AGENDA
ADJOURNED MEETING OF THE BOARD OF DIRECTORS
WEDNESDAY, NOVEMBER 18, 2020 - 9:00 AM
1391 Engineer Street, Vista, CA 92081
Phone: (760) 597-3100

COVID-19 RESPONSE PROCEDURES FOR MEETING
NOTICE FOR PARTICIPATION

In light of Governor Newsom's Executive Orders N-29-20 and N-33-20, and guidance from the County of San Diego, State of California, and Centers for Disease Control, please be advised that members of the public will not be able to attend this meeting in person. Executive Order N-33-20 requires persons "stay home or in their place of residence except as needed to maintain continuity of operations…" of critical infrastructure. As welcome as public attendance is at Vista Irrigation District Board of Directors meetings, it does not appear to fit this exception, and Vista Irrigation District encourages compliance with the Governor's Executive Order.

Members of the public may participate through Vista Irrigation District's teleconferencing line. The phone number and applicable pass code for such participation is as follows: Phone (877) 873-8018; Pass Code 474698#.

Vista Irrigation District's teleconferencing line capacity is limited and not all parties who wish to participate through this method may be able to do so. Phone participants are asked to place calls to this line at or before the scheduled start time of the meeting, so the District staff can organize order of speakers and assure the ability of all who wish to participate. Please also note phone or data charges from your carrier may apply to your use of this option.

To maintain orderliness in proceedings, phone participants will be asked to identify themselves, their address, and the item on the agenda they wish to address. Telephone participants are asked to limit background noise during telephonic participation (with muting features, if available) and to maintain proper decorum suitable to the conduct of public meetings at all times. Telephone participants may not speak until the appropriate time on the agenda and only when recognized by the Board President.

Members of the public may also address the Board of Directors by email; however, such email communication must be received at or before the time of the commencement of the meeting. The email address to use for such communications is as follows: BoardSecretary@vidwater.org.

Please also be advised that one or more members of the Vista Irrigation District Board of Directors or staff may participate in this meeting by teleconference or other digital means consistent with Executive Order N-29-20.

Vista Irrigation District appreciates your understanding as we all work through the unprecedented challenges posed by COVID-19. In compliance with the Americans with Disabilities Act, if special assistance is needed to participate in the Board meeting telephonically, please contact the Board Secretary during regular business hours at (760) 597-3128. Notification received 48 hours before the meeting will assist Vista Irrigation District in making reasonable accommodations.

VISTA IRRIGATION DISTRICT

AGENDA
ADJOURNED MEETING OF THE BOARD OF DIRECTORS
WEDNESDAY, NOVEMBER 18, 2020 - 9:00 AM
1391 Engineer Street, Vista, CA 92081
Phone: (760) 597-3100

1. **CALL TO ORDER**
2. **ROLL CALL – DETERMINATION OF QUORUM**
3. **PLEDGE OF ALLEGIANCE**
4. **CONSIDER APPROVAL OF AGENDA**
   In the case of an emergency, items may be added to the Agenda by a majority vote of the Board of Directors. An emergency is defined as a work stoppage, a crippling disaster, or other activity that severely imperils public health, safety, or both. Also, items that arise after the posting of the Agenda may be added by a 2/3 vote of the Board. Items on the agenda may be taken out of sequential order as their priority is determined by the Board of Directors. The Board may take action on any item appearing on the agenda.
5. **ORAL COMMUNICATIONS**
   Members of the public may address the Board on items not appearing on the posted agenda, which are within the subject matter jurisdiction of the Board. Speakers are asked to limit their comments to five (5) minutes; the total time allowable for all public comment on items not appearing on the agenda at any one meeting may be limited. Comments on items listed on the agenda will be taken before or during discussion of the agenda item. Members of the public desiring to address the Board are asked to complete a speaker's slip available on the table near the entrance of the Boardroom and present it to the Board Secretary prior to the meeting.
6. **CONSENT CALENDAR**
   Any member of the Board, staff or public may request that items from the Consent Calendar be removed for discussion. Items so removed shall be acted upon separately immediately following approval of items remaining on the Consent Calendar.

   A. **Minutes of the Board of Directors meeting on November 4, 2020**
      Recommendation: Approval of draft minutes.

   B. **Ratification of check disbursements**
      Recommendation: Adopt a resolution ratifying checks numbered 65554 through 65657 in the amount of $1,265,844.75 pursuant to the cash disbursement report detailing expenditures.

7. **EXCELLENCE IN FINANCIAL REPORTING AWARD**
   Recommendation: Receive Certificate of Achievement for Excellence in Financial Reporting from the Government Finance Officers Association (GFOA).

8. **STUDY OF ARROYO CHUB ON DISTRICT LAND**
   Recommendation: Consider request by California Department of Fish and Wildlife for access to District land to collect 20 individual specimen of arroyo chub from the West Fork of the San Luis Rey River for laboratory analysis.

9. **FOUR RESERVOIRS SEISMIC/STRUCTURAL ANALYSIS AND RESERVOIR IMPROVEMENT PLANS**
   Recommendation: Receive informational report on the primary findings and recommendations from the Four Reservoirs Seismic/Structural Analysis and an update on near-term reservoir improvement plans.

10. REVISIONS TO COMPENSATION SCHEDULE
Recommendation: Adopt Resolution No. 20-XX approving revisions to the Compensation Schedule effective January 1, 2021.

11. DECEMBER 2020 BOARD MEETING DATE
Recommendation: Consider adding a second Board of Directors meeting date in December 2020.

12. MATTERS PERTAINING TO THE ACTIVITIES OF THE SAN DIEGO COUNTY WATER AUTHORITY
Informational report by staff and directors concerning the San Diego County Water Authority.

13. MEETINGS AND EVENTS
A. Reports on meetings and events attended by Directors
B. Schedule of upcoming meetings and events

14. ITEMS FOR FUTURE AGENDAS AND/OR PRESS RELEASES
This item is placed on the agenda to enable the Board to identify and schedule future items for discussion at upcoming Board meetings and/or identify press release opportunities.

15. COMMENTS BY DIRECTORS
This item is placed on the agenda to enable individual Board members to convey information to the Board and the public not requiring discussion or action.

16. COMMENTS BY GENERAL COUNSEL
Informational report by the General Counsel on items not requiring discussion or action.

17. COMMENTS BY GENERAL MANAGER
Informational report by the General Manager on items not requiring discussion or action.

18. CLOSED SESSION: CONFERENCE WITH LEGAL COUNSEL-EXISTING LITIGATION
(Existing Litigation per Government Code Sections 54956.9(a) and (d)(1))
Name of Case: Kessner et al. v. City of Santa Clara, et al.;
Santa Clara Superior Court Case No. 20CV364054

19. ADJOURNMENT

- *The agenda package and materials related to an agenda item submitted after the packet's distribution to the Board, are available for public review outside the lobby of the District office during normal business hours.*
- *Agendas and minutes are available at www.vidwater.org.*
- *VID Board meetings are generally held on the first and third Wednesday of each month.*

AFFIDAVIT OF POSTING

I, Lisa R. Soto, Board Secretary of the Vista Irrigation District, hereby certify that I posted a copy of the foregoing agenda outside the lobby of the District office at 1391 Engineer Street, Vista, California at least 72 hours prior to the meeting, in accordance with Govt. Code Sec. 54954.2(a).

Date: November 12, 2020

Lisa R. Soto, Board Secretary

VISTA IRRIGATION DISTRICT

STAFF REPORT

Agenda Item: 6

Board Meeting Date: **November 18, 2020**
Prepared By: **Lisa Soto**

SUBJECT: CONSENT CALENDAR

A. Minutes of the Board of Directors meeting on November 4, 2020

B. Ratification of check disbursements

DRAFT MINUTES

Not part of the District's permanent record until approved by the Board of Directors.

MINUTES OF THE REGULAR MEETING OF THE
BOARD OF DIRECTORS OF
VISTA IRRIGATION DISTRICT

November 4, 2020

A Regular Meeting of the Board of Directors of Vista Irrigation District was held on Wednesday, November 4, 2020 at the offices of the District, 1391 Engineer Street, Vista, California.

1. CALL TO ORDER

President Vásquez called the meeting to order at 9:00 a.m.

2. ROLL CALL

Directors present: Miller, Dorey, Sanchez, and MacKenzie; President Vásquez was also present via teleconference.

Directors absent: None.

Staff present: Brett Hodgkiss, General Manager; Ramae Ogilvie, Administrative Assistant; Don Smith, Director of Water Resources; Randy Whitmann, Director of Engineering; Frank Wolinski, Director of Operations and Field Services; and Marlene Kelleher, Director of Administration. General Counsel David Cosgrove was also present.

Other attendees: Rodney Smith of Stratecon, Inc. and Bob Campbell (via teleconference) of Water Resource Consultants, Inc. were present for agenda Item 7. Reza Samandari and Lee Whittington were present via teleconference for agenda Item 10.

3. PLEDGE OF ALLEGIANCE

Director Sanchez led the pledge of allegiance.

4. APPROVAL OF AGENDA

20-11-93	***Upon motion by Director Miller, seconded by Director MacKenzie and unanimously carried (5 ayes: Miller, Dorey, Sanchez, MacKenzie, and Vásquez), the Board of Directors approved the agenda as presented.***

5. ORAL COMMUNICATIONS

No public comments were presented on items not appearing on the agenda.

6. CONSENT CALENDAR

20-11-94	***Upon motion by Director Miller, seconded by Director MacKenzie and unanimously carried (5 ayes: Miller, Dorey, Sanchez, MacKenzie, and Vásquez), the Board of Directors approved the Consent Calendar, including Resolution No. 20-30 approving disbursements.***

A. Minutes of Board of Directors meeting on October 21, 2020

The minutes of October 21, 2020 were approved as presented.

B. Resolution ratifying check disbursements

RESOLUTION NO. 20-30

BE IT RESOLVED, that the Board of Directors of Vista Irrigation District does hereby approve checks numbered 65461 through 65553 drawn on Union Bank totaling $1,113,765.60.

