

*Final*

**Invasive Species Management Plan**

**For**

**College Lake Integrated Resources  
Management Project**

Prepared for



***Pajaro Valley***  
***Water Management Agency***

Prepared by

Mike Podlech, Aquatic Ecologist

June 2021

# TABLE OF CONTENTS

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## Invasive Species Management Plan for College Lake Integrated Resources Management Project

	<u>Page</u>
<b>Chapter 1, Introduction .....</b>	<b>1-1</b>
1.1 Background .....	1-1
1.2 Setting and Project Description.....	1-2
1.3 Adaptive Management Plan.....	1-6
<b>Chapter 2, Management Plan Design .....</b>	<b>2-1</b>
2.1 Goals and Objectives .....	2-1
2.2 Monitoring .....	2-1
2.3 Success Criteria .....	2-2
2.4 Management Methods .....	2-3
2.4.1 Lake Draining.....	2-3
2.4.2 Direct Removal .....	2-4
2.5.3 Management Frequency.....	2-5
2.5 Management Authorizations .....	2-5
2.6 Reporting Procedures .....	2-6
<b>Chapter 3, Response Actions.....</b>	<b>3-1</b>
<b>List of Figures</b>	
1. Project Location Map .....	1-3
2. College Lake Ground Elevations and Drainage Channels.....	1-5

# CHAPTER 1

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## Introduction

### 1.1 Background

The Pajaro Valley Water Management Agency (PV Water) is planning to implement the College Lake Integrated Resources Management Project (College Lake Project or Project). The Project will store and divert water from College Lake for treatment, transmission, and distribution for agricultural irrigation. The primary purposes of the Project are to help balance the Pajaro Valley groundwater basin, prevent further seawater intrusion, and meet water supply needs in PV Water's service area by developing College Lake as a water storage and supply source. In support of this project, PV Water submitted water right Application A032881 to the State Water Resources Control Board for the storage and diversion of up to 3,000 acre-feet of water per year (AFY) at College Lake. The California Department of Fish and Wildlife (CDFW) initially protested the application but subsequently dismissed the protest conditionally, provided the water right permit contains a number of specific terms, including the following:

“Prior to the initial diversion of water, the right holder shall submit to NMFS<sup>1</sup> and CDFW for written approval an invasive species management plan. The invasive species management plan shall include, at a minimum, an annual survey for bullfrogs and non-native piscivorous fishes. If bullfrogs and/or non-native piscivorous fishes are identified, the plan shall provide potential actions to eradicate those species from the reservoir. Actions may include direct removal, such as seining and/or other lawful capture methods. The plan shall also include measures to be implemented should the above actions prove ineffective.”

In October 2019, PV Water certified the *Final College Lake Integrated Resources Management Project Environmental Impact Report* (2019 EIR). The 2019 EIR identifies a potential for populations of non-native predatory species to increase in College Lake as a result of the extended inundation season under the Project. To mitigate this potential impact, the 2019 EIR stipulates implementation of the following measure:

#### **Mitigation Measure BR-2: Invasive Fish Species Control Plan**

PV Water shall develop an Invasive Fish Species Control Plan.<sup>2</sup> PV Water would submit the plan to the appropriate resource agencies (CDFW, USFWS<sup>3</sup>, and NMFS) for approval within one year of Project implementation. The Fish Species Control Plan shall be implemented at College Lake

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<sup>1</sup> National Marine Fisheries Service (NMFS).

<sup>2</sup> This Invasive Species Management Plan addresses control of non-native fish, amphibian, and invertebrate species and thus satisfies the 2019 EIR requirement for an Invasive Fish Species Plan.

<sup>3</sup> U.S. Fish and Wildlife Service (USFWS).

within two years of Project implementation. The Fish Species Control Plan shall include, at a minimum:

1. Measures describing PV Water's methods of draining College Lake to the greatest extent feasible;
2. Measures describing PV Water's methods, equipment, and timing of invasive species eradication efforts to be conducted in association with lake drawdown efforts;
3. Measures describing the frequency at which invasive species control efforts are to be implemented.

This Invasive Species Management Plan for the College Lake Project has been prepared in response to the CDFW-requested protest dismissal term and the requirements of Mitigation Measure BR-2.

