STATE CAPITOL
SACRAMENTO, CA 95814
(916) 651-4015

California State Senate

SENATOR
JIM BEALL
FIFTEENTH SENATE DISTRICT

July 9, 2020

Nai Hsueh, Chair
Valley Water Board of Directors
5750 Almaden Expressway
San Jose, CA 95118

Dear Chair Hsueh:

I write to express my support for the Draft Community Preferred Plan (the Plan) that would be implemented should the Safe, Clean Water and Natural Flood Protection Program be renewed, and to urge the Valley Water Board of Directors to adopt the Plan for the November 2020 ballot.

While I support the Plan, I will work to ensure Valley Water provides land acquisition and enhancement funding for multi-agency projects, such as the wildlife crossing on Highway 17. Valley Water can be an essential partner in the creation of this important watershed protection project. This corridor would safely connect wildlife around the Lexington Reservoir open space nexus, ensuring the health of our watershed while further promoting the safety of Silicon Valley residents. This multi-agency watershed protection should be a priority.

Additionally, I will continue to advocate for the protection of residents along Coyote Creek high-risk flood zones— particularly for residents along the Rockspring and William Street Park neighborhoods. The hardships these residents endured in 2017 cannot be overstated. I look forward to working with residents and Valley Water on the timeliness, evaluation, and success of these public safety investments.

Exploratory discussions on the Plan have yielded several priorities which bring better services and clean waterway opportunities to residents, with accountability they can act upon.

I respectfully urge the Board to adopt and to place this measure on the November ballot. If you have any questions, please contact my office at (408) 558-1295.

Sincerely,

Jim Beall

Jim Beall
Senator, District 15

7/12/2020

Nai Hsueh, Chair
Valley Water Board of Directors
5750 Almaden Expressway
San Jose, CA 95118

Dear Chair Hsueh and members of the Board:

Since 2018, Valley Water has awarded our organization $25,000 in Safe, Clean Water and Natural Flood Protection Program grant funding for our five D3 mini-grant projects. These funds provide outdoor watershed-related educational programming for older adults including legally blind seniors. These activities create environmental stewards by bringing awareness about the importance of the creeks and watersheds in our community.

We support local dollars for local projects. The reason why we support the draft program is because it does the following:

- Provides for expanded grant funding
- Offers greater flexibility to fund additional innovative projects that meet community needs
- Streamlines and provides for a more efficient process through a stabilized grants program
- Provides for additional funding to address the impacts of the unhoused along our waterways
- Guarantees funding availability beyond a simple 15-year program

Bay Area Older Adults supports the proposed community-preferred program report to renew the Safe, Clean Water Program, and urges the Board to adopt it and place this measure on the November 2020 ballot. If you have any questions, please feel free to contact me at 408.472.4464 or share@bayareaolderadults.org

Sincerely

Dr. Anne Ferguson
Executive Director
Bay Area Older Adults
www.bayareaolderadults.org

Handout 2.7-AAH
07/14/20

City of Santa Clara
The Center of What's Possible

Mayor

Lisa M. Gillmor

Councilmembers

Raj Chahal
Debi Davis
Karen Hardy
Teresa O'Neill
Kathy Watanabe

July 10, 2020

Nai Hsueh, Chair
Valley Water Board of Directors
5750 Almaden Expressway
San Jose, CA 95118

Dear Chair Hsueh:

On behalf of the City of Santa Clara, I write to express support for the Draft Community Preferred Plan (the Plan) that would be implemented should the Safe, Clean Water and Natural Flood Protection Program be renewed, and approved by the Valley Water Board of Directors in order to adopt the Plan and place the renewal of that program on the November 2020 ballot.

We believe that ensuring a reliable supply of water coupled with comprehensive and progressive water conservation programs, environmental and flood protection programs are essential in addressing the needs of our communities while ensuring that associated cost impacts are minimized for our ratepayers. The San Francisco Bay Shoreline Project, as highlighted in the community-preferred program report is important to the City of Santa Clara as this project will provide coastal flood protection from climate change induced rising sea-levels, restore and enhance tidal marsh, protect 4,700 acres, 5,000 structures and the San José-Santa Clara Regional Wastewater Facility.
Passage of this measure would provide support for volunteer efforts and educational activities, safety protocols, and protection of our natural areas.

This potential ballot measure, known as the Safe, Clean Water and Natural Flood Protection Program has yielded the following draft priorities as part of the exploratory process:

- Ensure a safe, reliable water supply
- Reduce toxins, hazards and contaminants in our waterways
- Protect our water supply from earthquakes and natural disasters
- Restore wildlife habitat and provide open space
- Provide flood protection to homes businesses, schools, and highways
- Support public health and public safety for our community

The City of Santa Clara supports the Plan and requests the Board to adopt and to place this measure on the November ballot. If you have any questions, please feel free to contact Gary Welling, Director of Water & Sewer Utilities at (408) 615-2018 or gwelling@santaclaraca.gov.

Sincerely

Lisa M. Gillmor, Mayor
City of Santa Clara

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Michele King

From: Michelle Critchlow on behalf of Board of Directors
Sent: Monday, July 13, 2020 2:33 PM
To: Michele King
Subject: FW: DO NOT SUPPORT Report Safe, Clean Water Program
Attachments: FINAL NGO Letter to Valley Water.pdf

For the Board Meeting

From: Cheryl Weiden <weidenc@gmail.com>
Sent: Monday, July 13, 2020 1:58 PM
To: Board of Directors <board@valleywater.org>
Subject: DO NOT SUPPORT Report Safe, Clean Water Program

Nai Hsueh, Chair

Valley Water Board of Directors

5750 Almaden Expressway

San Jose, CA 95118

Dear Chair Hsueh and members of the Board:

As an engaged Valley Water infrastructure tour participant, I DO NOT support the proposed community-preferred program report to renew the Safe, Clean Water Program, and urges the Board to adopt it and place this measure for a parcel tax on the November 2020 ballot.

I am dismayed at the PR effort to persuade the public, including me, to support the ballot measure without full disclosure of the activities of Valley Water. Specifically, I oppose the Bay Delta Tunnel project and the water projects which will reduce water for environmental needs without prioritizing conservation first.

Please know I fully support the attached letter from Peter Drekmeier of Tuolumne River Trust and a coalition of environmental groups.

If you have any questions, please feel free to contact me at (650)464-1610.

Sincerely

Cheryl Weiden

LOS ALTOS HILLS
CALIFORNIA

July 8, 2020

Nai Hsueh, Chair
Valley Water Board of Directors
5750 Almaden Expressway
San Jose, CA 95118

Dear Chair Hsueh:

On behalf of the Town of Los Altos Hills, I write to express support for the Draft Community Preferred Plan (the Plan) that would be implemented should the Safe, Clean Water and Natural Flood Protection Program be renewed, and urge the Valley Water Board of Directors to adopt the Plan and place the renewal of that program on the November 2020 ballot.

We believe that ensuring a reliable supply of water is essential in addressing the needs of our communities. Passage of this measure would provide support for volunteer efforts and educational activities, safety protocols, and protection of our natural areas.

This potential ballot measure, known as the Safe, Clean Water and Natural Flood Protection Program has yielded the following draft priorities as part of the exploratory process:

- Ensure a safe, reliable water supply
- Reduce toxins, hazards and contaminants in our waterways
- Protect our water supply from earthquakes and natural disasters
- Restore wildlife habitat and provide open space
- Provide flood protection to homes businesses, schools, and highways
- Support public health and public safety for our community

The Town of Los Altos Hills supports the Plan, and urges the Board to adopt and to place this measure on the November ballot. If you have any questions, please feel free to contact me at (650) 947-2514 or ccahill@losaltoshills.ca.gov.

Sincerely

Carl Cahill
City Manager

26379 Fremont Road
Los Altos Hills
California 94022
650/941-7222
Fax 650/941-3160

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Date: July 12th, 2020
To: Board of Directors, Santa Clara Valley Water District
5750 Almaden Express Way
San Jose, CA 95118
From: Patrick Samuel, Bay Area Conservation Director, California Trout
360 Pine Street
San Francisco, CA 94141
Re: July 14, 2020 Board Meeting, Agenda Item 2.7. Approval of Updated and Enhanced Safe, Clean Water and Natural Flood Protection Program for a Future Funding Measure (Continued from June 23, 2020)

Dear Board Chair Nai Hsueh:

California Trout, Inc. ("CalTrout") provides these comments regarding Item 2.7, "Approval of Updated and Enhanced Safe, Clean Water and Natural Flood Protection Program for a Future Funding Measure," which is on the agenda for Santa Clara Valley Water District's ("Valley Water") Board of Directors July 14, 2020 meeting.

California Trout's mission is to ensure that resilient, wild fish thrive in healthy waters for a better California. We have been working statewide for almost 50 years, and have engaged with the Santa Clara Valley Water District for the past 17 years in good faith as an original Initialing Party of the Fisheries and Aquatic Habitat Cooperative Effort (FAHCE Agreement) toward that goal.

Over the past seventeen years, Valley Water has completed some important barrier removal and habitat improvements projects and conducted watershed studies. However, these have been insufficient to even maintain, let alone protect and enhance fish populations in the watersheds in which they operate. Despite these efforts, the status of federally threatened Central California Coast steelhead (*Oncorhynchus mykiss irideus*) has continued to decline over time. Dr. Jerry Smith has concluded from independent steelhead surveys throughout the Coyote Creek watershed that steelhead have either become extirpated already or populations have dwindled to such low levels of abundance to almost be undetectable in standardized surveys (*J. Smith 2019 – attached*). Mismanagement and lack of adequate streamflows, lack of quality habitat, and access to such habitats have contributed to the species' decline in Coyote Creek and the Guadalupe River and Stevens Creek as well, all under the Water District's watch. The best available science indicates that without action, CCC steelhead are likely to become extirpated in the next 50 years (https://watershed.ucdavis.edu/files/content/news/SOS%20II_Final.pdf).

We request that the Board direct staff to make changes to the proposed funding program that would be implemented if the special tax passes. Specifically, we request adding:

- Inclusion of a sunset clause for the parcel tax;
- addition of clear explanations and timelines for the fisheries-related projects that will be funded by the parcel tax under Project D4-D6 "Restore Wildlife Habitat" and
- assurance that the funds used for these purposes under the parcel tax do not count against the FAHCE budget.

CALIFORNIA TROUT
FISH · WATER · PEOPLE

First, CalTrout believes that this Parcel Tax measure, while it does include important provisions for environmental justice and public safety, is using positive polling data on clean water language in the measure to entice ratepayers to fund water supply projects without sufficient requirements for Valley Water to timely implement legally required restoration activities. Specifically, we request inclusion of a sunset clause on the parcel tax measure, which would avoid the potential for the delays in project design and implementation from the District that Initialing Parties have experienced in the FAHCE process.

While we enthusiastically support habitat restoration to benefit ecosystem function, fisheries recovery, and public health and safety, we are opposed to the inclusion of any of Priority D "Restore Wildlife Habitat" considerations as part of the parcel tax resolution ("Parcel Tax") without inclusion of specific safeguard amendments. Santa Clara Valley Water District ("Valley Water") has a duty to enact the habitat enhancement measures listed in the Parcel Tax through California Fish and Game Codes and through State Water Board provisions and/or mitigation with District funds. The Parcel Tax provisions that support fish passage and habitat improvements are listed in wide-ranging categories that give Valley Water too much discretion to fund other projects in place of these required restoration activities. We request more clarification on which projects specifically under Projects D4-D6 (Project D4, Fish Passage and Habitat Improvement; Project D5, Ecological Data Collection and Analysis; and Project D6, Restoration of Natural Creek Functions).

Finally, we request that any funds raised by the parcel tax will not count against the prior FAHCE budget. Ratepayers should not be expected to pay for a new tax for measures that should have already been completed under FAHCE over the last seventeen years were that process working as intended.

Should the Board direct District staff to incorporate these changes, we would support the proposed resolution for the parcel tax. We look forward to putting the past 17 years of frustration and delay behind us and working with you in this effort to ensure the health of Santa Clara County watersheds as soon as possible.

Respectfully,

Patrick Samuel

Bay Area Program Manager

California Trout

Fish Population and Environmental Sampling In 2014-2019 on Coyote Creek

Jerry J. Smith, Emeritus Professor
Department of Biological Sciences
San Jose State University
frogs_and_fish@yahoo.com
23 December 2019

CUMULATIVE ABSTRACT

Severe drought and cut-backs in the delivery of imported water via the San Felipe Pipeline resulted in substantial reductions in reservoir and pipeline releases to Coyote Creek from early February 2014 through March 2016. Despite the flow cut-backs, adult steelhead (*Oncorhynchus mykiss*) had access and spawned in Coyote Creek between Ogier Ponds and Anderson Reservoir during the very brief passage window in early February 2014; however, the brief and very early passage window would have prevented almost all steelhead smolts reared in 2013 or 2012 from successfully emigrating in 2014. In 2015, despite more rain and runoff into Anderson Reservoir, the reduced pipeline and reservoir releases that began in February 2014 were continued, and there was no downstream flow continuity to provide adult or smolt passage. No young-of-year (YOY) steelhead were captured in 2015, and most steelhead reared in 2014 were not found at sampled sites, and therefore likely smolted and attempted to emigrate. However, considering the persistent lack of suitable flow conditions in downstream reaches of Coyote Creek, any steelhead smolts that attempted to emigrate would have been trapped in the dry-back zone and/or lost to bass (*Micropterus* spp.) predation in the Ogier Ponds. In 2016, the lack of connectivity continued until the end of March, when large reservoir releases were made for groundwater percolation, that also provide for potential immigration of steelhead adults. However, no juvenile steelhead were captured during fall 2016 sampling. In 2017, despite the flood flows in February and high flows through summer, adult access to spawning and rearing areas upstream of Metcalf Pond would only have been possible (although difficult) prior to the flood, during very brief windows during the flood, and after 30 March due to damage at the Metcalf Dam. In addition, poor high flow/velocity passage conditions at the Singleton Road apron and culverts would have hindered or prevented adult upstream access during much of the migration period.

Spring-fall stream flows in 2017 were mostly between 30 and 70 cubic feet per second (cfs) in the potential spawning and rearing habitat. Most of the flow come from releases from Anderson Reservoir because of seismic-related reservoir storage limits, rather than from a more equal combination of reservoir and San Felipe Pipeline releases as in previous years. Therefore, water temperatures between the reservoir and the Ogier Pond complex were somewhat cooler than in 2014-2016. Releases warmed over the summer as the reservoir was

drawn down towards the mid-level release port. The heating effect of Ogier Ponds maintained very warm water temperatures downstream of the ponds (22-25+°C) as observed in 2014-2016. Temperatures downstream of the ponds were 3-6°C warmer than upstream into September, because of the large heat capacity within the ponds and the discharge of warm surface water from the ponds. The large amount of stored storm water in Anderson Reservoir atypically resulted in relatively turbid releases throughout summer and fall. Despite brief windows of potential adult steelhead access and suitable rearing conditions in summer and fall 2017, no juvenile steelhead were captured during sampling at four sites in August or October. Apparently, the last potential smolts to successfully emigrate in Coyote Creek were probably in 2013. The unsuitable flow conditions, and the barrier at Singleton Road, resulted in passage bottlenecks that eliminated most or all steelhead production for 2013-2017, potentially extirpating steelhead.

In 2018, adult steelhead access should have been possible during brief storms in mid-January and March through early April. However, passage at Singleton Road would have been suitable only intermittently, and passage at the Coyote Ranch Road stream gage weir would have been continuously difficult. The reservoir volume doubled to about 42,000 acre-feet (AF) by the end of March. Stream flows downstream of Anderson Reservoir were 30-50 cfs from February through October. Mean water temperatures of reservoir releases were warm (22°C) at the late September peak, but were 3-5°C warmer downstream of Ogier Ponds in May through July compared to upstream. No O. *mykiss* were captured by electrofishing at the four previously sampled sites. However, Valley Water (VW) biologists did capture two juveniles at another location. A tiny remnant population apparently still existed, but was still at risk of extirpation. New Zealand mud snails (*Potamopyrgus antipodarum*), an undesirable invasive, were encountered between the dam and Ogier Ponds.

In 2019, heavy rains in January through mid-March filled Anderson Reservoir towards it seismic storage limit, triggering heavy releases (400 cfs) in February through mid-March. Adult steelhead passage was potentially available into April and potential smolt passage was available through May. Late spring through fall releases were almost all from the mid-level release port at Anderson Reservoir. Release temperatures rose over the summer, and sharply increased in September, to a mean of 21°C, as the reservoir elevation lowered the thermocline to the mid-level outlet. Water temperatures increased little between the dam and the Ogier Ponds, but jumped substantially through the four ponds, with mean June through September temperatures 21-23°C; mean temperatures in June were 8°C higher downstream of the ponds compared to upstream. Temperature increase after going through only the first pond was still about half of that produced by the four ponds. Those temperatures and seasonal temperature pattern continued at sites farther downstream. Despite a sampling effort almost twice that of 2018, only one YOY and three yearling steelhead were seen or captured. Sampling by the VW also captured three YOY. The steelhead "run" consists of a very few fish, and the population is still at risk of extirpation.

Improvements to the steelhead population will require removal of the Singleton Road passage barrier as soon as possible and modification of current release strategies during late winter and

spring to provide for adult and smolt passage in dry years. The renovated VW gaging weir at Coyote Ranch Road also needs to be modified for fish passage as soon as possible. Less urgent, but necessary, is the modification of the Metcalf Dam (replaced with rubber dam?) and modification of the fish ladder so that the baffles can easily be removed or modified to accommodate a variety of stream flow and Metcalf Pond water levels. Stream flow connectivity for successful migration improves substantially if releases for aquifer recharge are maintained at a level (30-40 cfs) sufficient to reach below Metcalf Pond, particularly when prior to and during larger storm events. In addition to providing aquifer recharge, these releases would connect with storm runoff from Fisher Creek and from substantial suburban impervious surface runoff downstream of the Metcalf Dam, which would then provide connectivity into and through lower Coyote Creek. Additionally, mid-summer through fall releases similar to those in 2016-2018 (30-40+ cfs), rather than the much smaller releases in 2014 and 2015, would provide more rearing habitat extent and more optimal fast-water feeding habitat. Cooler water, based upon source (reservoir versus San Felipe Pipeline) and release port elevation in Anderson Reservoir, during most of mid to late summer and fall, would also improve rearing habitat quality. Finally, re-directing the stream around Ogier Ponds is urgently needed to eliminate the water temperature and predation effects of the ponds on rearing and migrating steelhead.