FURTHER RESOLVED that the Board of Directors does hereby authorize the execution of the checks by the appropriate officers of the District.

PASSED AND ADOPTED unanimously by a roll call vote of the Board of Directors of Vista Irrigation District this 4th day of November 2020.

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7. PRESENTATION ON ECONOMIC CONSIDERATIONS RELATED TO THE SAN DIEGO COUNTY WATER AUTHORITY'S PROPOSED REGIONAL CONVEYANCE SYSTEM

See staff report attached hereto.

General Manager Brett Hodgkiss presented an overview of the item, stating that the San Diego County Water Authority (Water Authority) has been studying a Regional Conveyance System (RCS) to transport a supply of conserved water from Imperial Irrigation District (IID) and a supply from lining the All-American and Coachella canals to the San Diego region (Region). Currently, both supplies are conveyed via the Colorado River Aqueduct, owned and operated by Metropolitan Water District of Southern California (MWD), via an exchange agreement, which expires in 2047. The RCS would provide conveyance independence from MWD.

Mr. Hodgkiss stated that the Board received an informational report on the San Diego County Water Authority Regional Conveyance System Feasibility Review prepared by Don MacFarlane, DLM Engineering, and Doug Gillingham, Gillingham Water on August 19, 2020. He noted that the review indicated that the project was feasible from an engineering perspective; however, the economic and financial analysis of the project were sensitive to changes in cost factors, such as the projected escalation in MWD's rates as well as the projected interest rates associated with financing the project. He added that changes in either of these factors could affect the overall financial viability of the project.

Mr. Hodgkiss stated that on August 27, 2020 the Water Authority delayed the vote on Phase B of the feasibility study, which would explore partnership opportunities and analyze project economics, in order to allow further outreach to Water Authority member agencies and stakeholders. He introduced Messrs. Rodney Smith of Stratecon, Inc. and Bob Campbell of Water Resource Consultants, Inc. and thanked them for taking the time to address the Board.

Mr. Smith presented the Economic Analysis and Risk Assessment of Water Delivery Alternatives via a PowerPoint presentation (attached) and reviewed the fundamental factors of moving forward with Phase B of the study. He discussed two possible alternatives, a "rental agreement" with MWD giving the Water Authority access to the Colorado River Aqueduct via an exchange agreement or the construction and

ownership of the RCS by the Water Authority, ensuring local control, partnership opportunities and mitigation of the risk associated with the uncertainty of MWD rates and charges.

Mr. Smith reviewed a graph showing the history of MWD water rates, pointing out that MWD water rates have been outpacing inflation regularly. He stated that Phase B of the study would include an economic analysis and risk assessment focused on the future of both MWD and Water Authority water rates and supply reliability; Phase B would also include a comparative analysis of the Water Authority's conveyance under an exchange agreement versus the RCS.

Mr. Smith reviewed the risk factors driving MWD's rates and charges, fixed and variable costs, and water sales. He discussed how to identify what may affect MWD's rate structure in the future, such as current cost-of-service studies, changes in cost allocation and rate restructuring probability and timing. Mr. Smith presented an Integrated RCS Decision Model identifying each factor that should be considered in making an informed decision.

Mr. Smith stated that the RCS is not yet a project; it is only being studied at this time. Phase B would be a complete economic/financial analysis and risk assessment of the two alternatives and would also evaluate partnership opportunities. He added that he and Mr. Campbell have advised the Water Authority to open negotiations with IID to secure an agreement extension past 2047 as part of Phase B and suggested adding geothermal power partnerships as a topic of discussion.

The Board discussed and commented on the information presented. Mr. Hodgkiss mentioned that some Water Authority member agencies have expressed concerns about future demands being less than "take or pay" commitments and the impact that lower demands would have on the financial viability of the RCS project. Mr. Smith commented that demand projections would be looked at as part of Phase B.

Mr. Hodgkiss thanked the Water Authority and Director Miller (as Vista Irrigation District's representative to the Water Authority) for arranging the presentation by Messrs. Smith and Campbell. The Board thanked Mr. Smith and Mr. Campbell for their presentation.

At this time, the Board took a brief break from 10:30 a.m. to 10:40 a.m.

8. DIVISION REPORTS

See staff report attached hereto.

Mr. Hodgkiss stated that the Warner Ranch Ditch Repair Project is complete; pumped water from the wellfield is currently being conveyed to Lake Henshaw via the repaired ditch system. Director of Water Resources Don Smith added that the wells will continue operating for a couple of weeks in order to test the system; the wellfield will shut down from late fall 2020 to spring 2021.

Director of Engineering Randy Whitmann updated the Board regarding the status of Request for Proposals for the Flume Replacement Alignment Study. He stated that three firms have declined to submit a proposal; however, he believes there could be multiple firms that may team up to submit a single proposal.

Director of Operations and Field Services Frank Wolinksi updated the Board regarding the boiler installation at the District Headquarters.

A brief break was taken from 10:43 a.m. to 10:53 a.m. Upon return from break, the following agenda item was taken out of sequence.

15. COMMENTS BY GENERAL COUNSEL

Mr. Cosgrove reported on a lawsuit brought about by California Assembly members James Gallagher (R-Yuba City) and Kevin Kiley (R-Rocklin) challenging Governor Newsom's executive order no. N-67-20 requiring that all California residents registered to vote in the November 2020 elections receive vote-by-mail ballots. State Superior Court Judge Sarah Heckman ruled against the executive order finding it improperly amended existing statutory law, exceeding the governor's authority and violating the separation of powers.

9. EXCHANGE AND TEMPORARY SERVICE AGREEMENTS

See staff report attached hereto.

Mr. Whitmann provided an overview of the types and terms of exchange and temporary service agreements. He stated that exchange agreements are between Vista Irrigation District (District) and a neighboring agency and used in situations where an agency does not have the facilities to service its customers. Mr. Whitmann reviewed a map of the District's service area showing all the locations of the current exchange agreements, noting that there are 26 District customers served by Vallecitos, 57 Vallecitos customers served by the District, and 13 City of Oceanside (Oceanside) customers served by the District.

Mr. Whitmann stated that the exchange agreement with Oceanside is for a master meter that feeds 13 properties; he said that either party may cancel the agreement by giving written notice. Mr. Whitmann said that the terms of the agreement with Oceanside are more permanent in nature (than the exchange agreements with Vallecitos) because they lack any discussion on future conversion of the customers back to Oceanside's system.

Mr. Whitmann stated that exchange agreements with Vallecitos are entered into for each property served and are meant to be temporary. The agreements may be terminated by either party under certain conditions (e.g. intended servicing agency extends facilities to serve the exchange property, the neighboring agency no longer has capacity to serve the exchange property, etc.) and by giving written notice.

Mr. Whitmann stated that the use of exchange agreements was common practice up until recent years; both agencies now promote service area reorganizations through LAFCO when service to an area appears to be permanent. A recent example of a reorganization through LAFCO was the Catalina Heights Reorganization completed earlier in 2020 in which a single-family lot split between the District's service area and Vallecitos' service area. The District had a main adjacent to the parcel so the owner was required to annex into the District instead of using an exchange agreement.

Mr. Whitmann reviewed a recent project in which an exchange agreement benefited the District. Referencing Detail Map 1, he stated that the District had 2,600 feet of Nipponite asbestos cement pipe within Deer Springs Road and Sarver Lane that served several parcels in the vicinity and was in need of replacement. An exchange agreement allowed this section of pipe to be abandoned, saving the District $585,000 in replacement construction costs. Mr. Whitmann noted that had this been a current project, Vallecitos would have required a formal reorganization through LAFCO, which would have cost the District approximately $380,000 in annexation and capacity fees. While costly, this approach would have still been less costly than pipeline replacement.

Mr. Whitmann reviewed Detail Map 2 stating that the District and Vallecitos are currently discussing a permanent reorganization of four District customers in the Calle Maria area that are being served directly off the Flume. He explained that it would be more cost effective for the District to pay to annex the properties to Vallecitos than to extend two Vallecitos mains to serve these properties and make them exchange meters. Mr. Whitmann also reviewed Detail Map 3 showing all the exchange meters in the "Bennett" service area related to the Nordahl Road subdivision where a District detachment and exchange agreement is being considered (agenda Item 10).

Mr. Whitmann explained that Temporary Service Agreements (TSAs) are between the District and a customer and have been used in lieu of requiring a main extension to the property; the District has just under 500 TSAs. He stated that the Board approved Resolution No. 98-43 in December 1998 that established a temporary offsite meter fee, eliminating the need for TSAs. Mr. Whitmann stated that the current practice, when a main extension is not desired by the District nor feasible at the time, is to allow either a temporary or permanent offsite service without an agreement.

Mr. Whitmann stated that while the use of TSAs is no longer common practice, there are still unique circumstances in which they are proposed. In 2017, the District allowed a TSA for offsite water service to parcels located in a steep hilly area known as Chicago Tribune Hills. He explained that a future extension would require major planning for facilities and include facilities such as pump stations, pipelines, and tanks. The established offsite meter fee would not cover the cost of the required facilities; therefore, use of a TSA was necessary under these circumstances.

10. NORDAHL ROAD SUBDIVISION

See staff report attached hereto.

Mr. Whitmann stated that the proposed Nordahl Road project is a 15-lot single-family residential subdivision located on Nordahl Road within the sphere of influence of Vallecitos in the "Bennett" service area. He said that the nearest Vallecitos water main is approximately 1,200 feet away on Rock Springs Road, and a Vallecitos pipeline extension to serve this subdivision would not be feasible at this time. Mr. Whitmann noted that there is a single-family residence on the subject parcel that is currently being served by the District from a main fronting the property.

Mr. Whitmann reviewed three options to be considered for this project. A full conversion of the project from the District to Vallectios, which would cost the owner upwards of a quarter million dollars to extend a pipeline from a Vallecitos main in Rock Springs Road to the proposed subdivision on Nordhal Road. A partial conversion requiring a detachment from the District and annexation into Vallecitos (through the LAFCO reorganization process) and a Vallecitos pipeline extension to the subdivision that is fed from the District's main; water service to the customers would be provided via a temporary exchange agreement. Lastly, no conversion and the District would provide water service to the project.