## 1.2 Setting and Project Description

College Lake is a seasonal lake that forms in a topographic depression along the Zayante-Vergeles Fault zone. The lake receives inflows from several tributaries (including Green Valley, Casserly, and Hughes Creeks, shown on **Figure 1**) and drains into Salsipuedes Creek, which is a tributary to the Pajaro River. The College Lake watershed consists of approximately 11,000 acres of range, rural residential, and crop lands. Approximately 2,000 feet downstream of College Lake, surface water enters Salsipuedes Creek from Corralitos Creek. At times during the wet season, the flow direction in the reach of Salsipuedes Creek between College Lake and the Corralitos Creek confluence can reverse. When these conditions occur, surface water can flow from Corralitos and Salsipuedes creeks into College Lake. Flow magnitudes and directions in this reach of Salsipuedes Creek are controlled by several factors, including the water level of College Lake, the flow rate in Corralitos Creek, and the flow rate in Salsipuedes Creek downstream of the Corralitos Creek confluence. During wet years, surface water overflowing from Pinto Lake flows through a drainage channel (called Pinto Creek) into this reach of Salsipuedes Creek between College Lake and the Corralitos Creek confluence (Figure 1).

South-central California coast (S-CCC) steelhead (*Oncorhynchus mykiss*), a federally-listed threatened species, are known to utilize College Lake seasonally for winter and spring juvenile rearing prior to outmigration to the ocean.<sup>4</sup> Invasive (i.e., non-native) species are also known to occur in College Lake. A juvenile steelhead outmigration study conducted at College Lake in 2011 documented the presence of invasive species such as common carp (*Cyprinus carpio*), fathead minnow (*Pimephales promelas*), golden shiner (*Notemigonus chrysoleucas*), channel catfish (*Ictalurus punctatus*), black bullhead (*Ameiurus melas*), and brown bullhead (*Ameiurus nebulosus*).<sup>5</sup> Bluegill (*Lepomis macrochirus*) and largemouth bass (*Micropterus salmoides*) have also been observed in College Lake and other non-native species may be present. Non-native fish species compete with native species for habitat and resources, and some (e.g., catfish, bass) may also prey on juvenile steelhead.

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<sup>4</sup> Podlech, M., College Lake Smolt Outmigrant Study–Spring 2011. Prepared for Resource Conservation District of Santa Cruz County, 2011.

<sup>5</sup> Ibid.