INTRODUCTION

Summer or fall investigations into the distribution and abundance of rainbow trout/steelhead had not been conducted for decades on Coyote Creek in the reach between Anderson Reservoir and Metcalf Pond until electrofishing was conducted between Anderson Reservoir and Ogier Ponds in September and November 2014 (Leicester and Smith 2014b). Despite the dry conditions in 2014, and the substantial reduction in releases to the stream after early February, presence of rearing YOY indicated that adult steelhead accessed and spawned in the reach between Ogier Ponds and Anderson Reservoir. The streambed dried downstream of Ogier Ponds by late June. YOY steelhead were captured at all three sample sites in both September and November, and despite warm late-summer water conditions, they were large enough to smolt and emigrate by spring 2015, especially with good conditions for growth in most of winter and spring 2015.

However, winter and spring conditions were extremely dry again in 2014-15, so stream connectivity was not restored and adult and smolt migration was not possible. Sampling was repeated in late June-early July, and in November 2015. Almost all YOY fish reared in 2014 had emigrated, but would have been lost during the attempt, due to the unconnected and drying stream farther downstream and/or to predatory bass in the Ogier Ponds (Leicester and Smith 2015). A very few large yearling steelhead were still present in June. The attempted emigration by most *O. mykiss* indicates that the fish were steelhead; there is no resident rainbow trout population in Coyote Creek downstream of Anderson Reservoir. In 2016, connectivity was not restored to allow potential adult or smolt migration until very late March,

when high releases were made for groundwater percolation and to potentially allow late-migrating steelhead adults to access upstream spawning and rearing areas. No juvenile steelhead were captured by fall sampling at four sites in 2016.

In 2017, high stream flows provided some windows in January, February and April for potential adult steelhead to access spawning and rearing habitat upstream of Metcalf Pond and the Ogier Pond Complex (Smith 2017). However, few adult steelhead were likely because of the impacts of flow conditions on smolt emigration in 2014-2016. Electrofishing sampling conducted in late August and late October 2017 captured no steelhead at four sample sites, so there was little or no apparent successful steelhead production for five years, 2013-2017, potentially extirpating steelhead in the watershed (Smith 2017).

In 2018, adult steelhead access should have been only possible during brief storms in mid-January and March through early April. Flows of at least 6 cfs reached the Edenvale gage throughout winter, and storm flows from Fisher Creek and the suburban impervious surfaces downstream of Metcalf Pond produced flows for potential adult passage throughout Coyote Creek to above Metcalf Dam (Smith 2018). However, passage at Singleton Road would have been suitable only intermittently, and passage at the reconstructed Coyote Ranch Road stream gage weir would have been continuously difficult (Smith 2018). The reservoir volume doubled to about 42,000 acre-feet (AF) by the end of March, and flows downstream of Anderson Reservoir were 30-50 cfs from February through October. Mean water temperatures of reservoir releases were warm (22°C) at the late September peak, and also were 3-5°C warmer downstream of Ogier Ponds in May through July compared to upstream. No O. *mykiss* were captured by electrofishing at the four previously sampled sites. However, VW biologists did capture two juveniles at another location.

In 2019, habitat monitoring and fall electrofishing was again conducted to assess the status of the precarious steelhead population in the watershed.

METHODS

Data on stream flow and Anderson Reservoir storage were obtained from the Santa Clara Valley Water District (SCVWD) Automated Local Evaluation in Real Time ("ALERT") website (Anderson reservoir storage, Madrone, Edenvale, Coyote Ranch Road, and Fisher Creek stream gages), and conditions in the streambed were visually assessed irregularly through June. In addition, stream flow conditions upstream of Coyote Reservoir were obtained from the USGS ("near Gilroy") gage, as an index to upper watershed runoff.

Six Onset Hobo temperature loggers, that recorded every 30 minutes, recorded from 1 April through November 23 (Figure 1). Four other loggers (dates in ( ) below) started recording on 1 May or 3 July; recovery of one of those loggers was delayed until 18 December:

1) in Coyote Creek County Park immediately downstream of Anderson Reservoir;

2. at the discharge from the hydro pipeline downstream of Anderson Reservoir *(3 July through 23 November)*
3) in the Park downstream of the San Felipe Pipeline/hydro discharge location, to reflect the combination of reservoir and pipeline discharges;
4) upstream of the Ogier Ponds complex, downstream of the Model Airplane Park;
5) immediately downstream of Ogier Pond #1 *(23 July through 18 December)*
6) immediately downstream of the Ogier Pond Complex;
7) downstream of the dead end Golf Course Road;
8) downstream of Coyote Creek Ranch Road *(1 May through 23 November)*;
9) immediately downstream of the outflow from Metcalf Pond ("Coyote Percolation Pond"); and
10) near the Edenvale stream gage (*1 May through 23 November*)..

On 9 September, four previously sampled sites were sampled by electrofisher (Figure 1): immediately downstream of Anderson Reservoir, upstream of the Correctional Facility downstream of the Reservoir, the main channel upstream of Ogier Pond #1, and a braided channel upstream of Ogier Pond #1. On 23 October a previously sampled site downstream of the Golf Course Road (downstream of the Ogier Ponds), additional braided channels upstream of Ogier Pond #1, and a short reach between Ogier Pond # 1 and #2 were sampled. Stream flow during sampling was approximately 40-48 cfs at four of the sites, but about 20 cfs at the site immediately downstream of the Anderson Reservoir, which received only part of the reservoir and pipeline release. Flows were between 6 and 25 cfs in the individual braided channels. Two pass electrofishing was conducted to provide depletion population estimates, but only two *O. mykiss* were captured and two others were shocked but not captured. Approximately the same habitats were sampled at the four resampled sites as in 2017 and 2018. A total of 2300 feet of stream was sampled in 2019, almost twice the length of habitat sampled in 2018.

Fish were identified to species, some lengths (fork length, FL) measured, and all fish were released in or near the habitat in which they were collected. Approximate sizes were recorded for the two *O. mykiss* that were shocked but not captured. Ages of the two captured *O. mykiss* were determined from scales.

RESULTS AND DISCUSSION

Streamflow Conditions

Streamflow conditions in 2019.—Runoff in upper Coyote Creek above Coyote Reservoir was heavy in early and mid-January, and then continuously high in February through mid-March (Figure 2). A late storm occurred in mid-May. Anderson Reservoir storage was headed towards it seismic limit in early February (Figure 3), and releases of more than 400 cfs were made in early February through mid-March (Figures 4 and 6). At the Edenvale gage, downstream of Fisher Creek runoff (Figure 8) and flow from the partial opening of one radial gate at Metcalf Pond (Photo 1), stream flow was near or above 600 cfs during the same period (Figure 10).

During the high flows at Metcalf Dam and at Singleton Road during February through mid-March adult steelhead passage should have been available (with some difficulty at both locations; Photos 2 and 6) throughout Coyote Creek. When stream flow dropped after mid-March, passage improved at Metcalf Dam (Photo 3), and passage initially became more difficult (Photo 7), then improved (Photo 8) at Singleton Road. However, adult passage at the Coyote Ranch Road gaging weir was unlikely except during the earlier peak flows (Photos 4 and 5). Any very limited smolts produced by 2018 rearing would have been able to emigrate during February through the beginning of June, when flows at Edenvale dropped below 10 cfs (Figure 11).

Releases from mid-June through November climbed from 35 to 50 cfs (Figure 5). Percolation losses reduced stream flow to 10-15 cfs at Coyote Ranch Road (Figure 7). Fisher Creek watershed added 7-8 cfs (Figure 9), most of which was returning water percolated from Coyote Creek. Percolation at Metcalf Pond and downstream resulted in 5-6 cfs remaining at Edenvale in June through November (Figure 11).

Streamflow Conditions in 2018.—In the relatively dry watershed upstream of Anderson Reservoir significant runoff was confined to a single storm peak in January and then to more brief peaks in March and early April (Smith 2018). The large releases of October 2017 through January 2018 were gradually reduced, and the January runoff stabilized the reservoir level (Figures 3 and 4). The later storms gradually doubled storage of the drawn down reservoir to about 42,000 AF by the end of May (Smith 2018). Releases from the reservoir and the San Felipe pipeline from mid-February to mid-April were about 30 cfs, before climbing to about 50 cfs from mid-May through October. Stream flow progressively declined downstream with percolation losses, so that at Coyote Ranch Road, upstream of Metcalf Pond and Fisher Creek, the flow in February through October was about 8-18 cfs (Smith 2018). The lack of significant tributaries upstream of Fisher Creek keep weather-related fluctuations to a minimum.

Fisher Creek added runoff during storms, but Metcalf Pond also percolated substantial water for aquifer recharge, so that flows between storms downstream of Metcalf Pond at the Edenvale stream gage were about 6 cfs in February through October (Smith 2018). However, Fisher Creek, and especially the increasing urbanized neighborhoods and their impervious surfaces, produced pronounced brief runoff spikes during the January, March, and early April storms (Smith 2018). These runoff peaks provided the potential attractant and migration flows for adult steelhead in the watershed.

Streamflow Conditions in 2017.--In early January through February extremely large storms produced record runoff in the upper Coyote Creek watershed (Smith 2017). From October through 9 January releases from Anderson Reservoir slowly declined from about 50 to 20 cfs (Smith 2017) to conserve water following the severe 2013-2015 drought, with the reservoir having only about 27,000 acre-ft of storage at the start of the intense storms. With the start of the storms the SCVWD began releasing at the maximum capacity of the outlet, increasing releases to about 370 and then to 525 cfs as the reservoir depth (and hydraulic head) increased (Smith 2017). Runoff from the upper watershed far outpaced the ability to release water from

the reservoir, and the reservoir filled and began to spill on 18 February (Smith 2017), with spilling (and bottom release) reaching approximately 7,300 cfs on 21 February. Flows from the reservoir declined to 600 cfs by 27 February and gradually declined to 400 cfs (with the maximum bottom release) through late April (Smith 2017); seismic rules required lowering the reservoir storage. Two brief reductions of releases were made: the first in early February to lower or remove dam panels at Metcalf Pond and the second in late May to modify the fish ladder at the dam for fish passage at the reduced pond water level (Smith 2017). Releases from the reservoir and the San Felipe Pipeline gradually declined to almost 30 cfs by early July before increasing to about 45 cfs from mid-July through most of September. Releases then fluctuated between 50 and 70-90 cfs in October and November to accommodate infrastructure repair and pond filling at Metcalf Pond and to draw down the reservoir by December to provide very conservative flood capacity (Smith 2017). The flood flows washed out the road downstream of Ogier Pond #1 (to the Model Airplane Park) and severely damaged the bridge at Coyote Ranch Road. In addition, it rerouted the main channel and produced braided channels upstream of Ogier Pond #1 and greatly widened the outlet channel from Ogier Pond #4 (Smith 2017)

The releases in January would have provided potential passage through the ladder at Metcalf Pond. However, the unprecedented storm flows in February required lowering the dam panels and opening the radial gates at Metcalf Dam. The fish ladder operated briefly during the peak on 21 February, but adult steelhead would have been unlikely to locate the ladder during the peak. Fish passage would probably not have been possible over the apron or through the radial gates at the Metcalf Dam from 19 February until 30 March, when the fish ladder was finally modified to function with the lowered pond level. Even after 30 March, steelhead might have had problems locating the ladder among the high flows dispersed among the dam apron and the left bank ladder in April. In October the dam panels were reinstalled, the damage to the supporting apron was buttressed with grouted boulders, and a set of grouted boulder weirs was constructed between the down-cut channel downstream of the dam and the fish ladder (Smith 2017).

Early January through mid-April stream flows farther downstream on Coyote Creek would have provided potential adult steelhead passage everywhere except at Singleton Road which is a major steelhead passage barrier (Photo 9). The high releases from the reservoir probably restricted passage at Singleton Road because of high velocities over the apron of the road crossing and through the two culverts. Only fish moving during the peak of the flood, which submerged the crossing, would have been likely to pass easily. Only in late April and May, after the migration/spawning period, would flows have declined enough to allow potentially marginal passage through the culverts (Smith 2017). Even without the passage problems at Metcalf Pond, steelhead access to spawning and rearing habitat would have been very difficult during and after January.

Streamflow Conditions 2014-2016.-- All late spring through fall stream flow, and almost all of the winter stream flow, in the potential steelhead rearing reaches downstream of Anderson Reservoir is provided by releases from Anderson Reservoir and from imported water from the San Felipe Pipeline (San Luis Reservoir water). Year-round releases from these sources are used

for groundwater percolation, and in April through September of 2013, releases were usually 37 – 55 cubic cfs (as reported by the SCVWD Alert Gage for the Madrone stream gage); that magnitude of releases had been typical of operations for the last 15 years. However, the releases after February 2014 and in 2015 were substantially curtailed because of severe reductions in Bureau of Reclamation deliveries to the San Felipe Pipeline due to the ongoing severe state-wide drought (Leicester and Smith 2014b and 2015b). A State Water Board decree restricted all Delta contract water to municipal and industrial use, stopping agricultural deliveries and general groundwater recharge. For the Coyote Creek watershed, this meant a shift from groundwater percolation to direct pipeline delivery of water to the water treatment plant for distribution to water retailers. This resulted in stream flows that were reduced from an average of 30 – 37 cfs in December 2013 - January 2014, to 13-15 cfs from early February 2014 through mid-June, and 8.0 – 9.0 cfs from mid-June through November 2014 (Leicester and Smith 2014b). Except for storms in December 2014 and February 2015, stream flows then remained in the 8 – 9 cfs range through mid-November 2015 (Leicester and Smith 2015b). Releases then increased slightly in mid-November to 14-15+ cfs, when the San Felipe water not imported during the pipeline interruption was recovered for SCVWD use. Those flows continued through late March 2016.

Storms in mid-December 2014 produced stream flows above Coyote Reservoir of more than 2000 cfs, and a brief storm in early February produced stream flows of approximately 1800 cfs (Leicester and Smith 2015b). Runoff increased Anderson Reservoir storage from about 34,000 acre feet (AF) to 46,000 AF from December through May. Despite the increased storage, releases from the reservoir and from the San Felipe Pipeline remained unchanged through winter and spring 2014-15 at 8-9 cfs. Local runoff from the December and February storms only slightly increased stream flow at the Madrone stream gage 1.5 miles downstream of the reservoir to 16 cfs in December and 12 cfs in February (Leicester and Smith 2015b). A small amount of local runoff was added farther downstream, and surface flow in Coyote Creek extended to downstream of the Golf Course. However, monitoring of the streambed after the storms indicated that neither storm resulted in extension of surface flow to Bailey Avenue. The Edenvale stream gage farther downstream, which is subject to runoff from Fisher Creek near Bailey Avenue and to flashy suburban runoff during storms, recorded brief runoff of approximately 200 cfs in late November, 165 cfs in December, and 40 cfs in February (Leicester and Smith 2015b). However, the low and steady releases from the reservoir and the pipeline did not provide a surface flow connection to the downstream storm runoff. In addition, the radial gate at the Metcalf Pond was closed during the late portion of the February runoff; therefore passage was not possible through the fish ladder at the partially filled pond. No potential adult steelhead or smolt passage was possible in winter/spring 2014-15 (Leicester and Smith 2015b).

In 2014, stream flow downstream of the Ogier Pond complex was eliminated by 20 June, but in 2015, flow below the Ogier Ponds was eliminated by 20 April (Leicester and Smith 2014b and 2015b). The most downstream Ogier Pond (#4) dried in both years.

In 2015, releases to Coyote Creek were generally about 2/3 from the San Felipe Pipeline and 1/3 from the reservoir (Leicester and Smith 2015b). However, the San Felipe Pipeline had to be shut down for repair from 1 August through 12 September. During that period, the 8-9 cfs discharge to the creek was maintained, but came entirely from the reservoir.

In winter 2016 there were two storms in January and two larger storm periods in early to mid-March (Smith 2016). The January runoff increased water stored in Anderson Reservoir from about 30, 000 AF to 40,000 AF. The larger March storms increased storage to over 55,000 AF, and additional water was stored during both periods farther upstream in Coyote Reservoir. Despite the large gains in storage in January and March, releases from the reservoir and the San Felipe Pipeline to Coyote were maintained at only about 15-17 cfs until the end of March. The releases into Coyote Creek produced surface flow only downstream to about 1 mile upstream of Bailey Avenue. During both January and early March, runoff from imperious surfaces in the suburbs near and downstream of Metcalf Pond produced brief and modest (38 and 49 cfs) runoff peaks at the Edenvale Gage, with larger stream flow increases farther downstream from more extensive suburbs. In addition, runoff was produced in January and March in Fisher Creek, which discharges to Coyote Creek upstream of Metcalf Pond, but downstream of the dry streambed up and downstream of Bailey Avenue during the storm periods. If releases from the reservoir had extended flows to fill Metcalf Pond during those periods, connectivity throughout Coyote Creek would have allowed potential adult steelhead immigration.

Large releases (which reached 140 cfs) from the Reservoir and the San Felipe Pipeline for groundwater recharge and adult steelhead passage were begun in late March (Smith 2016), with releases recharging the upstream aquifer and progressively extending surface flow downstream. Metcalf Pond was nearly full on 26 March and spilling about 25 cfs through the fish ladder on 28 March. By 1 April stream flow sufficient to allow adult steelhead passage had reached throughout the lower Coyote Creek channel, and connecting flow was maintained for much of April. Late-migrating adult steelhead should have been able to reach spawning and rearing areas upstream of the Ogier Ponds, although the culverts at Singleton Road may have made passage difficult.

Releases were cut back to about 60 cfs in mid-April and gradually declined to about 50 cfs by the end of October (Smith 2016). Much of the released water over the summer was from Anderson Reservoir, because of interrupted deliveries of Central Valley (San Felipe Pipeline) water. The reduced releases after the large release for adult passage maintained the flow to downstream of Metcalf Pond (which has a bypass requirement), but connectivity for potential smolt or adult emigration passage ceased by late April. The summer releases were generally similar to those that supported large-scale groundwater recharge prior to drought-induced flow cutbacks in February 2014 (Leicester and Smith 2014b).

