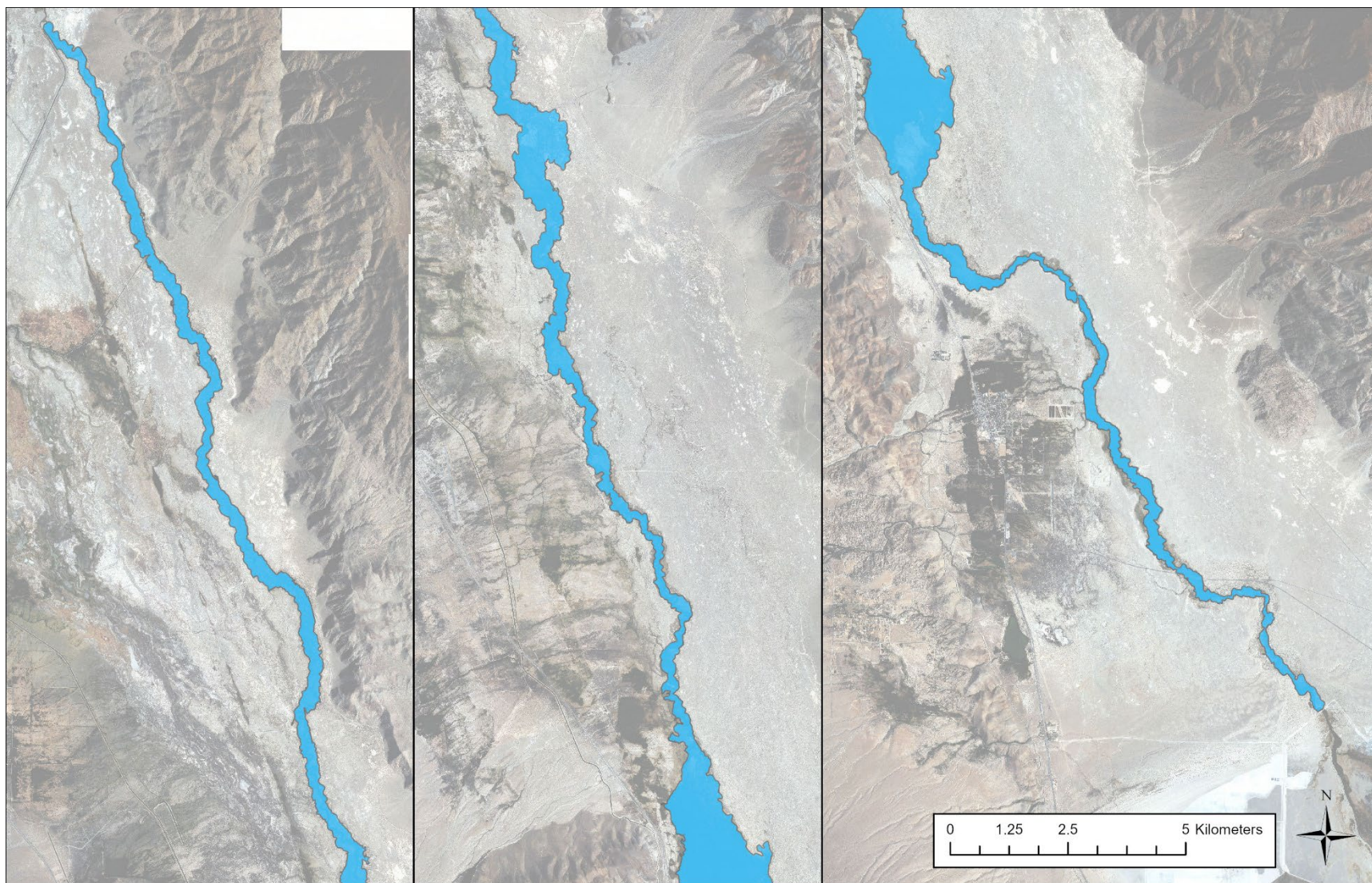


Figure 4-2. Flooded extent delineated based on *Sentinel 2* images for Lower Owens River.

4.1.3 Results/Discussion

Mapping

Figures 4-3 through 4-13 show the spatial distributions of three features (Table 4-1) along the length of the LOR: blue polygons are open-water features, yellow polygons are disturbances (scour/deposition) on the floodplain, and red polygons are dark features (wet soils/organic deposits). General trends demonstrate that above Mazourka Canyon Road the main channel is a single thread with sporadic secondary channels and ponding on the floodplain, while downstream of the road the channel becomes less distinguishable, and flooding becomes more extensive. Disturbance polygons comprise an extensive portion of the floodplain immediately below the Intake and diminish downstream. Conversely, dark deposit features occur less frequently upstream of Mazourka Canyon Road and become more ubiquitous downstream.

These spatial trends in features are likely a function of the river's hydraulics. In the upper reaches the main channel can convey a relatively higher percentage of flood flows owing to its channel being more incised and thus has a greater ability to erode and transport sediment (LADWP & ICWD, 2013). Conversely, in the lower reaches as a greater percentage of flood flows are lost to secondary channels and the floodplain, they encounter greater resistance from both tules and cattails, thus slowing flow, facilitating ponding, and the deposits of fine, organic material (NHC, 2012). Additionally, this ponding presumably drowned the floodplain vegetation and resulted in bare wetted ground as the flood waters receded.

DEM

Elevations derived from the 2017 DTM and 2024 DEM, at the same points, varied between -(9.7) feet and 4.3 feet with a vertical range of 14 feet (Figure 4-14). Differences in elevation between the two models were random instead of systematic based on elevation profiles along bridges that cross the LOR. For example, elevation differences varied (in absolute terms) from -(0.05) feet to -(2.82) feet heading east along seven points located along the Mazourka Canyon Road bridge. Along the Manzanar Reward Road bridge differences decreased from 1.12 feet to 0.28 feet, while heading east. Additionally, differences varied between -(7.0) feet and -(2.91) feet along the Highway 136 bridge. Because of the lack of accuracy in vertical elevations between these two models, they were not usable to quantify pre and post flood changes to the river.

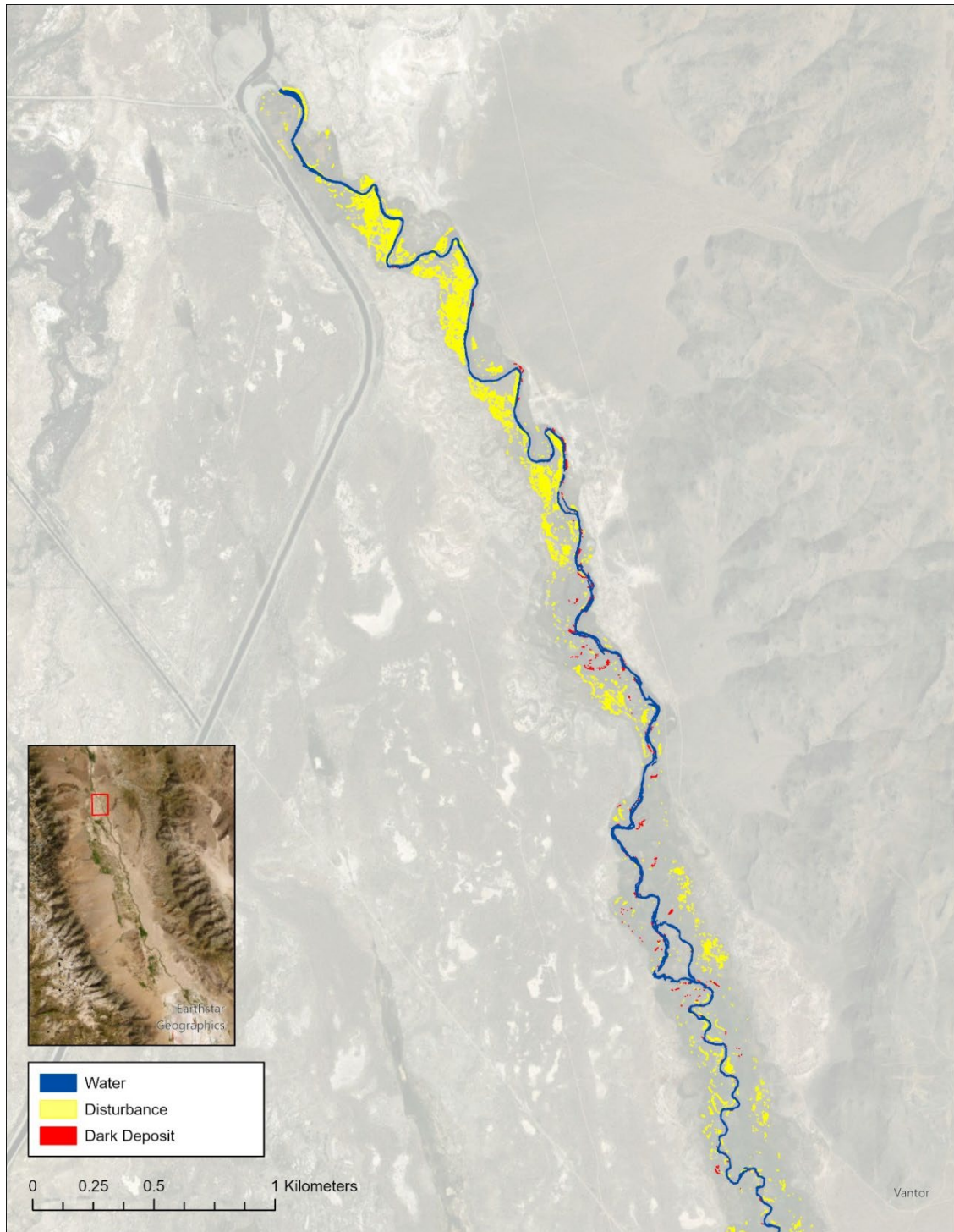


Figure 4-3. Water (blue), disturbance (yellow), and dark deposit (red) delineated over the area below Intake.

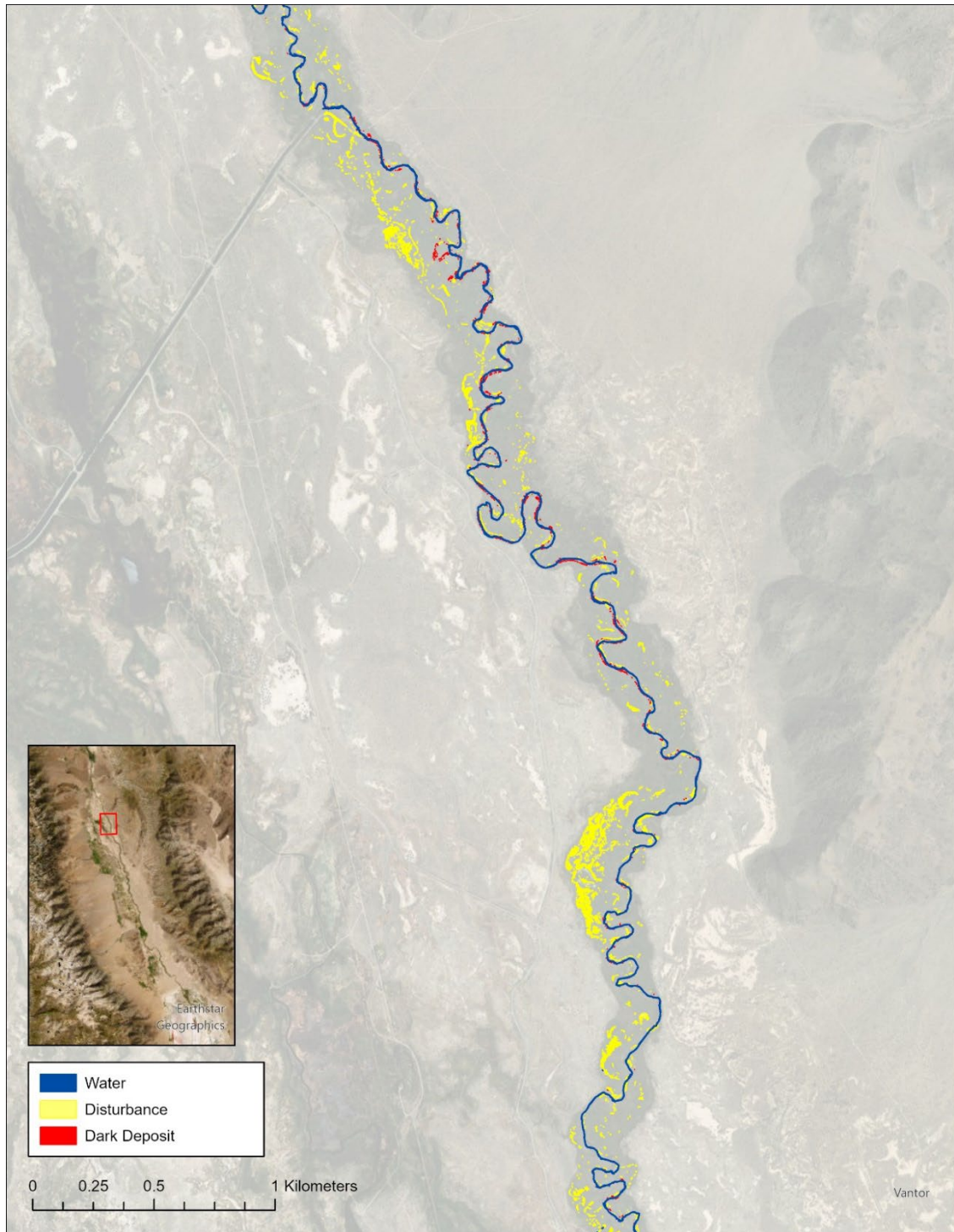


Figure 4-4. Water (blue), disturbance (yellow), and dark deposit (red) delineated over the area below Blackrock Ditch.

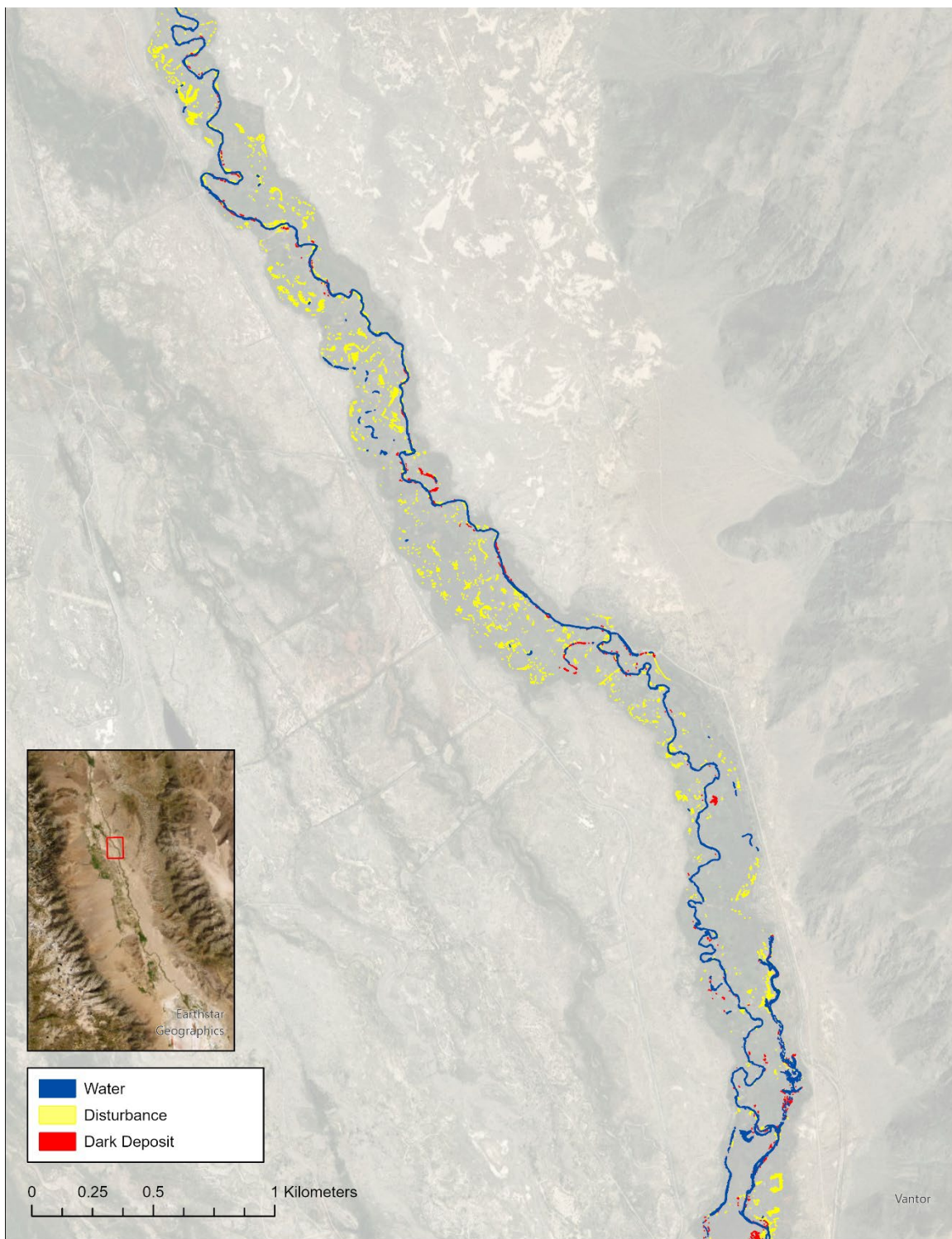


Figure 4-5. Water (blue), disturbance (yellow), and dark deposit (red) delineated over the area near Thibaut.

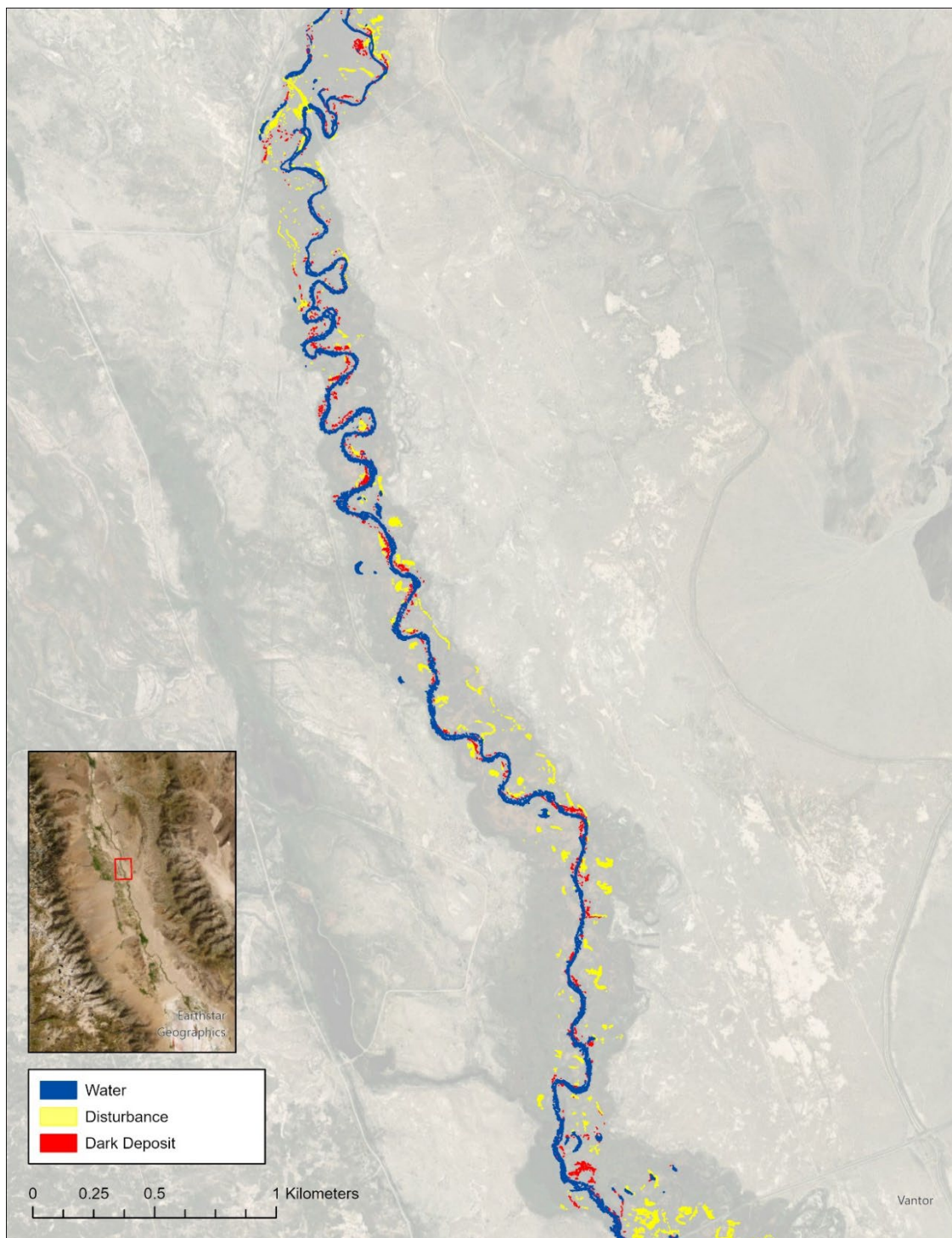


Figure 4-6. Water (blue), disturbance (yellow), and dark deposit (red) delineated over the area north of Mazourka Canyon Road.

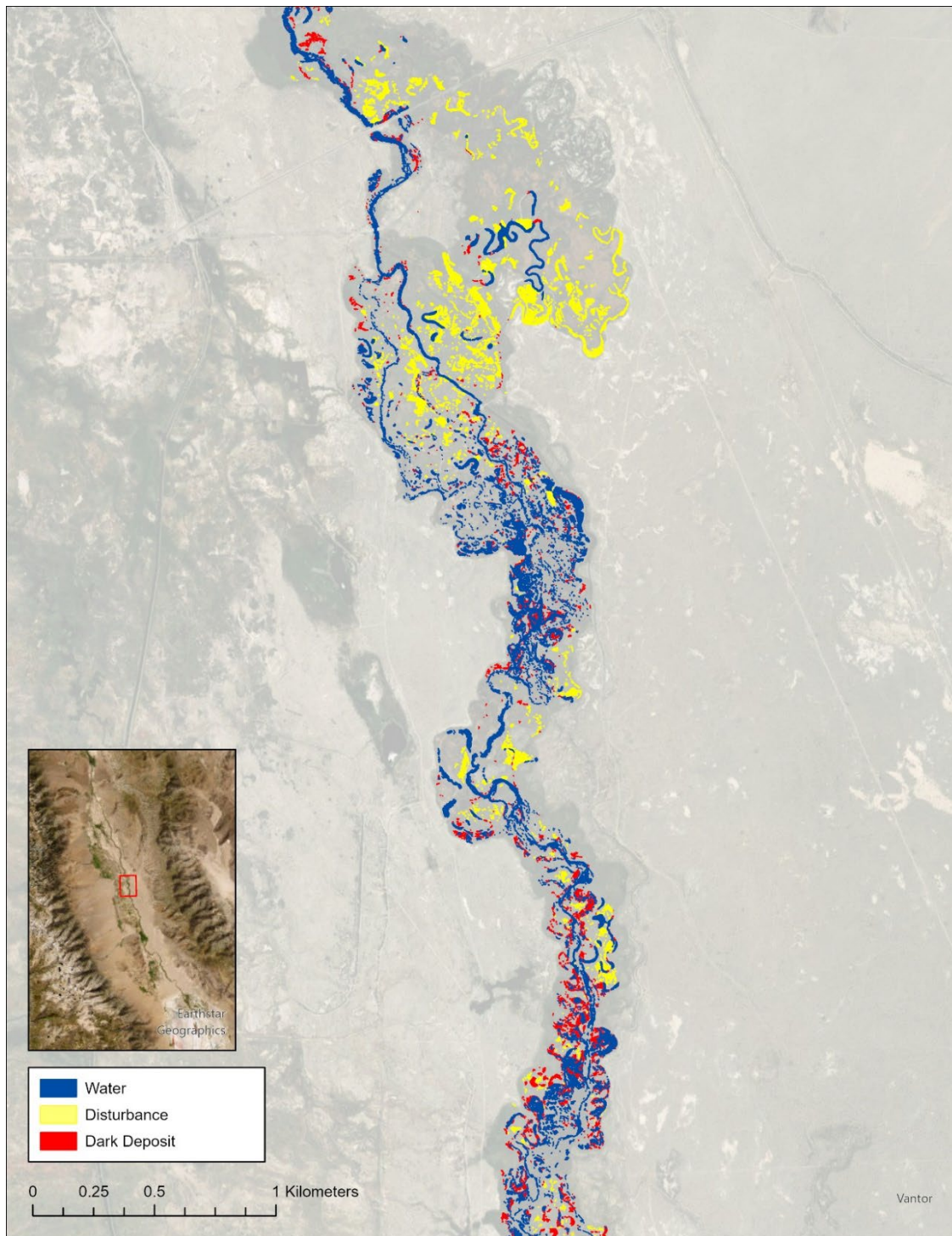


Figure 4-7. Water (blue), disturbance (yellow), and dark deposit (red) delineated over the area south of Mazourka Canyon Road.