SOURCE: Carollo Engineers, 2017; ESRI World Imagery, 7/23/2016; ESA

College Lake Integrated Resources Management Project

**Figure 1**  
Project Location Map



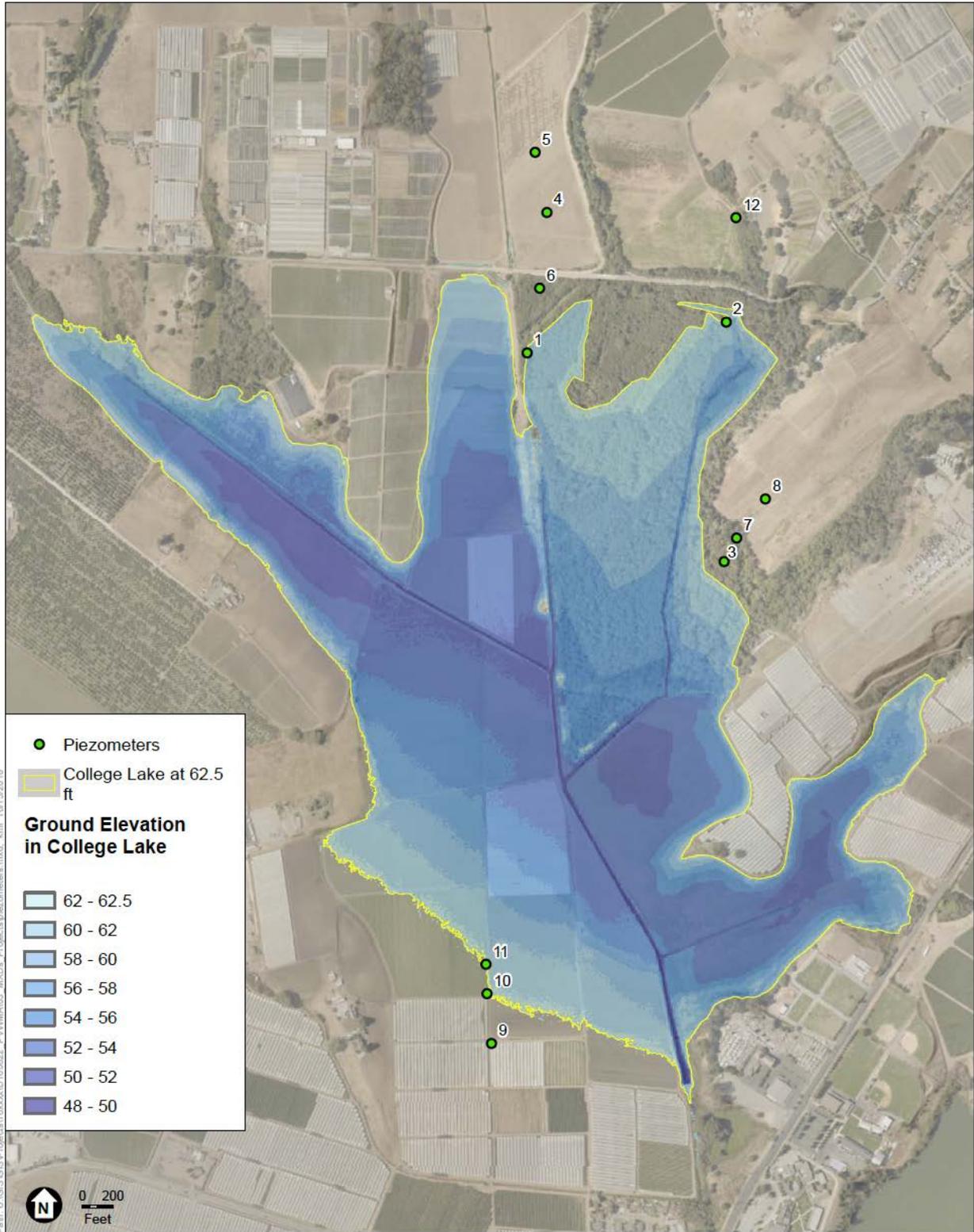
While there are no recorded observations of California red-legged frogs (*Rana draytonii*), a federally-listed threatened species, in College Lake, suitable breeding habitat for this species is present in the woodland along the shore of College Lake and in channels near the existing weir and in Salsipuedes Creek. However, American bullfrog (*Lithobates catesbeianus*), a non-native predator of California red-legged frogs, is known to occur in College Lake.<sup>6</sup> Non-native signal crayfish (*Pacifastacus leniusculus*) are also present. This species is capable of preying on small native fish and amphibians.

Under current conditions, Reclamation District 2049 (RD 2049) operates an existing weir and associated pump station located at the outlet of College Lake, which is at its south end. Flooding in and around College Lake occurs in association with wet weather events; during the wet season, water surface elevations regularly exceed the elevation of the existing weir (60.1 feet North American Vertical Datum of 1988 [NAVD88]). To allow summer farming in the lakebed, RD 2049 currently pumps water out of College Lake in the spring, usually beginning in mid-March, with each year's starting date depending on spring rain patterns. The spring draining of the lake allows the lakebed to dry out for summer crop planting. However, continued inflow from the Casserly Creek watershed, as well as agricultural irrigation drainage from lands within and adjacent to College Lake continue to maintain wetted conditions within drainage channels traversing the lake (**Figure 2**). Thus, pumping continues intermittently during the summer and fall as necessary to lower water levels in the drainage channels and keep the lakebed dry while crops are growing. The purpose of the existing weir is to prevent water that is pumped from College Lake into Salsipuedes Creek from flowing back into the lake. The current operations of draining the lake in spring and periodic pumping during the agricultural season, reduces wetted habitat in the summer and fall to the drainage ditches within the lake at a time when steelhead are not expected to occupy the lake. While this pumping practice does not entirely eliminate populations of invasive species, it likely helps to control and reduce populations annually by significantly limiting habitat availability.