Water Temperature Conditions

Temperature Conditions in 2019.—The draw-down rate in Anderson Reservoir (Figure 3) indicates that all of the releases into Coyote Creek came from the mid-level release at reservoir

until mid-November. Part of the release discharged at the base of the dam, where mean water temperatures gradually increased from 11-11.5°C in April to 12-13°C in June and 15-16.5°C in August as the reservoir was drawn down, moving warmer upper layers toward the mid-level release port (Figure 12). Then mean temperatures jumped to 17- 21°C in mid to late September as the thermocline lowered past the release port. Shorter days and cooler nights then cooled surface water, causing reservoir mixing ("turnover"), and mean water temperature steadily declined to 16°C at the end of October and 15°C in mid-November (Figure 12). Diurnal variation throughout the year was less than 1°C.

The logger at the pipeline discharge from the hydro system downstream was not installed until July, but the water source was the same mid-level port in the reservoir, so the mean water temperatures were nearly identical until November (14.4-16.5 in August and 17-21°C in mid-late September, when substantial cooling began (Figure 13). In mid-November the discharge was of imported water from the upstream pipeline (Photos 9 versus 10), and temperatures jumped to nearly 18°C (Figure 13). Slightly farther downstream in County Park a third logger has been used in the past to integrate the temperatures from the two discharge locations, which have often come from different sources. In 2019 the source for the two discharges was the same until November, so the water temperature at the third site was essentially the same (Figure 14).

Upstream of Ogier Pond #1, water temperatures had increased only about 1°C, compared to those below the reservoir, buffered by the high stream flows, but there was more diurnal variation (2-3°C) and week to week fluctuations with weather changes (Figure 15). Mean water temperatures were 12-13°C in April, 14-16°C in July, 16-17.5°C in August, and showed the same jump to 20.5°C in September as upstream. (Figure 15).

Other than the substantial seasonal reservoir release temperatures at the mid-level release port, the major impact to stream water temperatures was the effect of passage through the four on-channel Ogier Ponds (Figure 16). Regardless of the inflow temperature to the ponds the outflow temperature was warm in spring through summer. Mean water temperatures were 16-21°C in April, dropped with cool weather (and rain) in mid-May to 17.5°C, before climbing to 21-24°C with warm weather in early June (Figure 16). In July through late September mean temperatures were 21-23°C°, before declining to 15-16°C in November. Mean water temperatures downstream of the ponds were about 8°C more than upstream of the ponds in June, but the difference decreased to 2°C in September as upstream temperatures warmed (Figure 16). Because of the high thermal inertia of the ponds, diurnal variation immediately downstream of the ponds was usually less than 1°C, similar to the variation in the release from Anderson Reservoir (Figures 12 and 16).

The logger immediately downstream of the first pond showed that even a single deep pond can substantially impact downstream water temperature (Figure 17). The mean temperature increase downstream of the single pond was 2-3°C higher than upstream in July and 1-2°C higher in August, about half of the temperature impact of the four pond complex (Figures 15-17). A single pond raised the water temperature half-way to the surface temperature of

downstream ponds, so progressively less temperature change in outflow was possible. This was similar to the seasonal up and downstream temperature differential of the pond complex; in late summer when reservoir release temperatures and those upstream were already warm, there was little potential increase from the similar pond surface water. Diurnal temperature variation was also intermediate between that above and below the four pond complex.

The mean water temperatures farther downstream from the Ogier Ponds at the Golf Course Road (Figure 18) and at Coyote Ranch Road (Figure 19) were very close to the same mean temperatures of the Ogier Pond outlet (within 0.5 °C) throughout the recording period. However, diurnal variation increased to about 2°C at the Golf Course Road and 3°C at Coyote Ranch Road (Figures 18 and 19). The impact of the warming at the ponds persisted to and beyond Metcalf Pond.

Immediately downstream of Metcalf Pond the mean water temperatures were about the same as at Coyote Ranch Road, but, as with Ogier Ponds, the thermal inertia of the pond resulted in low diurnal variation(<1°C) in the discharge from the pond (Figure 20).

The much lower stream flows at Edenvale allowed additional stream warming and an increase in diurnal variation (2-3°C) compared to immediately downstream of Metcalf Pond (Figure 21). Mean water temperature was 20-21°C in early May and was mostly 23-25°C in June through early September before declining (Figure 21).

Temperature Conditions in 2018.—Mean water temperatures immediately downstream of the reservoir and downstream of the pipeline/hydro discharge were nearly identical in 2018, gradually climbing from less than 15°C at the beginning of May to 22°C at the end of August and early September (Smith 2018). The seasonal increase resulted from the lowering of the reservoir that brought increasingly warmer surface water to the mid-elevation reservoir release port. Mean temperature then declined to 18°C in mid-October, as surface water in the reservoir and from the San Felipe Pipeline began their seasonal cooling. The temperature then sharply dropped to 13°C for the last half of October, when the reservoir release was shifted to the bottom release port (Smith 2018). If the bottom release port had been used throughout the summer, the release temperatures would have been similar to the October anomaly. The release temperatures in 2018 were about 2.5°C warmer at the peak and the peak was earlier than in 2017, when the reservoir elevation was higher

Upstream of Ogier Pond #1, diurnal variation was about 3°C, rather than the 1-1.5°C at the reservoir release, and mean temperatures climbed less steeply from 15°C in early May to 21°C in early September (Smith 2018); temperatures actually cooled slightly downstream when the release temperatures were at their peak, as in 2016 and 2017. The October temperature drop in the reservoir release temperature, due to the change in the release port, was reflected in a similar drop upstream of Ogier Ponds.

The outflow from Ogier Pond #4, the last of the on-channel ponds, had a mean temperature of 18°C at the beginning of May and was 24°C at its peak in mid-July, before gradually declining to 21°C in late September (Smith 2018). As in previous years the temperature fluctuated somewhat with weather, especially in June 2018, but diurnal variation was low (1.5°C) compared to stream sites up and downstream, due to the large heat capacity of the ponds. The temperatures were increased 3-6°C compared to upstream of the ponds from May to mid-July (Smith 2018). The difference then declined as the temperature of reservoir releases and stream temperature upstream of the ponds increased. The temperature dip in October below the reservoir and upstream of the ponds disappeared downstream of the ponds due to the substantial temperature effect of the ponds (Smith 2018). Therefore, even with improved release temperatures at the dam, the stream downstream of the ponds would still be persistently warm.

Mean water temperatures farther downstream at the Golf Course and at Coyote Ranch Road mirrored those of the pond outflow, but with increasing diurnal variation downstream, reflecting diurnal air temperature variation and decreasing stream flow downstream (Smith 2018). Maximum temperatures reached 27°C at Coyote Ranch Road.

The mean water temperatures downstream of Metcalf Pond also mirrored those between Ogier Ponds and Coyote Ranch Road (Smith 2018), but as with the outflow from Ogier Pond #4 the diurnal variation was muted by the heat capacity of the pond. Metcalf Pond did not have a temperature effect on stream flow in 2018, because Coyote Creek was already warm when it entered the pond. If reservoir and pipeline releases were cooler, and Ogier Ponds were taken off channel, there would be some temperature effect of Metcalf Pond to go along with its potential predator effect.

Temperature Conditions in 2017.--Anderson Reservoir releases directly downstream of the dam and through the pipeline a short distance downstream (dominated by reservoir water throughout the summer) varied by only 0.5-1.5°C daily, but showed a major seasonal shift (Smith 2017). Mean temperature was less than 15°C in May, but gradually increased to 18°C in mid-September. Temperature increased more quickly to 19.5°C in late September and early October, before declining to less than 18°C in late October (Smith 2017); the decline coincided with exclusive releases from the reservoir while the San Felipe Pipeline was off-line for inspection. There was a one week spike in temperature to 18.5°C in late May when the source of releases was being adjusted. (Smith 2017). Peak temperatures of releases were about 1.5°C cooler than in 2015 and 2016 and occurred for a somewhat briefer period.

Farther downstream above the Ogier Pond complex water temperatures varied 2-3°C daily and had warmed somewhat, despite the relatively high stream flows that buffered against warming (Smith 2017). The daily variation was less than in in 2014 and 2015, when variation was 5°C, with much lower releases Leicester and Smith 2015b). Rather than climbing gradually throughout the summer, mean temperature climbed from 16°C in early May to 18.5°C by mid-June and only to 19°C by September, before declining to 17°C by the end of October (Figure 8). This same general pattern of early rise and relatively stable over the June to September period

occurred for all downstream sites (Smith 2017) and was similar to that of air temperature, which apparently controls seasonal temperature progression in the stream. Mean temperatures were only 0.5-1.0°C warmer than below the reservoir in May through August, and the seasonal peak was actually lower, with air cooling downstream in September (Smith 2017).

Immediately downstream of the Ogier Pond complex daily temperature variation was substantially lower (1-1.5°C) and mean temperatures were substantially higher (Smith 2017), due to the heating effects in the pond, especially at the pond surface, the source of outflow from the pond. Mean water temperatures were 19°C in May and climbed to 25°C by mid-June (with maximums above 26°C) and then declined to 23.5°C by mid-September and 17-19°C in October (Smith 2017). The was no overlap in water temperatures up and downstream of the Ogier Pond complex before mid-September, and mean temperatures were 3°C to more than 6°C higher downstream of the ponds (Figure 9), even more than the heating effect in 2016 (Smith 2016). As in 2016, the temperatures downstream of the ponds are likely to be consistently 22-25°C in summer regardless of the water temperature upstream of the ponds because of the large heat capacity and heating effect within the ponds(Leicester and Smith 2014b and 2015b; Smith 2016). The lower daily variation in outflow temperature in 2017 may be related to the wider opening at Ogier Pond #4 eroded by the February flood (Photo 4 and Smith 2017).

Farther downstream of the ponds, at the Golf Course Road, diurnal variation was 3-4°C, and mean water temperatures were 22-25°C from mid-June to mid-September. With maximums above 26°C in June (Smith 2017). These were similar to those in the pond outflow, although in 2016 means were actually slightly lower (0.5-1.0°C) then the pond outflow temperatures. Even farther downstream, at Coyote Ranch Road, the water temperatures were nearly identical to those at the Golf Course Road. The effects of the ponds makes water temperatures downstream of the Ogier Ponds unsuitable for rearing steelhead unless food is unusually abundant and available (Smith 2017).

The major water temperature issue in 2014 (Leicester and Smith 2014b) and 2015 (Leicester and Smith 2015b) was the sustained release of relatively warm water to Coyote Creek from the San Felipe pipeline and/or from Anderson Reservoir. This occurred despite a pool of cool water in the lower level of the reservoir that could have been utilized to maintain much cooler stream temperatures if the inflow to Coyote Creek had come solely from the near the bottom of the reservoir. With the additional stream flow and much longer wetted channel in 2016 and 2017 (and prior to 2014), then the additional major water temperature issue is the heating effect of the Ogier Ponds. If release temperatures are reduced in late summer, the warm surface water outflows from these large ponds will still result in temperatures downstream that would be similar to those seen in 2016 and 2017. Those temperatures would severely affect rearing quality for juvenile steelhead in the long reach between the Ogier Ponds and Metcalf Pond.

Temperature Conditions in 2014-2016.--In 2014 and 2015, with the cut backs in releases and stream flow extending only as far as Ogier Ponds in summer, the temperature analysis was limited to that of releases and changes down to and through the first two Ogier Ponds for most

of the years (Leicester and Smith 2014b and 2015b). In 2016 and 2017, the restored percolation releases allowed analysis under higher flow conditions and downstream through all four Ogier Ponds and to just above Metcalf Pond.

Air temperature patterns were similar in in 2014-2017, with general increases from April through June, relatively level means through August, and then gradual declines through October (Leicester and Smith 2014b and 2015b; Smith 2016 and 2017). Throughout the study period there were alternating periods of cooler and warmer conditions, with sharp contractions of temperature ranges during cooler, more overcast conditions. Peak air temperatures during warm periods were 30°C to more than more than 35°C, with maximums in 2015 generally somewhat higher than in 2016 (Leicester and Smith 2015b and Smith 2016). Air temperature means during June through August in both years were 20-21°C.

Water temperatures downstream of Anderson Reservoir and the San Felipe Pipeline had narrow (1°C) temperature ranges in all three years (Leicester and Smith 2015b and Smith 2016). In 2015 mean water temperatures increased from 14°C in mid-April to 16°C by early August, then increased sharply to above 20°C for early September through October, before declining sharply after late October (Leicester and Smith 2015b). In 2016 mean temperature increased from 13 °C in mid-April to 14.5°C at the beginning of July, then increased very sharply to 20°C, before sharply declining to 16.5°C a week later, as releases shifted from predominantly San Felipe water to a blend of Anderson Reservoir water and San Felipe water that was both discharged to the stream and delivered to the water treatment plant (Smith 2016). Temperatures then climbed to 20°C by the beginning of August, one month earlier than in 2015, as the draw-down of Anderson Reservoir lowered the thermocline to the level of the mid-elevation multiport release (Smith 2016). Means stayed 20-20.5°C until a slow decline to 19°C through October. The similar water temperatures in September of the three years provide the best month to compare downstream temperature changes.

In 2015, temperature ranges in summer at the site upstream of Ogier Ponds were usually about 5°C (Leicester and Smith 2015b). In 2016, with stream flow increased from about 9 to more than 50 cfs, the temperature range was less than 3°C (Smith 2016). In 2015, means upstream of the Ogier Ponds were 20-21°C in June through September, with maximums often 23-24°C (Leicester and Smith 2015b). In 2016, with the greater flow volume, the means and maximums were cooler; the mean in July was 17.5°C, the mean in August through September was 19.5°C, 0.5-1.5°C cooler than in 2015. Maximums were usually less than 21.5°C, 1.5-2.5°C cooler than in 2015 (Smith 2016). Means in August and September were actually 0.5-1°C cooler than at the site near the reservoir and pipeline discharges (Smith 2016).

In 2015, in the outflow from Ogier Pond #2, mean water temperatures were 17°C in early April, climbing to 22°C in May (Leicester and Smith 2015b). Mean temperatures reached 24-25°C in mid-June through August, and didn't drop below 20 °C until late October. In 2016, mean temperature climbed from 17°C at the beginning of May to 20°C by June and 22.5°C by the beginning of July (Smith 2016). By the beginning of August the mean was 22°C and declined to 21 °C by late September; means in October were 18-18.5°C (Smith 2016). Temperatures

downstream of the first two Ogier Ponds were about 3-4°C warmer than upstream of the ponds in 2015 (Leicester and Smith 2015b) and 2-2.5°C warmer in 2016 (Smith 2016), due to discharge of surface-heated pond water, while the cooler (and denser) inflows to the ponds went to lower levels in the pond. Warming through the first two ponds was apparently somewhat reduced by the substantially higher stream flow in 2016 (and slightly cooler air temperatures). However, the thermal effects of the ponds have sufficient surface heating capacity to overcome much of the thermal mass of the inflow at most operational flows. Diurnal variation was less below the ponds than at upstream stream sites due the larger volume of warm water in the ponds which had a buffering effect against nighttime cooling (Leicester and Smith 2015B and Smith 2016).

In 2015, immediately downstream of the fourth pond in the Ogier Pond sequence, water temperatures during March and April were about 1°C warmer than below Pond #2, before the pond level dropped and the stream dried (Leicester and Smith 2015b). In 2016, mean water temperatures below the fourth pond reached 22-24°C in August through September (Smith 2016), and were 1-1.5°C higher than in the outflow from Ogier Pond #2. Therefore, more of the heating by the Ogier Pond complex occurred in the first two ponds, but the overall heating by the four ponds was 3-4°C in June – October.

Farther downstream in 2016, near the Golf Course, diurnal temperature variation increased to about 2°C, but mean water temperatures (21-23°C in June through August) actually cooled 0.5-1°C compared to the outflow from the ponds (Smith 2016). Maximum water temperatures were similar (23-24 °C) to the site immediately downstream of the ponds. Upstream of Metcalf Pond at Coyote Ranch Road, diurnal variation increased to 3-4°C, mean temperatures were similar to those at the golf course, but maximum temperatures reached 24-25°C (Smith 2016).

Substrate and Turbidity Conditions

2014-2016.--Turbidity level in Coyote Creek was relatively clear (visibility > 120 cm) in 2014-2016 compared to that of other Santa Clara Valley streams downstream of reservoirs (Casagrande 2010; 2014; Leicester and Smith 2014a). In the smaller reservoirs, like Uvas and Stevens Creek, turbid storm water makes up most of the volume and remains suspended in the reservoir for much of the spring and is deposited on the streambed downstream with releases in spring. Sediment can also be deposited from turbid releases in late summer and fall, when the reservoirs are substantially drawn down. Anderson Reservoir is an order of magnitude larger than either of the smaller reservoirs, has usually been more than one-third full at the start of winter, and in most years winter runoff less than doubles the stored volume. Fine sediment in storm water tends to be diluted and settled in spring, and spring turbidity is therefore much lower in releases from Anderson Reservoir. Release water was observed to be clear in March 2014, February 2015, and April 2016; on 15 April 2016, even with significant winter storms, visibility downstream of the reservoir was 65 cm and at the Golf Course it was 89 cm. In addition, the usually high summer releases in 2016, and prior to 2014, apparently rinsed most fine sediments off the streambed, at least in most habitats except large pools. In 2014-2016, substrate in riffles and fast runs was clean, and slower runs, glides and smaller

pools had much less fine sediment than observed in Stevens Creek and much of Uvas Creek. The relatively clean substrate can potentially maintain much higher numbers of aquatic invertebrates (Kaller and Hartman 2004; Foster 2014). In particular, Hydropsychid (net-spinning) caddisflies and Baetid mayflies were abundant in 2016. The relatively clear water should also improve fish feeding efficiency (Barret et al. 1992).

2017-2018.--In 2017, the near record winter runoff to Anderson Reservoir was more than four times the storage prior to the storms, so the entire stored volume of the reservoir was atypically very turbid, similar to the usual annual condition in the smaller reservoirs. Even though the peak of the storm runoff in the upper watershed was over by March, turbidity in the reservoir persisted into summer. On 2 May visibility in Coyote Creek immediately downstream of the reservoir releases was only 15 cm, and downstream of Ogier Ponds at the Golf Course visibility was only 17 cm. By 23 July visibility below the reservoir had only improved to 40 cm and visibility at the Golf Course to only 48 cm. Even by 18 November visibility had only improved to 50 cm below the reservoir and 85 cm at the Golf Course; water in November 2017 was still more turbid than on 15 April 2016.