Mr. Samandari, Owner, and Mr. Whittington, Civil Engineer for the project, addressed the Board via teleconference stating that they are awaiting the decision of the Board in order to move forward with their project. They stated that they would prefer that the project stay with the District (option 3 above).

The Board discussed the options presented, including costs and future concerns associated with providing water service to properties located in the "Bennett" area. The Board decided that the District should serve the project and move forward with the subdivision/water main extension project.

20-11-95	***Upon motion by Director Miller, seconded by Director Sanchez and unanimously carried (5 ayes: Miller, Dorey, Sanchez, MacKenzie, and Vásquez), the Board of Directors decided not to reorganize and will notify Vallecitos Water District that the District intends to serve the project instead of entering into an exchange agreement with Vallecitos Water District.***

11. MATTERS PERTAINING TO THE ACTIVITIES OF THE SAN DIEGO COUNTY WATER AUTHORITY

See staff report attached hereto.

Director Miller reported that Christy Guerin from Olivenhain Municipal Water District resigned from the San Diego County Water Authority (Water Authority) Board of Directors, vacating her position as Vice Chair. He also reported that no members of the Water Authority Board of Directors lost their seats in the recent election.

12. MEETINGS AND EVENTS

See staff report attached hereto.

Director MacKenzie reported on her attendance at the Association of California Water Agencies (ACWA) Legislative Committee meeting in which there was discussion on proposed legislation concerning retail water rate validation actions. The Committee also discussed proposed legislation regarding access to public meetings via teleconferencing; more specifically, the legislation would address issues related to providing opportunities for public comment during meetings.

Mr. Hodgkiss stated that the guest speakers at the Council of Water Utilities (COWU) Meeting on November 17, 2020 would be Gloria Gray, Chair of the MWD Board of Directors, and Gary Croucher, Chair of the Water Authority Board of Directors. Director Vásquez requested to attend (virtually via Zoom) the November meeting of COWU.

Director Sanchez reported that the ACWA Business Development Committee meeting was canceled and will not be rescheduled until after the Fall ACWA Conference. He requested to attend the virtual Fall ACWA Conference on December 2, 2020.

20-11-96	***Upon motion by Director MacKenzie, seconded by Director Miller and unanimously carried (5 ayes: Miller, Dorey, Sanchez, MacKenzie, and Vásquez), the Board of Directors approved President Vásquez to attend the Council of Water Utilities Meeting on the November 17, 2020; and Director Sanchez to attend the Fall ACWA Conference on December 2, 2020.***

13. ITEMS FOR FUTURE AGENDAS AND/OR PRESS RELEASES

See staff report attached hereto.

Mr. Hodgkiss stated that renewal of the lease and license agreements with United States Navy for the Remote Training Site at Warner Springs will be presented to the Board for its consideration at a future meeting; the current lease and license agreements are set to expire at the end of 2020.

14. COMMENTS BY DIRECTORS

Director MacKenzie reported that ACWA Groundwater Committee will meet on December 8, 2020 and a date for ACWA Water Quality Committee meeting has yet to be determined. She reported that the California Special Districts Association (CSDA) Quarterly meeting will be held virtually (via Zoom) on November 19, 2020; the speaker will be Dennis Probst, Vice President of Development for the Airport Authority.

16. COMMENTS BY GENERAL MANAGER

Mr. Hodgkiss had nothing to report.

17. ADJOURNMENT

There being no further business to come before the Board, at 12:33 p.m. President Vásquez adjourned the meeting to November 18, 2020 at 9:00 a.m.

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Richard L. Vásquez, President

ATTEST:

_____
Ramae Ogilvie, Assistant Secretary
Board of Directors
VISTA IRRIGATION DISTRICT

Cash Disbursement Report

VISTA IRRIGATION DISTRICT

Payment Dates 10/22/2020 - 11/4/2020

Payment Number	Payment Date	Vendor	Description	Amount
65554-65557	10/28/2020	Refund Checks 65554-65557	Customer Refunds	9,679.05
65558	10/28/2020	Active Auto Collision	Vehicle Damage Repair	1,479.66
65559	10/28/2020	Amazon Capital Services	Rubbing Alcohol	(4.72)
	10/28/2020		Rubbing Alcohol	(10.00)
	10/28/2020		Rubbing Alcohol - Warehouse Non-Stock	143.70
65560	10/28/2020	Cass Arrieta	Warner Ranch Ditch Repair 09/2020	402,067.07
65561	10/28/2020	Cecilia's Safety Service Inc	Traffic Control - York Dr	4,892.50
	10/28/2020		Traffic Control - York Dr	1,425.00
	10/28/2020		Traffic Control - W Vista Way/Nettleton Rd	1,140.00
65562	10/28/2020	Certified Laboratories	Cleaning Solution For Distribution Regulators	890.10
65563	10/28/2020	City Of Escondido	Escondido Canal Operating Cost 07/2020 - 09/2020	85,508.93
65564	10/28/2020	City of Oceanside	Weese Treatment 09/2020	35,692.52
65565	10/28/2020	Flyers Energy, LLC	Fuel	56.39
	10/28/2020		Fuel	46.37
65566	10/28/2020	Fountain Car Wash	Wash Tokens (600)	540.00
65567	10/28/2020	InfoSend Inc	Backflow Notices	176.87
65568	10/28/2020	Jan-Pro of San Diego	Janitorial Service 10/2020	4,497.00
65569	10/28/2020	Lone Oak 24, LP	Refund Inspection & As-Built Deposits 10/2020	67,398.00
65570	10/28/2020	Partsmaster	Assorted Machine Screws & Drawer For Garage	56.50
65571	10/28/2020	Richard Brady & Associates, Inc	HB Reservoir Rehabilitation 09/2020	294,628.00
65572	10/28/2020	Registry	Temporary Registration for Ford F-650	85.00
65573	10/28/2020	San Diego Gas & Electric	Electric 10/2020 - Warner Ranch House	438.34
65574	10/28/2020	Southern Counties Lubricants, LLC	Fuel 10/01/20 - 10/15/20	5,665.60
65575	10/28/2020	Johnson Controls Security Solutions LLC	Burglar & Access Control Monitoring 11/20 - 01/21	2,719.42
65576	10/28/2020	Verizon Wireless	Cell Phones	1,457.53
65577	10/28/2020	WorkPartners OHS	DOT Physical	95.00
65578-65579	11/04/2020	Refund Checks 65578-65579	Customer Refunds	372.88
65580	11/04/2020	Refund Check 65580	Customer Refund	66.88
65581	11/04/2020	Advanced Chemical Transport Inc	Container for Universal Waste	81.19
65582	11/04/2020	Amazon Capital Services	12/24V Jump Starter	362.63
	11/04/2020		Rechargeable Batteries (4)	174.12
	11/04/2020		Hex Wrench Set	31.90
	11/04/2020		Supplies - COVID - 19	524.42
	11/04/2020		Sprayer Bottles (12)	56.20

Payment Number	Payment Date	Vendor	Description	Amount
	11/04/2020		Back Flows (3)	1,752.15
65583	11/04/2020	AT&T	3680/CALNET 09/13/20-10/12/20 - Legacy Lines	399.70
65584	11/04/2020	AT&T	Data Services	698.93
	11/04/2020		SIP Trunks	444.63
65585	11/04/2020	AT&T	0230/CALNET 09/13/20-10/12/20 - Legacy Lines	48.71
65586	11/04/2020	Auto Specialist Warehouse	Rear Brake Pads - Truck 43	68.12
65587	11/04/2020	Basic pacific	Flexible Spending Services/Cobra	303.40
65588	11/04/2020	Boot Barn Inc	Footwear Program	180.00
65589	11/04/2020	California Crane Safety Consulting	Annual Crane Inspections	2,800.00
65590	11/04/2020	California Special Districts Association	Membership Dues 2021	7,805.00
65591	11/04/2020	CI Solutions	ID Cards	11.80
65592	11/04/2020	Cecilia's Safety Service Inc	Traffic Control Design - S Santa Fe Avenue	35.00
	11/04/2020		Traffic Control - Ridge Rd	617.50
	11/04/2020		Traffic Control - W Country Club Lane	1,330.00
	11/04/2020		Traffic Control - York Drive	6,507.50
65593	11/04/2020	Christopher Craghead	Reimburse - Building Permit Fee (Electrical) - E43	407.12
65594	11/04/2020	Citi Cards	Supplies for Valve Holiday Tester	47.25
	11/04/2020		Silicone Blue Paint	157.22
	11/04/2020		Kitchen & Building Supplies	550.01
	11/04/2020		Kitchen & Building Supplies, Water - Customer Shutdowns	278.49
	11/04/2020		GFI Faxmaker Online Service	12.75
	11/04/2020		SSL Certificate	397.50
	11/04/2020		Primary Domain Renewal	234.90
	11/04/2020		Job Posting - Engineer Service Manager	200.00
	11/04/2020		Job Posting - Labor Trainee	200.00
	11/04/2020		Cloud Base Phone System - COVID -19	405.39
65595	11/04/2020	City Of Escondido	Bear Valley Reconciliation 07/2020 - 09/2020	864.06
65596	11/04/2020	Coastal Chlorination & Backflow	Chlorination of Main Line	414.00
65597	11/04/2020	Core & Main	Gasket/Gripper Ring Assembly for 1" Comp Coupling (33)	112.53
	11/04/2020		4" Ring Gaskets for Nut, Bolt and Gasket Sets (50)	64.95
	11/04/2020		Ell 1" 90 Degree Brass (5)	26.80
	11/04/2020		Nipple 1" x 2.5" Brass (5)	18.40
	11/04/2020		Nipple 1" x 4" Brass (5)	27.60
	11/04/2020		Sleeve 8"x12" Galvanized Top Sections (50)	462.78
	11/04/2020		Adapter 4" DI FLxPO (1)	51.36
	11/04/2020		Pipe 1.5" STD Black (21)	53.42
	11/04/2020		Flange 8" DI Blind (1)	74.69
	11/04/2020		Plug 2" Threaded Brass (10)	83.89
	11/04/2020		Flange 4" SOW (5)	86.60