To implement the Project, PV Water will construct a new adjustable weir to seasonally raise the controlled College Lake water surface level by up to 2.4 feet to an elevation of 62.5 feet NAVD88. Depending on water supply needs, PV Water will pump water from College Lake (either by direct diversions of water flowing into the lake or re-diversions of water previously stored in the lake) to a new water treatment plant. PV Water will convey the treated water for approximately six miles through the new College Lake Pipeline to its existing Coastal Distribution System for deliveries to farmers who will use the water for irrigation in lieu of pumping equivalent amounts of groundwater. With implementation of the Project, water would be retained in College Lake for a longer period of time in the spring, summer, and fall compared to existing conditions. An extended inundation season in College Lake could potentially allow populations of non-native predatory species to increase. However, depending on water year type and agricultural demand, PV Water will draw down most or all of the lake storage in most years, typically by September. This will result in the majority of the lakebed drying out and water remaining only within drainage channels in most years, as it does under existing conditions. Moreover, PV Water also plans to drain College Lake fully every two to three years for equipment maintenance or repair, to ensure the lake bottom is able to dry out for purposes of vegetation and/or sediment management, predator control, or to prevent water quality issues such as algal blooms or other unforeseen issues from developing within the lake.

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<sup>6</sup> Kittleson, G., Kittleson Environmental Consulting, pers. comm., December 30, 2020.



SOURCE: cbec, 2018

College Lake Integrated Resources Management Project

**Figure 2.** College Lake ground elevations and drainage channels.

## 1.3 Adaptive Management Plan

The 2019 EIR incorporates mitigation measures previously adopted by PV Water’s Board of Directors under the 2014 Basin Management Plan (BMP) Update Programmatic EIR. Mitigation Measure BIO-2i.1 (Develop Adaptive Management Plan for College Lake Waterfowl Management and Multi-Species Mitigation) was included in the *Final Environmental Impact Report for the Basin Management Plan Update* (2014 BMP Update PEIR) in response to public comment. PV Water is committed to preparing an Adaptive Management Plan (AMP) as part of the College Lake Project, as outlined below:

**BIO-2i.1: Develop Adaptive Management Plan for College Lake Waterfowl Management and Multi- Species Mitigation.** To mitigate impacts to existing waterfowl or waterfowl habitat at College Lake, an Adaptive Management Plan for waterfowl management and multi-species mitigation will be developed with the consultation of the state and federal resource agencies and College Lake stakeholders. The Adaptive Management Plan for waterfowl management and multi-species mitigation at College Lake will develop multi-year baseline waterfowl population and habitat use data for future project design, environmental permitting and CEQA impact analysis of project-level alternatives. To the extent practical, it will integrate the results of ongoing College Lake hydrology and hydraulic analyses, as well as future consultations with state and federal agencies on fish flows and fish bypass criteria.

The Management Plan will be specific to the level of impact and mitigations under site-specific and project implementation conditions. However, the following standards will apply as defined during project-level design, regulatory review and CEQA analysis: The Management Plan should include terms and conditions from applicable permits and agreements as appropriate and define provisions for monitoring assignments, scheduling, and responsibility. The Management Plan should also include habitat replacement and revegetation, protection during ground-disturbing activities, performance standards, maintenance criteria, and monitoring requirements for temporary and permanent impacts consistent with mitigation in this EIR and regulatory requirements during project- specific review. The Management Plan will be in conformance with the biology mitigation measures from this EIR, and will also include terms and conditions consistent regulatory requirements as applicable from the USFWS, USACE, SWRCB, and CDFW permits during project design and permitting as applicable. The Management Plan will be prepared for project level project implementation as determined needed through future CEQA review and consultation with agencies as required under CESA and ESA.

Adaptive management is defined as “a framework and flexible decision-making process for ongoing knowledge acquisition, monitoring, and evaluation leading to continuous improvements in management planning and implementation of a project to achieve specified objectives.”<sup>7</sup> An adaptive management approach provides a structured process that allows for taking action under uncertain conditions based on the best available science, closely monitoring and evaluating outcomes, and re-evaluating and adjusting decisions as more information is learned.<sup>8</sup> Adaptive management encourages an ecosystem-level approach to resource management and promotes collaboration among scientists, managers, and other

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<sup>7</sup> 2011 California Water Code, Division 35. Sacramento-San Joaquin Delta Reform Act of 2009, Chapter 4, Section 85052.