In 2018, modest (and less turbid) runoff in the upper Coyote Creek watershed resulted in doubling storage of the drawn-down Anderson Reservoir by the end of May (Smith 2018). On 23 March 2018, in the middle of March storms, visibility downstream of the reservoir was 50 cm, and visibility was 45 cm at the Golf Course Road. By 30 April visibility downstream of the reservoir had cleared to nearly 2 m visibility, and visibility was similarly clear in July (Smith 2018). In addition, there were no apparent lasting substrate impacts from the turbid releases in 2017.

There are no significant rocky tributaries between Anderson Reservoir and Metcalf Pond, and Anderson Reservoir has blocked gravel recruitment for more than 60 years. Fisher Creek, which does discharge to the reach, is a flat channel draining a large historic wetland (Grossinger et al. 2006), and is a source of turbidity, but not rocky substrate. Gravels in the range of 25 – 75 mm were relatively scarce in 2014-2016, and spotty in their distribution, including at the tails of pools and glides where steelhead spawning normally occurs. Large cobbles were common at pool tails and in riffles and runs, but they are too large to provide suitable spawning substrate. Suitable spawning gravels were present in the floodplain, but they are normally not available for spawning or recruitment to the active channel except during severe floods, which were largely prevented by the dam. However, the 2017 flood was sufficient to spread over the flood plain, move bank gravels into the channel to improve spawning conditions, and rearrange some channel configurations. Upstream of Ogier Pond #1, a significant part of the main channel was moved to an old flood plain channel (Smith 2017 and Photo 11). The unshaded but reoccupied old channel has abundant cobbles and well-distributed gravels. Even where the stream generally remained in the vegetated recent channel, it occasionally braided into multiple channels (Smith 2017).

2019.—The heavy runoff in January through mid-March (Figure 2) resulted in increasing the storage in Anderson Reservoir from less than 20,000 AF in January to nearly 50,000 AF by April

(Figure 3). This was despite releasing 30,000 AF (Figure 4) in February and early March to stay below the seismic storage limit. The effect was to replace and fill the reservoir with very turbid storm water. On 1 April visibility in the turbidity tube was 39 cm immediately downstream of Anderson Reservoir, 40 cm upstream of Ogier Pond #1, and 43 cm downstream of Ogier Pond #4 and at the Golf Course Road. These turbidities were similar to those from bottom releases at Pacheco and Uvas reservoirs, but the surface waters spilling at those two reservoirs had cleared to visibilities of >1.5 m. The complete replacement of water in drawn-down Anderson Reservoir by wet year storm flows in 2019 (and in 2017) made Anderson Reservoir act like one of the smaller reservoirs in Santa Clara County, where turbid releases last through spring. However, by 3 July 2019, visibility in the turbidity tube on Coyote Creek had cleared to 1 m downstream of the reservoir and downstream of Ogier Pond #1. By the end of August and early September visibilities at the same two locations, and also upstream of Ogier Pond #1, were more than 1.5 m (Photos 9 and 12).

Shade and Algal Growth

The usually perennial flows, and scarcity of significant floods and scouring flows occurring downstream of Anderson Reservoir, have allowed the density of riparian trees to increase substantially (Grossinger et al. 2006). The original sparse sycamore alluvial woodland has been converted to a dense mixed riparian forest. Western sycamores (*Platanus racemosa*) are still common along the stream, but are now joined, and far outnumbered, primarily by willows (*Salix* spp.), but also by box elder (*Acer negundo*), and cottonwood (*Populus balsamifera*). The resulting shade reduces water temperatures, but has other, potentially undesirable, effects on aquatic habitat. Densely shaded habitats can reduce feeding efficiency by steelhead, just as turbidity can. Shading also reduces growth of algae, which provides food and substrate for aquatic invertebrates (Hill et al. 1995; Foster 2014). Algae was generally only a thin coating on the rocks at the sites sampled in 2014-2016. Algae was more abundant at less-shaded Coyote Ranch Road in 2016. However, even in sunnier areas algae appeared relatively scarce, which might also be due to low nutrient levels in the controlled releases from the reservoir and from the pipeline. Anderson Reservoir may have low nutrient levels, at least in the middle water column where the releases have come from, because of its depth and because Coyote Reservoir, upstream, may trap many of the nutrients coming from upper Coyote Creek.

The turbid water in 2017 probably reduced the sparse and shaded algae. However, the new unshaded channel upstream of Ogier Pond #1 is likely to provide greatly enhanced algae and invertebrates; it may provide the best potential steelhead rearing habitat.

New Zealand Mud Snails 2018.—In 2018, New Zealand mud snails were discovered between Anderson Reservoir and Ogier Pond #1. This invasive species has the potential to substantially reduce algae abundance and the invertebrates (fish food) that dependent on it. Snail abundance was generally low (but with concentrations on some rocks); the snails are likely to increase and spread within the watershed.

***O. mykiss* Sampling Results**

2014-2015.--All captured *O. mykiss* in 2014 (*n* = 52) were found to be young-of-year (YOY) based on scale analysis. Sizes ranged from 85 to 124 mm SL long (Leicester and Smith 2014b and Figure 15). These were judged to be steelhead, because all were good-sized YOY. They were expected to grow enough in winter and spring to smolt and attempt to emigrate in spring 2015 (Leicester and Smith 2014b).

No YOY *O. mykiss* were captured or observed during sampling of the same three sites in 2015, reflecting the lack of adult steelhead access in either the December or February storm events. Most of the fish present in 2014 were apparently gone; only a single large yearling (250 mm) was captured (Figure 15) and a similar-size fish observed, but not captured. The large size of the single yearling captured in 2015 supports the prediction made in the 2014 report that fish captured in 2014 would grow well enough over winter and spring to be able to smolt and emigrate the following spring. The lack of additional captures or observations of larger fish indicates that almost all of the 2014 YOY steelhead attempted to emigrate. However, because there was no stream flow continuity through the passage corridor, emigrating smolts would have been lost to predation by bass (*Micropterus* spp.) in the Ogier Ponds or trapped and killed by the dry-back in the disconnected channel downstream of the ponds. In 2014 a single *O. mykiss* estimated at 300 mm SL was observed but not caught (Leicester and Smith 2014b). Based upon the size of the yearling captured in 2015, that 2014 fish was probably also a yearling steelhead. Adult steelhead access, spawning, and rearing probably occurred in 2013, based upon stream flow conditions. Therefore, the scarcity of yearling fish in 2014 indicates that most fish reared in 2013 also smolted and attempted to emigrate in 2014 (Leicester and Smith 2015b). The attempts would have been unsuccessful because of flow cut-backs after mid-February.

2016-2018.--In 2016 and 2017, no *O. mykiss* were captured or seen at any of the four sampled sites. Therefore, although potential passage stream flows had been provided in early April in 2016 and possibly in January, briefly in February, and April in 2017, apparently no adults accessed and/or spawned in the habitats used in 2014. The available passage in April 2016 and 2017, compared to the dominant late December to early April migration period (Shapovalov and Taft 1954), may have been a problem. Steelhead studies on the central coast found lower adult numbers and few late migrating and spawning steelhead in 2016 (Joseph Kiernan, NOAA Southwest Fisheries Science Center; and Jon Jankovitz, California Dept. Fish and Wildlife, pers. comm.). However, it may also be that with smolt or adult passage problems in 2014-2015 there were few or no potential returning adults produced in 2016-2018. The very few yearlings present in 2015 may have able to emigrate during the brief passage window provided by the pulse flows in April 2016.

Although adult steelhead migration was probably possible during a single storm in January and during the March and early April storms in 2018, no *O. mykiss* were captured or seen at any of the four sample sites in 2018. However, sampling by the VW did capture two juvenile steelhead

in late October near the Highway 101 crossing downstream of Anderson Reservoir (Jason Nishijima, VW, pers. com.), so apparently there was some limited, localized steelhead spawning and rearing in 2018 in the suitable habitat upstream of the Ogier Ponds.

2019.—Adult steelhead had windows of access to spawning and rearing areas upstream of Ogier Ponds in January through March. However, even with expanded sampling (2300 ft) in 2019 only four juvenile steelhead were shocked and only two captured. A 175 mm FL YOY fish was captured in a braided channel upstream of Ogier Pond #1 and a 330 mm FL yearling was caught in a head of pool in the main channel upstream of the braided channels (Table 1, Figure 22, and Photos 13 and 15). Two additional similar-sized (yearling) *O. mykiss* were shocked, but not captured, in deep, fast, heads of pools. One was in the main channel upstream of Ogier Pond #1, and the other was upstream of the Boy's Ranch below the dam. No *O. mykiss* were captured in the second round of sampling in late October. Sampling by the VW capture three smaller YOY near the Highway 101 crossing below the dam (Clayton Leal, VW, pers. com.).

In 2014 and 2015 several yearlings were seen or captured (Table 1), but most of the YOY in 2014 apparently grew fast in winter and attempted to emigrate in 2015 rather than remaining to rear as yearlings (Leicester and Smith 2015). The relatively large size of the few fish seen or captured in 2019 indicates that rearing conditions in the stream are potentially good. However, the steelhead "run" consisted of a very few fish, and the population is at risk of extirpation.

Other Fishes

In 2014-2018, prickly sculpin (*Cottus asper*) and Sacramento sucker (*Catostomus occidentalis* were the only native fish caught at all three sites upstream of Ogier Ponds, but hitch (*Lavinia symmetricus*) were present at the two sites nearest Anderson Reservoir (Leicester and Smith 2014b and 2015b; Smith 2016). Hitch were more common at the upstream sites in 2016. In 2017-2019, all three native species appeared to be less abundant, except in calmer secondary channels; they were probably reduced by the 2017 and 2019 floods.

Juvenile spotted bass (*Micropterus punctulatus*) and largemouth bass (*M. salmoides*), were present at all three sample sites in 2014 and 2015, but were less abundant in 2015 (Leicester and Smith 2015b). In 2016, bass were almost absent at the three sites upstream of the Ogier Ponds, apparently because of the pulse flow in late March and April and the higher flows throughout the remainder of the year (Smith 2016). Common carp (*Cyprinus carpio***)** and bass (115-275 mm FL) were common at the Golf Course sample site in 2016. The site was dry in summer 2014 and 2015, and the fish had apparently been rinsed down from the Ogier Ponds with the higher stream flows. In 2017-2019, non-native fishes were absent or very scarce during sampling at all sites upstream of Ogier Ponds and at the site below the ponds.

The 2017 flood, and the substantial draining and flushing of Metcalf Pond, probably reduced the predatory bass in the pond.

MANAGEMENT IMPLICATIONS

Adult Passage.—Some adult steelhead accessed the spawning and rearing habitat in 2014 despite a only about a 2-3 day window of flow continuity through the passage corridor in February (Leicester and Smith 2014b). It is likely that access by most adults was severely constrained by the window of potential suitable stream flow prior to flow cutbacks in early February. In 2015, the drought continued, as did severely reduced releases to Coyote Creek, despite improved runoff into Coyote and Anderson reservoirs compared to 2014 (Leicester and Smith 2015b). The continued reduced releases to Coyote Creek were insufficient to provide passage corridor connectivity. Increased releases from Anderson Reservoir during the February storm would have provided suitable adult passage through the dry gap in surface flow at and upstream of Bailey Avenue. The storm runoff from Fisher Creek, and urban runoff downstream of Metcalf Road, would have completed the connection to spawning and rearing habitat upstream of the Ogier Ponds. In 2016 potential passage was provided by large (up to 140 cfs) releases, but not until early April, which may have been too late. Spawning and rearing habitat upstream of Ogier Ponds was under-utilized in 2014, and apparently unused in 2015, 2016 and 2017. In 2018, there was apparently limited localized spawning and rearing. Releases in years prior to February 2014 had maintained continuous stream flow downstream to below the Metcalf Pond, and adult access was probably regularly available during even small winter storms, due to Fisher Creek and suburban runoff. A February or early March pulse flow release strategy that would provide or improve adult steelhead access, even *or especially* in drier years, should be considered as a vital tool to restore and maintain a viable steelhead population.

The Singleton Road low flow crossing, with its perched culverts and concrete apron, makes passage past this location difficult except during periods of sustained moderate storm flows. Down-cutting of the channel downstream of the crossing has reduced the back-flooding of the apron and culverts, increasing the jump height into the culverts and the length of the inclined apron that must be negotiated. The high flows in 2017 demonstrated the severe velocity problems of high flows. The potential flow windows for passage are few. In 2018, the storms were few and brief, so the windows for passage at intermediate stream flows were small. In 2019, passage appeared suitable at flows of 500 cfs and below 60 cfs. Removal of this crossing as soon as possible should be a priority, because it jeopardizes (and was a factor causing) the crippled steelhead run. It is hoped that coordinated and effective action happens as soon as possible. The stream gage weir downstream of Coyote Ranch Road was damaged and replaced in 2017. The present configuration, with boulders rather than a jump pool at its downstream base, is a significant potential barrier to adult steelhead passage at typical winter stream flows (Photos 4 and 5). It also needs to be modified as soon as possible, because it potentially blocks adult passage at times when the other barriers are passable. At Metcalf Dam passage was possible in 2019, apparently including during flows of 500-600 cfs, when opening a radial gate prevented overtopping the dam and reduced turbulent flows down the ladder (Photos 1 and 2). However, in 2017 the flood flows required removal of the steel panels of the dam, and the swollen wooden baffles in the ladder could not be removed in winter to allow passage through the ladder at the lowered pond level. Modification of the baffles and possible replacement of

the steel panels of the dam with a rubber inflatable dam is necessary to provide ladder passage at a variety of stream flows and pond water levels.

Smolt Passage.—Maintaining late winter and early spring stream flows would create suitable stream flow conditions for smolt emigration. The narrow window during and prior to the February storm in 2014 probably prevented most smolts reared in 2013 from emigrating, as it occurred prior to the peak smolt emigration period (Shapovalov and Taft 1954; Fukushima and Lesh 1998). However, if Coyote Creek regularly produces large smolts, that emigrate early, some smolts might have been able to use the small, early passage window. Smolts reared in 2014 had no chance to successfully emigrate in 2015 and were lost to the surface flow dry-back downstream of Ogier Ponds and/or to predation in Ogier Ponds. Since no YOY steelhead were apparently reared in 2015, 2016, and 2017, four consecutive years of steelhead production were eliminated, and smolt emigration substantially reduced in a fifth year (2014), extirpating the steelhead population in Coyote Creek or putting it at very significant risk of extirpation. Similar passage issues in Upper Penitencia Creek, the only tributary stream that has been recently documented to support steelhead, put the steelhead population in the entire watershed at great risk of extirpation (Leicester and Smith 2016; Smith 2018). A strategy needs to be developed to provide for smolt emigration, even in some drought years, if a viable steelhead population is to be restored and maintained.

All of the steelhead juveniles produced in the rearing habitat upstream of Ogier Ponds must emigrate through the Ogier Pond complex, with its abundant predatory largemouth and spotted bass. Taking the ponds off-channel, by rerouting the stream around the ponds, is a necessary action to prevent predation loss of many of the smolts. Unlike Metcalf Pond, which can be periodically and temporarily drained (an unintended result of the 2017 flood) to remove predatory non-native fish, the task of significantly reducing the predators in the Ogier Ponds is not feasible without reducing or eliminating stream flow into the ponds for an extended period (which would require severe reductions in stream flows upstream). Routing Coyote Creek around the Ogier Pond complex and taking them off-channel would allow for management actions that would not be possible under current conditions.

A seasonal (April through November) sport fishing season presently exists on Coyote Creek, and on other South Bay streams, despite the closure of all coastal steelhead streams to fishing during this period. A proposal should be made to the California Department of Fish and Wildlife Commission to close the stream to fishing during this period to better protect steelhead. The seasonal fishery, with allowable take of “hatchery” trout and steelhead, presents an enforcement problem and a threat to maintaining the precarious steelhead populations. However, the open season also allows fishing for bass and other species in the Ogier Ponds and at Metcalf Pond, as well as in the stream. If the Ogier Ponds are taken off line to eliminate the temperature and predatory threats to steelhead, fishing could continue in the off-channel Ogier Ponds, even if the fishing regulations are changed to exclude fishing in the creek.

Stream Flow.—The sites sampled in 2014 and 2015 were atypical of the general habitat conditions in Coyote Creek, in that they were specifically chosen to include riffles and shallow

run habitats that provide fast-water feeding habitat preferred by drift-feeding juvenile steelhead downstream from reservoirs in Santa Clara County (Casagrande 2010; Smith 2011; Leicester and Smith 2014a and 2015b). All of the *O. mykiss* caught in 2014 were from fast-water habitats (Leicester and Smith 2014b). The majority of Coyote Creek between Anderson Reservoir and Metcalf Pond is low gradient, and dominated by pools. Riffles and runs with coarse substrate are relatively scarce. Higher stream flows are necessary to increase width, depth, and velocity of riffles and runs and to increase the amount of fast-water "head of pool" habitat in pools located downstream of these coarse-bottomed riffle and run areas (Casagrande 2010) where aquatic invertebrates are abundant (Casagrande 2010; Foster 2014). However, those fast habitats would still be relatively scarce in the context of the entire system, and slow to moderate velocity pool habitat would still be the predominant habitat feature, even at high stream flows like those in summer 2016-2019. The operational flows observed in 2014 and 2015 were atypical due to the drought. Under operations prior to 2014 and in 2016-2019, with higher augmented flow rates, the amount and quality of juvenile steelhead rearing habitat increases substantially. Even where coarse substrates are absent or scarce, fast-water areas can make substantial numbers of terrestrial invertebrates available to drift-feeding steelhead (Foster 2014).

In years prior to 2014, dry season stream flows in Coyote Creek downstream of Anderson Reservoir were typically between 30 and 50 cfs. Most of this flow percolated between the reservoir and Blossom Hill Boulevard and recharged the underground aquifer, which the Santa Clara Valley heavily depends upon for its water supply. These flows would have also provided suitable fast-water rearing habitat for juvenile steelhead. Habitat appears to have been better in 2016-2018 in the areas that supported summer flow in 2014 and 2015, and potentially suitable physical (but warm) habitat existed downstream in 2016-2019 in areas that were dry in both years. Higher stream flows in 2016-2018 also reduced the relatively abundant juvenile spotted and largemouth bass that were common at the three sites sampled in 2014 and 2015, although bass and carp from the Ogier Ponds were present downstream of the ponds in 2016.