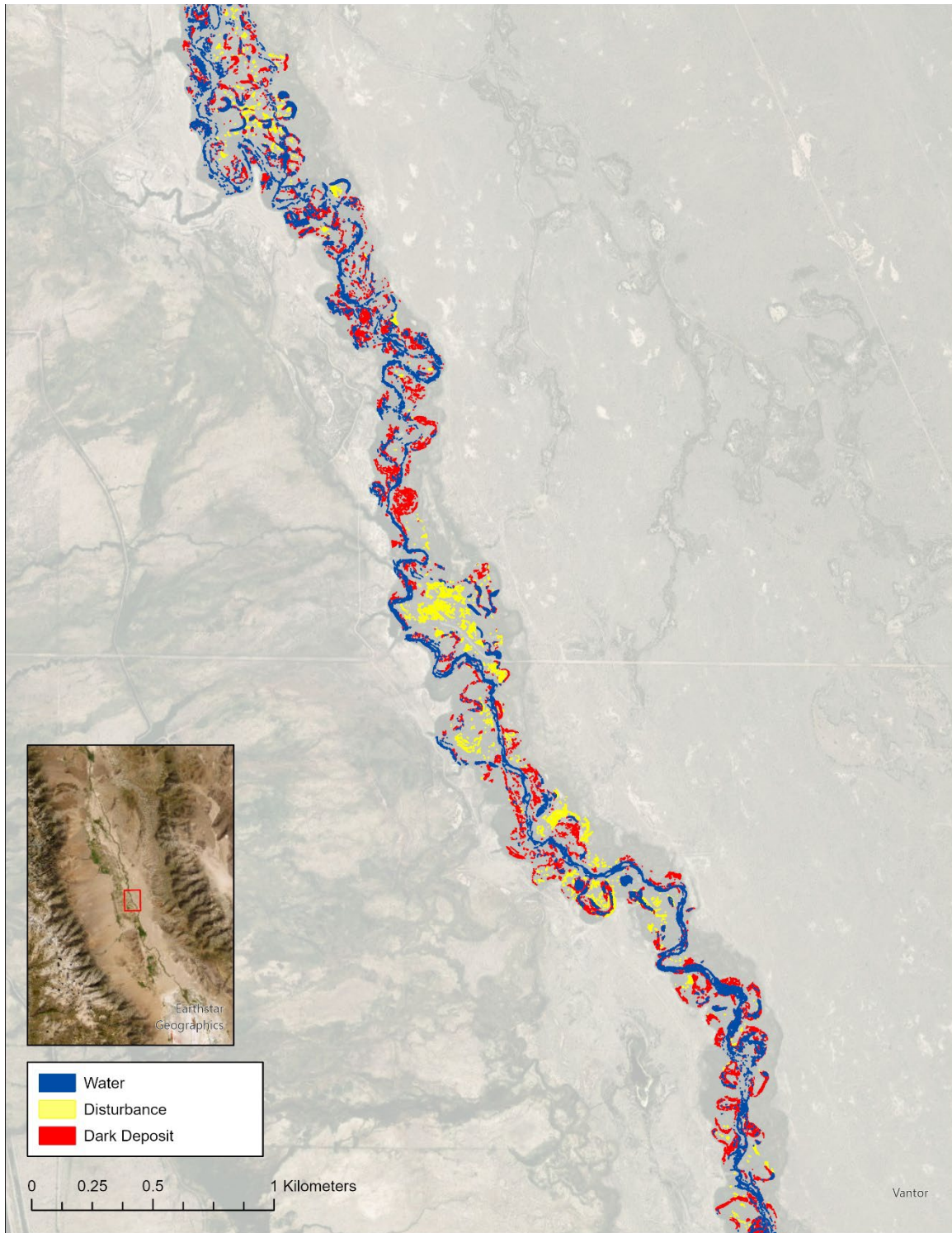


Figure 4-8. Water (blue), disturbance (yellow), and dark deposit (red) delineated over the area near Manzanar.

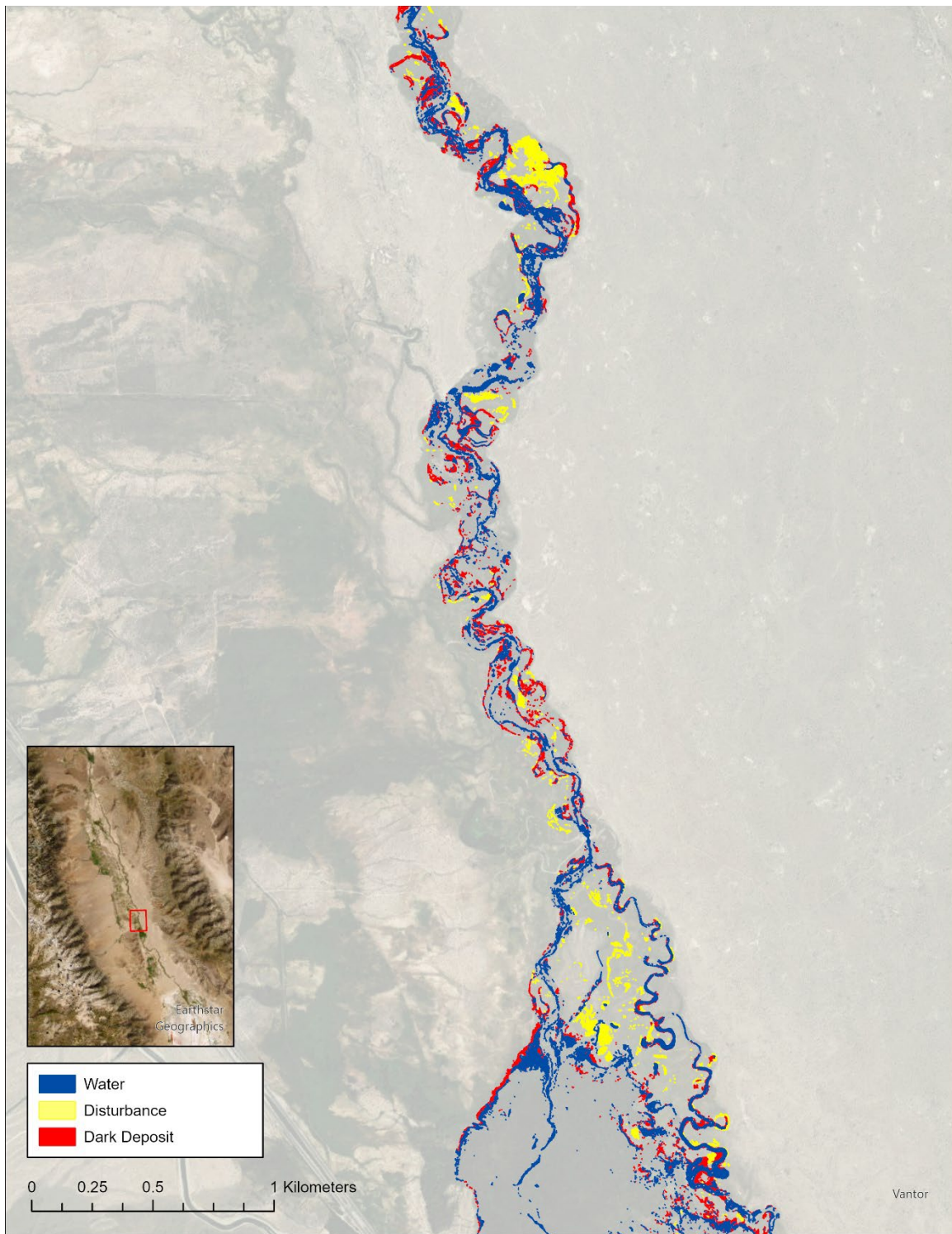


Figure 4-9. Water (blue), disturbance (yellow), and dark deposit (red) delineated over the area near Reinhackle Spring.

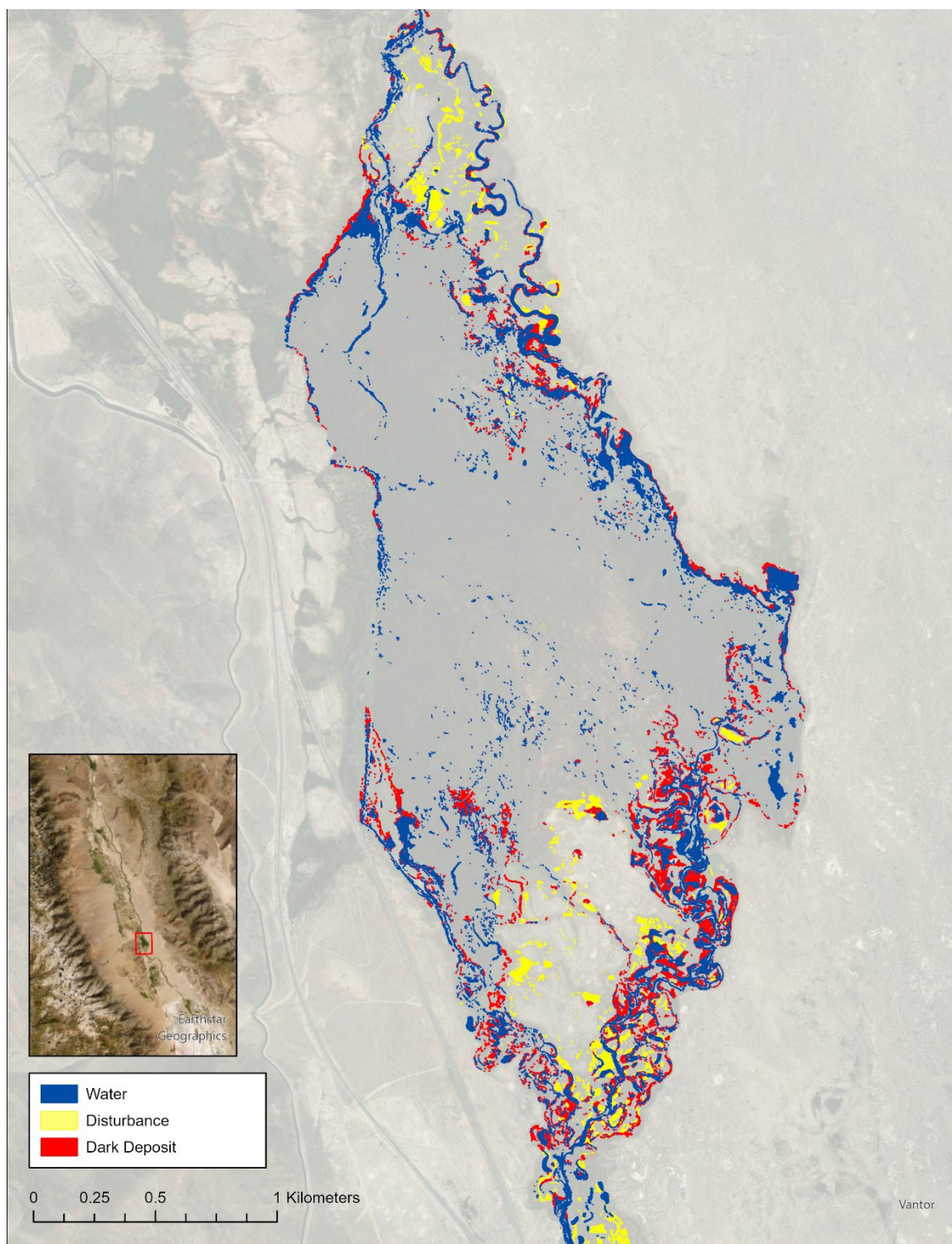


Figure 4-10. Water (blue), disturbance (yellow), and dark deposit (red) delineated over the Islands

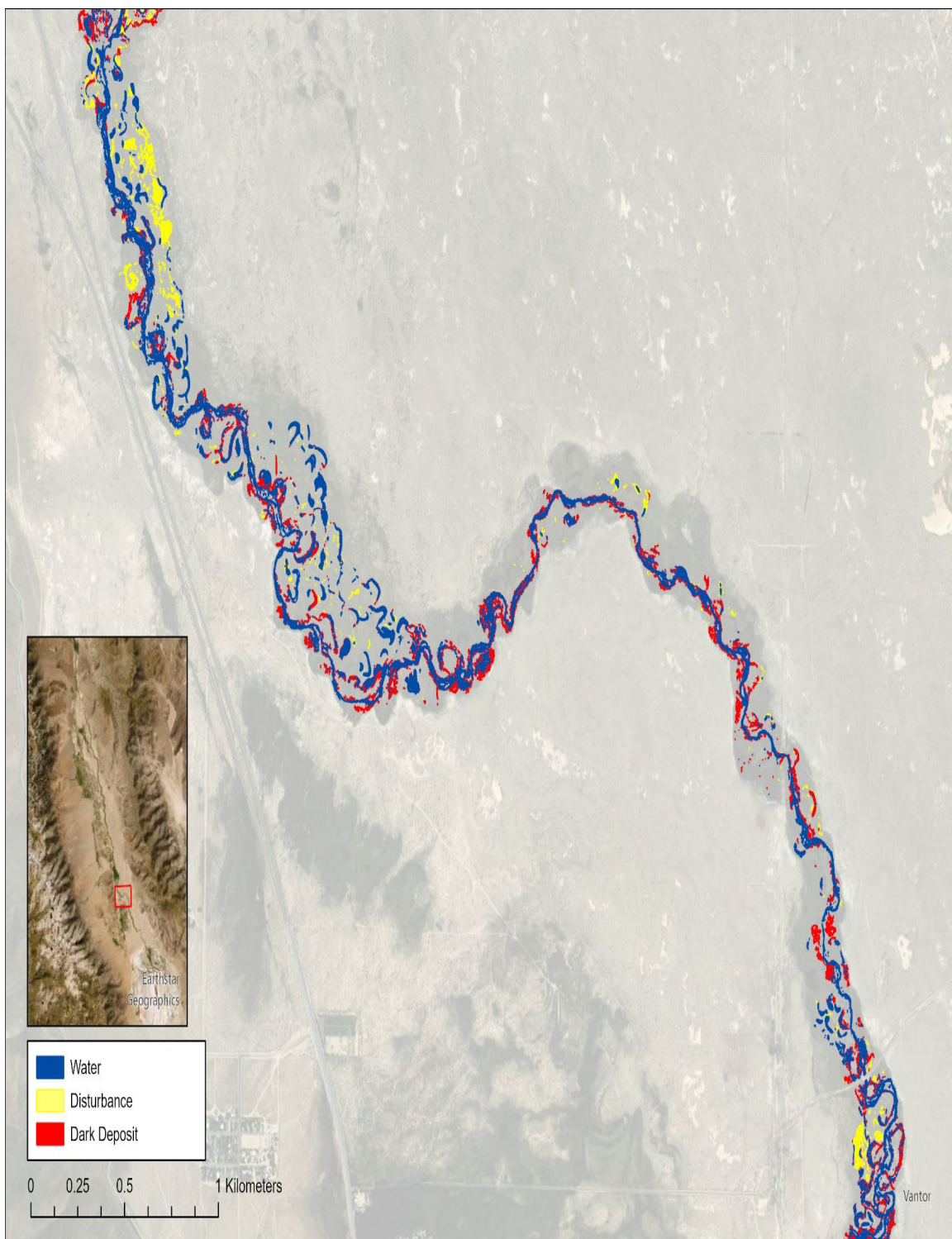


Figure 4-11. Water (blue), disturbance (yellow), and dark deposit (red) delineated over the area north of Lone Pine.

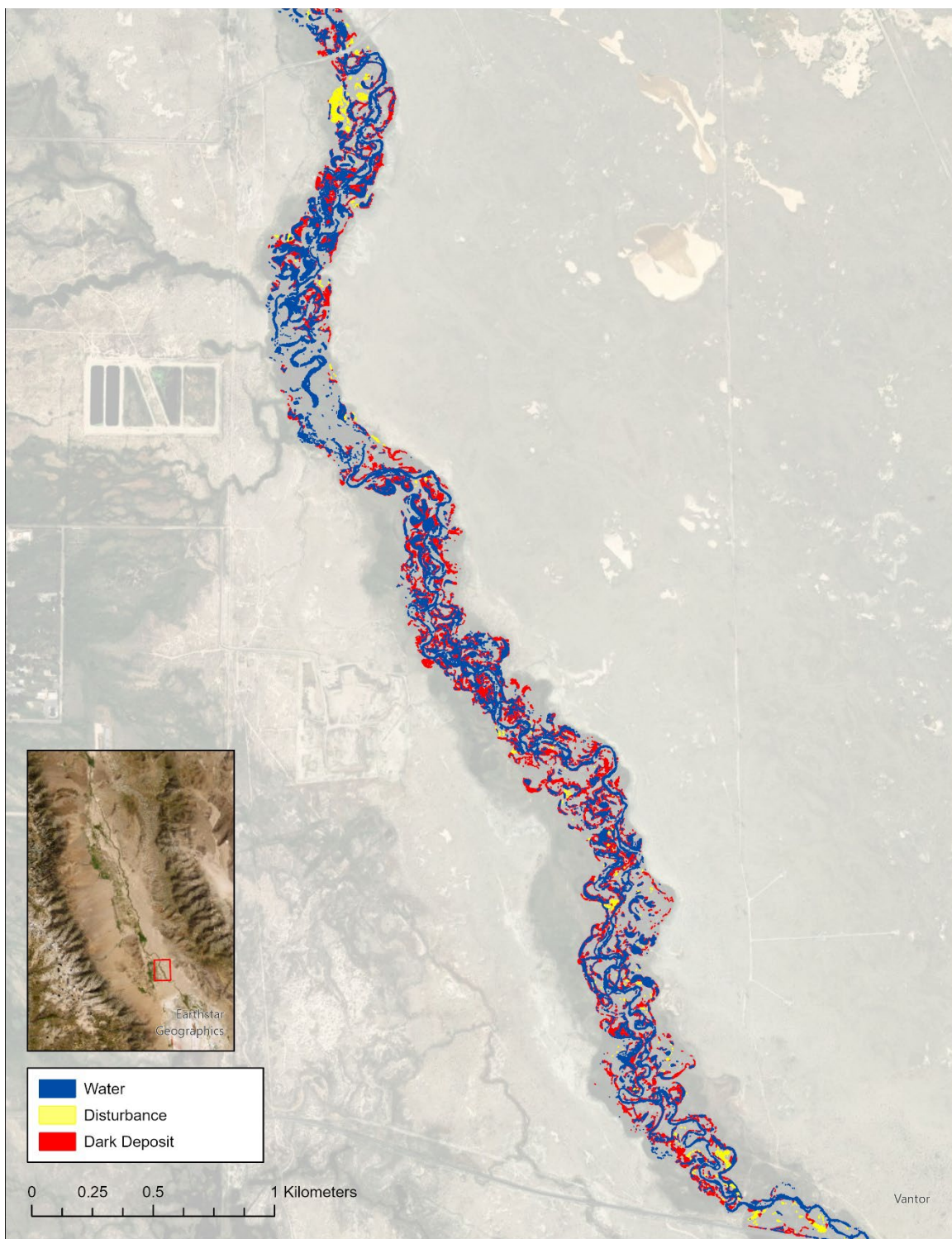


Figure 4-12. Water (blue), disturbance (yellow), and dark deposit (red) delineated over the area south of Lone Pine.

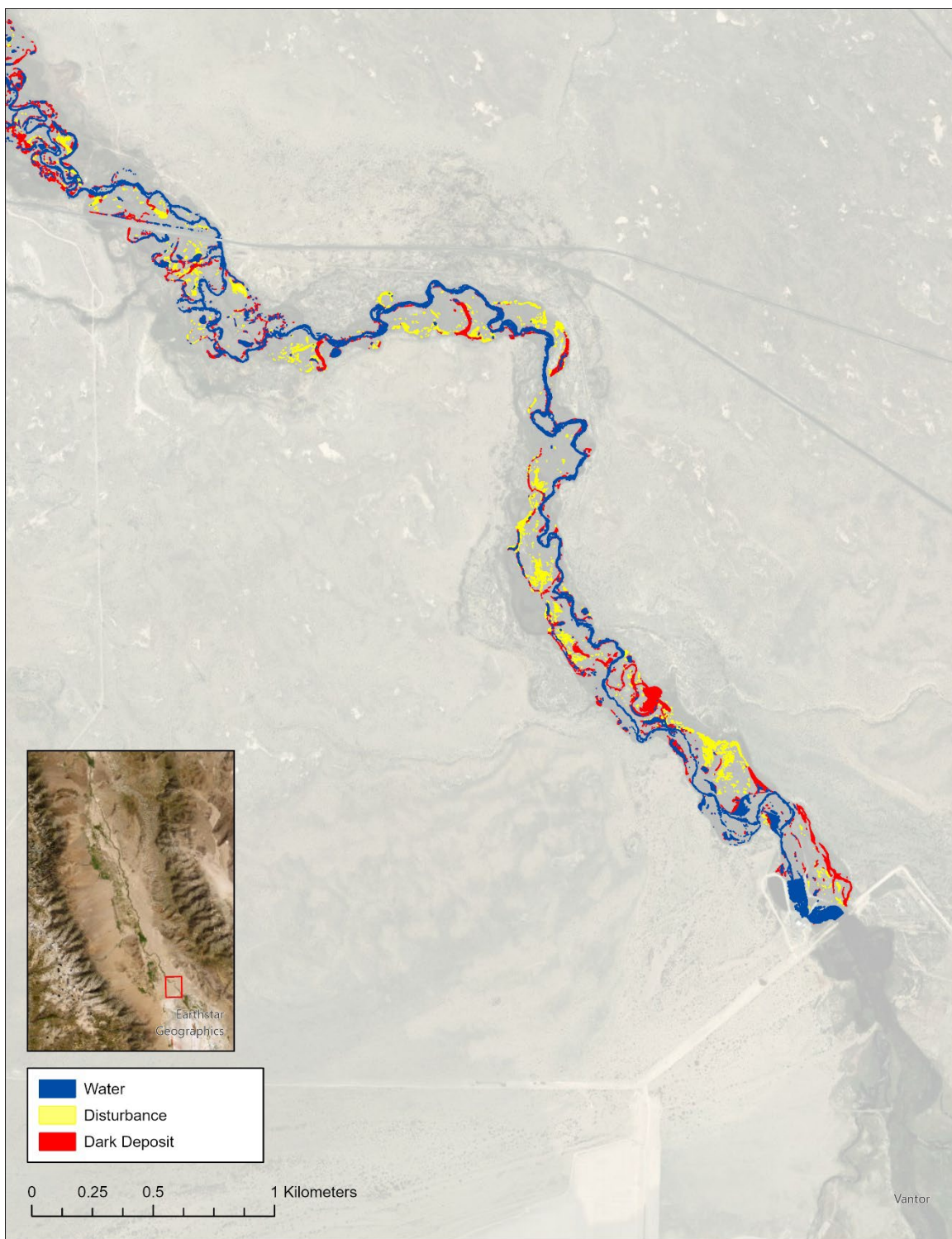


Figure 4-13. Water (blue), disturbance (yellow), and dark deposit (red) delineated over the area north of Pump Back Station.