<sup>8</sup> California Department of Fish and Wildlife, Adaptive Management. Available online at [https://www.dfg.ca.gov/erp/adaptive\\_management.asp](https://www.dfg.ca.gov/erp/adaptive_management.asp). Accessed on August 6, 2019.

stakeholders on decisions. To be effective, that decision-making process must be flexible enough to adjust in the face of uncertainties, variances or other unforeseen outcomes from management actions and other external events. With an established AMP, the project will be set up to use tools such as monitoring, modeling, or other applied studies to generate the science-based information that managers need for decision-making. Once this information is available, managers can “Adapt” a project. If needed, possible adaptive management actions include additional studies or monitoring and corrective on-the-ground actions. It is imperative when approaching a project with significant uncertainties, that all stages of the “Plan” phase are open to adaptive management consideration.

In response to environmental review and permitting requirements, the College Lake Project is generating several plans that are related to adaptive management. These include this invasive species management plan, a steelhead monitoring plan, a water quality monitoring plan, an operations and maintenance (O&M) plan, and a water right compliance plan. All of these plans have a role in the project process and will need to be comprehensively considered in the adaptive management process. The intention is for the AMP to serve as an umbrella document where the data and information generated by these various elements can be evaluated holistically in the context of the project objectives. The AMP therefore will become a critical process document and serve as the central organizing “spine” of most of the other plans, including this invasive species management plan. Most of these plans will already be complete prior to the development of the AMP. As such, the AMP will include a feedback process to each of those plans to account for any future management decisions that have the potential to ripple through various other documents. Since these other plans are driven largely by the regulatory process, the AMP will have to account for a process by which stakeholder education and feedback are incorporated back into those plans through the adaptive management process if warranted. For example, if data collected during implementation of this invasive species plan indicate that the population of one exotic species is not responding to suppression efforts, it may trigger an adaptive management action such as an evaluation of alternative management methods or perhaps a direct change in water management. PV Water would be responsible for reporting action triggers and implementing management actions based on these triggers as part of the development of the AMP. In short, this invasive species management plan defines the methods PV Water will implement in an effort to suppress and/or eradicate non-native species from College Lake and, in the process, feed science-based data and information into the adaptive management decision-making process, which may include, among others, adaptively managed changes to this plan itself.

# CHAPTER 2

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## Management Plan Design

### 2.1 Goals and Objectives

Non-native aquatic species reduce diversity and abundance of native species through competition, predation, parasitism, genetic dilution, introduction of pathogens, smothering and loss of habitat.<sup>9</sup> College Lake has been actively managed for agricultural production for a century, and farming will continue to occur on surrounding lands. Implementation of the Project will alter the existing hydrologic regime of College Lake, primarily during the summer and fall when the lake will be operated for water supply storage and diversion rather than agricultural production, thereby extending the duration, extent, and depth of lake inundation later into the summer compared to existing conditions. Although PV Water will draw down most of the College Lake storage every year and further drain it every 2-3 years, shallow residual water will remain within existing drainage channels and additional active management methods for controlling invasive species populations are therefore necessary.

The goal of this Invasive Species Management Plan is to promote aquatic habitat conditions in College Lake that are conducive to native species utilization by eliminating or limiting competitive and predatory pressures by invasive species. The objective of the plan is to minimize proliferation of, suppress, and/or eradicate invasive species in College Lake as part of ongoing operation and management of the Project. The means of accomplishing this objective include:

- (1) Determining potential sources of invasive species and developing and implementing appropriate strategies to control spread from identified sources;
- (2) Fully draining the lake every two to three years;
- (3) Direct removal of invasive species;
- (4) Monitoring invasive species composition and abundance;
- (5) Periodic reevaluation of invasive species control methods and continued need for management through the AMP process.

### 2.2 Monitoring

The CDFW water right protest dismissal term specifically states that this invasive species management plan “shall include, at a minimum, an annual survey for bullfrogs and nonnative piscivorous fishes. If bullfrogs and/or non-native piscivorous fishes are identified, the plan shall provide potential actions to

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<sup>9</sup> California Department of Fish and Game. 2008. California Aquatic Invasive Species Management Plan.

eradicate those species from the reservoir.” The surface area of College Lake is approximately 228 acres when fully inundated to the existing weir elevation of 60.1 feet (North American Vertical Datum of 1988 [NAVD88]) and is estimated to increase to approximately 285 acres when the future Project weir is raised to the maximum water surface elevation of 62.5 feet NAVD88.<sup>10</sup> Surveys for invasive species during times of full or partial inundation (i.e., spring/early summer) would likely be inconclusive over such a large area. Moreover, spring surveys for non-native piscivorous fishes during these conditions would require the use of direct capture methods (e.g., seining) that would be likely to result in incidental capture of federally-listed threatened S-CCC steelhead known to be present in College Lake during the winter and spring.