Water Temperature.—Quality of potential rearing habitat depends heavily on the food available and upon the water temperature of stream flows, as higher water temperature increases the metabolic rate of fish and increases their food demands for survival and growth (Myrick and Cech 2005). When food is readily available, the best growth rates occur at warmer temperatures (e.g., 19°C), because assimilation rate also increases at higher temperatures (Myrick and Cech 2005). However, at lower food availability the increased metabolic cost of higher temperature reduces growth (Weber et al. 2014). For drift-feeding steelhead, higher water temperatures cause fish to use faster microhabitats, where food is more abundant (Smith and Li 1983); therefore, stream flow and water temperature are not independent in determining steelhead abundance, growth and habitat selection.

For Coyote Creek the two main factors potentially affecting stream temperature are the temperatures of reservoir and pipeline releases to the stream and the warming effect of the Ogier Pond complex on water temperature downstream of the ponds. With most reservoirs operated by SCVWD, water is released from the bottom, which is normally cool in summer, at

least until the reservoir is drawn down (Casagrande 2010 and 2014; Leicester and Smith 2014a). However, Anderson Reservoir on Coyote Creek has a multiport release system; water can be released from the bottom where it remains cool year-round, or it can be released from higher in the reservoir water column where temperatures are much warmer, especially in late summer. The San Felipe Pipeline also brings in Bureau of Reclamation water from San Luis Reservoir for potential distribution to Anderson Reservoir by pumping up into the reservoir, when no reservoir withdrawals are being made, for direct release to Coyote Creek, or for distribution to other locations in northern Santa Clara County. In 2014-2016, releases to Coyote Creek were usually more from the pipeline than the reservoir and were quite warm for most of the late summer and fall. The moderate size of the YOY steelhead captured in 2014, their lack of significant growth between late September and late November, and the indications of slower growth and growth interruptions on their scales in late summer indicated that the water temperatures were too high for the food available for late summer growth (Leicester and Smith 2014b). Conversely, the large size of the single yearling steelhead captured in in June of 2015 indicates that growth in late fall through spring is good, and may be attributable to warmer and clearer water than is typically present in most local streams during that period. In 2017-2019, a larger share (usually most) of the stream flow was provided by reservoir releases, because of the seismic need to lower the reservoir storage level. Water temperatures were slightly lower, but increased later in summer as the reservoir was drawn down, sending warmer water through the mid-level release port.

If substantially cooler water was released for all or part of the summer (especially late summer), steelhead growth and survival would likely be much better, at least in the reach between the dam and the Ogier Ponds. However, this would potentially require sending more warm imported water to the treatment plants, blended with cool bottom reservoir water (rather than from the mid-elevation release port), which could impact treatment costs or drinking water quality. Water supply operations might have to depend upon monitoring the temperature of pipeline and reservoir releases. Anaerobic conditions near the bottom release port in summer results in hydrogen sulfide production and other chemical changes (due to solubility in anoxic water) that produce tastes, odors, and increase treatment costs. Aeration of bottom water, as is being done in other VW reservoirs to reduce methylation of mercury, might allow the use of the bottom release port in late summer, when water temperature in releases to Coyote Creek is a problem. Providing cooler releases, at least in late summer, should be pursued to improve conditions for threatened steelhead.

The Ogier Pond complex causes substantial increases in water temperatures downstream, because warmed surface water is progressively shuttled through the four ponds. The outflow temperature from the ponds in late spring through summer is likely to average 22-25°C, regardless of inflow temperature because of the high heat capacity of the ponds and the outflow of warm surface water. In June 2019, mean water temperatures were 8°C warmer downstream of the ponds compared to upstream of the ponds. Such temperatures will have severe effects on steelhead growth and survival downstream of the ponds, regardless of the release temperatures at the reservoir. Elevated water temperatures in the ponds also create another indirect effect by increasing the food requirements of the predatory bass. This would be

especially problematic during the late spring smolt emigration period. Predation impacts caused by the ponds and their substantial heating effect on water temperatures constitute very strong justification to reroute the stream around the ponds as soon as possible.

Spawning Gravels and Other Channel Enhancements.—Future investigations should evaluate the need for gravel augmentation, especially near the dam, to improve spawning success, especially since there are probably relatively few returning adult steelhead. Fast-water feeding habitats are important for steelhead abundance and growth in low gradient streams (Casagrande 2010). The step-run and riffle habitat created by boulders immediately downstream of Anderson Reservoir provides a viable example of channel enhancement for juvenile steelhead feeding (Leicester and Smith 2015b). Braided channels tend to provide a greater variety of habitat through a wide range of stream flows. Actions to improve channel migration and braiding should be evaluated. Multiple and migrating channels also result in more open canopy, improving algal growth and insect (fish food) abundance.

Fish Sampling.—NOAA guidelines since 2015 for electrofishing limit sampling to water temperatures of 18°C or less. Unless water temperatures are reduced from those encountered in 2014-2019, sampling for juvenile steelhead would be extremely restricted both as to timing and location. In 2015-2018, fall sampling was not possible until October or November, and early morning sampling in late June and early July was conducted to meet the requirements in 2015. In 2017, morning sampling in August was conducted just prior to the sampling temperature cut-off at the two sites closest to the reservoir; sampling the two warmer sites farther downstream was delayed until late October. In 2019, three sites upstream of Ogier Ponds were sampled in early September, just before water temperatures rapidly increased above the sampling threshold. Additional sampling was conducted in late October as conditions cooled. Future sampling at the warmer sites downstream of Ogier Ponds could probably not be sampled to determine their utilization by steelhead until late October or later. November sampling can only be conducted if it is prior to rains which might allow adult access. Sampling prior to June is not allowed because adults and smolts might still be present, and although sampling in June would occur after smolts had left, YOY would then be too small to be efficiently captured. In addition, sampling at sites downstream of the Ogier Ponds prior to June would still be prevented by high water temperatures produced by the Ogier Pond complex. This conflict for necessary population monitoring will persist as long as the 18°C cap is in place.

The more typical high summer/fall stream flows present in 2016-2019, and prior to 2014 are desirable for rearing steelhead, but in 2016-2019 the high flows made electrofishing more difficult. Coordinated, brief (1-2 day) reductions in flows, if they could be conducted without resulting in stream dry-back, might improve electrofishing effectiveness.

ACKNOWLEDGMENTS

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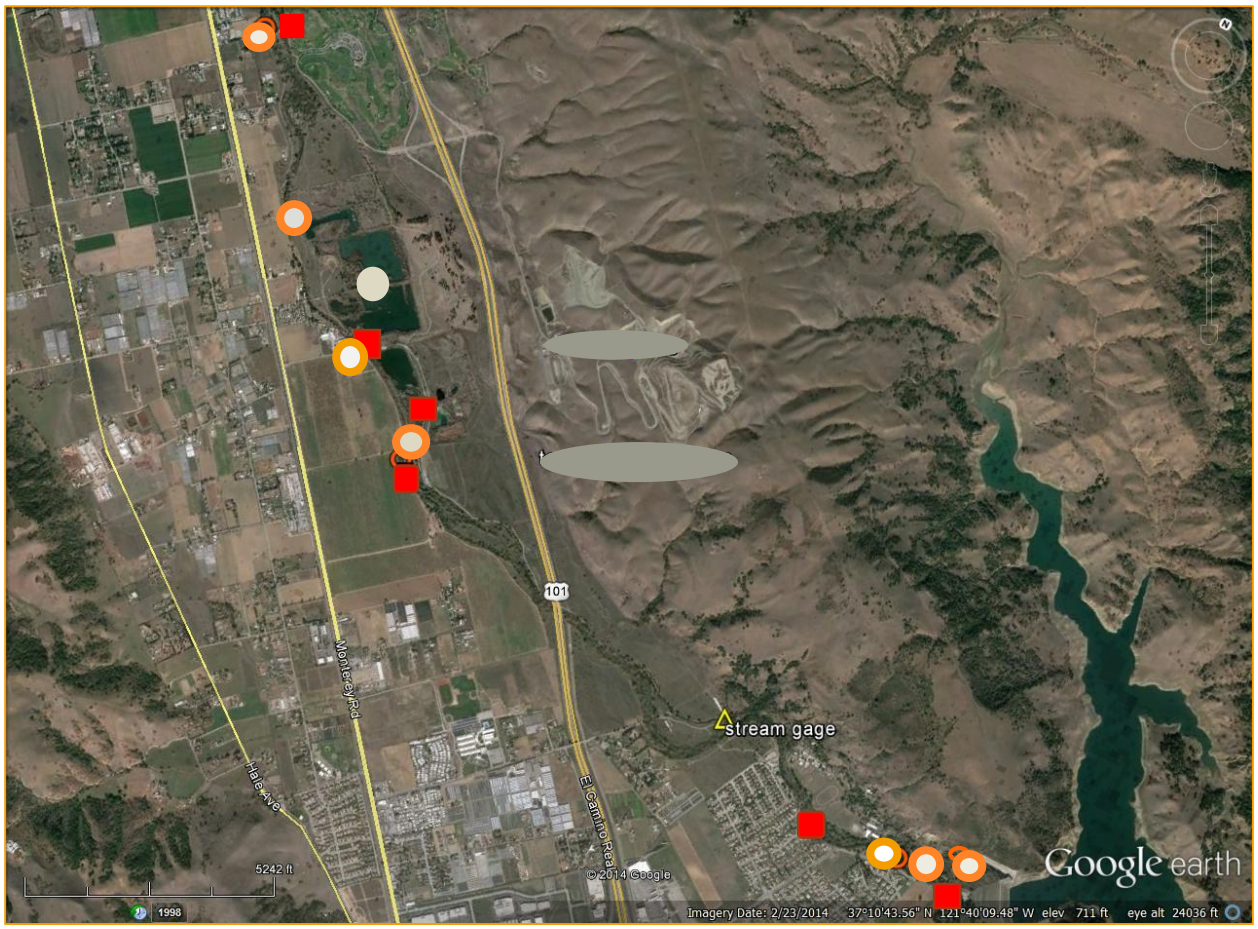

Figure 1. Coyote Creek downstream of Anderson Reservoir, showing locations of temperature recorders (orange circles) and fish sampling reaches (red squares) in 2019. Additional temperature recorders were upstream and downstream of Metcalf Pond and at the Edenvale Gage, farther north.

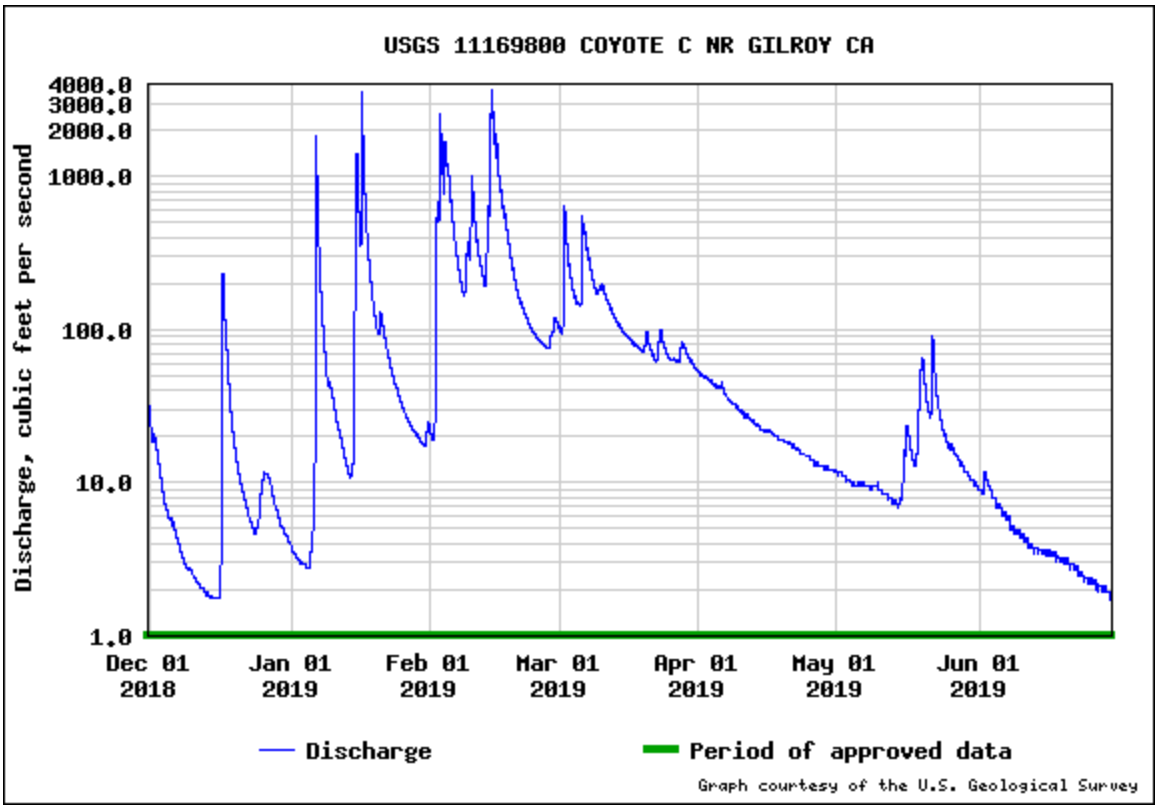

Figure 2. Stream flow on Coyote Creek at the USGS gage upstream of Coyote Reservoir From 1 December 2018 through June 2019.

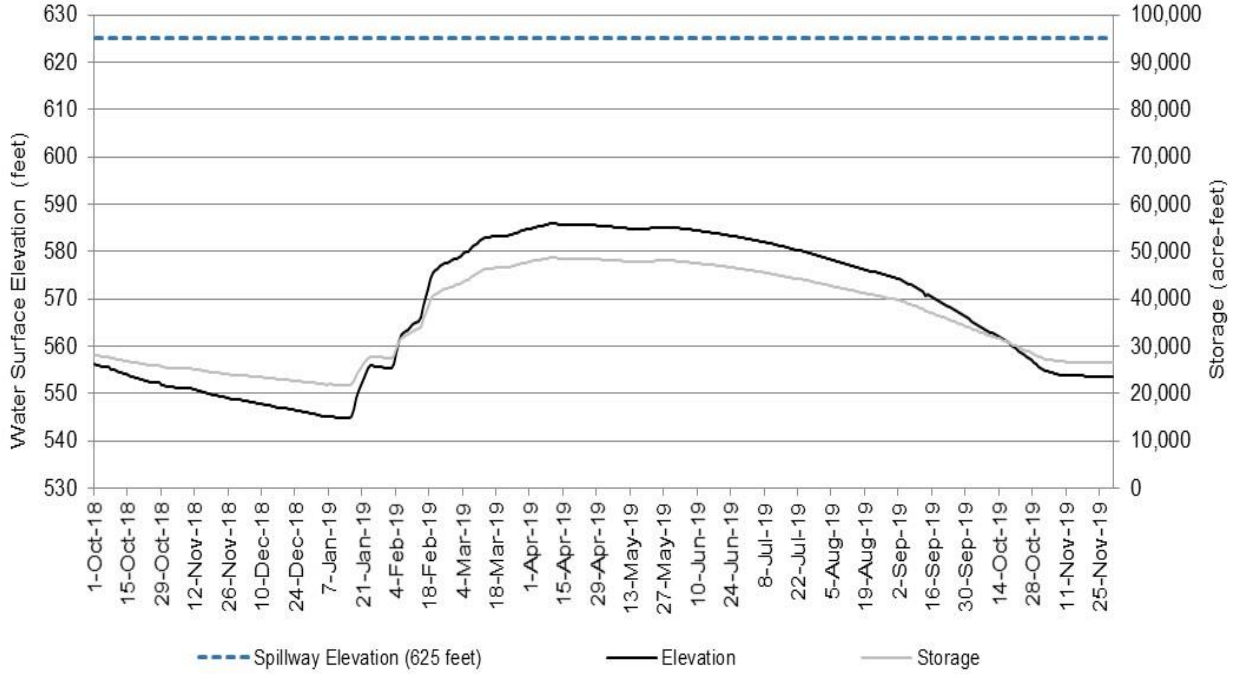

Figure 3. Anderson Reservoir water surface elevation and storage from 1 Oct 2017 through 30 Nov 2018. High releases in February through mid-March kept storage below 50,000 acre-feet.

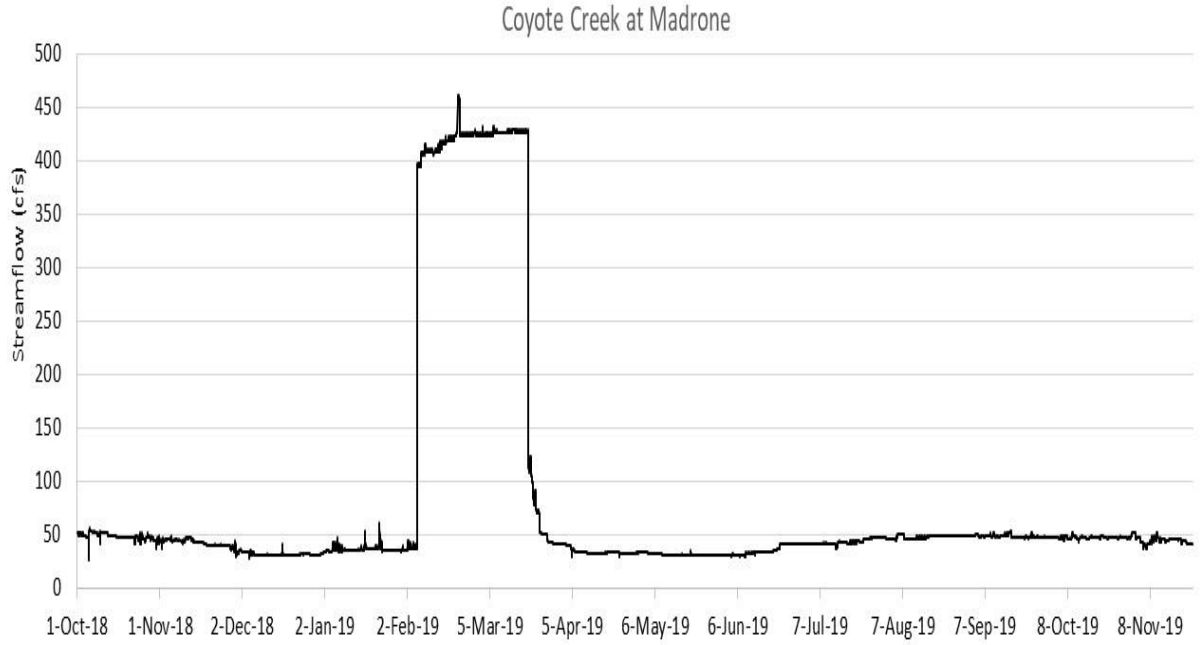

Figure 4. Mean daily stream flow at the VW Madrone Gage (1.5 miles downstream of Anderson Reservoir) from 1 October 2018 through 23 November 2019.