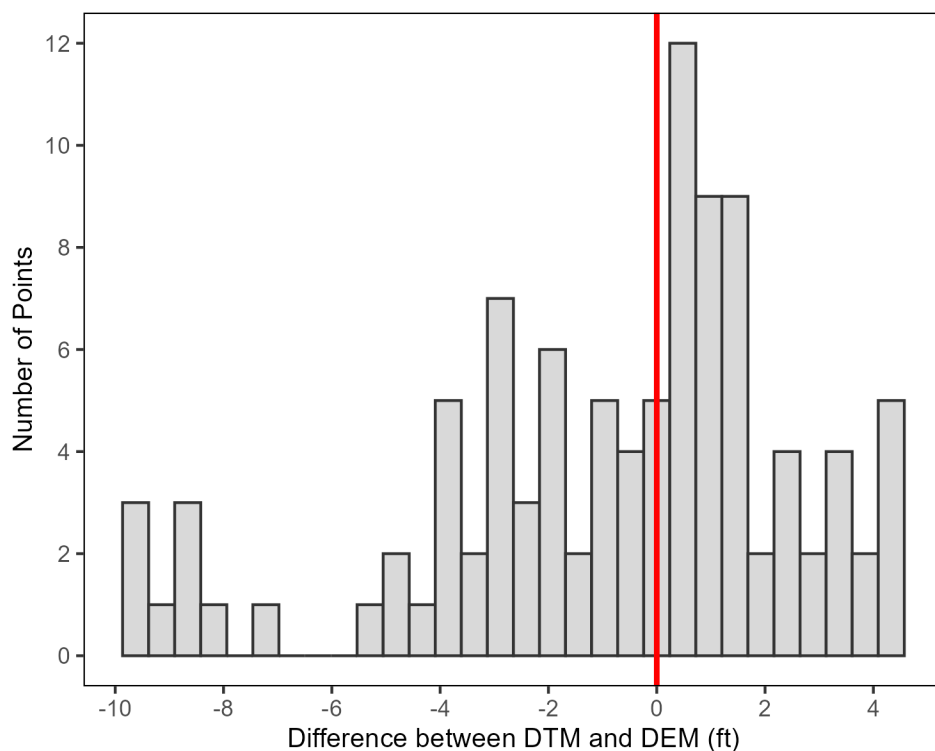


Figure 4-14. Histogram showing the distribution differences in elevation between the 2017 DTM and 2024 DEM.

4.1.4 Recommendations

Although the 2024 high resolution imagery provides a clear view of the LOR channel and its floodplains; a 3-band image, on its own, lacks the ability to both objectively and precisely classify features, and, in turn, results in a degree of subjectivity when assigning values to pixels. Further assigning the processes or sequence of events that generated the scour and depositional features was unachievable using only two-dimensional imagery. Owing to such limitations, the following are recommendations for future analysis of the river:

- 1) It is important to acquire NIR, or short-wave infrared (SWIR) if possible, along with RGB bands. RGB and NIR usually consist of multispectral (MS) band combinations.
- 2) It is advisable to acquire DTM based on Light Detection and Ranging (LiDAR) along with RGB bands which enables more precise topographic changes and presence/absence of vegetation. The year 2024 would have been an ideal year to acquire LiDAR especially in upper reaches as the terrain underneath ground cover was exposed.
- 3) Relatedly, it is advisable to acquire images of “before” conditions in terms of both MS and LiDAR to detect changes in landforms and ground cover and quantify effects of high flow. It is not possible to predict when such a flow occurs; consequently, thus MS and LiDAR should be acquired periodically.
- 4) Instead of relying solely on RGB values, use one or a combination of band ratios, HSV (hue, saturation, and value), or/and intensity to improve characterization of pixels.
- 5) Object recognition can be deployed to effectively and objectively remove undesired elements from the image before classification, such as shrubs and associated shadows.
- 6) Polygons delineating should be examined closely for site visits in future to observe successful woody recruitment. Once the successful sites are identity, these polygons should be selected for subsequent visits.
- 7) Combining both high resolution digital elevation data and measurements of both bedload and suspended sediments, during the flood stages, would allow a better understanding of the hydraulic processes responsible for the generation of both scour and depositional features and subsequently their classification.

4.1.5 References

LADWP and County of Inyo. 2013. Lower Owens River Project 2013 Annual Report. Los Angeles Department of Water and Power, Bishop, CA & Inyo County Water Department, Independence, CA. 430p.

LADWP and County of Inyo. 2023. Lower Owens River Project 2023 Annual Report. Los Angeles Department of Water and Power, Bishop, CA & Inyo County Water Department, Independence, CA. 197p.

Northwest Hydraulic Consultants (NHC). 2012. Lower Owens River Project Hydraulic Model. Prepared for Los Angeles Department of Water and Power, Bishop, California. 46p.

4.2 DHA Interim Flow Regime and Recommended Monitoring

4.2.1 Introduction

According to the 1997 MOU, the goal of the DHA is to “*enhance and maintain approximately 325 acres of existing habitat consisting of riparian areas and ponds suitable for shorebirds, waterfowl, and other animals and to establish and maintain new habitat consisting of riparian areas and ponds suitable for shorebirds, waterfowl, and other animals within the Owens River Delta Habitat Area. Diverse natural habitats will be created and maintained through flow and land management, to the extent feasible, consistent with the needs of the “habitat indicator species” for the Owens River Delta Habitat Area. These habitats will be as self-sustaining as possible.*”

The MOU continues with “*the quantity of water that will be released below the pumpback station for these purposes will be an annual average of approximately 6 to 9 cfs (not including water that is not captured by the station during periods of seasonal habitat flows).*” Section 2.4 outlined the schedule that was developed to achieve an average flow of 6 to 9 cfs. However, it was found that stream discharges into the DHA during the growing season, as originally prescribed, promoted growth and expansion of emergent vegetation and the subsequent loss of open-water habitat. As an adaptive management effort, an IP that reduced summer stream flow to induce hydrological stress of the emergent vegetation was developed to reverse this trend and provide open-water and meadow habitat for habitat indicator species (HIS) and other wildlife associated with the LORP.

The interim flows commenced on April 1, 2020, and adhered to the flows described in section 2.4. During the growing season, a minimum summer base flow of 3 cfs is applied between May 15 to August 31. The minimum summer base flow was implemented three times between 2020 and 2022. In 2023-24 RY, high flows associated with the winter 2023 runoff and Hurricane Hilary flooded the DHA for the entire growing season. During the 2024-2025 RY, in the month of April, flows to the DHA were still higher than prescribed, but the flows decreased by mid-May, with a few exceptions. For example, on June 19 and August 7, 2024, the flows to the DHA increased and peaked at 54 and 35 cfs, respectively (Figure 4-16).



Figure 4-15. Looking south at Owens Lake and Owens River delta (foreground) on April 16, 2024. On this date, the flow over the weir peaked at 138 cfs and water levels were still high from 2024-25 RY.

4.2.2 Methodology

Stream Flow

Flow releases to the DHA were monitored following methods described in the Hydrologic Monitoring section of this report (Section 2.0). The scheduled interim flows to the DHA are released through a Langemann gate at the Pump back station. Flows that exceed the capacity of the gate flow uncontrolled to the DHA and occur when flows in the Owens River exceed the capacity of the Pumpback Station, such as during precipitation events, SHFs, or during power outages. Average-daily flows for the 2024-25 RY were compared to the interim-flow schedule to evaluate adherence to the prescribed flows. The use of RY convention (4/1-3/31) versus WY (10/1-9/30) is because the former more closely aligns with the growing season and the goals of the IP.

Effectiveness of Adaptive Management Flows

The effectiveness of the interim flows was evaluated using the following three criteria:

- 1) Did the summer minimum baseflow result in drying and hydrologic stress of emergent vegetation in the DHA?
- 2) Did the minimum summer base flow maintain water in permanent ponds serving as “control points”?
- 3) Did the interim flows produce flooding of existing, seasonal ponds serving as “control points” from September through early May?

For criterion 1, aerial photos of the DHA were analyzed to determine if the interim flows were qualitatively inducing hydrologic stress among emergent vegetation. For criterion 2, the persistence of small permanent ponds through the 2024 summer period were documented from aerial photos. Similarly, these aerial photographs were also used to determine the creation of seasonal ponds associated with criterion 3.

4.2.3 Results and Discussion

For 2024-25 RY, between early April and May, flows to the DHA remained higher than prescribed by the interim flows. Flows were high in April due to operational issues. In late March 2024, the LORP pumps were taken out of service for maintenance. In early April, the LORP intake was temporarily increased to 143 cfs for about two weeks. Flows eventually decreased in May and remained largely within the prescribed interim flows (Figure 4-15).

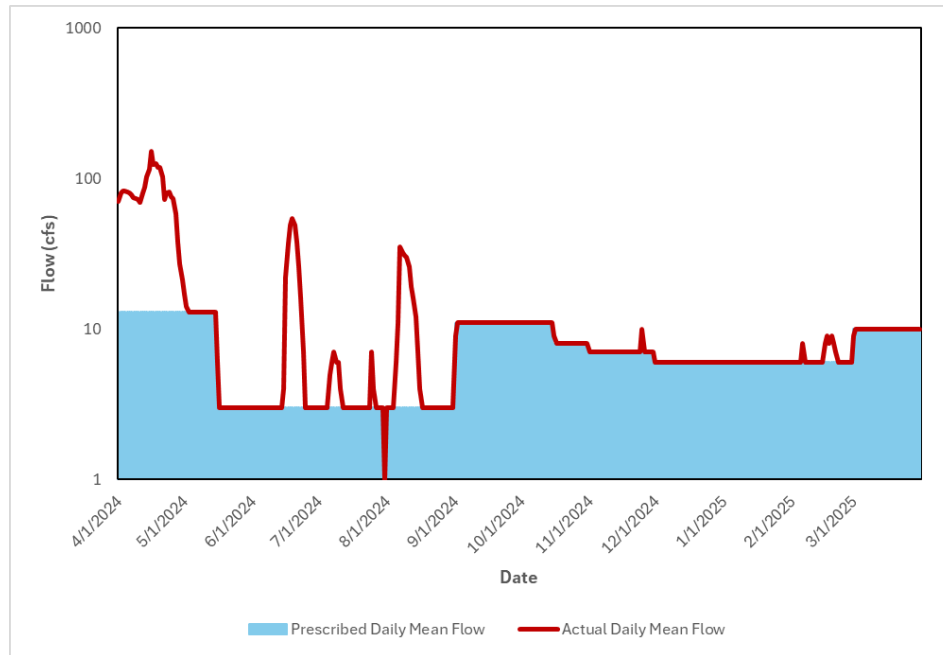


Figure 4-16. Actual daily mean flow (red) to the DHA verses prescribed daily mean flow (blue) in 2024-25 RY (y-axis is in log-scale).

Effectiveness of Adaptive Management Flow Regime

Criterion 1: Did the summer minimum baseflow result in drying and hydrologic stress of emergent vegetation in the DHA?

To evaluate the effectiveness of the interim flow changes on emergent vegetation, aerial photos of vegetation conditions within the DHA, were qualitatively compared between pre-project and current conditions (Figures 4-17 through 4-19). Pre-project conditions (August 16, 2019) show extensive emergent vegetation throughout the DHA that is vigorous and actively growing (Figure 4-17). Following implementation of the interim flows, in 2022, there was extensive dieback of emergent vegetation due to hydrologic stress (Figure 4-18). In 2023-24 RY, the DHA was flooded for the entire growing season, which renewed growth of emergent vegetation. The interim flows resumed in 2024-25 RY in the beginning of May 2024. This year criterion 1 was met because, as shown in Figure 4-19, there were similar areas of dieback as seen in 2019. However, due to the high flows experienced the previous year, it is difficult to assess the long-term effectiveness of the minimum base flows.

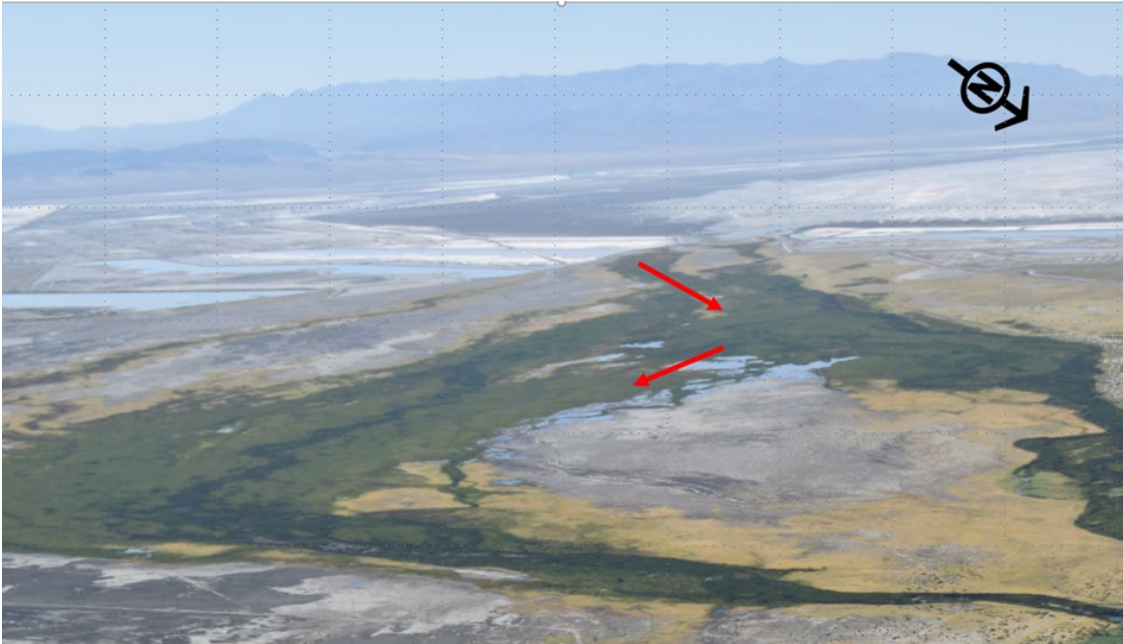


Figure 4-17. August 16, 2019, aerial image of DHA. The red arrows are reference locations for comparison to subsequent years.



Figure 4-18. August 25, 2022, aerial image of DHA. Reference locations denoted by red arrows exhibit extensive die-back of emergent vegetation from hydrologic stress.



Figure 4-19. August 16, 2024, aerial image of DHA. Reference locations denoted by red arrows show similar areas of die-back of emergent vegetation seen in 2022. This was the third year of interim flows.

Criterion 2: Did the minimum summer base flow maintain water in permanent ponds serving as “control points”?

The location of permanent ponds 1 and 2 that are to be monitored during the summer base flow conditions are shown in Figures 4-20, through 4-22. Both ponds were present in summer, and criterion 2 was met.



Figure 4-20. August 2, 2024. Ponds 1 and 2 (from left to right as shown by red arrows) were maintained by the summer baseflow.



Figure 4-21. August 7, 2024. Pond 1 (as shown by red arrows) was maintained by the summer baseflow.



Figure 4-22. August 7, 2024. Pond 2 (as shown by red arrows) was maintained by the summer baseflow.

Criterion 3: Did the interim flows produce flooding of existing, seasonal ponds serving as “control points” from September through early May?

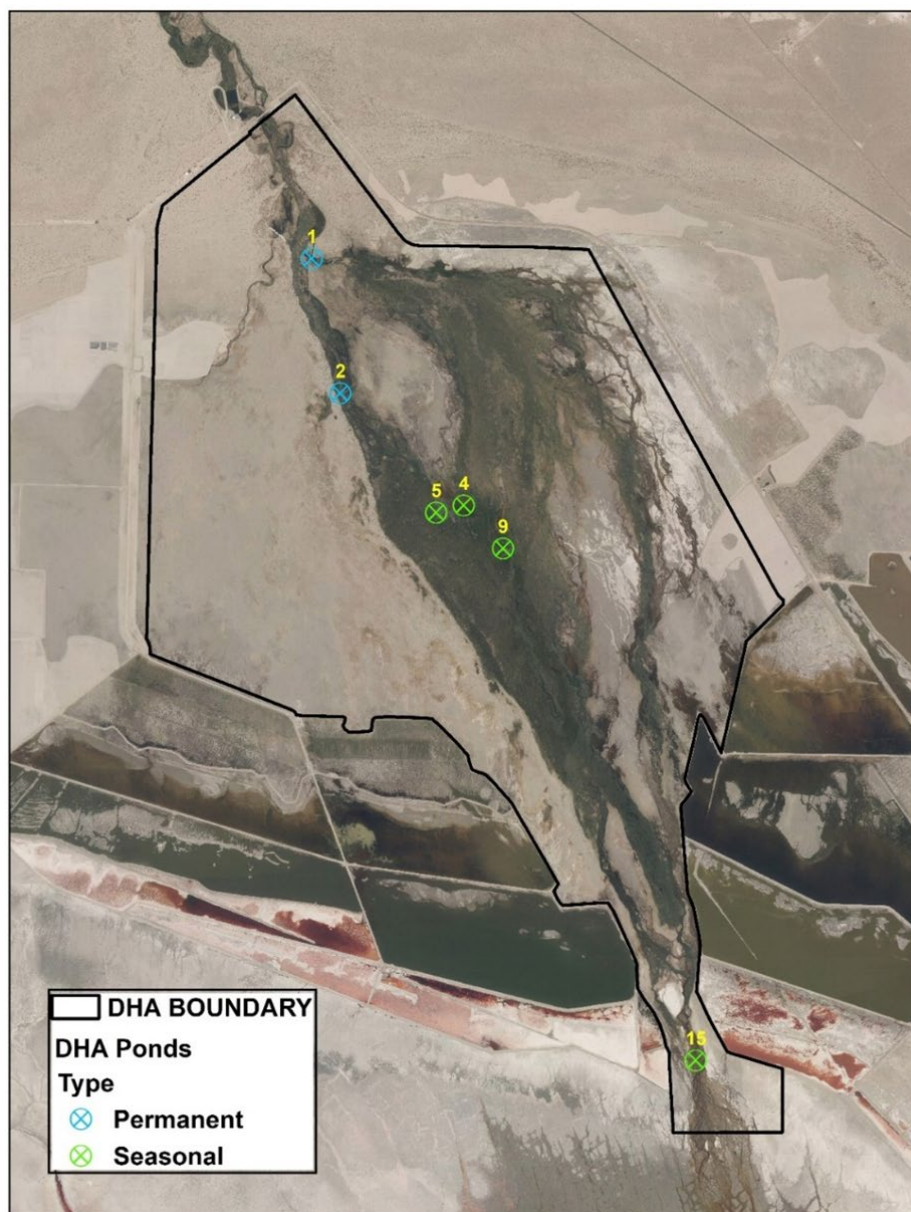


Figure 4-23. Locations of both permanent and seasonal ponds.

Figure 4-23 shows the location of seasonal ponds 4, 5, and 9 in the DHA. These ponds were flooded by the interim flows in 2024-25 RY (Figure 4-24). Seasonal pond 15 was not flooded as the channel had shifted farther west of its original location (Figure 4-25). While seasonal pond 15 was not flooded, the interim flows still made it to the brine pool transition area. Therefore, criterion 3 was met.



Figure 4-24. September 27, 2024, aerial Image of DHA. Red arrows denote location of ponds 4, 5, and 9, from left to right, respectively.



Figure 4-25. November 4, 2024, aerial image of DHA. Due to the high flows in 2023-24 RY, sediment was deposited at the southern end of the DHA. This deposition has shifted the channel to the west away from seasonal pond 15.

Since 2020, when the interim flows began, aerial photos of the DHA have been reviewed to qualitatively assess the effectiveness of the flows based on the extent of dead marsh as well as the presence of permanent and seasonal ponds. In previous LORP reports (2023 & 2024), it has been recommended that LADWP investigate how remote sensing could be used to assess habitat conditions and flow effectiveness. Different metrics were suggested including tracking changes in the extent of flooding, emergent vegetation, amount of open-water habitat, and size and availability of seasonal and permanent ponds. Vegetation indices are one option for assessing vegetation health vegetation in the DHA and its response to changing flow.

Normalized Difference Vegetation Index (NDVI) is a widely accepted remote sensing technique that measures both vegetation health and density using both the near-infrared and the red wavelength bands of a satellite image. Specifically, this index measures how healthy vegetation reflects and absorbs near-infrared and red compared to sparse vegetation or plants that are stressed by disease or drought. NDVI has some limitations, and factors such as seasonality, vegetation density, soil reflectance, and atmospheric effects can affect its values. It is discussed here as one option for assessing the effectiveness of the interim flows as it relates to criterion 1.

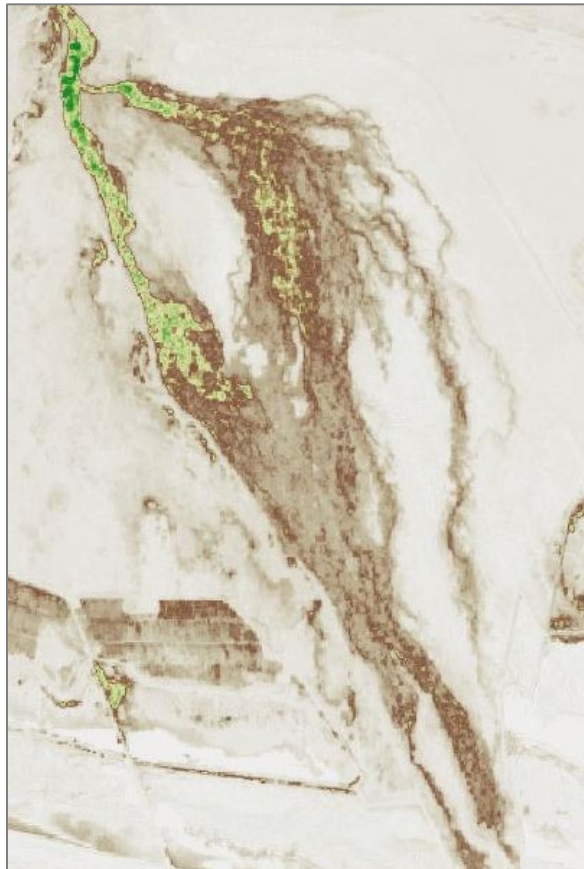
The following images from the *Sentinel-2 Explorer* in *ArcGIS Living Atlas of the World* show the NDVI in the DHA. The first set of images are from 2016 to 2019 when water was applied at a higher rate during the growing season (Figure 4-26). The second set of images are from 2020 to 2022 when the interim flows were implemented (Figure 4-27). The third set of images are from 2023 to 2025 when the interim flows were not implemented due to an above-average runoff year in 2023 (Figure 4-28). Images from August were used as these represent the timing of the lowest flows (i.e., 3 cubic feet per second) to the DHA during the interim flows and allowed for comparison across the two different time periods (i.e., pre- and post-interim flows).

In contrast with the previous photos, the satellite imagery provides a complete view of the DHA. Prior to the interim flows, vegetation in the DHA was generally healthy and dense, especially during the wet year of 2017. In contrast, following the implementation of the interim flows, healthy and dense vegetation has contracted, rebounded during high flows in 2023 and 2024, and is again retracting following the resumption of interim flows in 2025 (Figures 4-26 through 4-28). This pattern suggests vegetation is responding to a change in flow management, but additional analysis would be needed to quantify the magnitude of change over time.

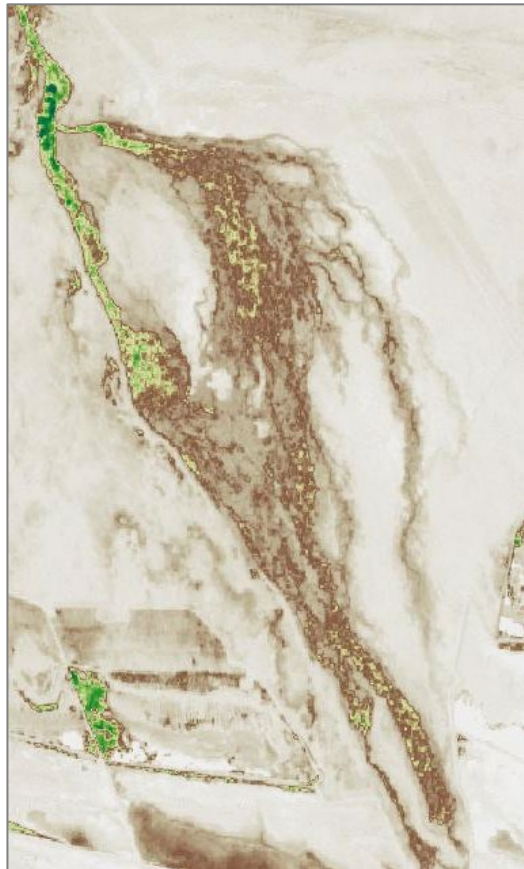
Quantifying changes in emergent vegetation using NDVI is one option but only addresses one of three criteria used to assess flow effectiveness. The other two criteria focus on the seasonal availability of open-water habitat. A more appropriate approach to assess flow effectiveness could be to quantify changes in the amount of open-water habitat.