Payment Number	Payment Date	Vendor	Description	Amount
	11/04/2020		Reducer 8x4 Cast Iron POxFL (1)	112.58
	11/04/2020		Fire Hydrant Spool 6x18 DI (1)	115.83
	11/04/2020		Adapter 2" Copper x MIP (12)	154.58
	11/04/2020		Ball Meter Valve 2" FLG X FIP DD & Lockwing (6)	1,708.19
	11/04/2020		Angle Ball Meter Valve 2" FLG X FIP DD Lockwing (5	1,380.19
	11/04/2020		Gate Valve 6" POxFL R/W (2)	1,316.32
	11/04/2020		Angle Ball Valve 2" FNPT X MNPT (CurbStop) (4)	1,177.76
	11/04/2020		Coupling 1"x1" Female Flare Super Grip (8)	207.84
	11/04/2020		Polyethylene Tubing Insert Stiffeners (10)	20.57
	11/04/2020		Gasket/Gripper Ring Assembly for 1" Comp Coupling (7)	23.87
	11/04/2020		Ell 8" DI POxFL 45 Degree (1)	158.05
	11/04/2020		Gate Valve 4" FL R/W (1)	477.38
	11/04/2020		Gate Valve 6" POxFL R/W (1)	658.16
	11/04/2020		Fire Hydrant 6x4x2.5x2.5 (1)	3,361.16
	11/04/2020		Adapters & Gaskets	1,002.26
	11/04/2020		Deflection Couplings	2,434.55
65598	11/04/2020	County of San Diego	Permit Fees 09/2020	6,458.60
65599	11/04/2020	Dion International Trucks, LLC - San Marcos	Gasket - Truck 52	35.46
65600	11/04/2020	DIRECTV	Direct TV Service	102.24
65601	11/04/2020	EDCO Waste & Recycling Services Inc	Trash & Recycle 10/2020	245.71
65602	11/04/2020	Electrical Sales Inc	Breaker Exchange	(36.51)
	11/04/2020		LED Bulbs (3)	289.03
65603	11/04/2020	Ergostop Inc	Roller Mouse (2)	447.07
65604	11/04/2020	Ferguson Waterworks	Service Saddle 14x2 Brass AC (1)	439.20
	11/04/2020		Service Saddle 16x1.5 Brass AC (1)	503.22
	11/04/2020		Corp Stop .75" MIP X Flare (4)	176.92
	11/04/2020		Union 1" CTS COMP X PEP (10)	496.33
	11/04/2020		Solenoid Valves (2)	555.76
	11/04/2020		Cla-Val Solenoid Coils (2)	351.60
65605	11/04/2020	Fleet Pride	Bed Up/Down Cable - Truck 22	186.12
	11/04/2020		Work Lamp - VE2	53.34
	11/04/2020		LED Flood Lamp	53.34
65606	11/04/2020	Flyers Energy, LLC	Fuel	196.97
65607	11/04/2020	Fredricks Electric Inc	Replaced LED Lamps & Lighting Ballast	1,058.08
65608	11/04/2020	Glennie's Office Products Inc	Office Supplies	45.21
65609	11/04/2020	Grainger	Electrical Gloves	152.28
	11/04/2020		Storage Tray	116.76
	11/04/2020		Eye Wash Station Test Funnel	54.90
	11/04/2020		Flange Wedges, Tube Cutting Wheels	90.37

Payment Number	Payment Date	Vendor	Description	Amount
65610	11/04/2020	Hach Company	Lab Supplies	1,296.94
65611	11/04/2020	Hawthorne Machinery Co	Park Brake Switch - B23	58.98
	11/04/2020		Backhoe Bucket Teeth	112.17
65612	11/04/2020	HELIX Environmental Planning, Inc	Warner Ranch Ditch Repair 10/2020 - SKR Monitoring	19,750.00
65613	11/04/2020	Home Depot Credit Services	Grinder	355.06
	11/04/2020		Sawzall Blades, Battery	246.49
	11/04/2020		Paint Supplies	11.82
	11/04/2020		Building Maintenance Materials	43.24
	11/04/2020		Lamps for Flag Pole Lights	19.70
	11/04/2020		Silver Solder, Filter	62.46
	11/04/2020		Irrigation Wire	13.45
	11/04/2020		Fuel for Equipment	121.72
	11/04/2020		Floor Reinforcement	20.39
	11/04/2020		Rebar	139.64
	11/04/2020		Electrical Supplies	77.10
	11/04/2020		Electrical Supplies	110.26
	11/04/2020		Electrical Supplies	59.95
	11/04/2020		Hardware & Cleaning Supplies	153.17
	11/04/2020		Pressure Regulator	100.81
	11/04/2020		Forms	70.67
	11/04/2020		Hose Reels	80.00
	11/04/2020		Concrete 60lb bag (112)	441.79
65614	11/04/2020	Horton Knox Carter & Foote LLP	Legal Services 11/2020	12,000.00
65615	11/04/2020	IDEXX Distribution Corporation	Colilert Comparator	19.40
65616	11/04/2020	InfoSend Inc	Data Processing/Mailing Services 09/2020	4,515.88
	11/04/2020		Newsletter Inserts (Summer 2020)	94.17
	11/04/2020		Support & Storage 09/2020	1,410.77
65617	11/04/2020	Inland Kenworth (US) Inc	2021 Kenworth Class 6 Dump Truck	119,813.09
	11/04/2020		Core - Truck 3	(98.51)
65618	11/04/2020	Jackson & Blanc	Quarterly HVAC Maintenance 10/2020 - 12/2020	2,668.00
65619	11/04/2020	Joe's Paving	Patch Paving - Montgomery Dr to Clarence Dr	58,288.10
	11/04/2020		Patch Paving	6,779.68
	11/04/2020		Patch Paving - Pala Vista Dr	14,744.50
65620	11/04/2020	Kimball Midwest	Metric Bolts/Hardware	175.38
65621	11/04/2020	Lawnmowers Plus Inc	Checked Chainsaw Condition - MS170	30.00
	11/04/2020		Checked Chainsaw Condition - MS271	30.00
	11/04/2020		Chainsaw	344.76
	11/04/2020		Pull Start Rope	28.96
65622	11/04/2020	Liebert Cassidy Whitmore	Legal Services 09/2020	342.00

Payment Number	Payment Date	Vendor	Description	Amount
65623	11/04/2020	Lightning Messenger Express	Messenger Service 10/02/20	52.50
65624	11/04/2020	McMaster-Carr Supply Company	Water Quality Fittings	87.66
	11/04/2020		Water Quality Fittings	97.13
65625	11/04/2020	Mission Resource Conservation District	Home Water Use Evaluations 10/2020 (3)	158.50
65626	11/04/2020	Moodys	Dump Fee (1)	200.00
65627	11/04/2020	Mutual of Omaha	LTD/STD/Life Insurance 11/2020	6,745.67
65628	11/04/2020	NAPA Auto Parts	Blower Motor - Truck 10	(163.99)
	11/04/2020		Tail Lamp Converter Adapter - VE2	33.01
	11/04/2020		Tail Lamp Converter, Brake Controller, Filter	149.58
65629	11/04/2020	Partsmaster	Bolts, Nuts, Washers	212.00
	11/04/2020		Brass Fitting	19.85
65630	11/04/2020	North County Auto Parts	Turn Rotors (2) - Truck 16	53.00
	11/04/2020		Gas Cap - Truck 47	11.08
	11/04/2020		Shop Chemicals & Oil	63.77
	11/04/2020		Front Brake Pads - Truck 10	134.34
	11/04/2020		Rear Brake Pads - Truck 10	134.34
	11/04/2020		Brake Fluid (2)	13.79
65631	11/04/2020	North County Industrial Park	Association Fees 11/2020	879.30
65632	11/04/2020	Opto 22	SCADA Power Supplies (2)	554.37
65633	11/04/2020	O'Reilly Auto Parts	Battery Core - Truck 47	(18.00)
	11/04/2020		Battery Core - Truck 21	(18.00)
	11/04/2020		Battery Core - W4	(10.00)
	11/04/2020		Battery - A6 Compressor	109.59
	11/04/2020		Battery - Stationary Generator	206.35
65634	11/04/2020	Pacific Pipeline Supply	Hydrant Wharf Head (1)	761.95
	11/04/2020		Router Bit (1)	220.91
	11/04/2020		Regulator Pipe Stands (2) - E43	127.91
	11/04/2020		Bolt Kits, Flange Gaskets	269.07
	11/04/2020		Nipple 0.75" x CL Brass (5)	10.83
	11/04/2020		Weld Coupling 1" Black (Thick Walled) (7)	30.31
	11/04/2020		6" PO Rubber Gaskets (10)	43.30
	11/04/2020		3/4" x 1" Meter Bushing (10)	119.08
	11/04/2020		6" Pipe Restrainer with T-Bolts (10)	259.80
	11/04/2020		Nipple 1" x 2" Brass (5)	16.24
65635	11/04/2020	Plateau Pest Solutions Inc	Bee Removal (8) & Hive Removal Service (6)	550.00
65636	11/04/2020	Ramco Petroleum	Fuel 09/2020	1,605.10
65637	11/04/2020	RC Auto & Smog	Smog Inspection - Truck 66	50.00
	11/04/2020		Smog Inspection - Truck 79	50.00
	11/04/2020		Smog Inspection - Truck 5	50.00