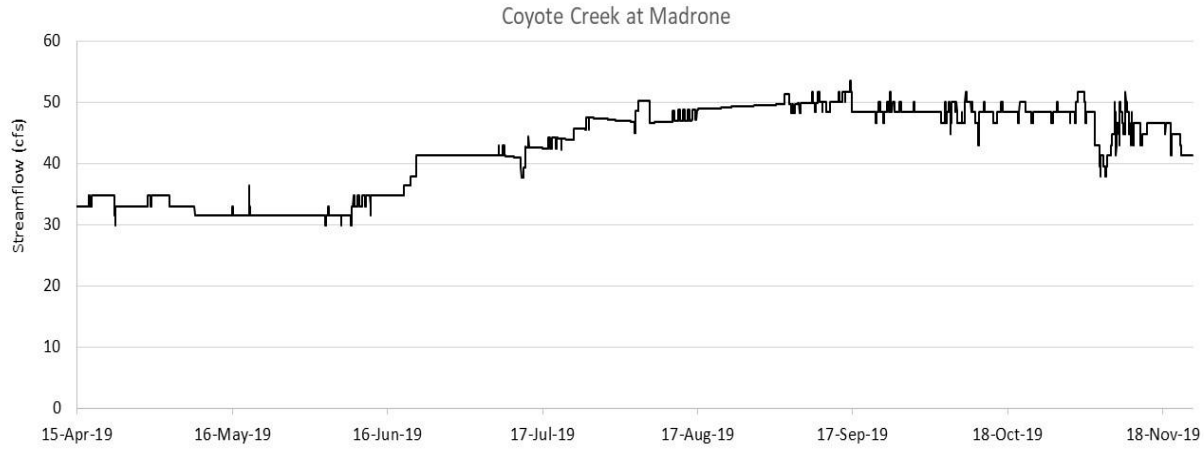

Figure 5. Mean daily stream flow at the VW Madrone Gage from 15 April – 23 November 2019.

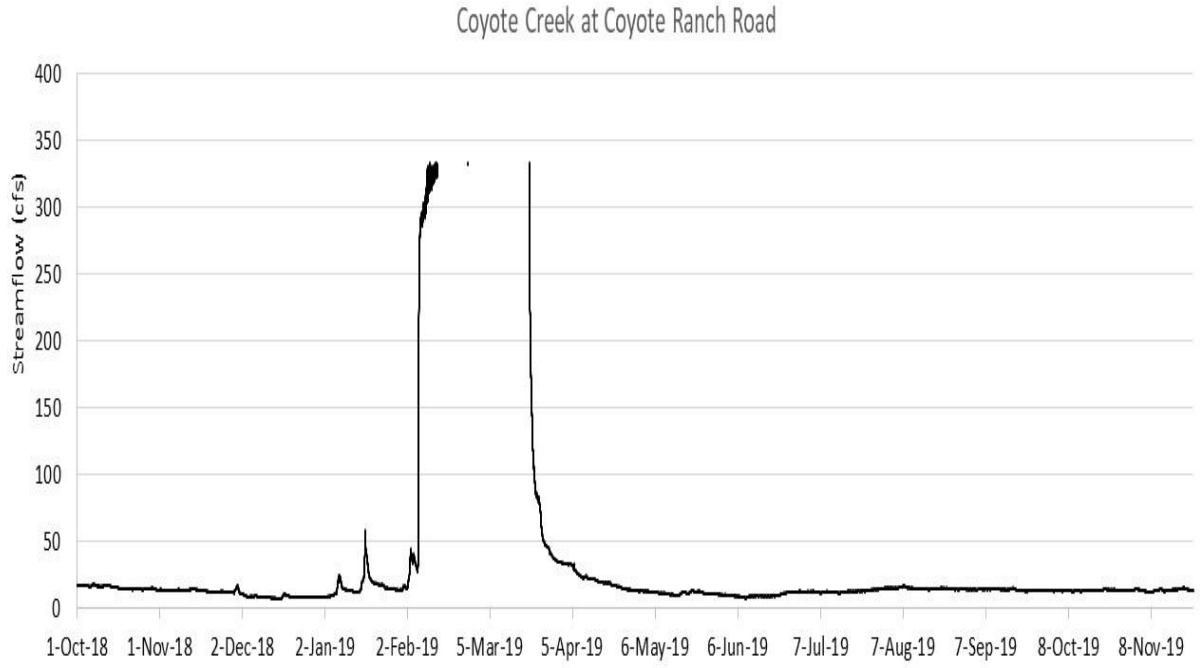

Figure 6. Mean daily stream flow at the VW Coyote Ranch Road Gage (upstream of Fisher Creek and Metcalf Pond) from 1 October 2018 through 23 November 2019. The February through late March high flows were continuous (as in Figure 4), but not recorded at all times with the low flow stream gage.

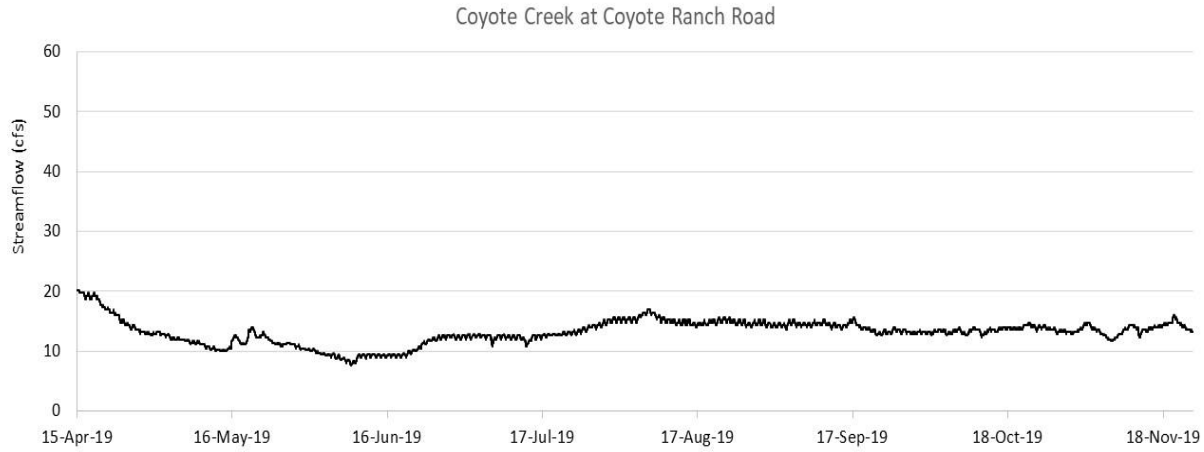

Figure 7. Mean daily stream flow at the VW Coyote Ranch Road Gage from 15 April through 23 November.

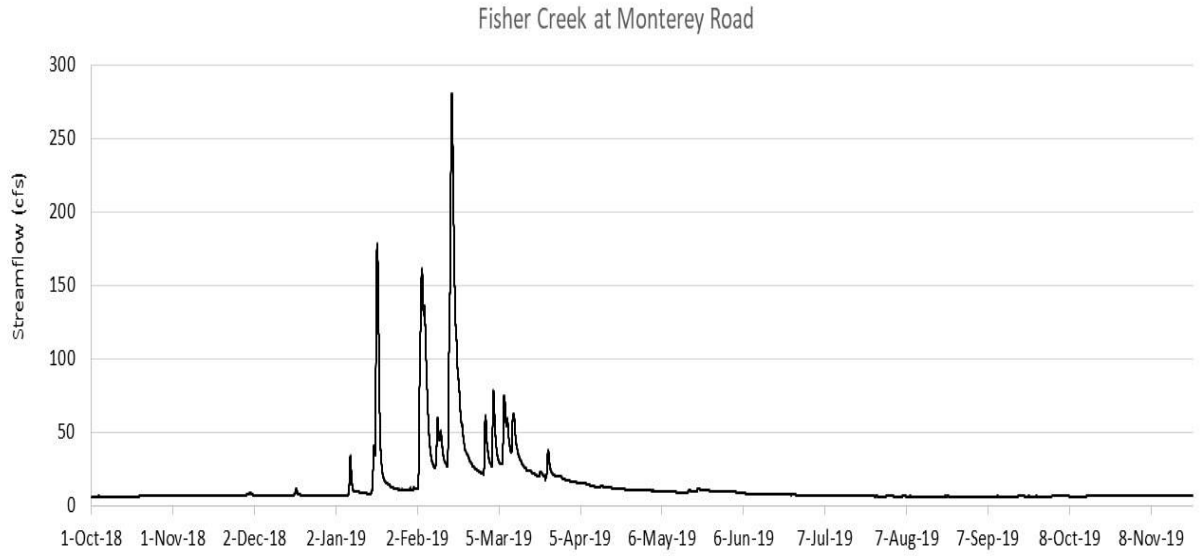

Figure 8. Mean daily stream flow at the VW Fisher Creek Gage at Monterey Road from 1 October 2018 through 23 November 2019.

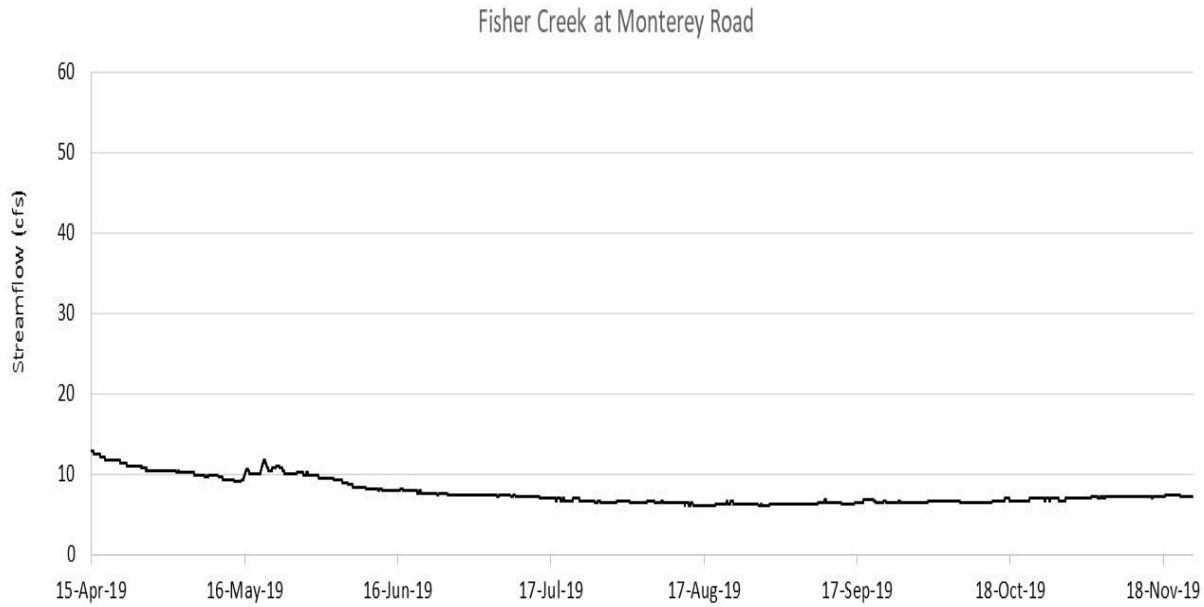

Figure 9. Mean daily stream flow at the Fisher Creek gage from 15 April through 23 November.

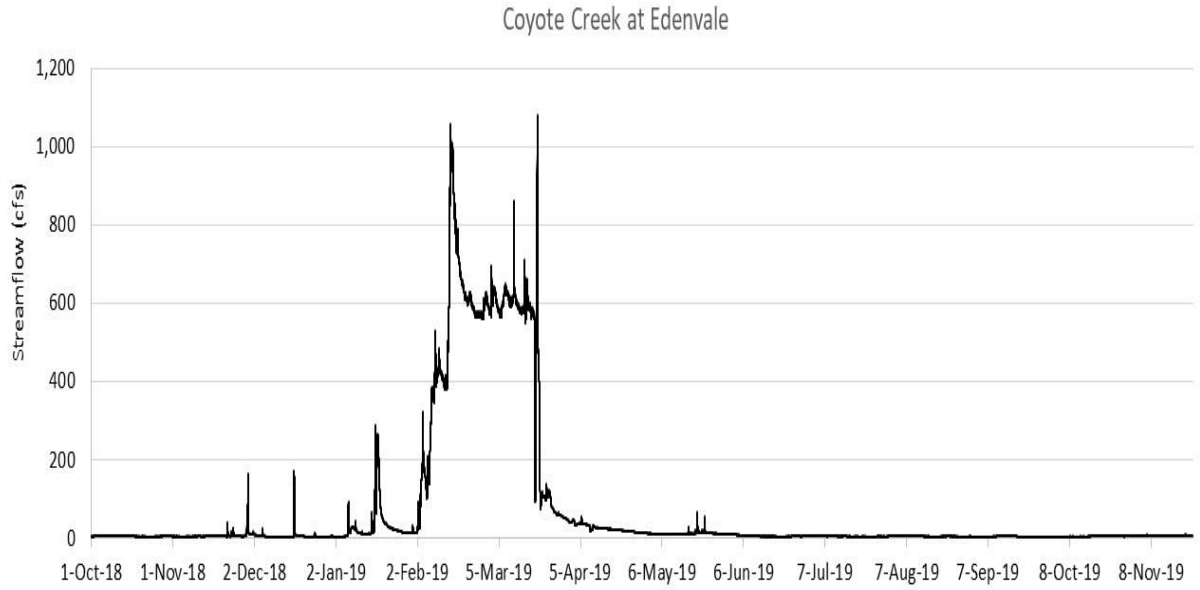

Figure 10. Mean daily stream flow at the VW Edendale gage (in the urban area downstream of Metcalf Percolation Pond) from 1 October 2018 through 23 November 2019.

Figure 11. Mean daily stream flow at the VW Edendale gage from 15 April through 23 November 2019.

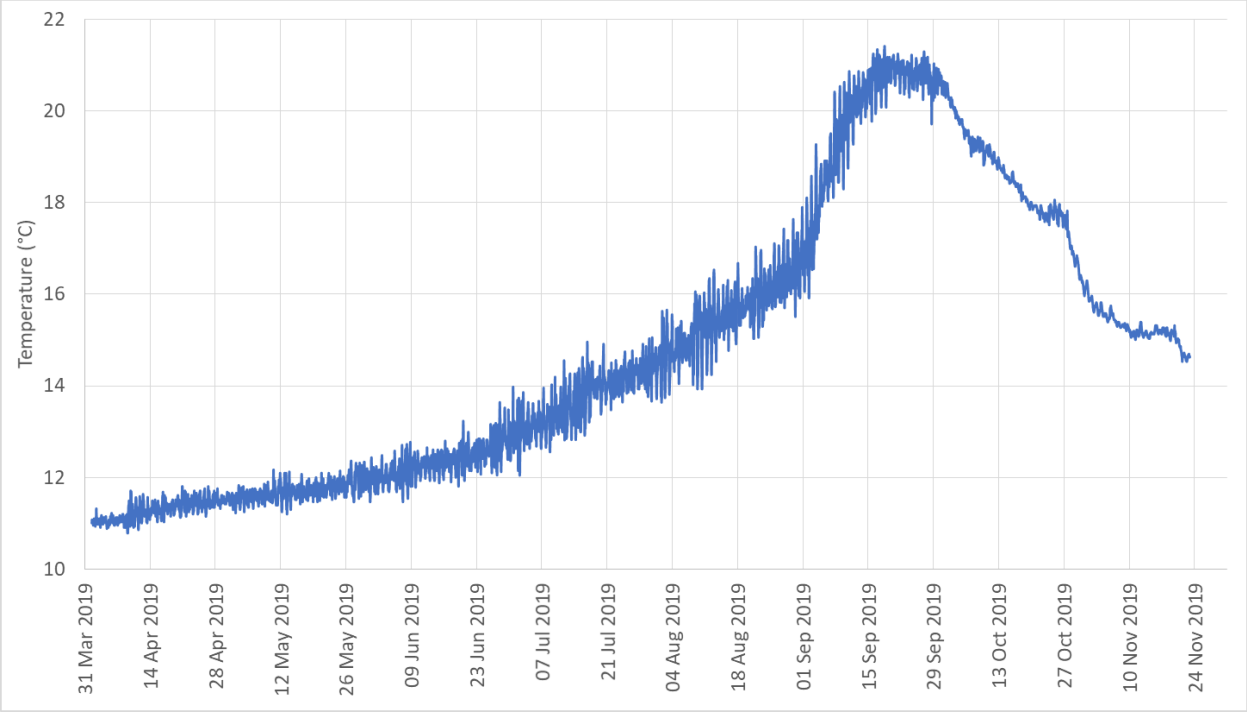

Figure 12. Water temperatures in Coyote Creek downstream of Anderson Reservoir from 1 April through 23 November 2019. Water was drawn from a mid-level port, and temperatures increased as the reservoir level declined.