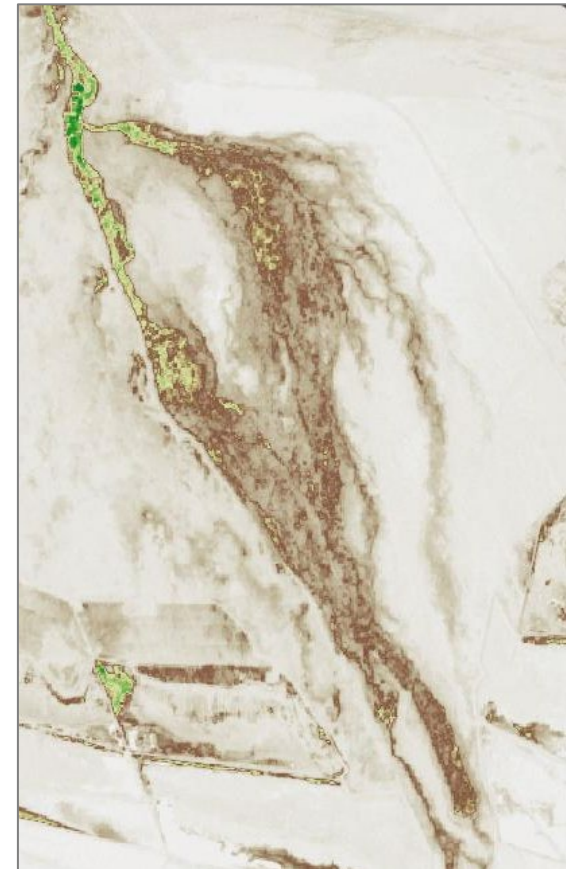
Figure 4-26. Prior to 2020, water was released year-round and at a prescribed rate of 7.5 cfs from May 1 to September 30. The runoff for 2017 was, at the time, the second highest year on record. Discharge to the Delta Habitat Area approached 60 cfs in late July and early August after exceeding 100 cfs the previous month. Dark green color is thick, vigorous vegetation; brown to tan represents sparse or dry vegetation to bare ground; and white indicates water. (Contains modified *Copernicus Sentinel* data [2016, 2017, 2018, 2019] for *Sentinel* data. Map image is the intellectual property of *Esri* and is used herein under license. Copyright © 2026 *Esri* and its licensors. All rights reserved.)



August 26, 2020



August 06, 2021

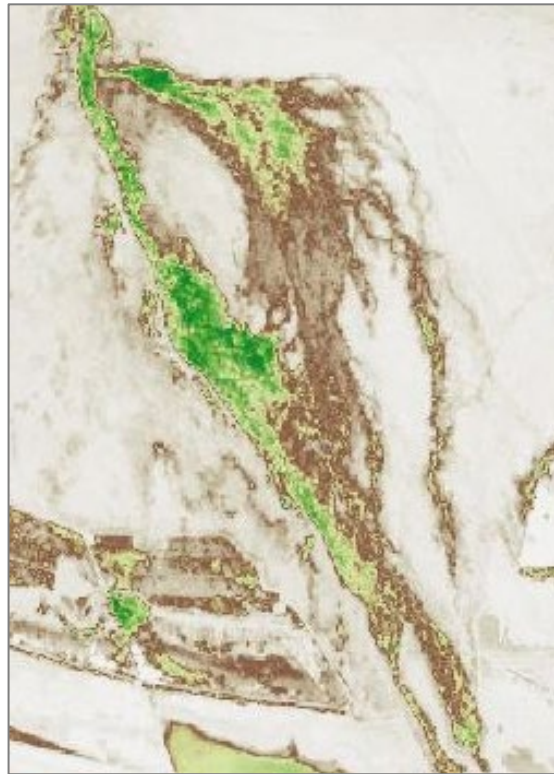


August 31, 2022

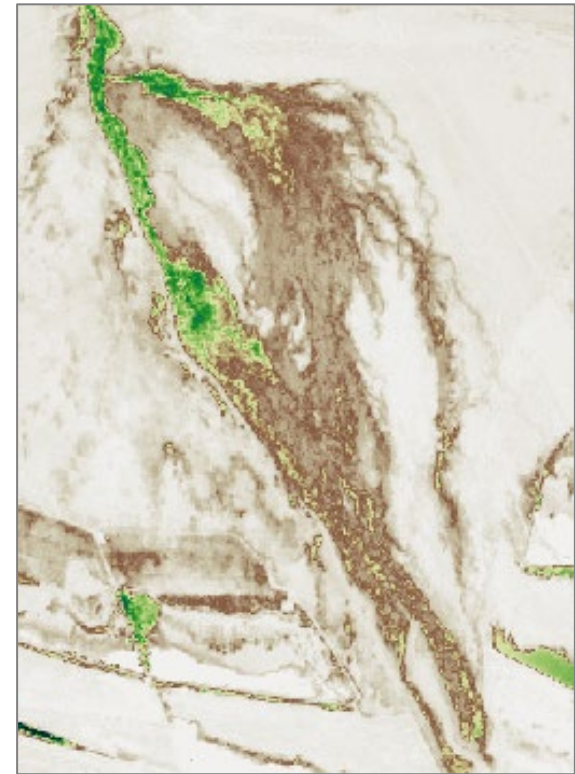
Figure 4-27. These images show the NDVI for the first three years of interim flows. Dark green color is thick, vigorous vegetation; brown to tan represents sparse or dry vegetation to bare ground; and white indicates water. (Contains modified *Copernicus Sentinel* data [2020, 2021, 2022] for *Sentinel* data. Map image is the intellectual property of *Esri* and is used herein under license. Copyright © 2026 *Esri* and its licensors. All rights reserved.)



August 31, 2023



August 5, 2024



August 30, 2025

Figure 4-28. In 2023, it was an above-average runoff year, and the interim flows were not implemented. Flows remained higher than prescribed by the interim flows until May 2024. The 3 cfs flows in summer resumed in 2024 and 2025. Dark green color is thick, vigorous vegetation; brown to tan represents sparse or dry vegetation to bare ground; and white indicates water. (Contains modified *Copernicus Sentinel* data [2023, 2024, 2025] for *Sentinel* data. Map image is the intellectual property of *Esri* and is used herein under license. Copyright © 2026 *Esri* and its licensors. All rights reserved.)

4.2.4 Conclusion

All three evaluation criteria were met although flows were still high to the DHA during April. The interim flows resumed in the 2024-25 RY and marked the fourth, non-consecutive year of this adaptive management approach. RY 2025-26 will be the fifth year of the interim flows, which will expire on March 31, 2026. A one-year extension to the plan was extended for RY 2025-26 and will expire on March 31, 2026. It is proposed to extend the interim flows into the future.

Both aerial photography and satellite imagery suggest that marsh vegetation is stressed under the reduced growing season flows. Lower flows appear beneficial in the short term by limiting further marsh expansion; however, the rate at which the aboveground biomass breaks down and transitions into open-water habitat will be a limiting factor. To assess the long-term effectiveness of the interim flows, it is recommended to quantify the current amount and seasonal availability of open-water habitat. A monitoring strategy should focus on maintaining, and eventually increasing, this type of habitat. This can be done with a combination of remote sensing and surveys to document avian use of the DHA. A methodology for using remote sensing and a monitoring strategy will be presented in next year's annual report following completion of five years of interim flows.

4.2.5 References

Los Angeles Department of Water and Power and Inyo County. 2019. Lower Owens River Project 2019 Evaluation Volume II: Status of the LORP. 87 pp.

Los Angeles Department of Water and Power and Inyo County. 2022. Lower Owens River Project 2021 Final Annual Report. 269 pp.

Los Angeles Department of Water and Power and Inyo County. 2023. Lower Owens River Project 2022 Final Annual Report. 767 pp.

Los Angeles Department of Water and Power and Inyo County. 2024. Lower Owens River Project 2023 Final Annual Report. 197 pp.

4.3 BWMA Interim Management and Monitoring

4.3.1 Background

The BWMA is managed in accordance with the goals and provisions stated in the 1997 MOU: *“The goal is to maintain this waterfowl habitat area to provide the opportunity for the establishment of resident and migratory waterfowl populations as described in the EIR and to provide habitat for other native species. Diverse natural habitats will be created and maintained through flow and land management, to the extent feasible, consistent with the needs of the “habitat indicator species” for the Blackrock Waterfowl Habitat Area. These habitats will be as self-sustaining as possible.”* Further the MOU describes management prescriptions: *“Approximately 500 acres of the habitat area will be flooded at any given time in a year when the runoff to the Owens River watershed is forecasted to be average or above average. In years when the runoff is forecasted to be less than average, the water supply to the area will be reduced in general proportion to the forecasted runoff in the watershed. (The runoff forecast for each year will be DWP’s runoff year forecast for the Owens River Basin, which is based upon the results of its annual April 1 snow survey of the watershed.) Even in the driest years, available water will be used in the most efficient manner to maintain the habitat. The Wildlife and Wetlands Management Plan element of the LORP Plan will recommend the water supply to be made available under various runoff conditions and will recommend how to best use the available water in dry years. The amount of acreage to be flooded in years when the runoff is forecasted to be less than average will be set by the Standing Committee based upon the recommendations of the Wildlife and Wetlands Management Plan and in consultation with DFG.”*

Historically, this year-round flooding has resulted in considerable growth of emergent vegetation - cattails (*Typha* spp.) and tules (*Scheoenoplectus* spp.), which has resulted in a loss of open-water habitat and a subsequent decline in water bird use.

Consequently, LADWP and the County adopted a seasonal flooding regime that would improve habitat conditions for both shorebird and waterfowl species (LADWP & ICWD, 2020). Specifically, this new plan ends year-round flooding and instead provides flooding during the dormant growing season of at least 500 acres of the BWMA each year from fall to mid-spring. This approach is to increase both habitat quality and productivity by 1) controlling the growth of emergent vegetation (by drying out the units) to maintain open water habitat, and 2) implementing moist soil conditions to enhance forage for indicator species (LADWP & ICWD, 2021).

LADWP and the County finalized the new flooding regime in an IP in April 2021, following consultation with the MOU Parties. The Inyo/Los Angeles Standing Committee set the BWMA flooded acreage in accordance with the IP at its June 22, 2023, meeting.

The IP was implemented as adaptive management for a period of 5 years (ending March 31, 2026). During this period both vegetation and birds will be monitored annually to assess the effectiveness of the new flooding scheme. Following the conclusion of the IP the project will be reviewed to determine continuation and if needed, a long-term management plan.

4.3.2 Introduction

Thibaut, Waggoner, and the West Winterton units were flooded in late 2024 to early 2025. Following their drying out, vegetation sampling occurred in these units in August 2025. Results of this sampling along with analysis regarding favorable forage species and emergent vegetation species are presented. Lastly, active vegetation management that occurred in portions of both West Winterton and the Waggoner is also detailed.

4.3.3 Methodology

Transects were established in select sub-basins of the units to measure vegetation and document habitat conditions (Figure 4-29). A total of 17 transects were read in 2025 which include 14 transects from 2024 as well as three newly established transects in the West Winterton Unit (Table 4-2).

Methods used consisted of photo points at the 0m to the 100m and back from the 100m point to the 0m. Additionally, the Dry-Weight-Rank (DWR) sampling method was applied inside a 40cm by 40cm quadrat frame, placed every meter along a 100m tape, a total of 100 quadrats were sampled at each transect. The DWR requires the observer to assign ranks for the three heaviest plant species in each quadrat (BLM, 1996). This method can generate a rapid estimate of production based on species composition. This method does not generate an estimate of pounds/acre of plant material but can provide a general depiction of which species contribute the largest amount of biomass across a given area (Friedel *et al.*, 1988).

Line point intercept was also used to estimate cover along the same transect. The first live cover hit at each meter was recorded. If no cover was intercepted then the ground cover hit was recorded as soil, litter, or rock. These results help interpret the DWR results which are based on the relative contribution by species to the total given weight in each quadrat. Typically cover values over represent plants with lower biomass and underrepresent species that produce high amounts of biomass.

Table 4-2. Vegetation transects (n=17) associated with active units in 2024-25.

Unit	Basin	Transect Name
Thibaut	SW2	SW2-2
	SW2	SW2-1
	TH5	TH5-1
	TH6	TH6-1
	TH7	TH7-1
	TH8	TH8-1
	TH10	TH10-1
	TH11	TH11-1
Winterton	W 9	W9-1
West Winterton	W2	WW2-1
	WW4	WW4-1
	WW5	WW5-1
Waggoner	Wag_3	Wag 3-1
	Wag_2	Wag 2-1
	Wag_4	Wag 4-1
	Wag_5	Wag 5-1
	Wag_6	Wag 6-1

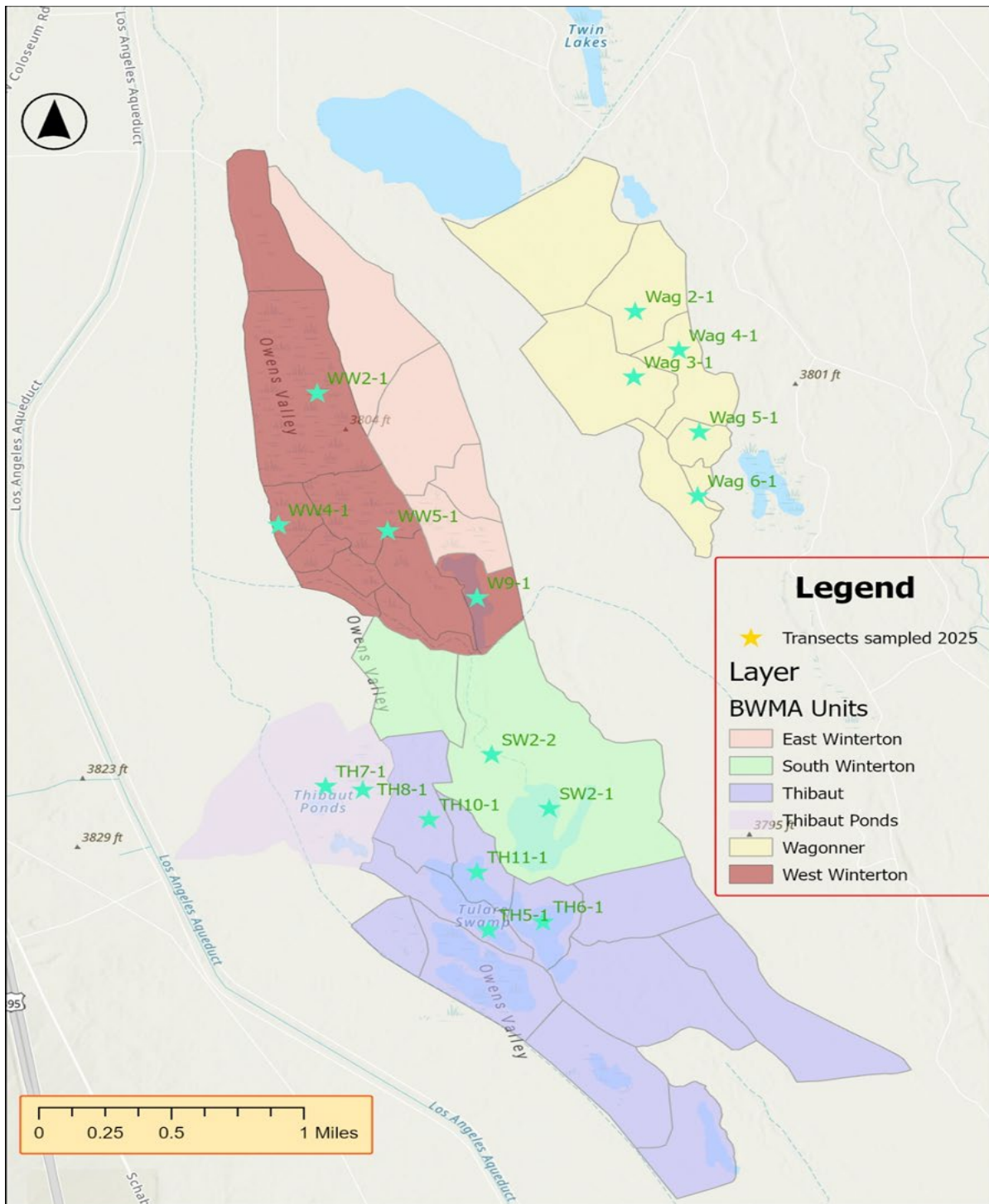


Figure 4-29. Location of units and vegetation transects in the BWMA project area.

4.3.4 Results

Live cover

Sampling for live cover in the five Waggoner subbasins ranged between 7%-10%. Only one transect was sampled in the East Winterton unit (W9-1) and had a live cover value of 8%. Live cover values ranged between 6%-26% in the eight Thibaut subbasins which included the two South Winterton (SW) transects.

Forage plants

Both smartweed (*Polygonum* spp.) and swamp timothy (*Crypsis schoenoides*) are important forage plants for waterfowl and shorebirds as their seeds are highly nutritious and support macro-invertebrates that provide other food sources for birds. In 2022, smartweed was only observed on transect TH7-1 with 2% relative species composition. It has subsequently spread across the Thibaut and Waggoner units but continues to contribute moderately to overall plant composition in the BWMA (Figure 4-30).

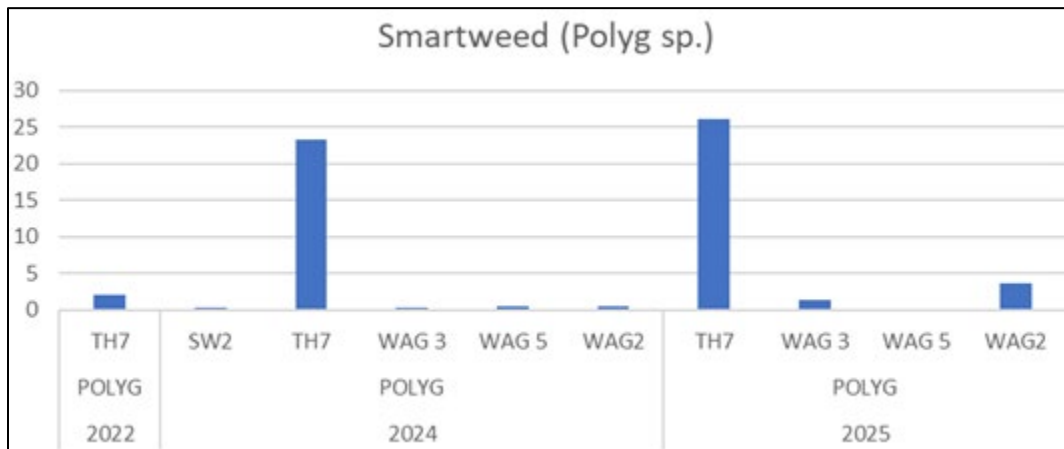


Figure 4-30. Percent of smartweed relative to total vegetation cover, of a unit, in 2022, 2024, and 2025.

The emergence of swamp timothy was observed on four Thibaut sub-basin transects with a range between 4%-30% in 2022. By 2024, it had spread across additional units to eight transects, in 2025 it was observed across 13 transects in much greater amounts than prior years (Figure 4-31).

All other plants

Additionally, a wide range of plants associated with mesic habitats (moderately wet soils) were encountered in the units in 2025, and a complete list for the year can be found in Appendix 4-1 along with average annual dry weights for commonly found species for the years 2022, 2024, and 2025 (Appendix 4-2).

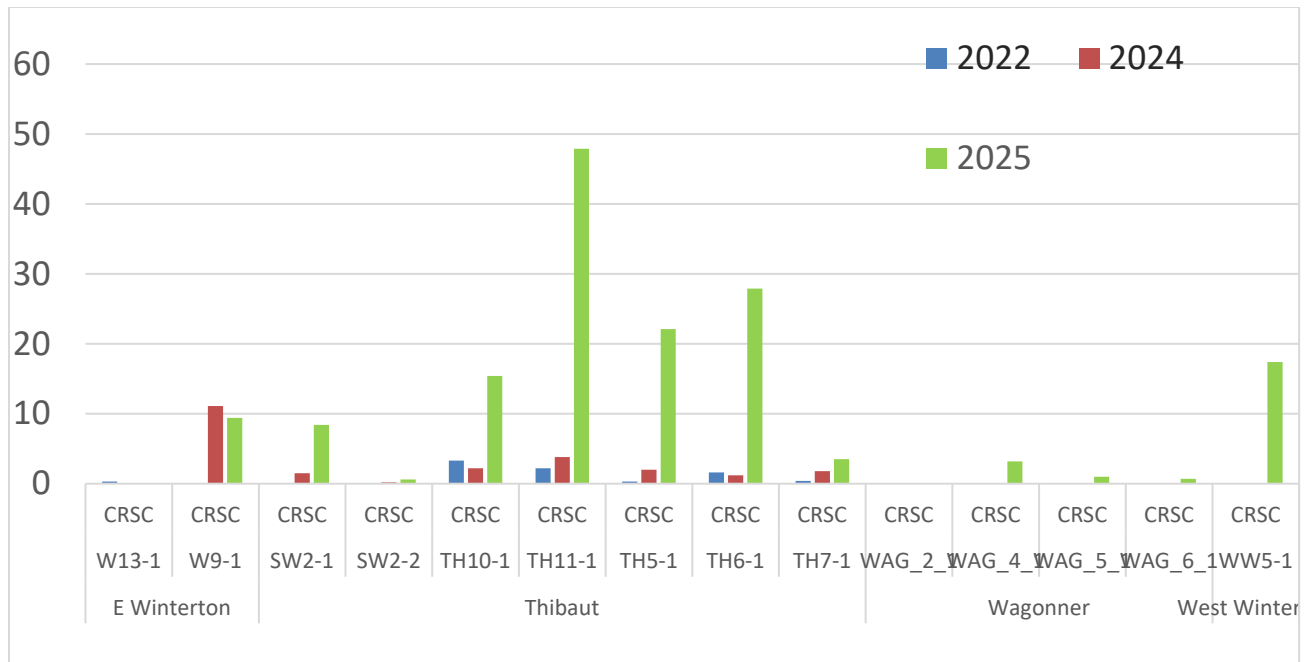


Figure 4-31. Swamp timothy (CRSC), by estimated weight, in 2022, 2024, and 2025.

Undesirable Vegetation

Five-horned smother weed (*Bassia hyssopifolia*) is a dense annual weed that proliferates in moist conditions; after senescence it can prevent the establishment and growth of desirable vegetation owing to its semi-woody stems and branches, which are resistant to breaking down. Five-horned smother weed increased in dry weight from 1% to 4% between 2024 and 2025 across all units.

For species which can occlude open water including cattails, tules, and common reed (*Phragmites australis*) percentage of dry weights have all declined relative to 2024. Further, these species show estimated dry weights similar to those measured in 2022. Specifically, the estimated dry weight of cattail increased from 0% to 19% in 2024 and then declined to 6% in 2025. Similarly, tules increased in weight from 2022 to 2024 (10% to 16%, respectively) then declined to 11% in 2025. Common reed increased from trace (<1% cover) amounts in 2022, to 22% by weight in 2024, and then decreased to trace amounts in 2025 (Table 4-3).

Table 4-3. Percentage of dry weights for cattail, tules, and common reed.

	2022	2024	2025
Species	% Dry weight	% Dry weight	% Dry weight
Cattail	0	19	6
Tule	10	16	11
Common reed	<i>t</i>	22	<i>t</i>

t= trace (<1% cover)

Lastly, perennial pepperweed was found in trace amounts in the sub-basins in 2025, which was like previous years (Appendix 4-2).

Active Management

There were multiple vegetation management activities that occurred in 2025 – discing and mowing of vegetation in the West Winterton and mowing in Waggoner units. In August of 2024, LADWP mowed approximately 100 acres of tules and cattails, in the north half of the West Winterton unit, in preparation for flooding, which resulted in a thick layer of mulch preventing the establishment of new vegetation (Figure 4-32). This area was disced in the summer of 2025 to expedite the breakdown of the thatch layer and expose the soil. Observations in fall of 2025 show that the area has more open water and mud flats relative to 2024 conditions.

Additionally, in West Winterton LADWP disced alternating rows in dense stands of sunflowers (*Helianthus annuus*) as to create open habitat for doves (*Zenaidura macroura*) during the dry season and when submerged provide open-water runways for waterfowl.



**Figure 4-32. Transect WW2-1, West Winterton (August 2024) following mowing.
Note thick layer of thatch.**

In the Waggoner unit, a large stand of rough cocklebur (*Xanthium strumarium*), which can be toxic to wildlife and has limited forage value, was found in 2025. To reduce both seed production and dispersal, the area was mowed in late August of 2025 (Figure 4-33) with plans to continue mowing over the next several years.



Figure 4-33. Waggoner cocklebur infestation (August 18, 2025) prior to mowing (upper photo) and after mowing (lower photo), (September 12, 2025).