Given the ineffectiveness of surveying across a large body of water and the known presence of invasive fish, amphibians, and crustaceans in College Lake, as well as the near-annual drawdown of the lake, pre-management presence/absence monitoring surveys are not necessary at this time. Rather, the invasive species management activities described below (Section 2.4) will be implemented based on presumed presence, and monitoring of invasive species population trends will be conducted concurrently to track the effectiveness of invasive species management. As such, the direct removal activities described below will also serve to monitor ongoing population trends and management effectiveness. Monitoring parameters will include species, life stage, numbers, locations, and densities of invasive species captured per unit effort. Index sites will be established to allow for quantitative comparisons of species composition and abundance over time. All management and monitoring activities will occur when water in College Lake is confined to the drainage channels and the presence of listed steelhead is highly unlikely (i.e., late summer/early fall), as described in Section 2.4 below.

In summary, monitoring for invasive species presence is typically conducted in order to determine whether subsequent removal activities are necessary, but as described below, PV Water is committed to implementing near-annual invasive species removal efforts for the foreseeable future. Detailed record keeping during these efforts will serve as a quantitative monitoring tool for tracking invasive species presence, abundance, and management effectiveness over time.

## 2.3 Success Criteria

The levels of effort needed to successfully manage invasive species populations vary by site. College Lake is a relatively large, natural, onstream lake that is hydrologically connected to other waterbodies known to support non-native species (e.g., Pinto Lake, Salspuedes Creek, Pajaro River). Additionally, amphibian species such as bullfrogs are capable of traveling long distances overland. As such, even if full control of invasive species is achieved, recolonization may occur. Therefore, invasive species control in College Lake will be considered successful if the proliferation of invasive species is minimized and populations are either eradicated or significantly suppressed over time, as measured by species abundances and/or densities per unit effort. Detailed success criteria will be incorporated into the AMP and may be reevaluated and/or adjusted through that process based on the results of initial control efforts.

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<sup>10</sup> cbec, College Lake Integrated Resources Management Project Hydrologic and Hydraulic Modeling Technical Memorandum, Figure 4, Stage-Storage and Stage-Surface Area Curves, November 2018.

## 2.4 Management Methods

In general, there are two main methods available for the control of invasive species: Indirect removal through lake draining, and direct (i.e., manual) removal through physical capture. Implementing both indirect and direct removals is generally considered the most effective approach. For invasive species management at College Lake, PV Water will use a combination of these two approaches.. The lake will be mostly or entirely drawn down for water supply purposes on a near-annual basis and, when necessary, drained further to the greatest extent feasible for maintenance activities every two to three years. Direct removal of invasive species will occur within areas of the lake that remain wetted after lake draw-down, as described further below.

### 2.4.1 Lake Draining

Under the Project, an intake pump station will pump raw (untreated) water from a screened intake just upstream of a new adjustable weir to a water treatment plant via a 30-inch diameter intake pipeline. The intake pump station will have a maximum pumping capacity of 30 cubic feet per second (cfs). Depending on water year type and agricultural demand, PV Water will draw down most or all of the lake storage in most years, typically by September. This will result in the majority of the lakebed drying out in most years. However, similar to existing conditions, inflows to the lake may continue to occur throughout the summer and fall, but will be confined to the lake's drainage ditch channels (**Photos 1 and 2**). Project designs include a 30-inch bypass pipeline from the pump station to the downstream side of the new weir structure. This bypass pipeline will be used to further drain College Lake (including drainage channels) every two to three years for equipment maintenance or equipment repair, invasive species control, or to prevent water quality issues such as algal blooms or other unforeseen issues from developing within the lake.<sup>11</sup> The intake is expected to be able to pump water down to a surface water elevation of approximately 51 feet NAVD88 while the channel elevation at that location will be at approximately 48 feet NAVD88.<sup>12</sup> If deemed necessary, it may be feasible to further drain water levels below 51 feet NAVD88 using appropriately-screened temporary submersible pumps. Nevertheless, some water is expected to remain within the drainage channels and PV Water will conduct direct manual removal during these minimum surface water elevation periods, as described below.