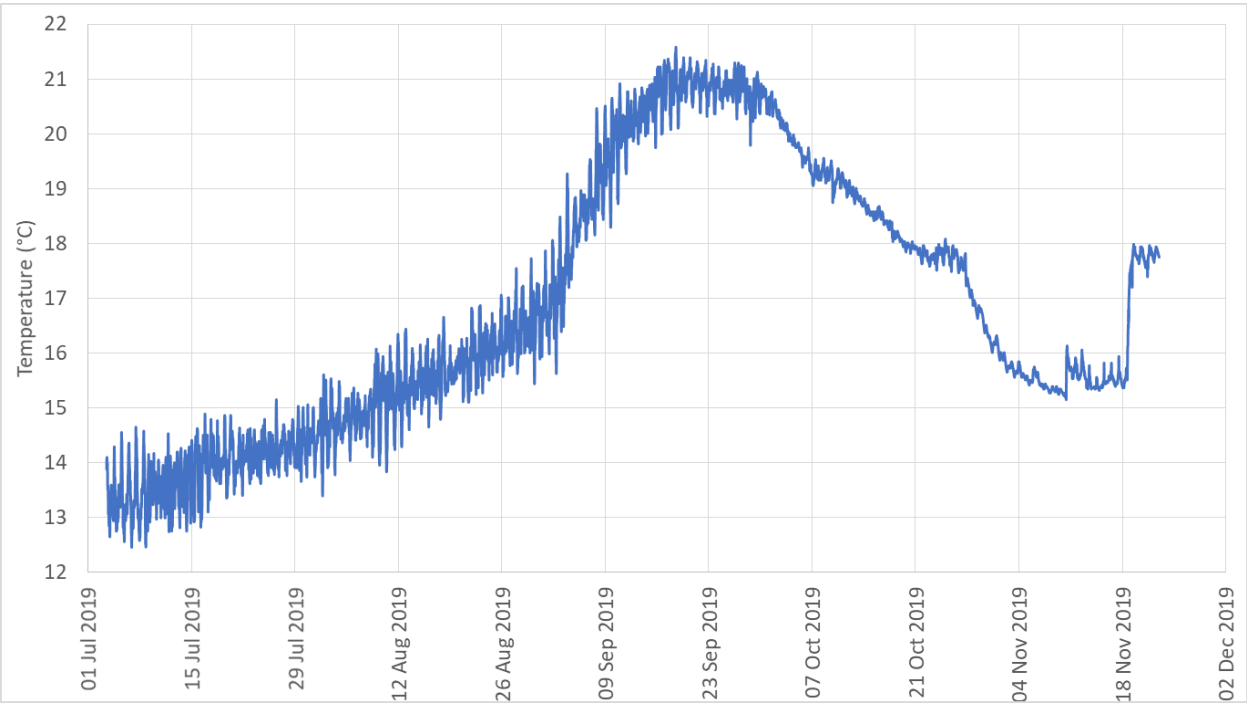

Figure 13. Water temperature in Coyote Creek downstream of Anderson Reservoir and the San Felipe Pipeline and hydropower release from Anderson Reservoir from 3 July through 23 November 2019. The increase in water temperature in mid-November was due to a shift from reservoir release to imported water release.

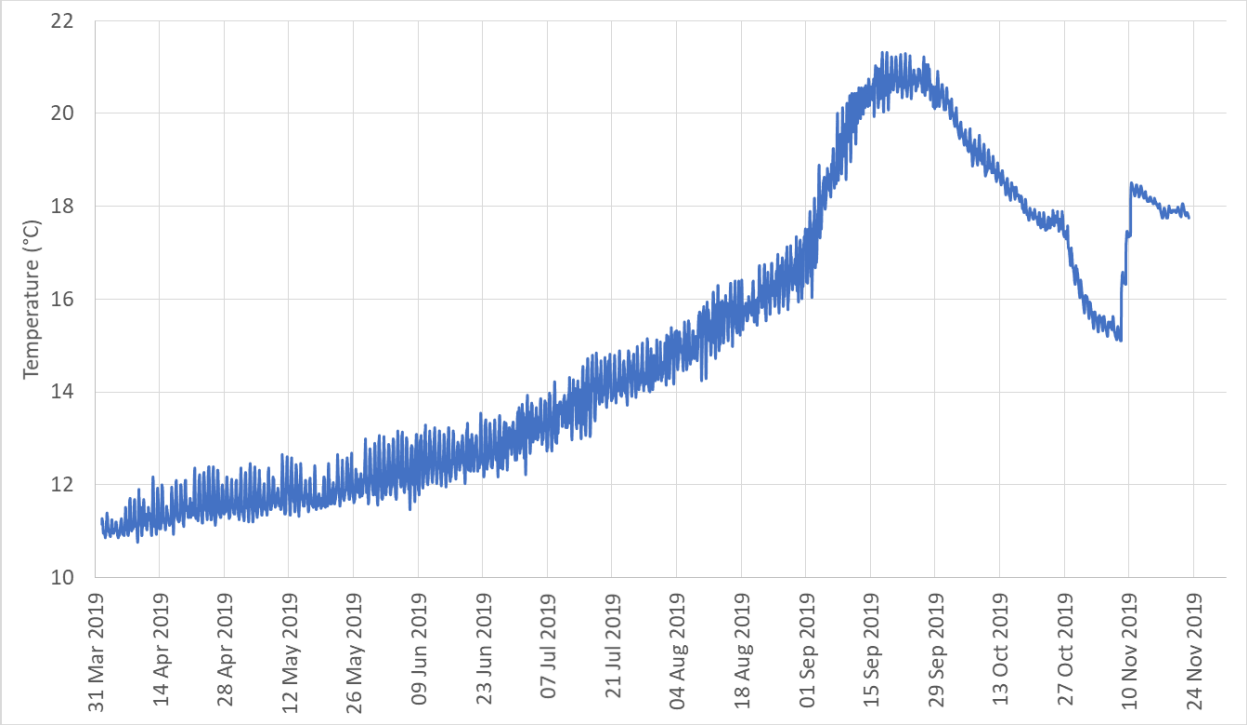

Figure 14. Water temperature in Coyote Creek in the park downstream of releases from Anderson Reservoir and from San Felipe Pipeline and hydropower discharges from 1 April through 23 November 2019

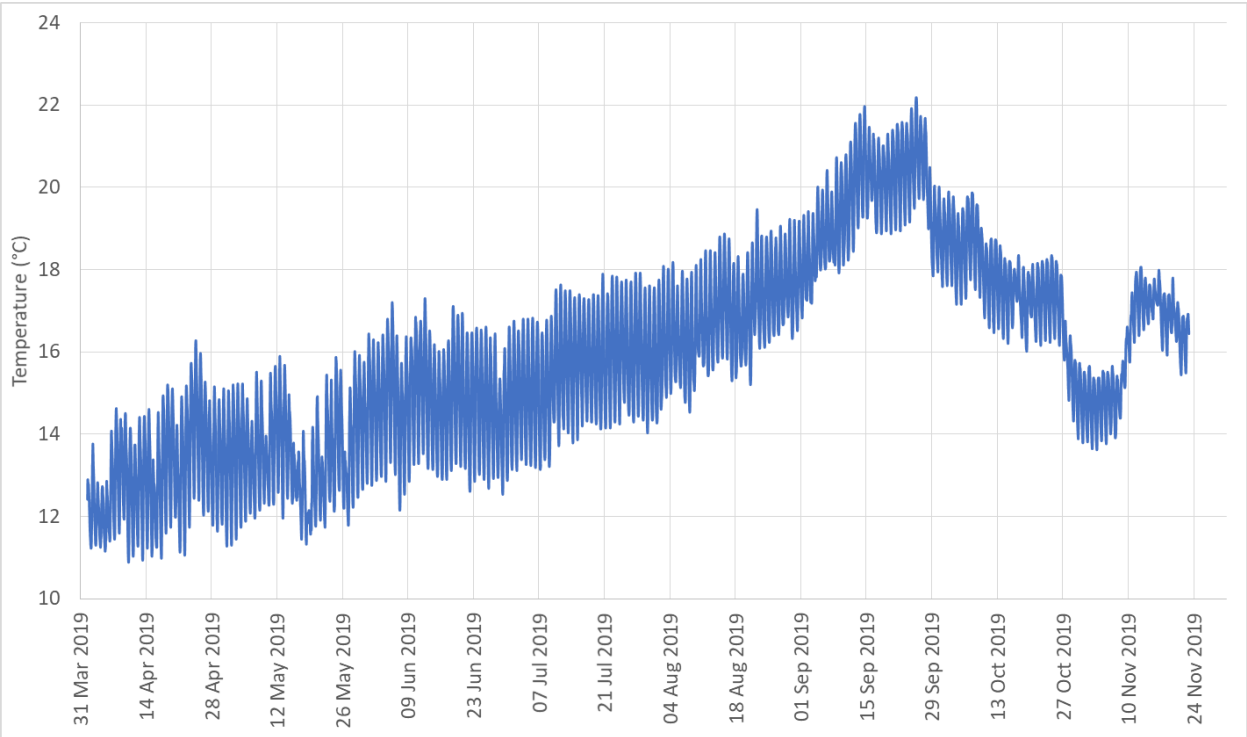

Figure 15. Water temperatures in Coyote Creek upstream of the Ogier Ponds Complex from 1 April through 23 November 2019.

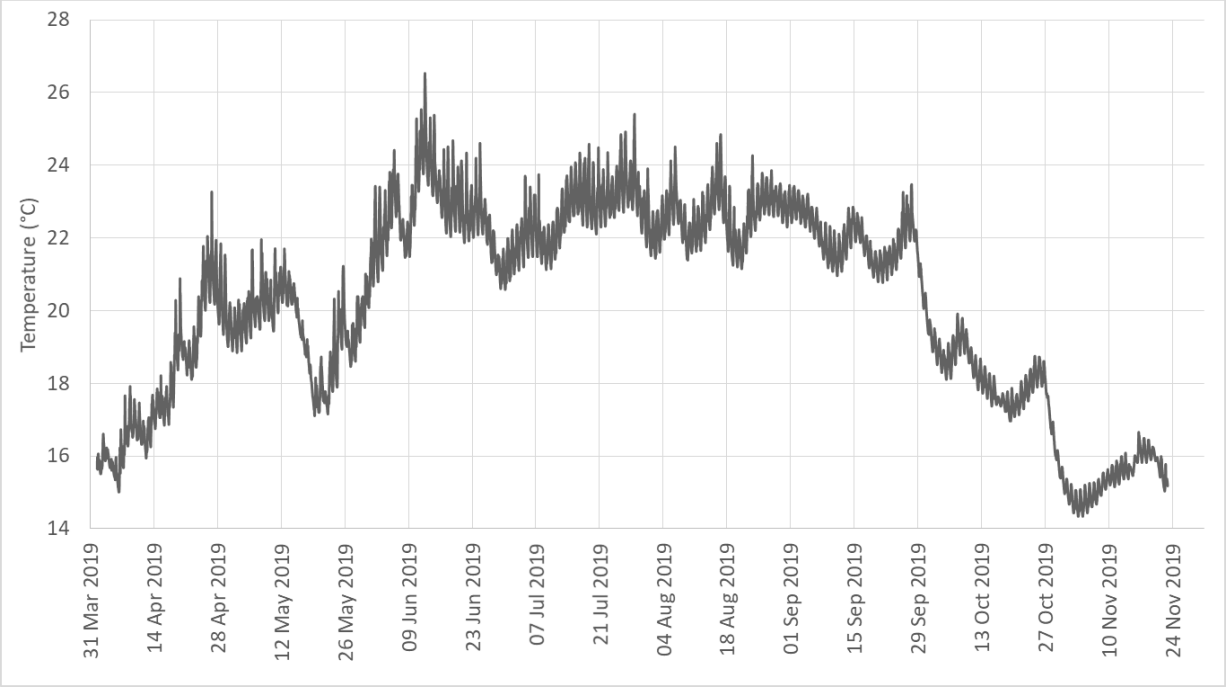

Figure 16. Water temperatures in Coyote Creek immediately downstream of the Ogier Pond complex (downstream of Ogier Pond #4) on Coyote Creek from 1 April through 23 November 2019.

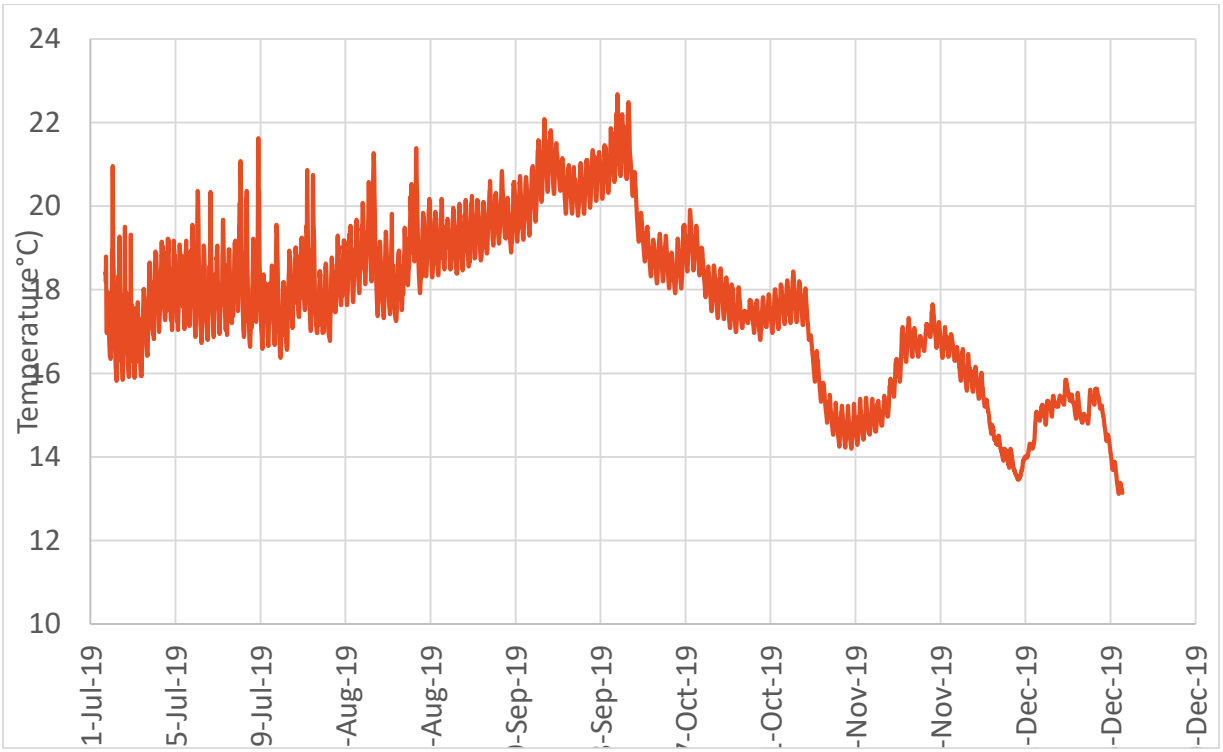

Figure 17. Water temperatures in Coyote immediately downstream of Ogier Pond #1 from 3 July through 18 December 2019.

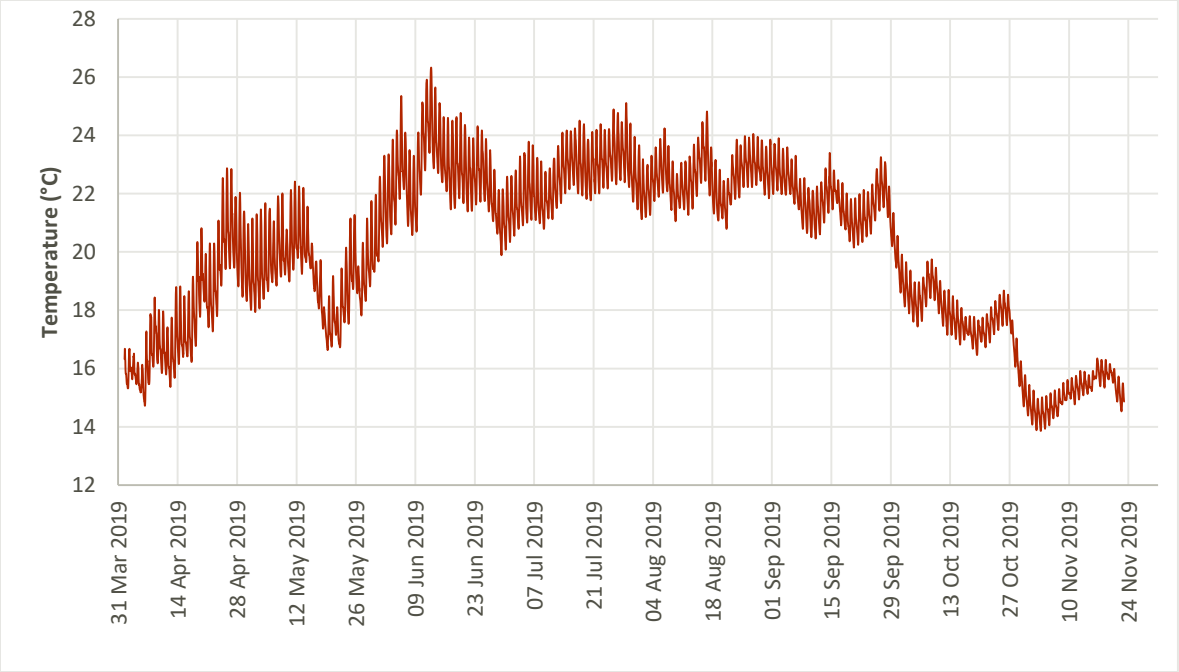

Figure 18. Water temperatures in Coyote Creek immediately downstream the old Golf Course Road from 1 April through 23 November 201.

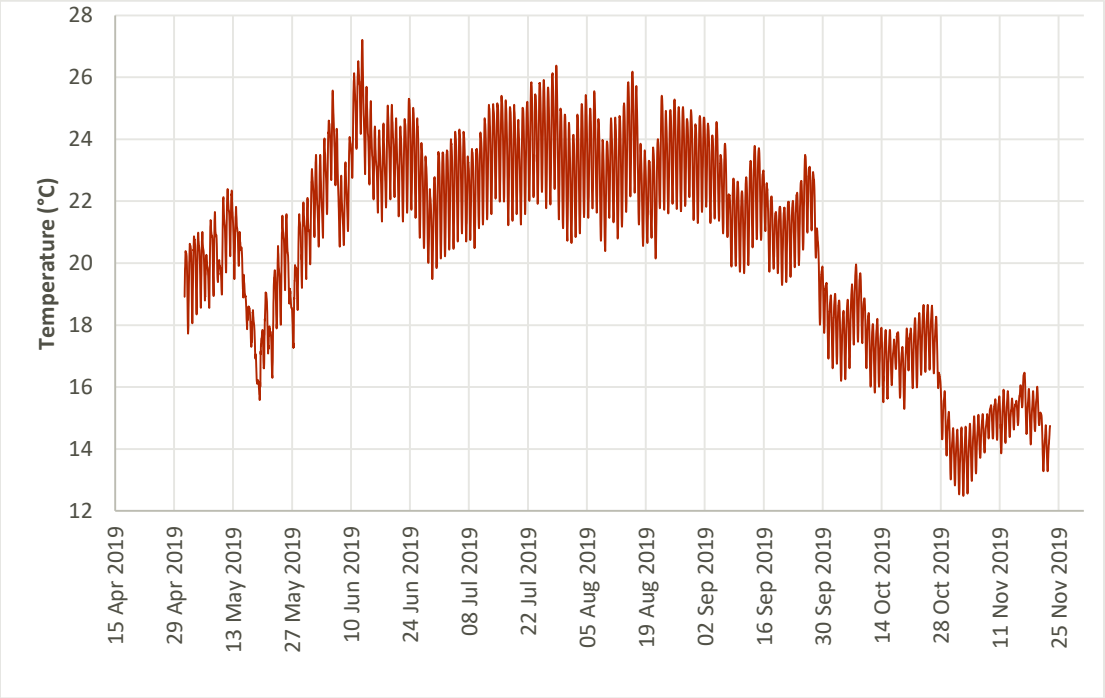

Figure 19. Water temperatures in Coyote Creek immediately downstream of Coyote Ranch Road (upstream of Fisher Creek and Metcalf Pond) from 1 May through 23 November 2019.