Payment Number	Payment Date	Vendor	Description	Amount
65638	11/04/2020	Volvo Construction Equipment & Services	Bucket Teeth & Retainers - E1	645.94
65639	11/04/2020	San Diego Gas & Electric	Electric 10/2020 - Henshaw Building & Grounds	423.81
	11/04/2020		Electric 10/2020 - Henshaw Wellfield	9,578.31
65640	11/04/2020	Shred-it USA LLC	Shredding Services	253.46
65641	11/04/2020	SiteOne Landscape Supply, LLC	Roundup Weed Killer	38.04
	11/04/2020		Landscaping Straw Wattle Roll	27.16
65642	11/04/2020	Southland Pipe Corp.	18" Pipe (40')	3,366.11
	11/04/2020		16" Slip on Weld Flanges (2)	463.32
	11/04/2020		18" Slip on Weld Flanges (2)	632.17
65643	11/04/2020	Steve Waters	Reimburse for Damage	177.60
65644	11/04/2020	Sunbelt Rentals	Dump Trunk Rental	472.95
	11/04/2020		Hydraulic Tank Replacement Kit - L1	816.77
	11/04/2020		Excavator Rental	375.82
	11/04/2020		Concrete	271.12
	11/04/2020		Concrete	288.72
65645	11/04/2020	Sunrise Materials Inc	Pallets (2)	(32.48)
	11/04/2020		Pallet Deposit (2)	43.30
	11/04/2020		Delivery Fee (1)	135.31
	11/04/2020		Rock Bags (70)	284.16
	11/04/2020		Bricks 8" x 2" x 16" (240)	636.51
65646	11/04/2020	Tegriscape Inc	Landscape Service 10/2020	1,787.00
65647	11/04/2020	The UPS Store 0971	Shipping 10/2020	347.61
65648	11/04/2020	Bend Genetics, LLC	HABS Testing - Lake Henshaw	975.00
65649	11/04/2020	Titan Fire Protection Inc	Refund Fire Flow Application 10/2020	229.00
65650	11/04/2020	TS Industrial Supply	Impact Sockets (4)	91.47
	11/04/2020		Air Couplers, Safety Lock Pins	137.49
	11/04/2020		Fire Hose (1)	26.71
	11/04/2020		Impact Swivel (4)	136.50
	11/04/2020		Suction Hose (25')	146.01
	11/04/2020		Striping Paint Asphalt Black (12)	65.21
	11/04/2020		Striping Paint White #710 (12)	65.21
	11/04/2020		Teflon Tape 1" (20)	24.90
	11/04/2020		2" Pipe Wrap Tape (12)	93.27
	11/04/2020		Sea Electrical Tape (50)	51.96
	11/04/2020		Striping Paint Blue #750 (12)	65.21
	11/04/2020		Marking Paint Blue #203 (12)	48.58
	11/04/2020		Marking Paint White #207 (12)	48.58
	11/04/2020		Towel Scrub in a Bucket (6)	111.84
65651	11/04/2020	Underground Service Alert of Southern California	Dig Alert New Tickets 10/2020 (297)	500.05

Payment Number	Payment Date	Vendor	Description	Amount
	11/04/2020		Dig Safe Board Fees 10/2020	220.93
65652	11/04/2020	Underground Solutions, Inc	Potholing - S Santa Fee & Monte Vista Dr	1,300.00
	11/04/2020		Potholing - Hardell Lane	3,000.00
65653	11/04/2020	Verizon Wireless	Air Cards	152.04
	11/04/2020		SCADA Remote Access	376.01
65654	11/04/2020	Vista Brake & Smog	Tires (2) - Truck 1	517.45
65655	11/04/2020	Vista Paint Corporation	Paint	232.46
65656	11/04/2020	Western Water Works Supply Company	18" Bolt Strap	649.84
65657	11/04/2020	Xerox Corporation	Xerox Supplies & Service	94.50
			Grand Total:	**1,265,844.75**

VISTA IRRIGATION DISTRICT

STAFF REPORT

Agenda Item: 7

Board Meeting Date:	**November 18, 2020**
Prepared By:	**Shallako Goodrick**
Reviewed By:	**Marlene Kelleher**
Approved By:	**Brett Hodgkiss**

SUBJECT: EXCELLENCE IN FINANCIAL REPORTING AWARD

RECOMMENDATION: Receive Certificate of Achievement for Excellence in Financial Reporting from the Government Finance Officers Association (GFOA).

PRIOR BOARD ACTION: The Comprehensive Annual Financial Report (CAFR) for the fiscal year ended June 30, 2019 was presented to the Board on January 22, 2020.

FISCAL IMPACT: $460 for the application fee.

SUMMARY: The District earned the Certificate of Achievement for Excellence in Financial Reporting from the Government Finance Officers Association (GFOA) for its CAFR for the fiscal year ended June 30, 2019.

DETAILED REPORT: The District is a member of the GFOA, which is a professional association serving more than 20,000 government finance professionals with offices in Chicago, IL and Washington, D.C. The mission of the GFOA is to advance excellence in public finance. Each year the GFOA recognizes governmental agencies for their success in achieving the highest standards in governmental accounting and financial reporting. This is the thirteenth year that the District has received this award.

The GFOA established the Certificate of Achievement for Excellence in Financial Programs in 1945 to encourage and assist state and local governments to go beyond the minimum requirements of generally accepted accounting principles to prepare CAFRs that evidence the spirit of transparency and full disclosure and then to recognize individual governments that succeed in achieving that goal.

The District submitted its CAFR for the fiscal year ended June 30, 2019 to the GFOA for consideration of this award. The CAFR not only includes the District's financial statements, but also other transmittal, supplementary and statistical information necessary to be considered for this award.

The District recently received the Certificate of Achievement award for the June 30, 2019 CAFR. The award will be presented during the Board meeting and will be displayed in the District offices.

ATTACHMENT: Award Certificate

Government Finance Officers Association

Certificate of Achievement for Excellence in Financial Reporting

Presented to

Vista Irrigation District
California

For its Comprehensive Annual
Financial Report
For the Fiscal Year Ended

June 30, 2019

Christopher P. Morrill

Executive Director/CEO

VISTA IRRIGATION DISTRICT

STAFF REPORT

Agenda Item: 8

Board Meeting Date:	**November 18, 2020**
Prepared By:	**Don Smith**
Approved By:	**Brett Hodgkiss**

SUBJECT: STUDY OF ARROYO CHUB ON DISTRICT LAND

RECOMMENDATION: Consider request by California Department of Fish and Wildlife for access to District land to collect 20 individual specimen of arroyo chub from the West Fork of the San Luis Rey River for laboratory analysis.

PRIOR BOARD ACTION: None.

FISCAL IMPACT: None.

SUMMARY: Russell Barabe, Coldwater Fisheries Biologist with California Department of Fish and Wildlife (CDFW), has requested permission to collect 20 individual specimen of arroyo chub from the West Fork of the San Luis Rey River on District land in order to perform laboratory testing to determine the genetic characteristics of the San Luis Rey population of this small native fish. This work will complement existing studies of arroyo chub genetics to create a more comprehensive understanding of species diversity, enhancing the likelihood of success of management strategies for this species classified as of high concern by CDFW.

CDFW will publish the findings of this work in either the Transactions of the American Fisheries Society or the Journal of the CDFW. CDFW will also submit a report of their findings to the District.

This request conforms to District guidelines in that it is likely to advance legitimate scientific and/or public interest objectives and will not present any substantive interference with the activities of the District or its licensees. If approved by the Board, CDFW will sign a standard District entry permit providing appropriate liability release.

DETAILED REPORT: CDFW proposes to perform their survey and capture activities on a single day in 2020, preferably before significant rains. If approved, the District will issue a permit for entry after the current deer hunting season, which concludes on November 22, 2020.

The proposed survey area and detailed methods are described in the attached proposal prepared by Russell Barabe. A 2016 article from the Transactions of the American Fisheries Society, *Conservation Genetics of an Urban Desert Fish, the Arroyo Chub,* is also attached for reference.

ATTACHMENTS:

- CDFW Proposal by Russell Barabe
- Benjamin, et. al. (2016) *Conservation Genetics of an Urban Desert Fish, the Arroyo Chub,* Transactions of the American Fisheries Society

State of California -The Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
South Coast Region
3883 Ruffin Road
San Diego, CA 92123
(858) 467-4201
www.dfg.ca.gov

***EDMUND G. BROWN, JR**, Governor*
***CHARLTON H. BONHAM,** Director*

Author – Russell Barabe

Purpose/Background

The purpose of this work is to collect arroyo chub (Gila orcuttii) from the San Luis Rey River Watershed to complete a summary of the species. Benjamin et al., (2016) attempted to collect arroyo chub from each of the seven drainages to which it is native. From north to south, those seven drainages are Malibu Creek, the Los Angeles River, the San Gabriel River, the Santa Ana River, San Juan Creek, the Santa Margarita River, and the San Luis Rey River. The purpose of this work was to examine the genetics of each population to determine the relatedness of each population and the time each population has been isolated from the others. This valuable information could impact future management of this native species. Unfortunately, Benjamin et al., (2016) were unable to locate arroyo chub within the San Luis Rey River Watershed, and it was considered extirpated when the manuscript was published. When I learned USGS had found the species in the West Fork San Luis Rey River, I contacted our geneticist and asked him if we could re-run the samples collected in 2016 and add in new samples from the seventh watershed.

Introduction

The arroyo chub *Gila orcuttii* is a small cyprinid native to coastal drainages of Los Angeles, Orange, Riverside, and San Diego counties. This species has fairly deep bodies and caudal peduncles, large eyes (for a cyprinid), short, rounded snouts, and small, subterminal mouths (Moyle 2002). Average adult lengths are 70-100 mm, and fish can be silver or gray to olive green dorsally, white ventrally, and connected with a dull gray lateral band (Moyle 2002). Considered true omnivores, arroyo chub eat algae, insects, and small crustaceans (Moyle 2015), and spawning generally occurs in June

and July, but the eggs of females ripen in small batches (Tres 1992), allowing spawning to occur anywhere from February through August.

Typically, arroyo chub are found in slow-moving sections of cool to warm (10-26°C) streams dominated by sand and silt substrates (Wells and Diana 1975; Saiki 2007; O'Brien et al. 2011), but Feeney and Swift (2008) found fish in pools with gravel, cobble, and boulder substrates, illustrating the flexibility of habitat use exhibited by this species. These fish are adapted to survive the fluctuating conditions present in southern California streams, including hypoxic conditions in summer (Castleberry and Cech 1986), and high flows and turbidity levels in winter.