4.3.5 Discussion and Recommendations

Vegetation monitoring and analysis demonstrates that the IP is performing as planned with respect to limiting expansion of emergent and noxious vegetation, while promoting open water and desirable forage species for waterbirds. It is recommended to summarize the vegetation response following the conclusion of the IP (March 31, 2026), to evaluate the effectiveness of existing management practices, along with developing a periodic monitoring plan to continue to track vegetation and habitat conditions.

4.3.6 References

Bureau of Land Management. 1996. Sampling vegetation attributes. Interagency Technical Reference, BLM/RS/ST-96/002+1730. pp. 50-54.

Friedel, M.H., Chewings, V.H., and G.N. Bastin. 1988. [The use of comparative yield and dry-weight rank techniques for monitoring arid rangelands](#). Journal of Range Management 41:430-434. (pdf)

Los Angeles Department of Water and Power. 2004. Final Environmental Impact Report and Environmental Impact Statement – Lower Owen River Project. June 23, 2004.

4.3.7 Appendix 4-1. List of all monitored species, August 2025.

COMMON NAME	SPECIES	CODE
Yerba mansa	<i>Anemopsis californica</i>	ANCA10
Western pearly everlasting	<i>Anaphalis margaritacea</i>	ANMA
Triangle orache*	<i>Atriplex prostrata</i>	ATPR
Tumbling saltweed*	<i>Atriplex rosea</i>	ATRO
Torrey's saltbush	<i>Atriplex torreyi</i>	ATTO
Wedgescale saltbush	<i>Atriplex truncata</i>	ATTR
Fivehorn smotherweed*	<i>Bassia hyssopifolia</i>	BAHY
Sedge	<i>Carex spp.</i>	CAREX
Hians goosefoot	<i>Chenopodium hians</i>	CHHI
Canadian horsetweed	<i>Conyza canadensis</i>	COCA5
Saltmarsh bird's beak	<i>Cordylanthus maritimus ssp. canescens</i>	COMAC
Swamp timothy*	<i>Crypsis schoenoides</i>	CRSC
Spreading alkaliweed	<i>Cressa truxillensis</i>	CRTR5
Dodder	<i>Cuscuta sp.</i>	CUSCU
Durango roots	<i>Datisca glomerata</i>	DAGL2
Saltgrass	<i>Distichlis spicata</i>	DISP
Squirreltail	<i>Elymus elymoides</i>	ELEL5
Rubber rabbitbrush	<i>Ericameria nauseosa</i>	ERNA10
American licorice	<i>Glycyrrhiza lepidota</i>	GLLE3
Curlycup gumweed	<i>Grindelia squarrosa</i>	GRSQ
Common sunflower	<i>Helianthus annuus</i>	HEAN3
Salt heliotrope	<i>Heliotropium curassavicum</i>	HECU3
Foxtail barley	<i>Hordeum jubatum</i>	HOJU
Arctic rush	<i>Juncus arcticus</i>	JUAR2
Coulter's horsetweed	<i>Laennecia coulteri</i>	LACO13
Broadleaved pepperweed*	<i>Lepidium latifolium</i>	LELA2
Beardless wildrye	<i>Leymus triticoides</i>	LETR5
Birdsfoot trefoil*	<i>Lotus corniculatus</i>	LOCO6
Alkali mallow	<i>Malvella leprosa</i>	MALE3
Sweetclover*	<i>Melilotus officinalis</i>	MEOF
Scratchgrass	<i>Muhlenbergia asperifolia</i>	MUAS
Witchgrass	<i>Panicum capillare</i>	PACA6
Common reed	<i>Phragmites australis</i>	PHAU7
Inyo phacelia	<i>Phacelia inyoensis</i>	PHIN4
Oval-leaf knotweed*	<i>Polygonum arenastrum</i>	POAR11
Smartweed	<i>Polygonum sp</i>	POLYG
Annual rabbitsfoot grass*	<i>Polypogon monspeliensis</i>	POMO5

Appendix 4-1. (Cont.)

Jersey cudweed*	<i>Pseudognaphalium luteoalbum</i>	PSLU6
Willow dock	<i>Rumex salicifolius</i>	RUSA
Hardstem bulrush	<i>Schoenoplectus acutus</i>	SCAC3
Verrucose seapurslane	<i>Sesuvium verrucosum</i>	SEVE2
Eastern annual saltmarsh aster	<i>Symphotrichum subulatum</i>	SYSU5
Saltcedar*	<i>Tamarix ramosissima</i>	TARA
Rough cocklebur	<i>Xanthium strumarium</i>	XAST

*non-native vegetation

4.3.8 Appendix 4-2. Annual averages of percentage dry-weight.

COMMON NAME	SPECIES	CODE	2022	2024	2025
Triangle orache*	<i>Atriplex prostrata</i>	ATPR	13%	t	3%
Tumbling saltweed*	<i>Atriplex rosea</i>	ATRO	14%	28%	6%
Nevada saltbush	<i>Atriplex torreyii</i>	ATTO	0%	1%	2%
Wedgescale saltbush	<i>Atriplex truncata</i>	ATTR	12%	3%	t
Fivehorn smotherweed*	<i>Bassia hyssopifolia</i>	BAHY	16%	3%	4%
Sedge	<i>Carex spp.</i>	CAREX	26%	2%	1%
Canadian horsetweed	<i>Conyza canadensis</i>	COCA5	9%	t	0%
Saltmarsh bird's beak	<i>Cordylanthus maritimus</i>	COMAC	15%	0%	t
Swamp timothy*	<i>Crypsis schoenoides</i>	CRSC	1%	3%	12%
Spreading alkaliweed	<i>Cressa truxillensis</i>	CRTR5	11%	38%	30%
Saltgrass	<i>Distichlis spicata</i>	DISP	5%	19%	12%
Squirreltail	<i>Elymus Eliodes</i>	ELEL5	t	3%	0%
American licorice	<i>Glycyrrhiza lepidota</i>	GLLE3	1%	1%	2%
Common sunflower	<i>Helianthus annuus</i>	HEAN3	9%	1%	13%
Salt heliotrope	<i>Heliotropium curassavicum</i>	HECU3	3%	1%	3%
Mountain rush	<i>Juncus arcticus</i>	JUARL	2%	1%	2%
Perennial pepperweed*	<i>Lepidium latifolium</i>	LELA2	2%	t	t
Beardless wildrye	<i>Leymus triticoides</i>	LETR5	t%	1%	2%
Alkali mallow	<i>Malvella leprosa</i>	MALE3	7%	34%	20%
Scratchgrass	<i>Muhlenbergia asperifolia</i>	MUAS	8%	t	2%
Common reed	<i>Phragmites australis</i>	PHAU7	t	22%	t
Inyo phacelia	<i>Phacelia inyoensis</i>	PHIN4	2%	13%	2%
Oval-leaf knotweed*	<i>Polygonum arenastrum</i>	POAR11	0%	12%	30%
Smartweed	<i>Polygonum sp.</i>	POLYG	2%	4%	8%
Annual rabbitsfoot grass*	<i>Polypogon monspeliensis</i>	POMO5	6%	t	1%
Willow dock	<i>Rumex salicifolius</i>	RUSA	2%	2%	2%
Hardstem bulrush	<i>Schoenoplectus acutus</i>	SCAC3	10%	16%	11%
Verrucose seapurslane	<i>Sesuvium verrucosum</i>	SEVE2	10%	2%	3%
Alkali sacaton	<i>Sporobolus airoides</i>	SPAI	1%	16%	7%
Annual saltmarsh aster	<i>Symphyotrichum subulatum</i>	SYUS5	5%	8%	8%
Broadleaf cattail	<i>Typha latifolia</i>	TYLA	0%	19%	6%
Rough cocklebur	<i>Xanthium strumarium</i>	XAST	1%	10%	8%

*non-native species
t= <1%

4.4 Avian Surveys

4.4.1 Introduction

To evaluate the effectiveness of the IP on bird usage in the BWMA, avian surveys were conducted in fall, winter, and spring that coincided with late 2024 and early 2025. Surveys noted species and behavior to better understand how the wetlands are being utilized and to guide future management activities. Analysis consisted of temporal and spatial trends relative to pre-LORP, LORP, and conditions associated with the IP.

4.4.2 Methodologies

Avian Surveys

The BWMA units/subunits were surveyed nine times between October 2024 and April 2025 to evaluate use by HIS. Three units were surveyed: Thibaut, Waggoner, and Winterton (Figures 4-34 through 4-36). Within the units there are four survey routes: West Winterton, South Winterton, Waggoner, and Thibaut. Surveys took place over 2 to 3 days, using 2 to 3 surveyors with all surveys conducted on foot.

Each survey is assigned to a season to help elucidate seasonal changes in both diversity and abundance (Table 4-4). However, because of the recent change in management of the BWMA, some past surveys are no longer done. For example, under prior management flooding of the units/subunits was year-round, and the “Fall” surveys started the first week of August. Under the IP, water releases are not initiated until mid-September. Thus, the “Fall 1” and “Fall 2” surveys are no longer conducted. Flooding Cycle (FC) refers to the timing and duration of water application to management units. As prescribed by the IP, flooding is initiated on September 15 and continues through March 1 of the following year (see Section 2.6). The first survey conducted during the 2024-25 season, which was the fourth FC (September 2024 – March 2025) under the IP, is equivalent to “Fall 3” under the previous management scheme.

Under the IP, eight seasonal surveys were scheduled; however, a total of nine have been conducted due to the addition of an early spring survey in mid-March. LADWP and County staff recommended adding the mid-March survey since water would be turned off to the units/subunits on March 1, and it was uncertain how long the water would remain in each unit. Surveys show that a considerable amount of water is still present.

Surveys were conducted as area counts with observers walking the edge of flooded areas in a manner that would allow a complete view of each subbasin within the unit/subunit being surveyed. Surveys began within 30 minutes of local sunrise and were generally completed within 4 to 5 hours. Avian numbers and activities were recorded for

each subbasin. During each survey, all bird species and number of individuals encountered were recorded.

Analysis focuses on the BWMA HIS, which includes: all waterfowl, wading birds, shorebirds, rails, Northern Harrier (*Circus hudsonius*), and Marsh Wren (*Cistothorus palustris*). The resident, migratory, and wintering waterfowl group includes all species in the Family Anatidae including geese, swans, and ducks. The wading birds group includes species in the Family Ardeidae (egrets and herons), and Threskiornithidae (i.e., White-faced Ibis). The shorebird group includes all species in the Order Charadriiformes, exclusive of gulls and terns (Family Laridae). The MOU also identified Least Bittern (*Ixobrychus exilis*) (a wading bird) and Northern Harrier, both California Species of Special Concern, as HIS. The rail species expected to occur in the BWMA are Virginia Rail (*Rallus limicola*), Sora (*Porzana carolina*), and American Coot (*Fulica americana*). Marsh Wren is the only songbird species that is designated as a HIS. For all bird species encountered, behaviors were documented such as foraging, perching, calling, locomotion, flying over (not using habitat), and flushing. The location of HIS individuals was mapped in the field using *ArcGIS Field Maps* to document the spatial distribution of waterbirds within subbasins.

Table 4-4. Dates of the BWMA Seasonal Avian Surveys by Survey Route.

Seasonal Survey	Survey Dates	West Winterton Unit	South Winterton Subunit	Thibaut Unit	Waggoner Unit
Fall 3	October 7-9, 2024	X	X	X	X
Fall 4	October 21-23, 2024	X	X	X	X
Fall 5	November 4-7, 2024	X	X	X	X
Winter 1	December 10-12, 2024	X	X	X	X
Winter 2	January 14-16, 2025	X	X	X	X
Spring 1	March 4-7, 2025	X	X	X	X
Spring 2	March 18-20, 2025	X	X	X	X
Spring 3	April 1-3, 2025	X	X	X	X
Spring 4	April 15-17, 2025	X	X	X	X

4.4.3 Data Summary

Species Composition

The total number of bird species and individuals (HIS and non-HIS) encountered over the nine surveys was summed for the entire BWMA and by unit/subunit surveyed. The BWMA HIS totals (number of species and individuals) were also calculated and compared across units/subunits. Individuals unidentified to species (e.g., unidentified dabbling duck, or unidentified swallow) were not included in the species count but were included in total individual counts.

Seasonal Patterns of Abundance

The number of HIS individuals were tallied for all units/subunits for each of the nine seasonal surveys to describe the seasonal use patterns of the BWMA.

Spatial Distribution

The spatial distribution of HIS was evaluated by looking at the percentage of HIS individuals observed in each subbasin and across the BWMA. For each subbasin, the total number of HIS individuals was divided by the total for each unit/subunit. For example, the total number of HIS individuals in the SW1 subbasin, of the Thibaut Unit, was divided by the total number of HIS individuals in the entirety of the Thibaut Unit. For the BWMA, percentage was calculated using the total number of HIS individuals per unit/subunit and dividing that by the total number of HIS individuals observed in the BWMA over the entire survey season. These two percentages demonstrate the representation of HIS individuals within each subbasin relative to each unit/subunit, and each unit/subunit within the BWMA.

Comparison to Previous Years

To allow comparison of data from previous years, all existing BWMA avian data were filtered by unit, subunit, and seasonal survey.

To compare data during the IP, surveys included in the analysis were those from the Waggoner unit, Thibaut unit, and Winterton unit. The time periods corresponded to the seasonal surveys are: Fall 3, Fall 4, Fall 5, Winter 1, Winter 2, Spring 1, Spring 2, Spring 3, and Spring 4.

Comparing data from the IP (FC1 2021-22; FC2 2022-23; FC3 2023-24) to pre-LORP conditions (encompassing data from years 2002-03) and LORP (years 2009-2017) is more complicated. As the spring seasonal surveys have typically started the last week of March, there are no prior mid-March (Spring 1) survey data in the BWMA, except for data from FC1. In addition, the East Winterton subunit had not been flooded prior to

implementing the IP, therefore there are no data prior to these flooding cycles. For this comparison, the average number of HIS was calculated per survey due to differences in the total number of surveys conducted in each period. The Spring 1 survey data were removed from the FC because there were no surveys conducted during that period prior to the IP and it is important to note that the number of surveys within the Pre-Project and Pre-IP periods was variable and not as extensive as it is now.

4.4.4 Results

Table 4-5 shows the percentage of HIS individuals in each unit and across the BWMA. This value is used to demonstrate the importance of each subbasin within a unit as well as across the BWMA.

Table 4-5. Percentage of HIS Individuals in Each Unit/Subunit and BWMA

Unit/Subunit Name	Subbasin	Total HIS Individuals	Total HIS per Unit	% HIS in Unit	% HIS in BWMA
Thibaut	SW1	2		0%	
Thibaut	SW2	2517		19%	
Thibaut	TH1	268		2%	
Thibaut	TH10	2240		17%	
Thibaut	TH11	910		7%	
Thibaut	TH2	35		0%	
Thibaut	TH3	1012		8%	
Thibaut	TH4	257		2%	
Thibaut	TH5	2693		20%	
Thibaut	TH6	2401		18%	
Thibaut	TH7	704		5%	
Thibaut	TH8	78		1%	
Thibaut	TH9	192		1%	
			13309		59%
Winterton	W1	346		3%	
Winterton	W2	597		4%	
Winterton	W3	2		0%	
Winterton	W4	11		0%	
Winterton	W5	449		3%	
Winterton	W6	13		0%	
Winterton	W7	77		1%	
Winterton	W8	1		0%	
Winterton	W9	270		2%	
Winterton	W10	0		0%	
			1787		8%
Waggoner	WAG1	269		2%	
Waggoner	WAG2	2163		16%	
Waggoner	WAG3	1854		14%	
Waggoner	WAG4	1986		15%	
Waggoner	WAG5	953		7%	
Waggoner	WAG6	84		1%	
Waggoner	WAG7	33		0%	
			7324		33%
BWMA Total		22420			

Waggoner Unit

The Waggoner unit has a total of 7 subbasins (Figure 4-34) and had 33% of the total HIS observations throughout the BWMA (Table 4-5).

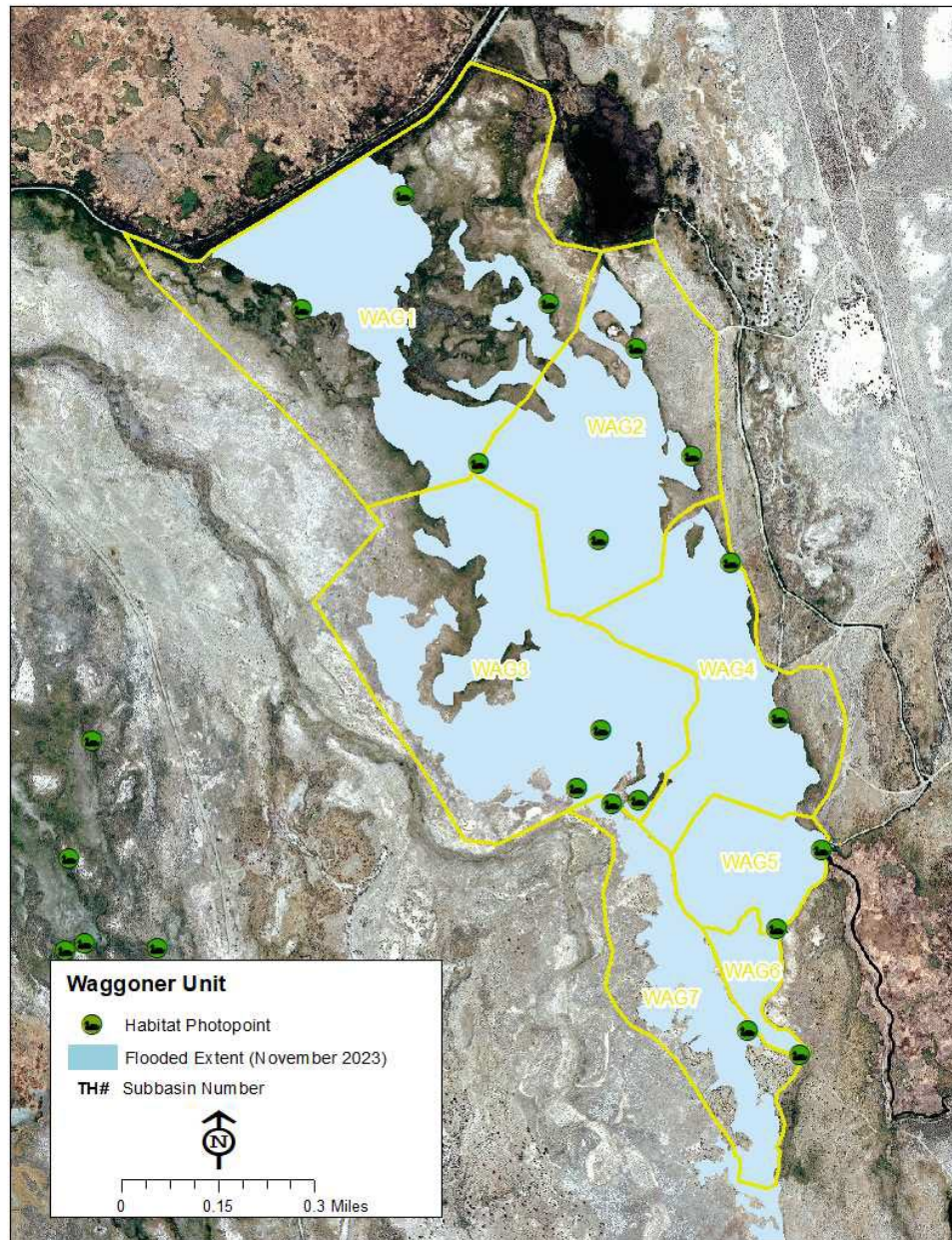


Figure 4-34. Waggoner unit subbasins.

Thibaut Unit

The Thibaut unit, which includes the South Winterton Subunit, has a total of 9 subbasins (Figure 4-35) and 59% of the HIS observations in the BWMA (Table 4-5).

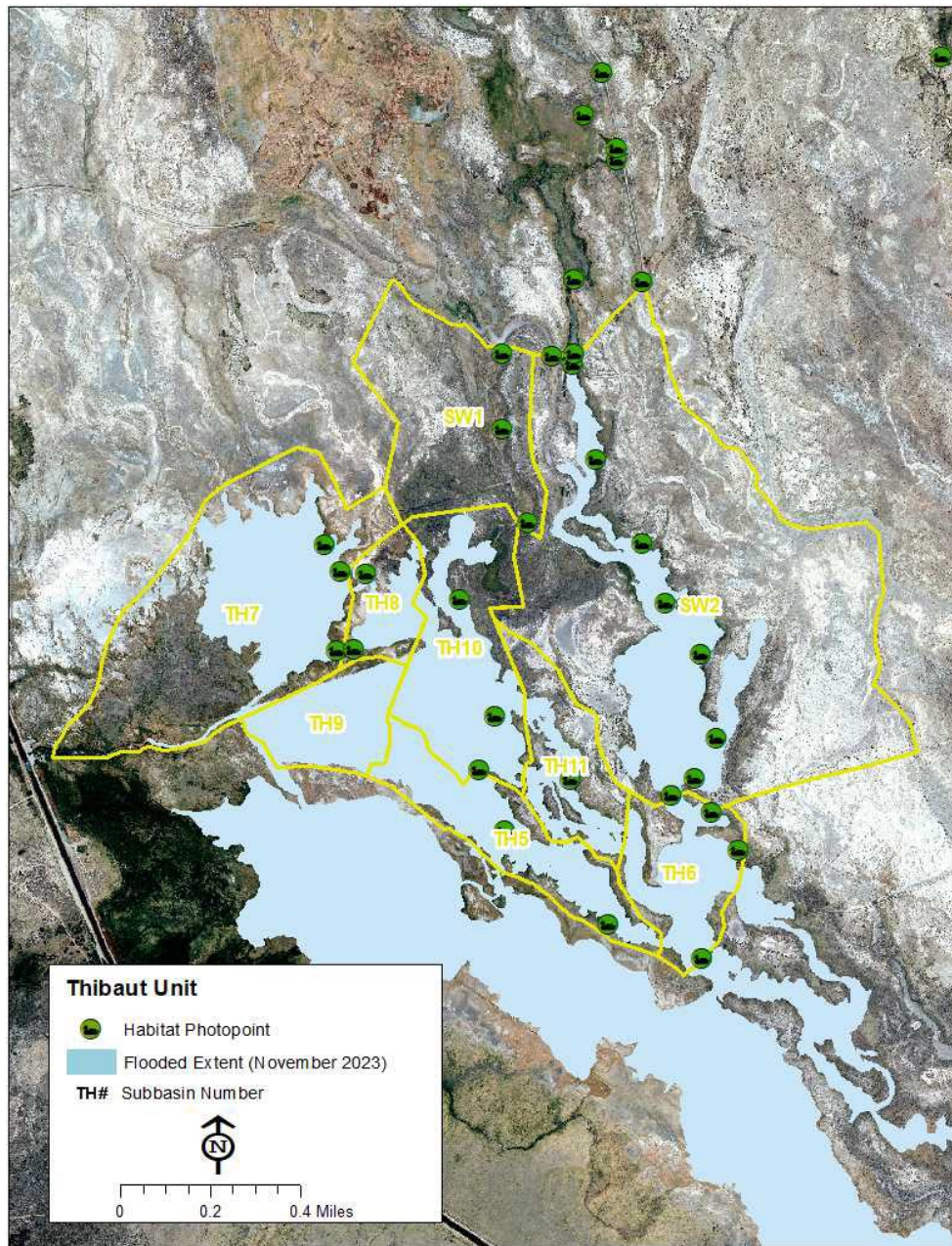


Figure 4-35. Thibaut Unit subbasins.

West Winterton Subunit

The Winterton subunit has 10 subbasins (Figure 4-36) and had 8% of the HIS observations in the BWMA (Table 4-5).