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<sup>11</sup> Lake draining will occur in compliance with applicable federal and state water quality regulations, such as the federal Clean Water Act and the State Porter-Cologne Water Quality Control Act.

<sup>12</sup> Friedlander, P., Carollo Engineers, pers. comm., January 8, 2021.



**Photo 1.** College Lake drainage channel immediately upstream of existing weir, August 11, 2020



**Photo 2.** College Lake drainage channel 150 ft upstream of existing weir, August 11, 2020

## 2.4.2 Direct Removal

Direct removal activities will occur in late summer/early fall when College Lake has been drawn down and remaining wetted areas are confined to the existing drainage channels similar to conditions depicted in Photos 1 and 2. This will concentrate and confine invasive species remaining after drawdown to habitats with residual depth that can be effectively targeted for capture.

All direct capture and removal efforts will be conducted by qualified biologists with expertise in invasive and native aquatic species identification. A team of two or more biologists may use a variety of standard methods to capture invasive species, including seining, dip-netting, -electrofishing, or other methods recommended and authorized by CDFW and NMFS. All captured organisms will be identified and the number and location of captured individuals of each invasive species will be recorded. Invasive species will be euthanized and disposed of in accordance with applicable management authorizations (see Section 2.5 below). Native species, including California red-legged frogs, that are captured during the direct removal efforts will be returned to the habitat where they were captured.

Although highly unlikely to be present in College Lake during late summer due to expected unsuitable habitat conditions, S-CCC steelhead may inadvertently be captured during removal efforts. In such an event, steelhead will be transported to suitable habitat in coolers filled with lake water and fitted with battery-powered aerators in accordance with applicable federal authorizations (see Section 2.5 below). A separate Steelhead Monitoring Plan will also be prepared for the Project and will establish steelhead handling and relocation protocols in coordination with NMFS and CDFW.

### 2.4.3 Management Frequency

Multiple annual management efforts are typically needed to fully eradicate invasive species, but even with such extensive efforts, success cannot be guaranteed. College Lake is a natural lake and has likely been occupied by invasive species for decades. Moreover, potential sources of invasive species such as Pinto Lake and Salsipuedes Creek are hydrologically connected to College Lake and may facilitate reintroductions. Existing management by RD 2049, particularly the annual draining of the lakebed for agricultural production, has undoubtedly helped to control proliferation of non-native populations by limiting available habitat to existing drainage ditches during the summer/fall and thereby exposing them to predation by birds and mammals.

As noted above, PV Water will continue to draw down most or all of the lake storage in most years, typically by September, several months later than under current operations. Depending on water year type and demand, however, the lake may not be fully dried every year. In addition to the annual drawdown for water supply, PV Water also plans to further drain the lake and drainage ditches, to the greatest extent feasible, every two to three years for maintenance activities (e.g., equipment maintenance or equipment repair, vegetation and/or sediment management). The full or substantial annual drawdown of the lake for water supply, combined with additional periodic draining for maintenance, will result in significant to complete lake drying of the lakebed on a near-annual basis and help to control invasive species populations by reducing available habitat to the existing drainage ditches.

Direct removal activities are only expected to be effective when water surface elevations in the lake are very low and confined to existing drainage channels such that remaining invasive species are concentrated in shallow wetted areas. Direct removal activities will be conducted whenever such conditions are present in College Lake. Based on anticipated water supply and maintenance needs, direct removal activities may occur as frequently as every year and no less frequently than every three years.

Index sites established for monitoring purposes will be surveyed annually in late summer/early fall when the water surface elevation of the lake is at the expected minimum for that year. Index site will be established in locations that are expected to retain residual depths after drawdown and draining (e.g., immediately upstream of the weir and other depressions within the drainage ditches). Final site selection will occur during the first 1-3 years of plan implementation when typical conditions become evident. All non-natives captured during index site monitoring will be removed. Depending on water storage levels in the lake, additional direct removal efforts in non-index locations will be conducted in most years when feasible, as described above). If significant increases in non-native abundance are noted during index monitoring but the lake has not been fully drained for maintenance, PV Water will drain the lake to the greatest extent feasible to support direct removal efforts.