The decline of native fishes in the continental United States has been well documented, and arroyo chub are no exception. Reasons for the decline are numerous and include habitat loss, urbanization, water development, flood control, and the introduction of invasive species. These have led to a reduction in the preferred habitat of arroyo chub within the coastal plain of southern California. Historically, arroyo chub occurred throughout the seven drainages illustrated in Map 1, but the current distribution shown in red reveals the extent of the decline.

Study Area

Recent work by USGS reported finding arroyo chub in the lower West Fork San Luis Rey River on Vista Irrigation District lands. The area where fish were found is located near the Henshaw Road Bridge (Maps 2 and 3). Personal communication from USGS reported 7 perennial pools in this area, most of which have arroyo chub.

Methods

The California Department of Fish and Wildlife wishes to Access Vista Irrigation District property for one day to collect arroyo chub from the West Fork San Luis Rey River. Fish would be collected using a seine and placed into bottles containing 95% ethanol for preservation. Once 20 individual arroyo chub were collected, CDFW personnel would leave Vista Irrigation District lands and return to the laboratory.

Deliverables

This project would allow complete sequencing of arroyo chub from all seven native watersheds. An update to the Benjamin et al., 2016 paper would be submitted to

Transactions of the American Fisheries Society to make sure data in the literature is current and up to date. If this journal does not wish to publish this information, the California Department of Fish and Wildlife Journal will be used. All collected information will be supplied to Vista Irrigation District in a report.

References

Benjamin, A., B. May, J. O'Brien, and A. J. Finger. 2016. Conservation genetics of an urban desert fish, the Arroyo Chub. Transactions of the American Fisheries Society 145:277-286.

Castleberry, D.T. and J.J. Cech, Jr. 1986. Physiological responses of a native and an introduced desert fish to environmental stressors. Ecology 67:912-918.

Feeney, R. F., and C. C. Swift. 2008. Description and ecology of larvae and juveniles of three native cypriniforms of coastal southern California. Ichthyological Research 65:65-77.

Moyle, P. B. 2002. Inland fishes of California revised and expanded. University of California Press, Berkeley, USA.

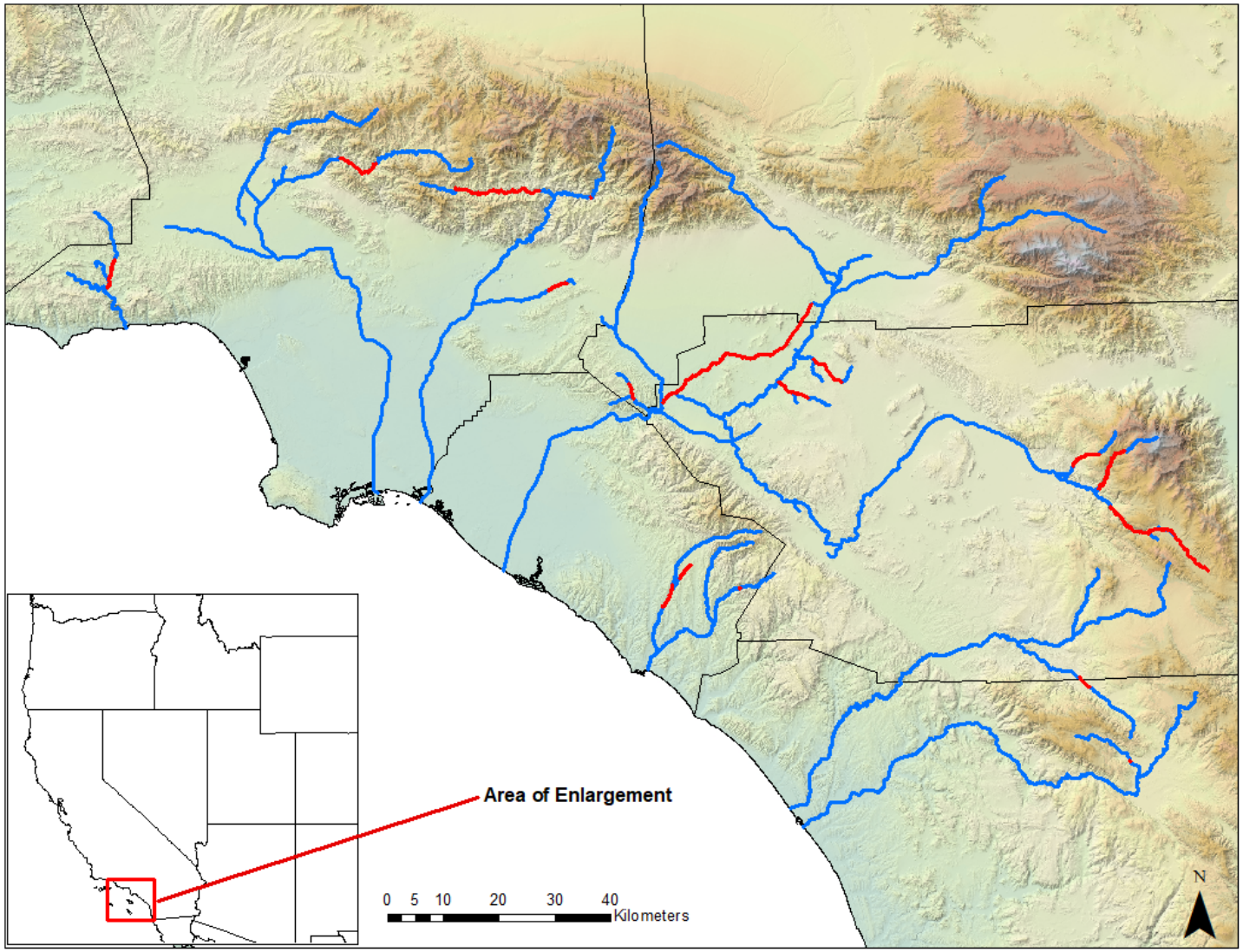
Moyle, P. B., R. M. Quiñones, J. V. Katz, and J. Weaver. 2015. Fish species of special concern in California, Third Edition. Sacramento, California Department of Fish and Wildlife.

O'Brien, J. W., H. K. Hansen, and M. E. Stephens. 2011. Status of fishes in the upper San Gabriel River Basin, Los Angeles County, California. California Fish and Game Journal 97(4):149-163.

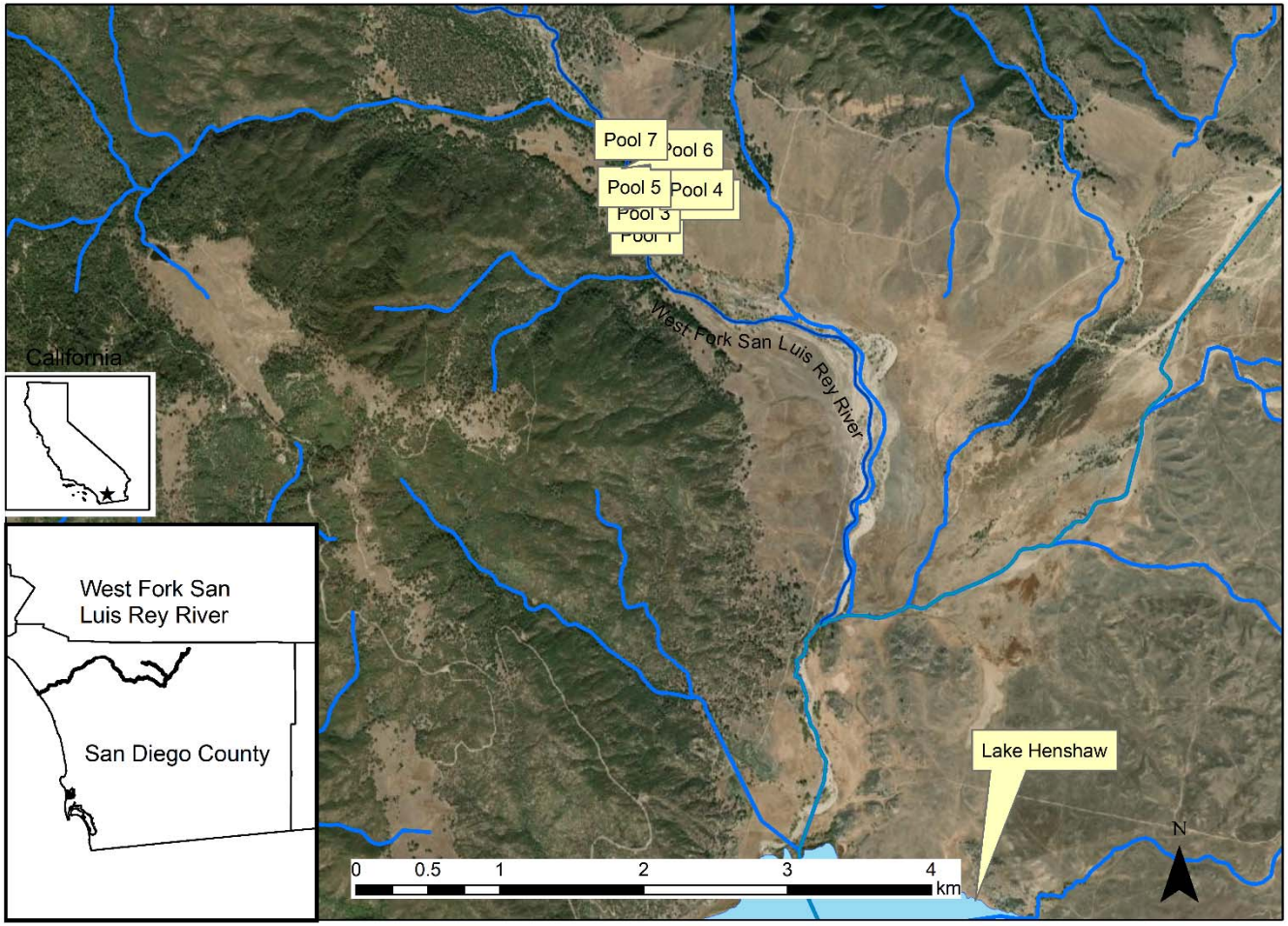
Saiki, M. K., B. A. Martin, G. W. Knowles, and P. W. Tennant. 2007. Life history and ecological characteristics of the Santa Ana Sucker, *Catostomus santaanae*. California Fish Game 93:87-101.