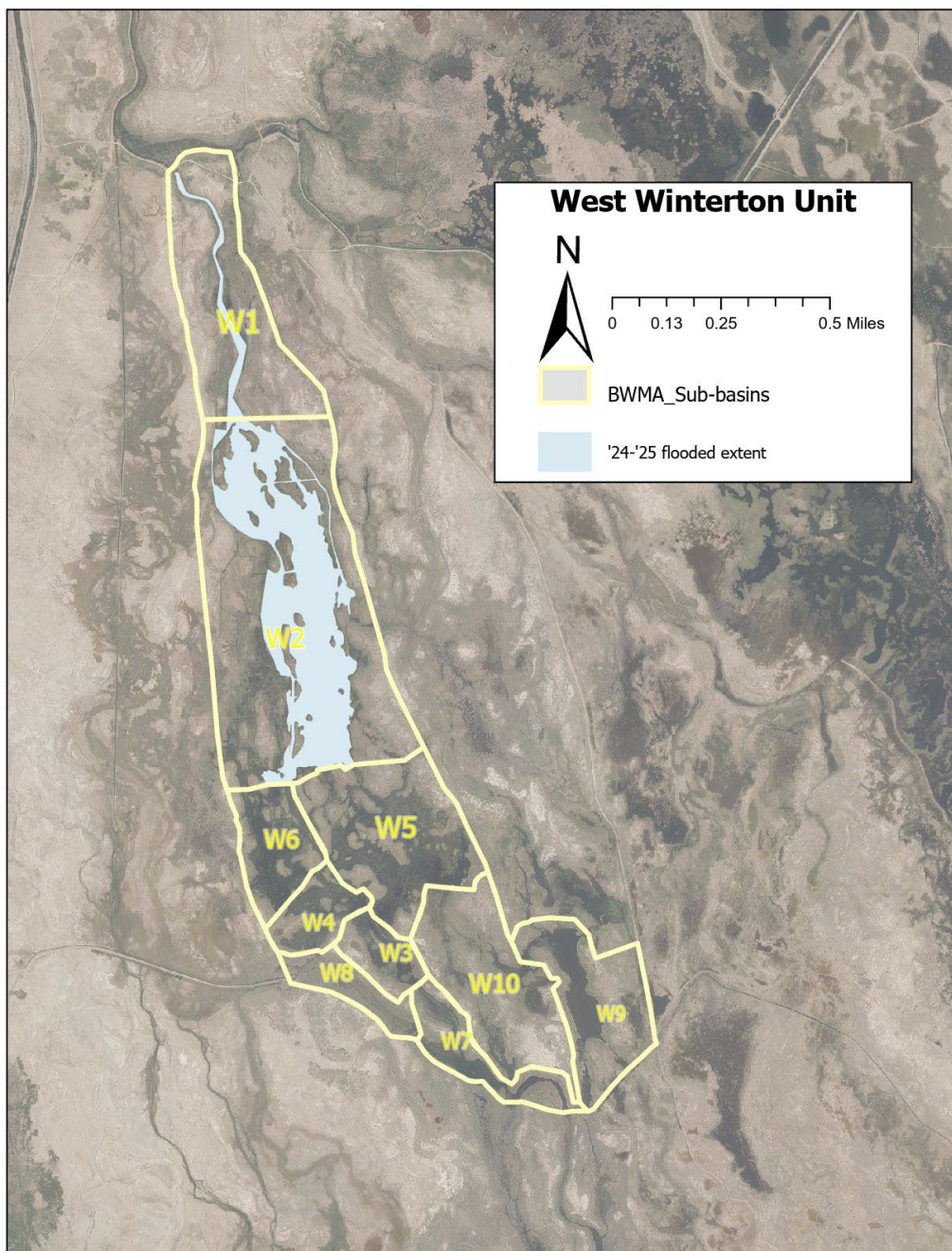


Figure 4-36. West Winterton subbasins.

General Habitat Conditions

Above average precipitation and snowpack of 2023 forced LADWP to use the BWMA as water spreading basins throughout the spring and summer of 2023. The units were then activated to begin flood cycle (FC) 4 on September 15, 2024, with water releases for the BWMA Interim project ending on March 1, 2025. Because of this, there was no drawdown on the units between November 2022 through March 2024. Vegetation conditions reflected this lack of drawdown (LADWP & ICWD, 2024). During the summer of 2024, the units were drawn down and early seral vegetation responded positively (see Section 4.5). Waterbird use following the growing season in the active units appeared to reflect this increase in forage availability with numbers greater than what was observed during FC3.

BWMA Avian Species Composition

A total of 95 bird species and 32,410 individuals (HIS and non-HIS) were detected in the BWMA during FC3 (Table 4-6). The Thibaut Unit had the greatest species richness with 72 different species detected, followed by the Waggoner Unit with 69 species detected. The Winterton Unit had the lowest species richness with 60 different species observed (Table 4-6).

A total of 22,506 individuals observed were HIS, comprising 69% of all birds (HIS and non-HIS) recorded (Table 4-6). The Thibaut Unit supported the highest number of HIS individuals (13,309) and the Winterton Unit the fewest (1,787). Waterfowl were the most abundant HIS Group. The total number of individuals in the Waterfowl Group represented 67% of all the HIS individuals observed. The number of individuals in the Rail Group represented 29% of all the HIS individuals observed (99% of rails were American Coot). The Wading Birds and Shorebirds Group together represented only 2.2% of all HIS individuals encountered.

Table 4-6. Bird Species and number by Unit for FC3 (2024-25). HIS are in red text.

	Thibaut	Waggoner	Winterton	Grand Total
Waterfowl				
American Wigeon	153	13	26	192
Blue-winged Teal	82	18		100
Bufflehead	340	377	8	725
Cackling Goose		0		0
Canada Goose	46	8		54
Canvasback	71	16		87
Cinnamon Teal	1254	360	177	1791
Common Merganser	12	2		14
Gadwall	987	485	147	1619
Greater White-fronted Goose	8	6	16	30
Green-winged Teal	1334	210	560	2104
Lesser Scaup	6	9	3	18
Mallard	1242	1249	466	2957
Northern Pintail	239	60	9	308
Northern Shoveler	1427	507	3	1937
Redhead	103	34		137
Ring-necked Duck	839	197	52	1088
Ruddy Duck	1030	519	7	1556
Snow Goose	15			15
Unidentified Dabbling Duck	91	77	81	249
Waterfowl Total	9279	4147	1555	14981
Wading Birds				
American Bittern			1	1
Cattle Egret	4			4
Great Blue Heron	4	5	1	10
White-faced Ibis	138			138
Wading Birds Total	146	5	2	153
Shorebirds				
American Avocet	22			22
Black-necked Stilt	18			18
Greater Yellowlegs	73	42		115
Killdeer	44	14	3	61
Least Sandpiper	23	6	4	33
Lesser Yellowlegs		2		2
Long-billed Curlew	7			7
Long-billed Dowitcher	22	12	3	37
Semipalmated Plover		1		1

Table 4-6 (Cont.)

	Thibaut	Waggoner	Winterton	Grand Total
Shorebirds				
Wilson's Snipe	11	26	9	46
Shorebird Total	220	103	19	342
Rails				
American Coot	3379	2977	47	6403
Sora	25	1	13	39
Virginia Rail	2		1	3
Rails Total	3406	2978	61	6445
Northern Harrier	37	28	21	86
Marsh Wren	224	81	108	413
Other				
American Goldfinch			248	248
American Kestrel	1	3	6	10
American Pipit	87	39	162	288
American White Pelican		8		8
Ash-throated Flycatcher			1	1
Bald Eagle		2		2
Barn Swallow	235	239	24	498
Bell's Sparrow	1	1	1	3
Belted Kingfisher		1	1	2
Bewick's Wren	1	1	3	5
Black Phoebe	5	7	4	16
Black-billed Magpie		10		10
Brewer's Blackbird	34	27	1	62
Brewer's Sparrow	5		1	6
Brown-headed Cowbird	36			36
California Gull	5	63		68
California Quail	113			113
Chipping Sparrow		1		1
Clay-colored Sparrow			2	2
Cliff Swallow	20	30		50
Common Raven	91	64	44	199
Common Yellowthroat	4	7	2	13
Double-crested Cormorant	9			9
Eared Grebe	80	10		90
Eurasian Collared-Dove		1		1
Great Horned Owl		1	1	2
Horned Lark	193	89	115	397
House Finch		2		2
LeConte's Thrasher			2	2
Lesser Goldfinch			1	1
Lincoln's Sparrow		2		2
Loggerhead Shrike	9	5	10	24

Table 4-6 (Cont.)

	Thibaut	Waggoner	Winterton	Grand Total
Other				
Long-eared Owl		1		1
No birds observed	0		0	0
Northern Flicker		3	2	5
Northern Mockingbird	2		2	4
Northern Rough-winged Swallow			1	1
Northern Shrike	1		3	4
Peregrine Falcon			1	1
Pied-billed Grebe	20	24	2	46
Red-tailed Hawk	1		2	3
Red-winged Blackbird	1171	1796	1359	4326
Ring-billed Gull	2			2
Savannah Sparrow	295	217	214	726
Say's Phoebe	6	8		14
Short-eared Owl	2			2
Song Sparrow	71	37	31	139
Tree Swallow	911	364		1275
Turkey Vulture	1	2		3
Vesper Sparrow			2	2
Violet-green Swallow	51	35		86
Western Meadowlark	178	162	177	517
White-crowned Sparrow	217	117	282	616
Yellow-headed Blackbird	1	7	1	9
Yellow-rumped Warbler	5	24	8	37
Others Total	3864	3410	2716	9990
Grand Total	17176	10752	4482	32410

The Thibaut unit had the highest number of individuals in the Rail, Shorebirds, Wading Birds, and Waterfowl Groups during FC4 (Table 4-7). It had 18 of the 19 waterfowl species, with the highest number of individuals for Cinnamon Teal (1,254), Gadwall (987), Green-winged Teal (1,334), and Northern Shoveler (1,427). It also had the highest numbers of American Coot (3,379). The Waggoner Unit had the highest numbers of Bufflehead (377), and Mallard (1,249).

The Winterton Unit had the lowest numbers of species and individuals, compared to the Waggoner and Thibaut units (Tables 4-6 and 4-7). It had the highest numbers of

American Pipit (162), American Goldfinch (248), and White-crowned Sparrow (282), all non-HIS species.

The most common Rail was American Coot (6,403), Shorebird was Greater Yellowlegs (115), Waterfowl was Mallard (2,957). The highest number non-HIS species was Red-winged Blackbird (4,326) (Table 4-6).

The BWMA attracted an additional 52 non-HIS species, including large numbers of Western Meadowlarks, swallows, migrating and overwintering blackbirds and Horned Larks (Table 4-6).

Table 4-7. Bird Totals by Species Group and Unit/Subunit

Species Group	Thibaut	Waggoner	Winterton	BWMA Total
Waterfowl	9279	4147	1555	14981
Rails	3406	2978	61	6445
Marsh Wren	224	81	108	413
Shorebirds	220	103	19	342
Wading Birds	146	5	2	153
Northern Harrier	37	28	21	86
Total HIS	13312	7342	1766	22420
Non HIS	3864	3410	2716	9990
Total All Bird Species	17176	10752	4482	32410

Seasonal Patterns of Abundance

HIS were observed using the BWMA throughout the flooding period (Figure 4-37). Northern Harrier and Marsh Wren were not included in the seasonal analysis because the IP is focused on creating and enhancing open water habitat and limiting the development of marsh, which is needed by these species. We will continue to report on these species and the BWMA will continue to provide habitat for them, but looking at their response to the adaptive management of the BWMA will not help evaluate the success of the IP.

Overall, the trend in the number of HIS individuals varied by flood cycle (FC), as well as when the peak of HIS occurred in the BWMA. For FC1, the number of HIS individuals was relatively the same between Fall and Winter surveys, but then increased substantially in the Spring 1 survey, followed by a gradual decline over time. In FC1, the peak of HIS individuals was during the Spring 1 survey (4,099). For FC2, the number of HIS increased over the three fall surveys, then declined during the winter surveys. This was followed by an increase over the first three spring surveys then declined in the

spring 4 survey. In FC2, the peak was in Spring 3 (3,791), which is lower than the peak in FC1. For FC3, the peak was in the Fall 3 (3,099), followed by a decline in Fall 4 (879). There was an increase in Fall 5 (1,143) and Winter 1 (2,130) followed by a decline in Winter 2 (1,824). Spring 1 (2,945), Spring 2 (2,855), and Spring 3 (2,795) surveys saw relatively similar numbers followed by a decline in Spring 4 (1,200). In FC4, the most recent complete flooding cycle, the peak was during the Spring 1 survey (4,265) (Figure 4-37). The lowest bird numbers observed were during the Fall 3 survey (1,388). The remaining seven surveys remained within 20% of the average (2,395) for all avian surveys in FC4.

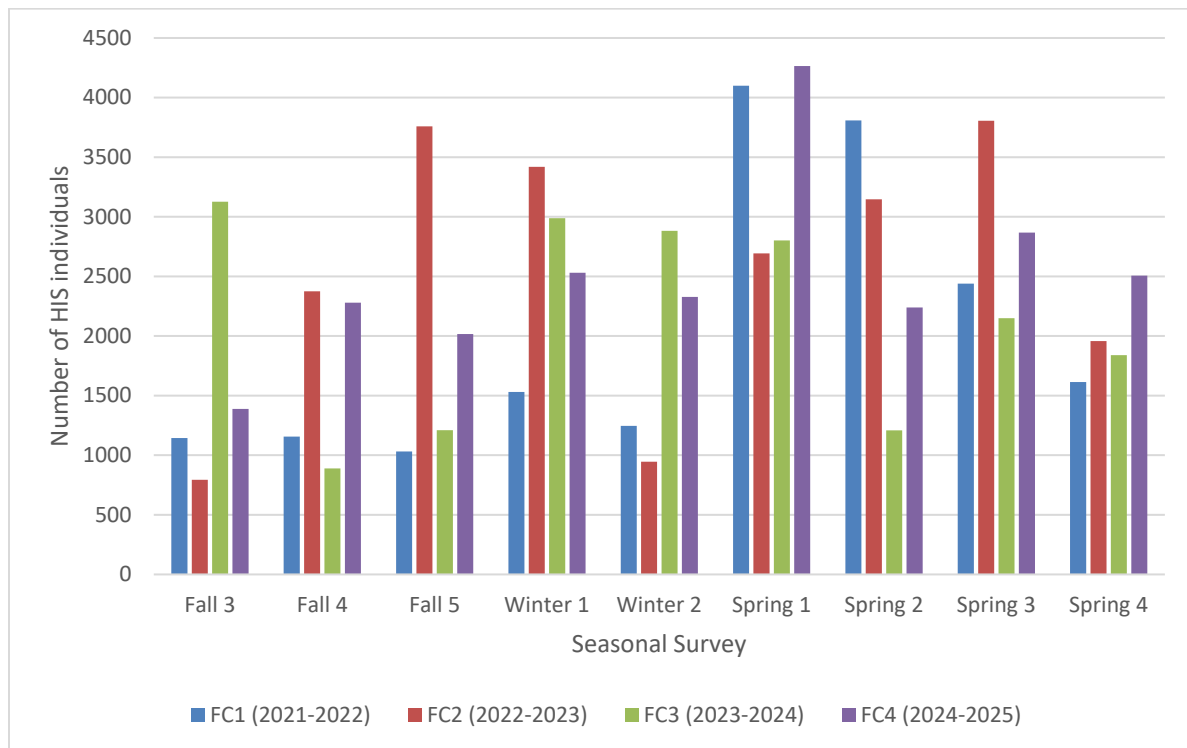


Figure 4-37. Seasonal Abundance of HIS for All Units/Subunits during FC2 (2022-23) and FC3 (2023-24) and FC4 (2024-25).

Spatial Distribution

Within each unit/subunit, individual subbasins varied in terms of their suitability (i.e., use) to waterbirds, and based on their size, the overall percentage of HIS individuals they supported (Figure 4-38). The Waggoner unit consists of 6 managed subbasins. The WAG7 subunit is surveyed but just receives overflow from the other subbasins. During FC3, over 79% of HIS were observed in three subbasins within the Waggoner unit: WAG2, WAG3, and WAG4.

The Thibaut Unit, which also consists of the South Winterton subunit, contains four subbasins that made up 90% of the HIS observations during FC4: TH5, TH6, TH10, and SW2. The Winterton unit, which consists of East Winterton, has been surveyed the last three years. East Winterton contains 5 subbasins: 14, 13, 12, 11, and 9. During FC4, Subbasin 9 made up 45% of the HIS observations (Figure 4-38).

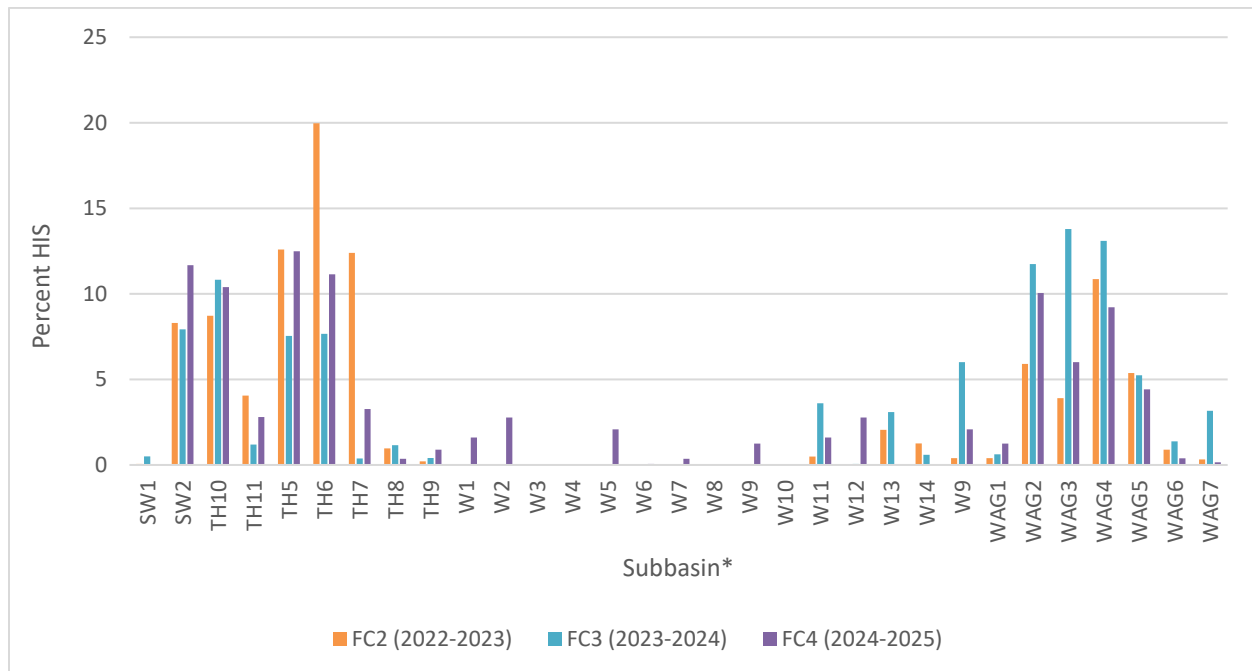


Figure 4-38. Percentage of HIS by subbasin. *West Winterton subbasins (W1-W10) were first surveyed in FC4

Comparison to Previous Years

Overall, the average number of waterfowl, shorebirds, and rails observed per survey is higher during the IP versus pre LORP (i.e. pre-project) and pre-IP, with a few exceptions (Figure 4-39). For example, shorebirds: in FC2, the average number was down but there was not a drawdown of water, which may have limited habitat for that HIS group. Wading birds only increased above pre-project and pre-IP levels in FC3. Marsh wren is higher in FC4 than pre-IP. Northern harrier has always been low but is similar across all-time periods except FC2.

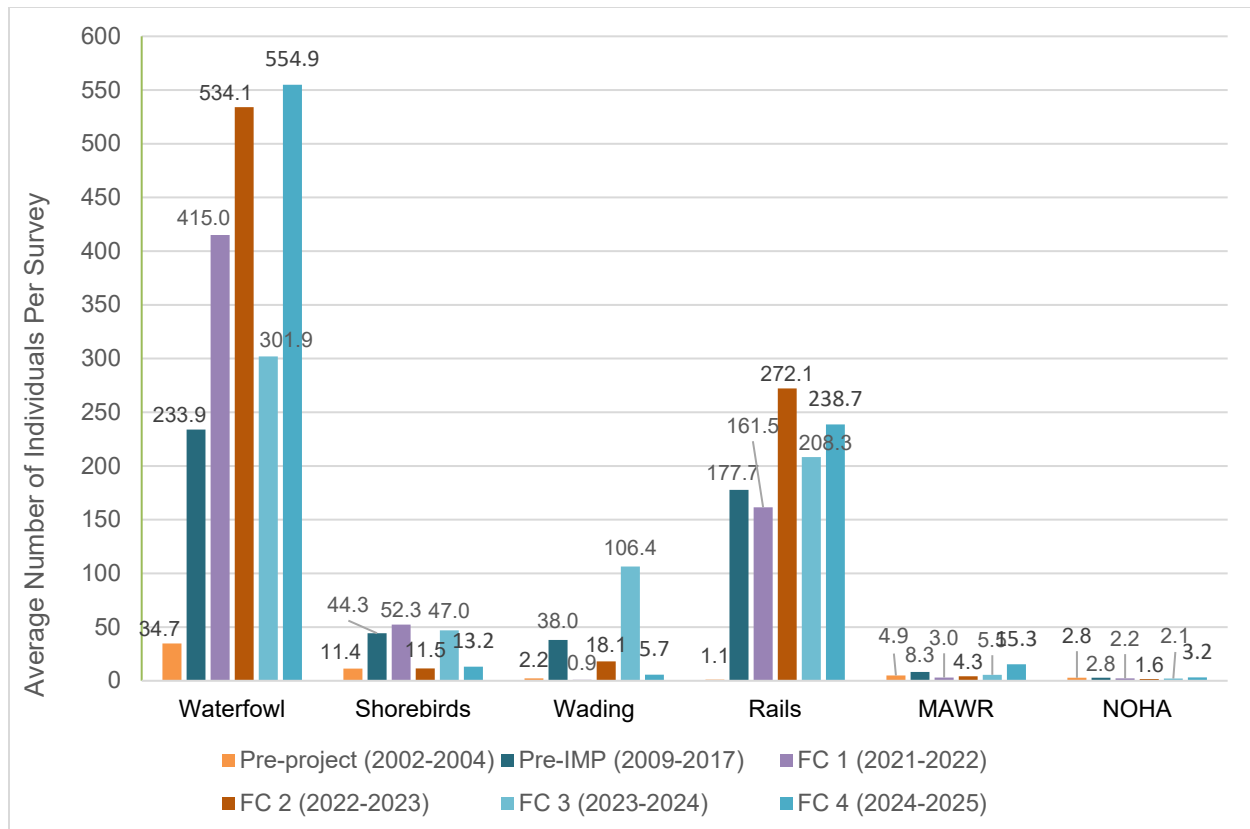


Figure 4-39. Average number of individuals in each HIS group per survey (MAWR = Marsh Wren, NOHA = Northern Harrier) for five time periods.

Comparison among the Last Three Flooding Cycles

The total number of birds observed in FC4 was 11.9% higher than FC3, and the total of HIS species observed in FC4 was 17% greater than the previous flooding cycle (Figure 4-40). Comparing FC4 to the previous three flooding cycles, the average number of waterfowl rebounded from its lowest level in FC3 to nearly the highest average count recorded since implementation. The average waterfowl count from FC4 (554.9) is 14.7% greater than the four-year waterfowl mean from FC1 - FC4 (483.4). The average number of shorebirds continued a biennial fluctuation trend, showing a similar low in numbers in FC2 and FC4. The average number of wading birds also decreased to a lower value similar to FC1 and FC2. The average number of rails remained high as FC4 was the second highest count recorded after FC2. Finally, while always low, Marsh Wren were higher in FC3 and Northern Harrier were equal in FC1 and FC3.