## 2.5 Management Authorizations

California Fish and Game Code (FGC) Section 5501 allows CDFW, as limited by the commission, to issue a permit to destroy fish<sup>13</sup> that are harmful to other wildlife, as regulated under Section California

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<sup>13</sup> FGC 45 defines “Fish” as “a wild fish, mollusk, crustacean, invertebrate, amphibian, or part, spawn, or ovum of any of those animals”. Therefore, take of invasive signal crayfish is permitted under FGC Section 5501.

Code of Regulations (CCR), Title 14 (T-14) 226.5 *Issuance of Permits to Destroy Harmful Species of Fish in Private Waters for Management Purposes*. This allows CDFW to issue free permits to destroy harmful aquatic species by seining and draining. PV Water expects CDFW will issue such a permit upon approval of this invasive species management plan.

Additionally, take of bullfrogs is specifically allowed in CCR T-14 section 5.05(a)(28), under the authority of a sport fishing license. There is no daily bag limit, possession limit or hour restriction, but bullfrogs can only be taken by hand, hand-held dip net, hook and line, lights, spears, gigs, grabs, paddles, bow and arrow or fish tackle.

CDFW may also authorize ongoing invasive species management activities as part of a Lake or Streambed Alteration Agreement (LSAA) issued for project maintenance activities pursuant to FGC Section 1602. Given that PV Water intends to request an LSAA for maintenance activities such as facility repairs and sediment management, this appear to be the most appropriate permitting approach for this invasive species management plan, pending further discussion with CDFW.

Incidental capture and subsequent release/relocation of steelhead and/or of California red-legged frogs to suitable habitat will occur in accordance with applicable federal Endangered Species Act take authorizations for the Project from NMFS and USFWS.

## **2.6 Reporting Procedures**

Written logs of management and monitoring efforts will be kept. The written logs will include: 1) date and time of each management and monitoring effort, 2) methods and equipment used, 3) locations of monitoring/management efforts, 4) approximate number and life-stages of each species detected and/or removed per effort, and 5) capture per unit effort. An annual summary report of the results of monitoring and management activities, as well as discussions of the level of success and recommendations for potential modifications to the management protocols, will be submitted to CDFW, NMFS, and USFWS by December 31 of each year.

# CHAPTER 3

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## Response Actions

As described in Section 1.3 above, College Lake and the Project will be managed adaptively through an AMP. The AMP will serve as an umbrella document where the data and information generated by various monitoring efforts, including this invasive species management plan, can be evaluated holistically in the context of the Project objectives. The AMP will provide a set of objectives and an associated set of monitored parameters. The AMP will also define thresholds for the monitored parameters that when exceeded would require management actions (i.e., action triggers). The exact management action will depend on the nature of the problem and the appropriate remedies available. Typically, the first management action will be to conduct a thorough review of the available information that can inform project managers regarding the applicability of various actions. Often, technical experts (both associated with and external to the project, as warranted) will be consulted before taking a management action to analyze the relevant information and provide a range of appropriate management actions, including their risks and costs.

Within the context of the AMP, the annual reports (Section 2.6) for this invasive species management plan will provide the values of monitored parameters (e.g., numbers of an invasive species captured) to be compared to the value of the action trigger, related discussions of the effectiveness of implemented control measures, and, if warranted, recommendations for potential remedial response actions for consideration by PV Water and regulatory stakeholders (CDFW, NMFS, USFWS) through the adaptive management process. Depending on the reasons for invasive species persistence (e.g., ineffective capture methods, re-colonization from nearby waterbodies, illegal stocking, etc.), PV Water will identify feasible response actions. For example, if recolonization from Pinto Lake is found to be the primary source of invasive species in College Lake, PV Water may discuss potential remedial actions (e.g., screening of Pinto Lake outlet) with the City of Watsonville. If invasive species persistence or proliferation are determined to be the direct cause of lake management practices, PV Water will coordinate with regulatory stakeholders (CDFW, NMFS, USFWS) to identify potential response actions (e.g., more extensive direct removal efforts) that are consistent with Project needs and objectives.