Tres, J. 1992. Breeding biology of the Arroyo Chub, *Gila orcuttii* (Pisces: Cyprinidae). M.S. Thesis, California Polytechnic State University, Pomona, USA.

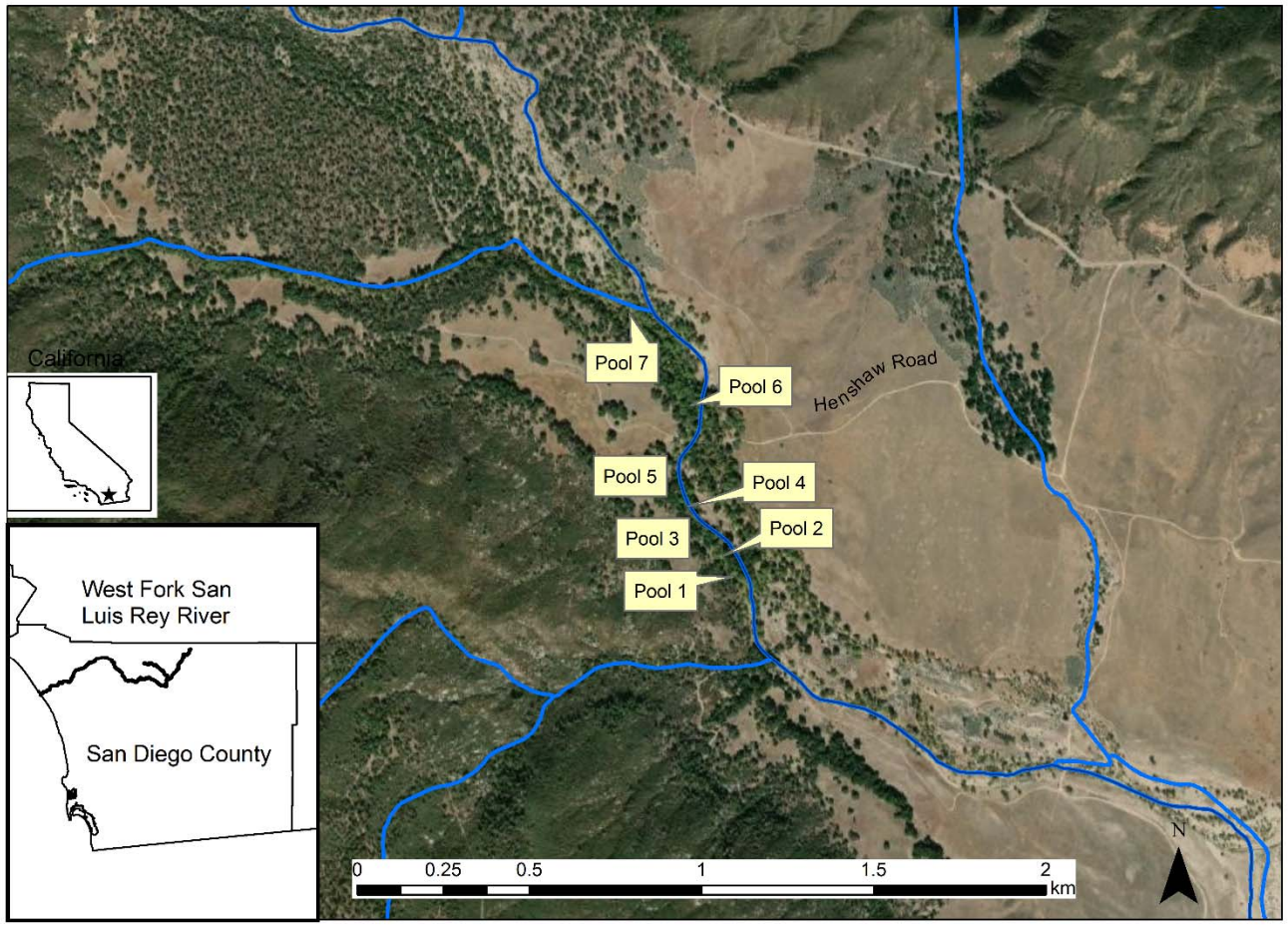
Wells, A.W., and J.S. Diana. 1975. Survey of the freshwater fishes and their habitats in the coastal drainages of southern California. Report submitted to California Department Fish and Game, Inland Fisheries Branch from the L.A. County Museum of Natural History. 360 pp.



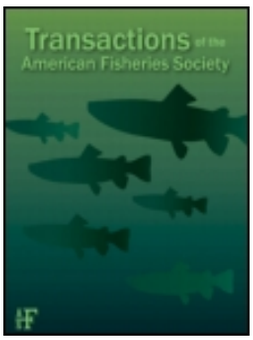
Map 1. Map illustrating the seven drainages in which arroyo chub are native. From north to south, those seven drainages are Malibu Creek, the Los Angeles River, the San Gabriel River, the Santa Ana River, San Juan Creek, the Santa Margarita River, and the San Luis Rey River. Historic habitat is shown in blue while current occupancy is shown in red.



Map 2. Overview of lands north of Lake Henshaw where proposed surveys would occur.



Map 3. Detailed view of lands north of Lake Henshaw where proposed surveys would occur..



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ARTICLE

Conservation Genetics of an Urban Desert Fish, the Arroyo Chub

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Abstract

Urbanization, habitat degradation, fragmentation, and invasive species have led to the severe decline or extirpation of many endemic southern California freshwater fish species, including the Arroyo Chub *Gila orcuttii*, which has declined precipitously in recent years. Classified by the California Department of Fish and Wildlife as a species of high concern, the Arroyo Chub is native to the Los Angeles, San Gabriel, San Luis Rey, Santa Ana, and Santa Margarita rivers and Malibu and San Juan creeks. To examine Arroyo Chub population structure and genetic diversity within the species' native range, we used 10 microsatellite markers to genotype 259 individuals. We observed moderate to high genetic diversity and population differentiation both between and within drainages; Bayesian clustering supported eight distinct clusters of Arroyo Chub corresponding to eight isolated populations. Of these populations, the Big Tujunga Creek population (Los Angeles River) was the least genetically differentiated (genetic differentiation index $F_{ST} = 0.048–0.208$) and also had the highest genetic diversity (observed heterozygosity $H_o = 0.890$). Populations in Malibu Creek, Pacoima Canyon (Los Angeles River), and the Santa Margarita River were the most genetically differentiated ($F_{ST} = 0.163–0.400$), had the lowest genetic diversity ($H_o = 0.556–0.680$), and showed evidence of past bottlenecks. Arroyo Chub at these localities are at risk for continued loss of genetic diversity due to drift and small population sizes; therefore, we suggest that in the event of extirpation, translocations from the most closely related source populations should be considered. However, we recommend that management efforts focus on improving habitat quality and habitat area for Arroyo Chub in order to maximize population genetic diversity and adaptive potential over time.

With the continuing rise in human population density, urbanization poses an increasing threat to the well-being of many ecologically important endemic taxa. Multiple empirical studies have documented the anthropogenic factors leading to habitat loss and fragmentation, which in turn cause reductions in biodiversity (Fahrig 2003; Vörösmarty et al. 2010). However, maintaining biodiversity is essential to protecting both the functionality and the productivity of ecosystems (Hedrick and Miller 1992). With regard to species in highly urbanized environments, genetic surveys provide useful insights for management and conservation efforts. For instance, urbanization has been shown to reduce genetic

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variation and impact gene flow in a number of aquatic vertebrate species (Bessert and Orti 2008; Kobayashi et al. 2013; Munshi-South et al. 2013; Emel and Storfer 2015). By elucidating population structure and identifying populations with reduced genetic diversity, managers can determine the localities where populations (1) are in greatest need of conservation efforts or (2) have experienced bottlenecks or inbreeding (Frankham et al. 2010). Populations that have undergone bottlenecks and that have low effective population sizes (N_e) are more likely to experience genetic drift, causing further reduction in genetic diversity and possibly reducing evolutionary potential (Moritz 1999). As a result, such populations are candidates for increased management efforts, including habitat restoration, the designation of evolutionarily significant units or management units, the removal of nonnative species and hybrids, and reintroductions or translocations; genetic monitoring is often used to evaluate the effects of these actions on genetic diversity (Moritz 1994, 1999; Schwartz et al. 2006; Van Doornik et al. 2011; Osborne et al. 2012).

One fish species that is in need of genetic analysis is the Arroyo Chub *Gila orcuttii* (Eigenmann and Eigenmann 1890), a once-common cyprinid that over the past decade has declined in many portions of its native range, which encompasses coastal streams of southern California (J. O'Brien, personal observation). Due to stressors related to urbanization and interactions with nonnative species, the California Department of Fish and Wildlife (CDFW) classifies the Arroyo Chub as a "species of high concern"; this status rating is assigned to taxa with a high risk of becoming a critical concern due to significantly reduced range, significantly reduced abundance, and projected vulnerability over the short term (<10 generations; Moyle et al. 2015). Despite the Arroyo Chub's decline, it only qualifies for listing as a "species of moderate concern" when its entire range is considered, as Arroyo Chub also thrive in the Santa Ynez, Santa Maria, Cuyama, Santa Clara, and Mojave River systems and other small coastal streams—waters that are outside the species' native range (Moyle et al. 2015). However, because introduced Arroyo Chub are known to hybridize with other cyprinids, introduced populations may be introgressed; without thorough genetic analysis, fish from such populations would be unacceptable for use in translocations or reintroduction to the native range (Hubbs and Miller 1943; Greenfield and Deckert 1973; Swift et al. 1993; Moyle et al. 1995).