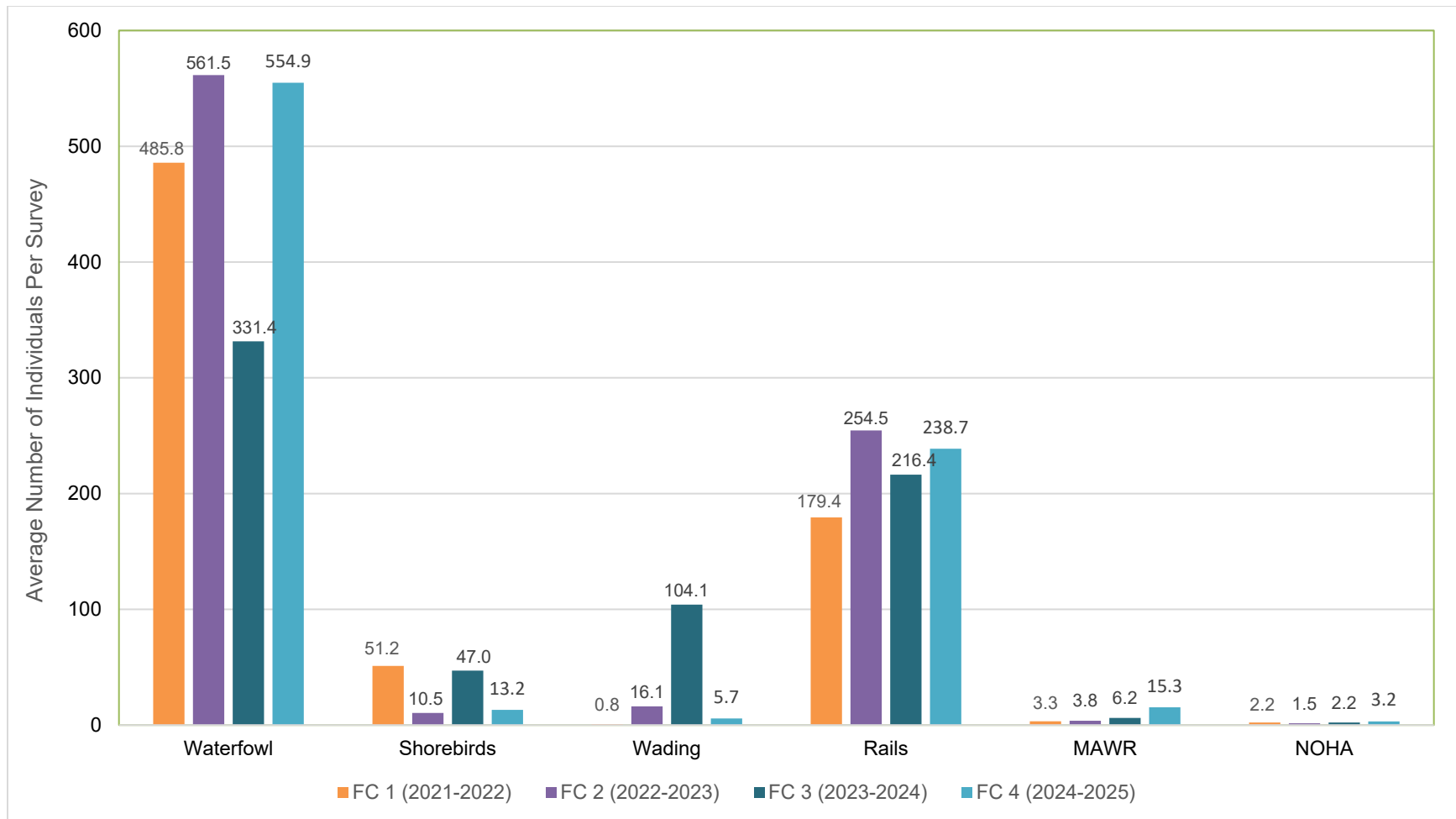


Figure 4-40. Average number of HIS individuals per FC1, FC2, FC3 and FC4.

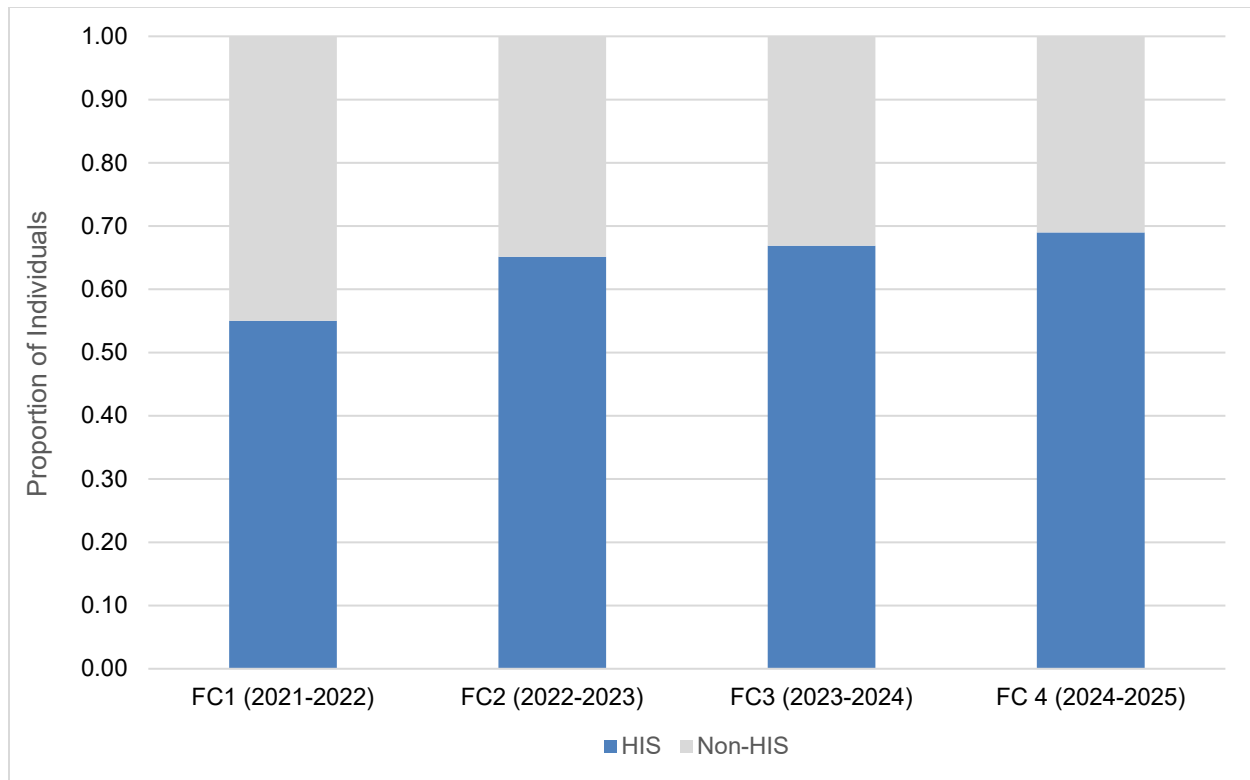


Figure 4-41. Proportion of individuals, HIS and non-HIS, for FC1, FC2, FC3, and FC4.

Since implementation of the IP, there have been four Flooding Cycles and three Dry Cycles in the BWMA. The FC's have been effective at creating habitat and attracting HIS to the BWMA. During FC4, the set of HIS were observed in the BWMA during each survey. During FC3, higher than normal spring runoff resulted in extensive flooding in the BWMA and reduced the forage base that was generated during the previous summer. Additionally, without the summer draw down and drying, the units were prone to the re-establishment of emergent vegetation and the loss of open water habitat. During FC4, slightly less than average runoff resulted in the prescribed drying of the BWMA units during the summer months, which was beneficial for maintaining open water.

The Waterfowl and Rail HIS groups have shown the best response to implementation of the IP compared to the prior management strategy of year-round flooding (Figure 4-39). The average number of individuals in the Shorebirds and Wading Birds HIS Groups has been more variable over time (Figure 4-39). In FC3, the average number of individuals in the Shorebirds HIS Group rebounded to FC1 levels and is above pre-IP levels. The Wading Birds HIS also rebounded to the highest level since implementation of the FC. The trends in the number of Marsh Wren and Northern Harrier have been more variable over time, and their numbers remain small compared to the other HIS Groups. This

could be because the adaptive management strategy in the IP favors the creation of open water habitat while minimizing marsh habitat these two species depend upon. Lastly, as a proportion of total bird numbers, HIS are continuing to increase relative to non-HIS (Figure 4-41), which aligns with the stated goal of the 1997 MOU to manage the BWMA “...consistent with the needs of the habitat indicator species.”

4.4.5 Recommendations

Since the adaptation of the IP in 2021, the BWMA has witnessed both an increase in waterfowl populations, and other HIS relative to previous management, subsequently it is recommended to continue the IP into the future, which is set to expire on March 31, 2026

4.4.6 References

Los Angeles Department of Water and Power and Inyo County. 2024. Lower Owens River Project 2023 Final Annual Report. 197 pp.

4.5 Tree Recruitment

4.5.1 Adaptive Management - Tree recruitment

Three adaptive management actions were proposed to understand riparian tree recruitment within the LORP project area (LADWP and ICWD, 2020; LADWP and ICWD, 2021) including: 1) characterizing conditions that allowed tree establishment prior to re-watering (pre-project), 2) identifying conditions that have permitted recruitment since project initiation (post re-watering), and 3) determining biological processes that could limit tree germination or establishment. The first item, historical recruitment, will be addressed using the Type D (Riparian) study (ICWD 2020-2022), and the third item was addressed using removal experiments; both described in prior reports (LADWP and ICWD, 2023 & 2024). This report summarizes riparian tree recruitment assessment activities during the 2024-25 fiscal year on the LORP (through July 1, 2025) and primarily addresses the second action item.

4.5.2 Successful Recruitment Locations Post-implementation

To identify conditions that have allowed riparian tree recruitment since the LORP rewatering, known recruitment locations were revisited to characterize conditions at these sites. As described in prior LORP reports, the bulk of the tree recruitment observed during the LORP Rapid Assessment Survey (RAS) events has been documented on LORP reaches 2 and 3 (LADWP and ICWD, 2019).

Questions:

1. How does the type of water year during recruitment affect the type of fluvial establishment surface such as elevation above and distance from the river channel?
2. Why is there so little recruitment in LORP reaches 5 and 6 as compared with reaches 2 and 3?

4.5.3 Methods

To understand conditions that permitted riparian tree germination and establishment, a set of recruitment sites identified from the LORP Rapid Assessment Survey (RAS), which occurred from 2007 – 2018, were revisited (Figure 4-42). First, because little recruitment has been observed on LORP reaches 5 and 6, all RAS sites that were originally recorded were revisited in these reaches. Second, to understand the effect of the runoff year on recruitment events including fluvial surface type, elevation, or distance from channel, RAS sites were randomly selected that recruited on each of reaches 2 and 3 during three distinct periods:

- 1) *wet-up*: the initial project wet-up period from 2007-2009; a time when soils were dry, and very few plants were present in the floodplain
- 2) *wet*: high runoff years
- 3) *dry*: low runoff years (during drought)

Ten locations in each of these categories within LORP reaches 2 and 3, respectively, were revisited.

Revisits occurred at sites with seedlings that survived into 2018; if a site was visited to discover seedlings were no longer found, it was not surveyed and replaced with a new site that met the same criteria. Tree recruitment that occurred during 2017 was documented during the 2018 RAS due to inundation of the river and floodplain making sites inaccessible. At each RAS recruitment location, several datasets were recorded including: 1) the number of tree recruits of red and black willow and Fremont cottonwood (*Salix laevigata*, *Salix gooddingii*, & *Populus fremontii*) and their size (basal diameter and height), 2) presence of co-occurring vegetation species, and 3) ground substrate (e.g. bare soil, litter) with the latter two recorded along line-point transects. Local environmental conditions such as landform, tree topographic elevation relative to water surface, soil substrate, soil salinity, and patch size were also assessed (as identified in the LORP Work Plan 2020-2021).

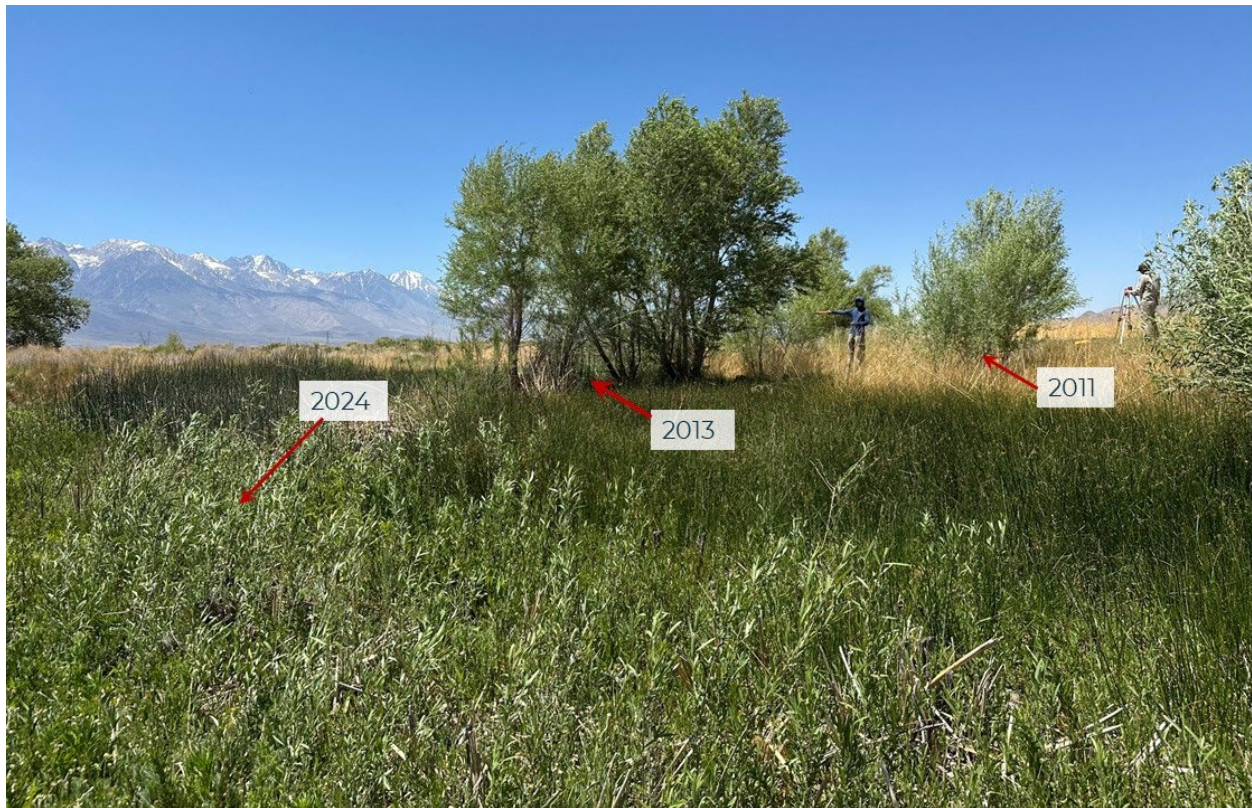


Figure 4-42. An original RAS woody recruitment location identified during the Rapid Assessment Survey in 2011, with a new RAS site recorded in 2013. When revisited in 2025, these multiple recruitment events were identified at the same location, including a new event from summer 2024 Preliminary field work summary

During spring 2025, the field component of this project was completed by revisiting and sampling an additional 34 original RAS recruitment locations (initially recorded during 2007-2018) for a total of 86 sites during the five-year re-sampling period (2021-2025). Table 4-8 summarizes the total sampling effort by year and indicates the year sampling was completed. During 2023, seventeen sites were identified and sampling initiated but data collection could not be finished due to inundation of the ground surface; these were completed in 2024 (Figure 4-43). Some novel tree recruitment sites were not present in the original RAS database but were found during sampling of other RAS tree recruitment events and these were designated as “unknown” recruitment year; this is evidence not all recruitment events were initially recorded likely due to flooding or site inaccessibility during the initial RAS year.

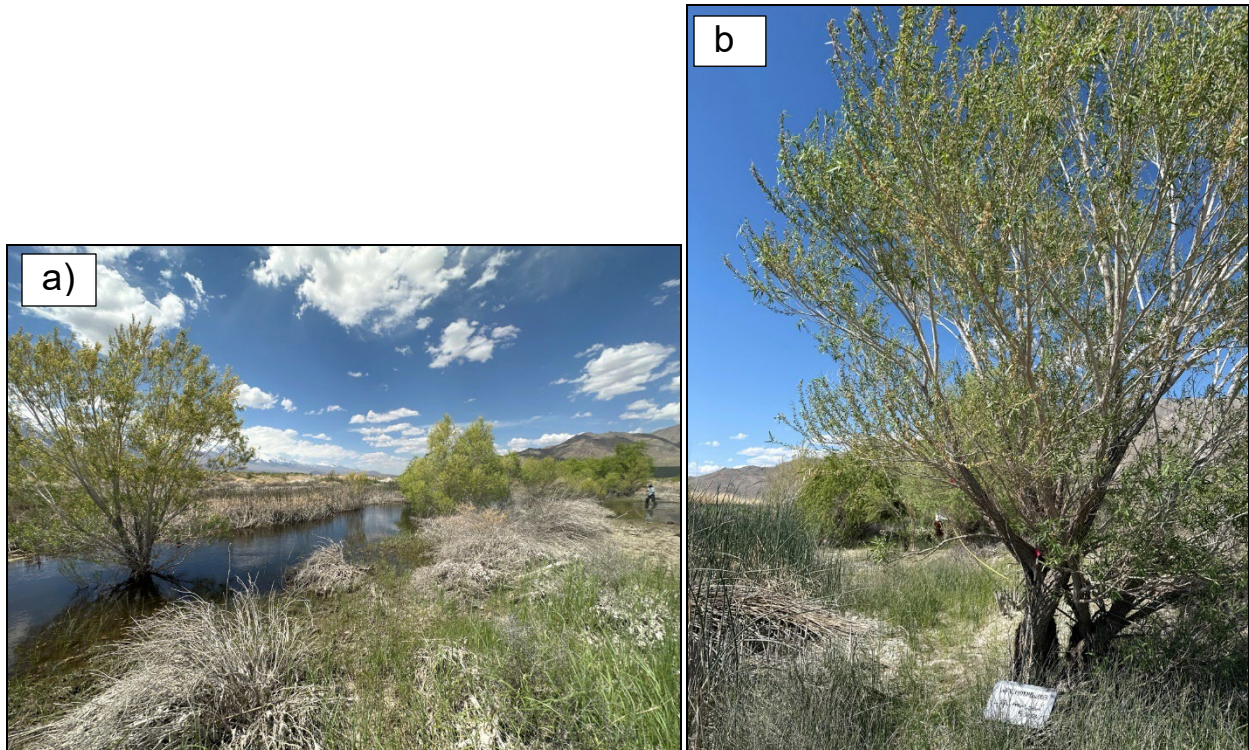


Figure 4-43. A woody recruitment site on the Lower Owens River Project identified during the Rapid Assessment Survey in 2014, and revisited a) in 2023 during high water, and b) in 2024 during vegetation sampling.

Table 4-8. Rapid Assessment Survey recruitment sites (originally recorded during surveys from 2007-2018) documenting tree recruitment that were revisited and sampled between 2021 and 2025.

Resurvey year	# sites
2021	28
2022	6
2024	18
2025	34
Total	86

To understand the effect of the type of runoff year on tree recruitment and how this influenced the type of establishment site, RAS events are categorized by the reach in which they were observed, and the type of runoff year during which establishment occurred (Table 4-9). Sample size across target LORP reaches 2, 3, 5, and 6 are uneven because 1) all original RAS tree recruitment events that occurred in reaches 5 and 6 were re-sampled, 2) the preliminary RAS re-survey included some sites in LORP reaches 1 and 4, and 3) ten original RAS sites were selected and re-sampled each from “wet-up”, “wet”, and “dry” locations in each of reaches 2 and 3. A minimum of 20 sites from each of “wet-up”, “wet”, and “dry” runoff-year sites were thus sampled (Table 4-10).

Table 4-9. RAS recruitment sites (originally recorded during 2007-2018) that were re-sampled by reach and the runoff year type during which they recruited; *wet-up* = 2007-2009, *dry* = 2012-2016, *wet* = 2011, 2017, *unknown = unknown recruitment year.**

Reach	Year type	# sites
1	wet	3
2	unknown	3
2	dry	14
2	wet	10
2	wet-up	9
3	dry	8
3	wet	12
3	wet-up	12
4	wet	1
5	unknown	1
5	wet	2
5	wet-up	2
6	dry	1
6	wet	2
6	wet-up	6

**Unknown recruitment year; site found and recorded incidentally during sampling of other RAS tree recruitment events.*

Table 4-10. RAS recruitment sites (originally recorded during 2007-2018) and re-sampled between 2021-2025 by runoff year type; *wet-up* = 2007-2009, *dry* = 2012-2016, *wet* = 2011, 2017, *unknown = unknown recruitment year.**

Year type	# sites
unknown	4
dry	23
wet	30
wet-up	29

4.5.4 Future Work

To discern mechanisms that have permitted riparian tree recruitment within the LORP riparian zone, the adaptive management actions originally proposed will be assessed. These include the mechanisms that have allowed both historic (pre-rewatering) and post implementation riparian tree recruitment, and the influence of biological processes including plant competition. This will involve a comparison of tree elevation relative to low flow stage and recruitment year-type (wet-up, wet, dry), soil texture and salinity, and similarity in co-occurring plant cover and ground surface substrate (litter, bare soil) at

RAS revisit sites. This analysis is expected in a future LORP report (2026) or a dedicated tree recruitment assessment report.

4.6 2024 Rapid Assessment Survey

To document riparian tree recruitment that occurred following the historic flows of spring and summer 2023, which were over three times in magnitude greater in peak flow than a typical SHF and lasted most of the summer rather than the two-day peak of a typical SHF, a Rapid Assessment Survey occurred during fall 2024. This RAS could not occur at any time during the 2023 growing season as the river could not be accessed due to flooding and road closures. This campaign documented seedlings that germinated during 2023 in the floodplain following high flows, and also incidentally documented observations of tree seedlings, when visible, that germinated in 2024 adjacent to the river channel on a riverbank surface formerly dominated by tule (*Scirpus* spp. and *Typha* spp.).

Questions:

1. Was there substantial riparian tree recruitment following the 2023 high flow event?
2. Which types of fluvial surfaces facilitated the recruitment of riparian tree seedlings, and were these surfaces located above the river channel within the floodplain, as would be anticipated during high flow events that elevate the river stage out of the channel?

4.6.1 Methods

In order to identify the appropriate RAS survey path, which by necessity needed to include the lateral extent of late spring and early summer (peak) runoff into the floodplain, a high definition (3 m resolution) georeferenced satellite orthomosaic of the river and its floodplain was obtained between June 21-27, 2023, which captured the RGB and NIR bands. This image was used to create a GIS layer of the lateral extent of flooding or the “high water line” (Figure 4-44) and was uploaded to Field Maps to be used to direct the RAS survey. Crews were instructed to walk 20 m interior (on the river side) of the high water line and to visually survey 20 m on either side of that reference, for a total of 40 m surveyed to the inside (river side) of the high water line.

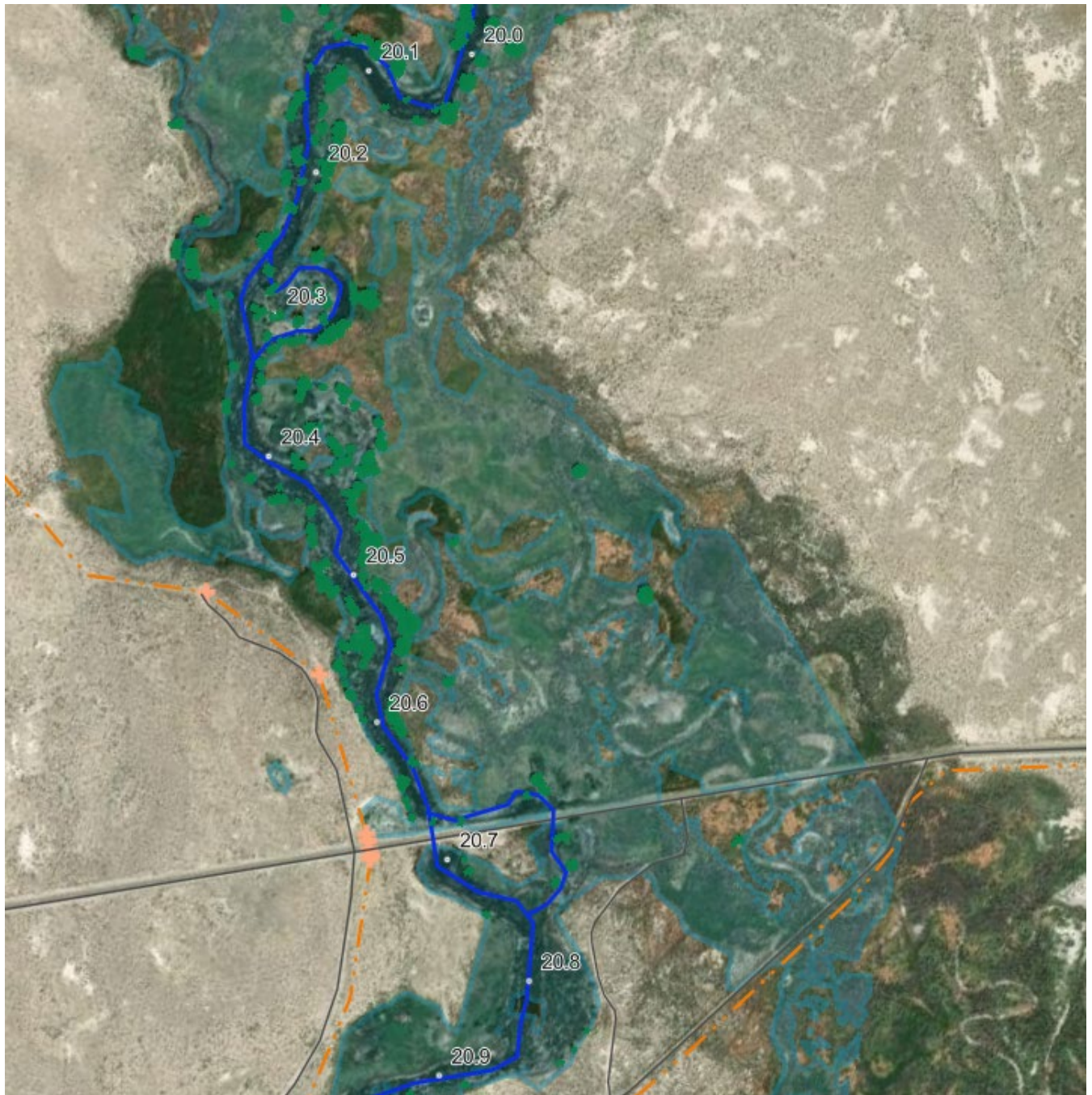


Figure 4-44.The “high water line” along Mazourka Canyon Road generated from the NIR band of the orthomosaic is depicted in light blue, with the Owens River channel depicted in dark blue.