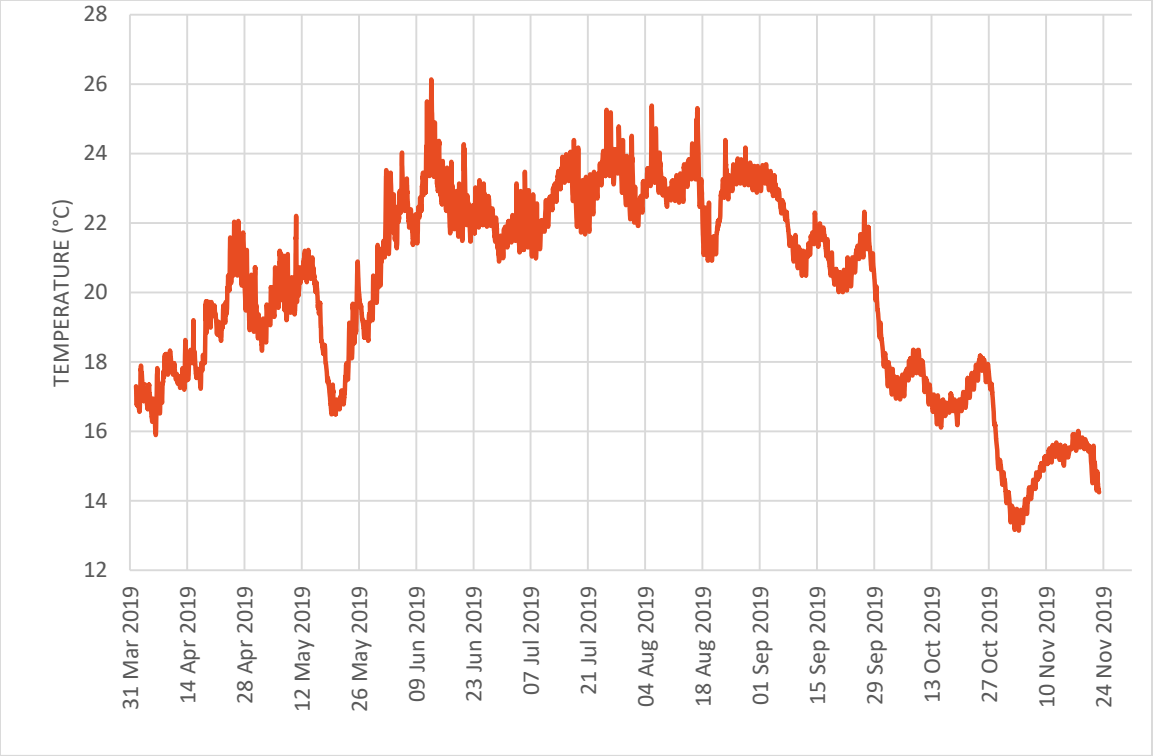

Figure 20. Water temperatures in Coyote Creek immediately downstream of Metcalf Pond from 1 April through 23 November2019.

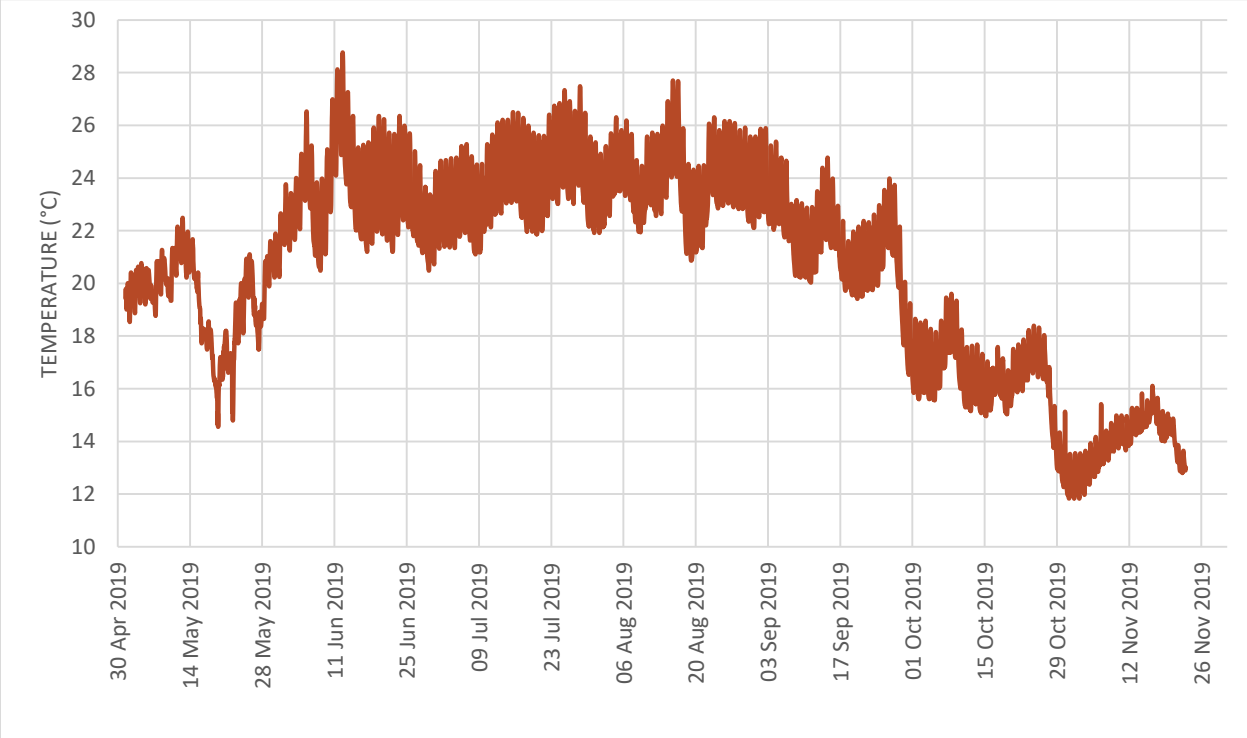

Figure 21. Water temperatures in Coyote Creek near the SCVWD Edenvale Gage from 1 May through 23 November 2019.

Figure 22. Standard lengths (mm) of *O. mykiss* captured by electrofisher at three sites on Coyote Creek on 29 September/24 November 2014; 28 June 2015; and 9 September and 23 October 2019 (fork lengths) . No *O. mykiss* were captured in 2016, 2017, or 2018. Numbers instead of X are ages from scales.

Standard Length (mm)	Upstream of Ogier Ponds		US Boys Ranch DS of Anderson Reservoir	Immediately DS Anderson Reservoir	
	2014		2014	2014	
	9/29 (n=9)	11/24 (n=3)	11/24 (n=30)	9/29 (n=12)	11/24 (n=7)
80 – 84			XXX		
85 – 89	XXX		XXXXXXXXXX		
90 – 94	XX		XXXXX	X	
95 – 99	X		XXXXX	XX	XXX
100-104	X	XX	XXXX	XXX	X
105-109	X	X	X	XXX	X
110-114				XXX	X
115-119	X				
120-124			X		X

	US Boys Ranch DS of Anderson Res. 28 June 2015
225 -229	1

Fork Length (mm)	Upstream of Ogier Ponds 9 Sept 2019	Upstream of Boys Ranch 9 Sept 2019
175-180	0	
320-330	1 (+similar missed)	(similar missed)

Table 1. Amount of habitat sampled, number of *O. mykiss* captured, and estimated density from depletion at sites on Coyote Creek in September and November 2014 and 28 June, 3 July and 14 November 2015, 21 October 2016 , 28 August and 26 October 2017, 2 November 2018, 9 September 2019 (2019 data in bold).

Site and Date	Distance Sampled (feet)	*O. mykiss* Captured	Estimated Density (number per 100 feet)
Downstream of Reservoir			
29 September 2014	175	12	7.1 / 100 feet
24 November 2014	175	7	4.1
3 July 2015	175	0	0
21 October 2016	175	0	0
28 August 2017	185	0	0
2 November 2018	185	0	0
9 **September 2019**	**215**	**0**	**0**
Upstream of Correctional Facility			
24 November 2014	422	30 (+ 1 yearling missed)	8.2
28 June 2015	425	1 (+ 1 missed)	0.4 (yearlings)
14 November 2015	425	0	0
21 October 2016	365	0	0
28 August 2017	425	0	0
2 November 2018	425	0	0
9 **September 2019**	**510**	**0 (1 yearling missed)**	**0.2**

Table 1 (continued)

Site and Date	Distance Sampled (feet)	*O. mykiss* Captured	Estimated Density (number per 100 feet)
Upstream of Ogier Ponds near Model Airplane Park			
29 September 2014	524	10	1.9
24 November 2014	275	3	1.1
28 June 2015	475	0	0
21 October 2016	285	0	0
26 October 2017	710	0	0
2 November 2018	560	0	0
9 **September 2019**	**560**	**1 (+ 1 yearling missed)**	**0.4 yearlings**
Multiple braided channels Upstream of Ogier Pond #1			
9 September 2019	170	1	0.6 YOY
23 October 2019	640	0	0
Between Ogier Ponds 1 and 2			
23 October	100	0	0
Downstream of Golf Course Road			
21 October 2016	95	0	0
26 October 2017	120	0	0
2 November 2018	110	0	0
23 October 2019	**105**	**0**	**0**

Appendix: Photos

Photo 1. Metcalf Dam on 10 February 2019 at a flow of about 500-600 cfs, due to high releases from Anderson Reservoir to comply with seismic restrictions. One of the radial gates was partially opened to lower the pond water level and prevent overtopping of the dam.

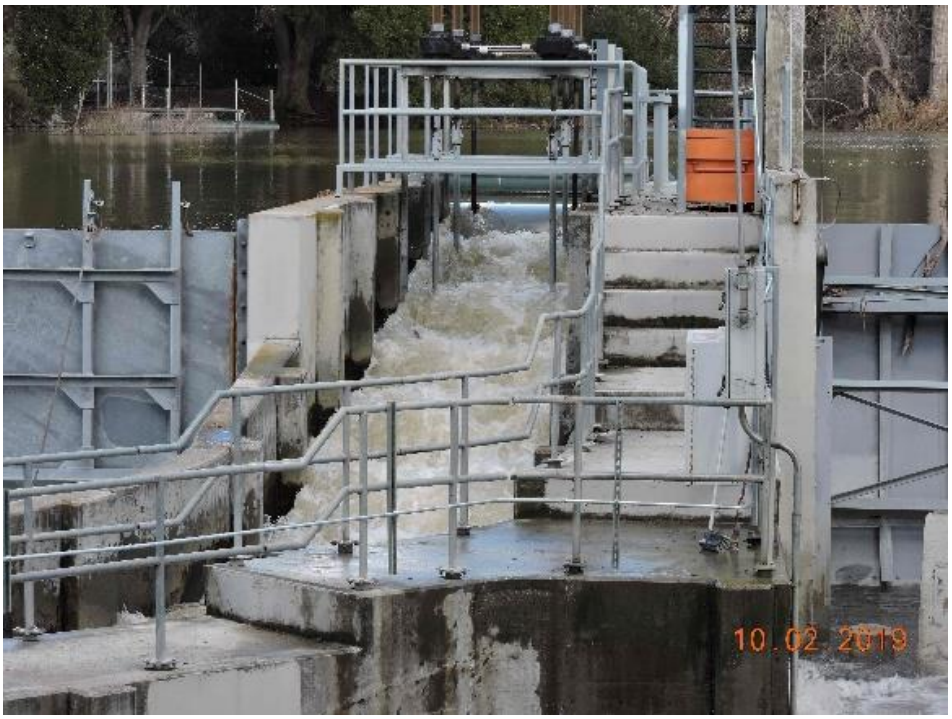

Photo 2. The fish ladder at Metcalf Dam on 10 February 2019. Despite turbulence in the ladder, it was probably passable by adult steelhead (if they successfully located the ladder in the high flows).

Photo 3. Metcalf Dam fish ladder on 1 April 2019, with radial gate partially open and easy passage in the fish ladder; combined flow below the dam was 54 cfs.

Photo 4. The stream gage weir at Coyote Ranch Road on 10 February 2019 at a flow of 350-400 cfs through several channels. The site was passable from February through mid-March, but not at 32 cfs on 1 April 2019. It is a major passage impediment at lower flows because of boulders at the base of the weir that interfere with jumping.

Photo 5. The stream gage weir at Coyote Ranch Road on 23 November 2019 at a flow of 13 cfs, showing the very difficult potential fish passage.

Photo 6. Singleton Road crossing of Coyote Creek on 10 February 2019, during February through mid-March stream flow of about 500-600 cfs. High velocity in the culverts would have blocked passage, but the depth of flow (and moderate velocity) over the apron may have allowed adult steelhead upstream passage over the apron and submerged crossing.

Photo 7. Singleton Road crossing at a dropping stream flow of about 140 cfs on 18 March 2019. High velocity in the culverts and the shallow flow over the apron probably prevented adult steelhead upstream passage.

Photo 8. Singleton Road Crossing after stream flows had dropped further to about 40 cfs on 1 April 2019. Adult steelhead passage would have been possible through the culvert on the left.

Photo 9. Release from the downstream pipeline below Anderson Dam on 31 August 2019. Releases to Coyote Creek for most of the summer were from mid-level Anderson Reservoir water released immediately below the dam and through the downstream hydro pipeline below the dam.

Photo 10. In November the releases were from immediately below the dam (Anderson Reservoir water) and from the upstream pipeline discharge of warmer imported water (23 Nov 2019).

Photo 11. Atypically unshaded channel upstream of Ogier Pond #1, due to channel realignment into a previously abandoned historic channel during the flood of 2017. Habitats include riffles, runs, and fast "heads of pools" that provide fast-water feeding habitat for steelhead. No steelhead were seen or caught in the fast riffles or runs, but one large yearling was shocked, but not caught, in the head of pool at the bend downstream, and one large yearling was caught at the head of pool upstream of this picture (9 September 2019).

Photo 12. Head of pool upstream of Photo 11, where a large yearling steelhead was captured.

Photo 13. 330 mm fork length yearling steelhead caught in the head of pool in Photo 12. Two others of similar size were shocked, but not captured, in head of pool habitats upstream of Ogier Pond #1 and upstream of the Boy's Ranch near the dam.

Photo 14. Main braided channel (of 4-5 channels) immediately upstream of Ogier Pond #1.

Photo 15. 175 mm fork length YOY steelhead captured in one of the braided channels upstream of Ogier Pond #1.

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Santa Clara & San Benito Counties Building & Construction Trades Council

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Cement Masons 400
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Electricians 234
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Glaziers 1621
Heat & Frost Insulators 16
Iron Workers 377
Laborers 270
Laborers 67
Lathers 9144
Millwrights 102
Operating Engineers 3
Painters District Council 16
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Sheet Metal Workers 104
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July 10th 2020

Nai Hsueh, Chair
Valley Water Board of Directors
5750 Almaden Expressway
San Jose, CA 95118

Dear Chair Hsueh:

On behalf of the Santa Clara and San Benito Counties Building and Construction Trades Council, I write to express support for the Draft Community Preferred Plan (the Plan) that would be implemented should the Safe, Clean Water and Natural Flood Protection Program be renewed, and urge the Valley Water Board of Directors to adopt the Plan and place the renewal of that program on the November 2020 ballot.

We believe that ensuring a reliable supply of water and providing flood protection is essential for creating and sustaining jobs, which bolsters not just our communities, but also our economy at the local and regional levels. Passage of this measure will help ensure the creation of jobs in the infrastructure sector by building sustainable, locally controlled water supply, flood protection, and environmental stewardship projects.

This potential ballot measure, known as the Safe, Clean Water and Natural Flood Protection Program has yielded the following draft priorities as part of the exploratory process:

- Ensure a safe, reliable water supply
- Reduce toxins, hazards and contaminants in our waterways
- Protect our water supply from earthquakes and natural disasters
- Restore wildlife habitat and provide open space
- Provide flood protection to homes businesses, schools, and highways
- Support public health and public safety for our community

The Santa Clara and San Benito Counties Building and Construction Trades Council supports the Plan, and urges the Board to adopt and to place this measure on the November ballot. If you have any questions, please feel free to contact me at (408) 265-7643 or david@scbtc.org.

Sincerely,

David Bini

David Bini
Executive Director

Michele King

Subject: FW: July 14, 2020 Agenda Item 2.7

From: Katja Irvin <katja.irvin@sbcglobal.net>
Sent: Monday, July 13, 2020 9:30 PM
To: Clerk of the Board <clerkoftheboard@valleywater.org>; Board of Directors <board@valleywater.org>
Cc: Barbara Kelsey <barbara.kelsey@sierraclub.org>; James Eggers <james.eggers@sierraclub.org>
Subject: July 14, 2020 Agenda Item 2.7

The Sierra Club Loma Prieta chapter continues to have concerns about the Safe Clean Water property tax renewal measure being proposed for the November ballot. In general, this proposal seems rushed and unnecessary given the current program is set to run though 2028. Our sense is that it would be better to wait and put a renewal measure on the ballot in 2024.

Regarding the proposed ballot measure, our biggest concern is the lack of a sunset date for this parcel tax funding. Property owners in Santa Clara County already fund Valley Water substantially though the Ad Valorem Tax and the State Water Project Tax. This special tax for Safe Clean Water should remain a "special tax" and be re-evaluated by the voters on an occasional basis.

The Sierra Club is also very interested in any efforts to make expedited progress on the Fisheries and Aquatic Habitat Collaborative Effort, either through the ballot measure or through other commitments and follow through. There has been plenty of rhetoric about this being an important project but no significant progress is made.

Thank you for your consideration,

Katja Irvin
Conservation Committee Co-Chair
Sierra Club Loma Prieta Chapter