4.6.2 Preliminary observations

Because the river and its adjacent banks were inundated with flood water during most of the 2023 summer, tree recruitment that occurred in 2023 was located on fluvial surfaces out of the river channel and into the floodplain (Figure 4-45).

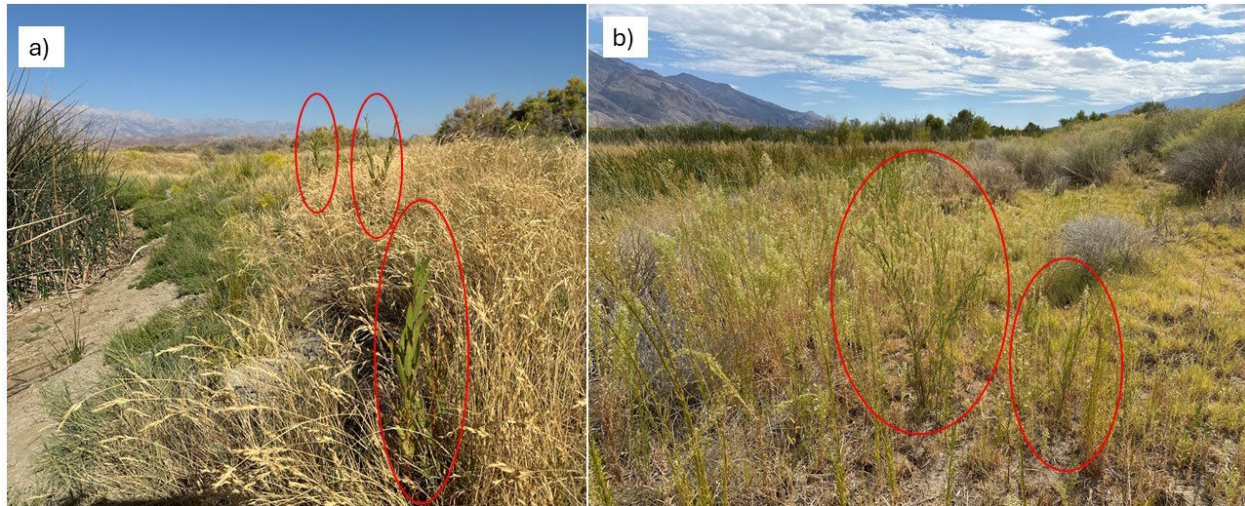


Figure 4-45. Tree recruitment that occurred during the 2023 flood occurred on higher elevation fluvial surfaces above the riverbank and into the floodplain as in a) LORP reach 3 and b) in LORP reach 6. Red circles identify willow (*Salix spp.*) recruits

Summer 2024 riparian tree recruits, which had germinated directly adjacent to the river channel on a wet and formerly tule (*Scirpus* spp. and *Typha* spp.) dominated surface on which dead tule stems were visible, (Figure 4-46) were occasionally incidentally found and recorded.

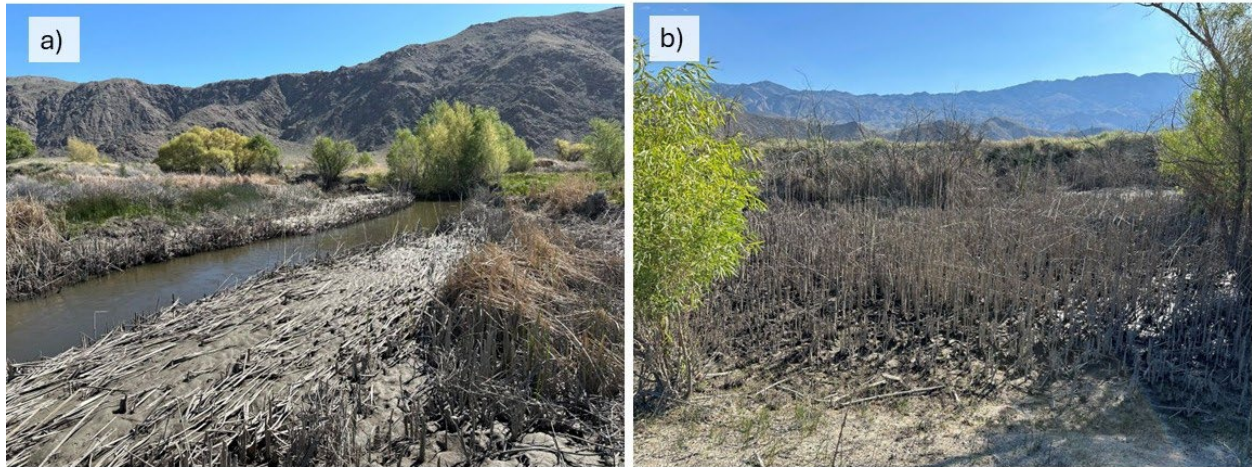


Figure 4-46. Evidence of tule (*Scirpus* spp. and *Typha* spp.) death by inundation that occurred during the 2023 high flows, with light sedimentation also visible in a).

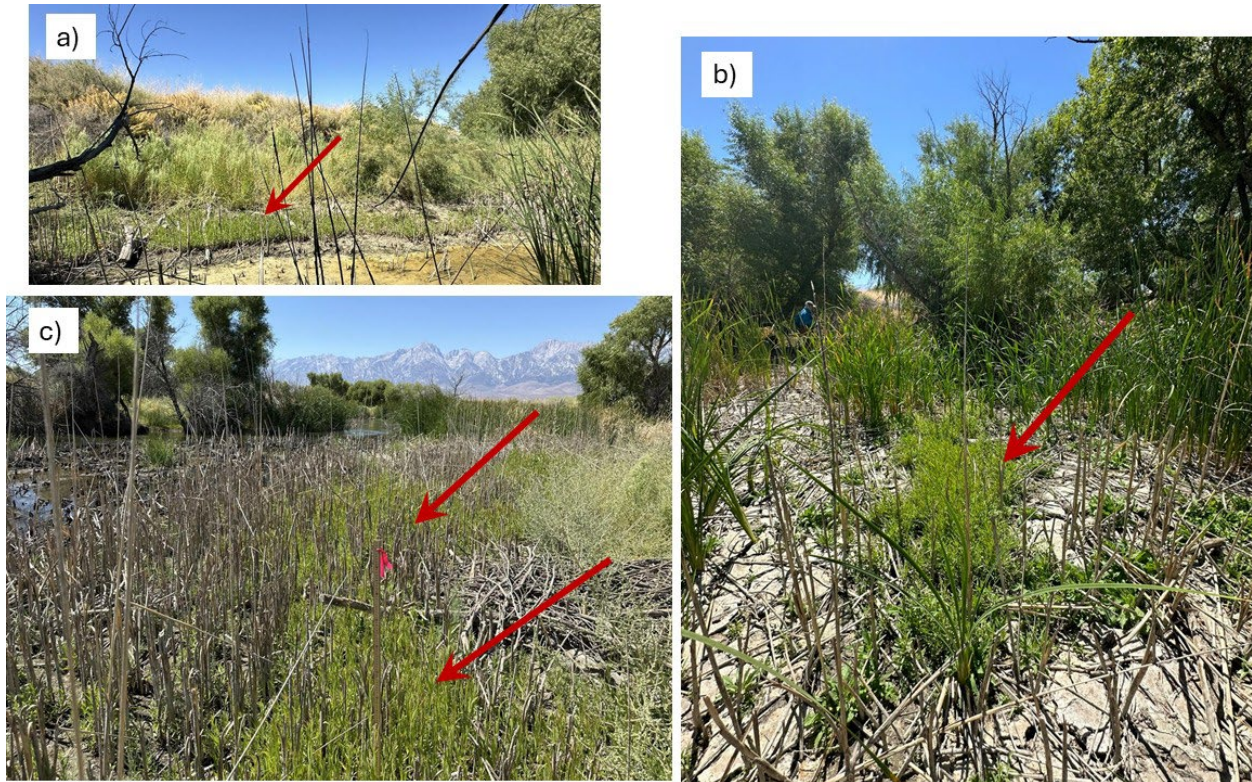


Figure 4-47. Riparian tree recruitment that occurred one year after the high flow event, in 2024, on wet, formerly tule-dominated fluvial surfaces directly adjacent to the river channel.

Riparian tree recruitment events were thus recorded for both 2023 and 2024 cohort years although the RAS was not designed to search exhaustively for 2024 recruits. During the 2024 RAS, 288 tree recruitment locations were recorded for the 2023 cohort year (Figure 4-47, Table 4-11), identified by their elevation above stage (Figure 4-48), basal diameter and height. Most of these sites contained 1-5 seedlings, but some hosted greater than 100 individuals (Table 4-11).

Table 4-11. The number of individual seedlings observed by site in the 2023 cohort year during the fall 2024 RAS recruitment survey.

Abundance	# sites
1 to 5	138
6 to 15	61
16 to 25	34
26 to 100	23
> 100	32

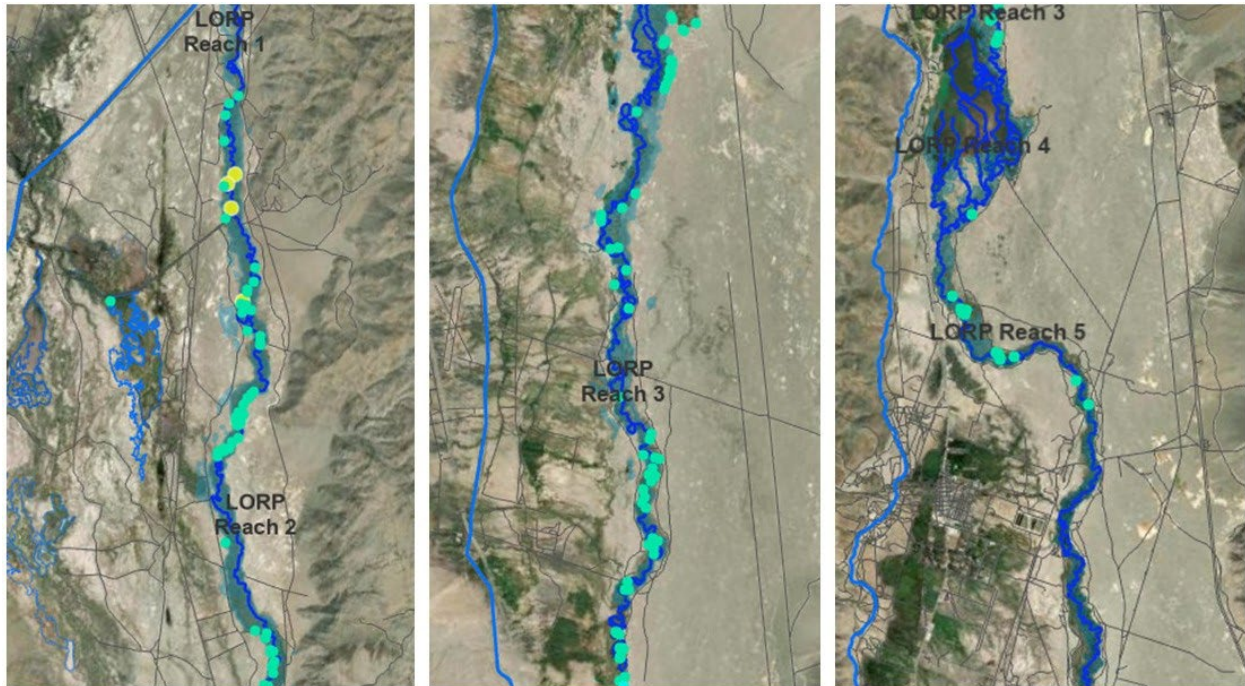


Figure 4-48. Riparian tree recruitment that occurred during or just following the 2023 high water event (2023 cohort) depicted by bright blue and yellow points, documented along the Lower Owens River during the Rapid Assessment Survey in the fall of 2024

4.6.3 Future work

To fully address the questions presented regarding recruitment during the summer of 2023 and in the two years following, a Rapid Assessment Survey was also completed during the summer of 2025. This survey focused on the river channel and aimed to capture the recruitment that occurred on the formerly tule-dominated fluvial surface made available by the 2023 flooding. A future report is anticipated in order to fully analyze the elevation of recruitment surfaces by overlaying recruitment events of each cohort year with a Digital Elevation Model to assess site elevation, linear distance from river, the ground substrate, and soil type of both former RAS recruitment events and the tree recruitment events that have occurred during and just after the 2023 historic runoff year.

4.6.4 References

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4.7 Noxious Weed Treatment

4.7.1 Inyo and Mono Counties Agricultural Commissioner's Office Noxious Weed Treatment

The Inyo and Mono Counties Agricultural Commissioner's Office (CAC) manages specific invasive weeds within the LORP area in conjunction with the LADWP, and in coordination with the ICWD. Funds from all three agencies are used to support the effort. Target weeds for CAC management and control include California Department of Food and Agriculture (CDFA) designated noxious weeds with a significant focus on perennial pepperweed (*Lepidium latifolium*). Management of perennial pepperweed is accomplished both by efforts to control and eradicate known weed populations within the large LORP area of more than 78,000 acres, as well as monitoring for pioneer populations.

Within the LORP area, disturbances can carry and spread weed seeds, including operations and maintenance activities, flooding, wildlife activity and cattle grazing, off road vehicles, and other recreational uses. A significant source of weed contamination comes from outside the LORP boundary. The middle Owens River from the Pleasant Valley Dam to the LORP Intake contains large established populations of perennial pepperweed that can be mobilized to contaminate the LOR and adjacent area. To limit spread, CAC now treats areas of extensive perennial pepperweed populations from Pleasant Valley to Warm Springs Road as grant funding permits, and LADWP is managing invasive weeds on city-owned lands including along the Owens River from Warm Springs Road to the LORP intake.

The paramount goal of controlling invasive weeds is protecting the native habitat. Maintaining a healthy native plant habitat will support wildlife (including threatened and endangered species), help reduce stream bank erosion, control dust, maintain healthy fire regimes, preserve the viability of open-space agriculture, and enhance recreational experiences.

The CAC was staffed with an Agricultural Biologist Inspector, as time permitted, and two seasonal field assistants. CAC staff began the treatment season in May 2024. This was the second season following the record-breaking runoff and flooding of the LORP in 2023, which significantly limited access and treatments to known populations of perennial pepperweed. Low volume directed spot treatments using the selective herbicide *Telar XP* was employed. Applications were made from all-terrain vehicles where terrain allowed and from backpack sprayers in more challenging terrain. Care was taken to minimize damage to native plant communities within the LORP.

The total net perennial pepperweed acreage treated in 2025 was 39.53 acres (Figure 4-49). This represents a 122% increase from the total 17.79 net acres treated in 2024. This was the most substantial increase year-over-year since 2005. There were significant increases in pioneer populations as well as well as known established populations. We expected to see similar or expansion to the net acres treated, however we did not expect to see this drastic of an increase. The total person hours spent treating and surveillance saw an increase of more than 33%. The additional hours doing surveillance could account for the increase in net acreage that staffing shortages in the previous years may have missed, allowing the populations to expand.

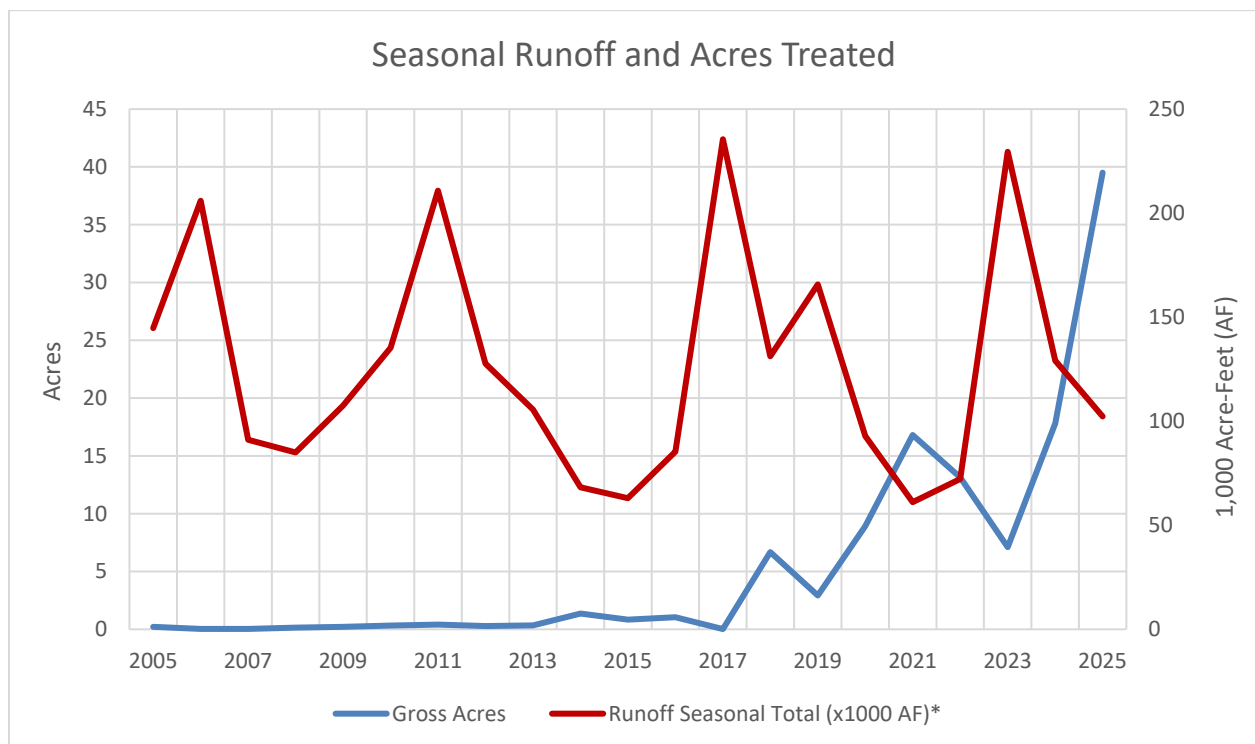


Figure 4-49. Annual acres of perennial pepperweed treated in the LORP and Owens Valley runoff from 2005 to 2025.

The most significant management difficulty is maintaining adequate staffing for effective management of such a large site. With only two seasonal employees dedicated to invasive weed control, it continues to be challenging to spend the much-needed time surveying the entire LORP area. However, CAC surveys are supplemented by observations of perennial pepperweed spread made by ICWD staff during the RAS. The two seasonal employees were also responsible for invasive weed treatments throughout the Eastern Sierra. Next season's activities should include expanded survey efforts where staffing allows.

4.7.2 LADWP Noxious Weed Treatment

Saltcedar Treatment

In 2024–25, saltcedar (*Tamarisk* spp.) treatment efforts within the LORP focused on two sites northeast of Independence: a 1.6-mile section of the McIver Canal and an adjacent 30-acre downslope spreading area (Figure 4-50) and along the river.

Along the McIver Canal, saltcedar occurred at low to moderate densities, ranging from seedlings to young saplings. The infestation likely became established after canal flows ceased following the 2017 runoff season. Removal involved a combination of mowing and hand clearing along the steep canal banks, which slowed progress but ensured thorough treatment.

In the downslope spreading area, vegetation consisted primarily of medium to large saltcedar shrubs. These were cut and removed using skid steer attachments, and the resulting slash piles were transported to the Billy Lake site for subsequent burning. To prevent resprouting, all cut stumps were treated with *Garlon® 4 Ultra* herbicide immediately after cutting.

Lastly, ICWD staff canvassed the river near the Blackrock area and hand pulled seedlings that had established following the 2023 high flows

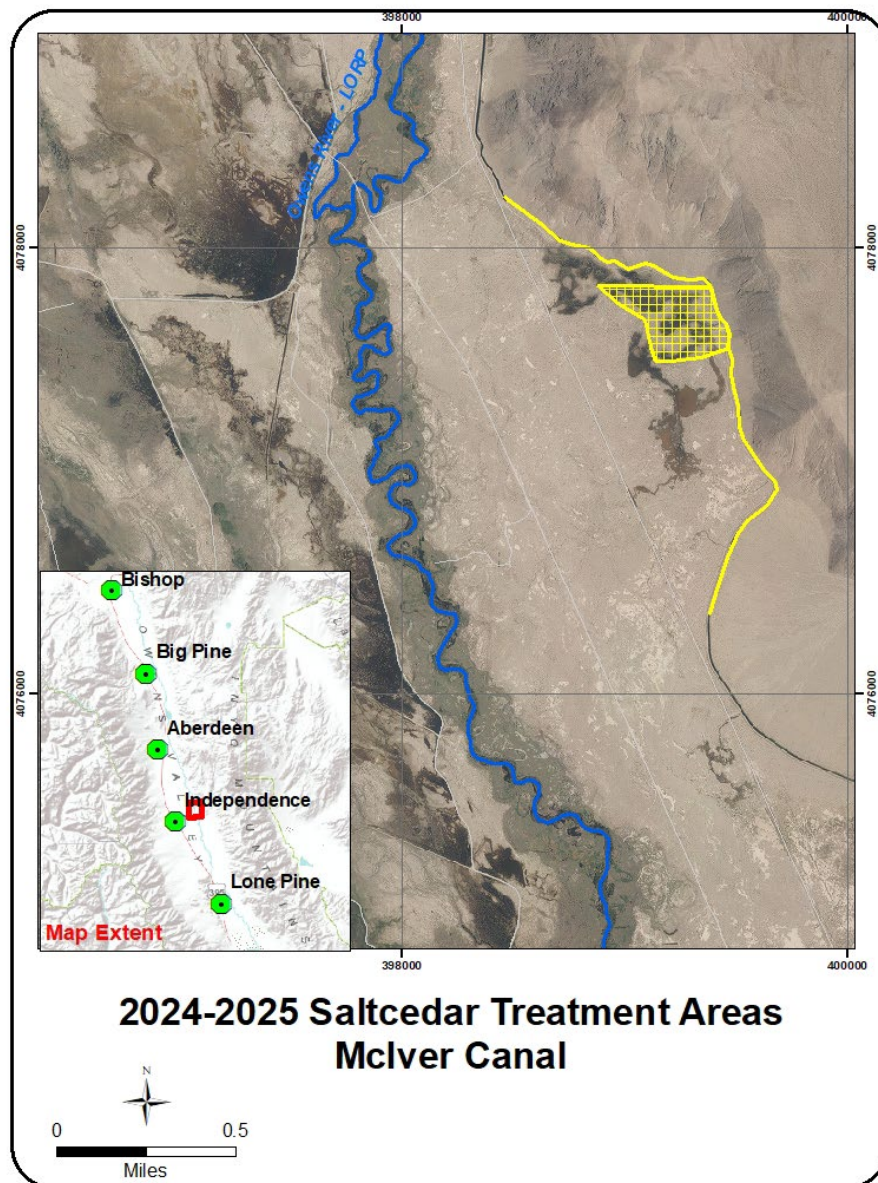


Figure 4-50. Saltcedar treatment area.

Pepperweed Treatment

In 2025, noxious weed management within the LOR focused on several key areas, including the first 20 miles of the Los Angeles Aqueduct, the Blackrock Waterfowl Management Area, the vicinity of Four Corners, and the Homestead site.

Approximately 13 acres of perennial pepperweed were treated during the season. LADWP field crews utilized side-by-side vehicles equipped with tank-mounted spray

systems to access remote locations and apply herbicide treatments efficiently across the project area.