Preservation of the Arroyo Chub requires an understanding of threats that are present in the native range, which includes the Los Angeles, San Gabriel, San Luis Rey, Santa Ana, and Santa Margarita rivers and Malibu and San Juan creeks (Wells and Diana 1975). Because the species' native range overlaps with the greater Los Angeles area—a region with one of the greatest human population densities in North America—the Arroyo Chub faces habitat degradation and fragmentation resulting from the dramatic increase in urbanization over the past century. In these areas, human development has nearly eliminated the lower-gradient streams that provide ideal habitat for Arroyo Chub, as most of these streams have been channelized, dammed, diverted, and otherwise degraded (Moyle et al. 2015). The present-day population structure of Arroyo Chub is likely affected by (1) these watercourse alterations, which reduce connectivity between native watersheds by preventing the floods that historically provided such connection; and (2) dams, which fragment populations within a given watershed. Dams are known to alter flows, impair sediment recruitment, and create barriers that prevent genetic exchange between chub populations; dams have been linked to reduced diversity in other fish species as well (Bessert and Orti 2008; Liermann et al. 2012; Moyle et al. 2015). Human modification of watercourses via logging, mining, flood control, and water storage projects has drastically changed the character of streams, and the recent drought in California has continued to reduce the amount of available habitat (Swift et al. 1993).

The combined negative effects of invasive species and habitat loss, degradation, and fragmentation have substantially reduced Arroyo Chub populations, highlighting the need for genetic analysis. We used microsatellite data from Arroyo Chub populations across the species' native range to analyze population structure and genetic diversity, examine potential barriers to dispersal, and determine the number of distinct populations that could serve as management units. We recommend appropriate conservation management strategies and discuss source populations that could be used for translocations.

METHODS

Sample collection.—Samples were collected from 25–66 Arroyo Chub within each of six native drainages (sampling efforts were unsuccessful in the seventh drainage, the San Luis Rey River): Malibu Creek (MC), Los Angeles River (LA), San Gabriel River (SG), Santa Ana River (SA), San Juan Creek (SJ), and Santa Margarita River (SM; Table 1; Figure 1). Arroyo Chub were captured by use of backpack electrofishing, seining, and dipnetting. The fish were collected whole, or the upper caudal fin was clipped and stored in a 2-mL microcentrifuge tube containing a 95% solution of ethanol. Whole genomic DNA was extracted from each fish by using Qiagen DNeasy Blood and Tissue Kits (Qiagen, Valencia, California) in accordance with the manufacturer's protocols.

Microsatellite genotyping.—Using previously published procedures, we genotyped each Arroyo Chub at 10 microsatellite loci: *Pmac01, Pmac04, Pmac15, Pmac21, Pmac24, Pmac29*, and *Pmac32* (Mahardja et al. 2012); *Cyp-G3* and *Cyp-G48* (Baerwald and May 2004); and *Gbi-G13* (Meredith and May 2002). For genotyping, 2 μL of PCR product were added to 0.28 μL of Applied Biosystems, Inc. (ABI), GeneScan 500 LIZ size standard and 8.72 μL of Hi-Di formamide (Life Technologies [LT], Carlsbad, California) in individual wells on a 96-well plate. Samples were denatured at 95°C for 3 min and then were electrophoresed on an ABI 3730XL

TABLE 1. List of California watersheds, sample collection sites, GPS coordinates, collection year, and number of Arroyo Chub (*N*) that were sampled at each site.

Watershed	Collection site	GPS coordinates	Year	*N*
Malibu Creek (MC)	Las Virgenes Creek	34.09680, −118.72845	2013	19
	Above Serra Road Bridge	34.04722, −118.68972	2012	5
	Above Rindge Dam	34.07640, −118.70230	2012	11
	Near Cross Creek Road Bridge	34.04539, −118.68703	2013	7
Los Angeles River (LA)	Pacoima Canyon (PC)	34.34541, −118.35827	2013	20
	Big Tujunga Creek (BTC)	34.29451, −118.24232	2013	20
		34.30181, −118.25575	2012	20
San Gabriel River (SG)	West Fork (WF)	34.24319, −117.87497	2013	24
		34.24317, −117.92865	2013	2
	Walnut Creek (WC)	34.08722, −117.84511	2013	40
Santa Ana River (SA)	Santa Ana River	34.03594, −117.35670	2013	40
San Juan Creek (SJ)	Bell Canyon–Starr Ranch	33.63169, −117.55531	2013	24
	Hot Springs Creek	33.60814, −117.51082	2013	1
Santa Margarita River (SM)	Temecula Creek	33.43408, −116.85529	2013	26
Total *N*				259

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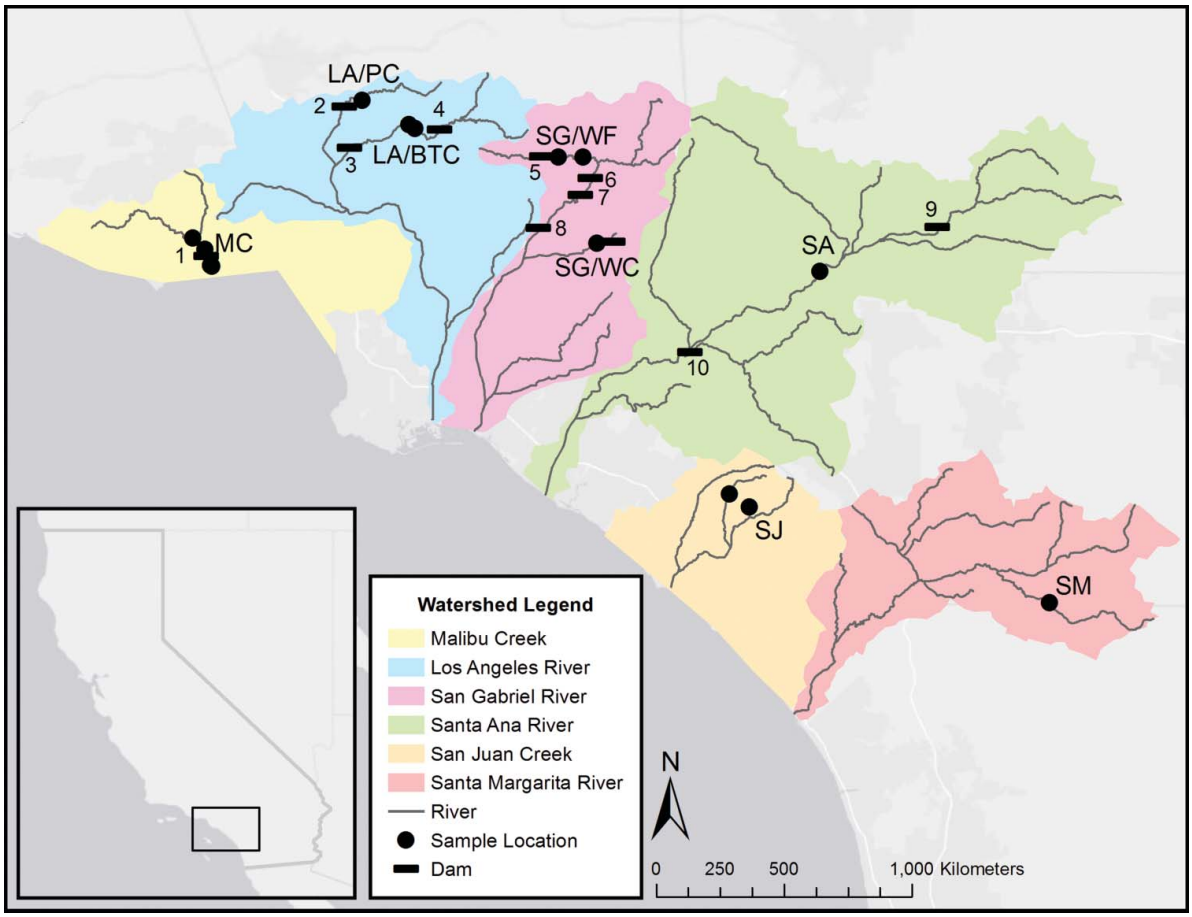

FIGURE 1. Map of southern California, depicting the major rivers in the Arroyo Chub's native range, watershed boundaries (eight-digit hydrologic unit data set; U.S. Geological Survey), sampling locations, and major dams (1 = Rindge Dam; 2 = Pacoima Dam; 3 = Hansen Dam; 4 = Big Tujunga Dam; 5 = Cogswell Dam; 6 = San Gabriel Dam; 7 = Morris Dam; 8 = Santa Fe Dam; 9 = Seven Oaks Dam; 10 = Prado Dam). Location codes are defined in Table 1.

DNA Analyzer (LT). The resulting peaks were analyzed using GENEMAPPER version 4.0 (LT). Electropherograms were inspected twice to confirm allele sizes; individuals that were run on multiple plates had consistent scores across the different runs. Samples with poor genotypic quality (<70% of the genotypic data) were discarded from further analysis. We used MICRO-CHECKER version 2.2.3 (Van Oosterhout et al. 2004) to detect abnormal values in genotypic data, as such values potentially resulted from stuttering or the presence of null alleles (indicated by significant homozygote excess).

Population structure.—We used STRUCTURE version 2.3.3 (Pritchard et al. 2000) to determine the optimal number of clusters (K) and to assign individual Arroyo Chub to groups. For each K-value from 1 to 10, we ran three iterations with a 100,000-replicate burn-in period and 1,000,000 Markov chain–Monte Carlo replications. To determine the optimal value of K, STRUCTURE HARVESTER (Earl and vonHoldt 2012) was used to calculate ΔK (Evanno et al. 2005). The software CLUMPP (Jakobsson and Rosenberg 2007) and the Greedy K algorithm were employed to test for multimodality; the three STRUCTURE outputs for optimal K were compiled for graphical representation via the program DISTRUCT (Rosenberg 2004). The program GENETIX (Belkhir et al. 2003) was used to develop a graphical representation of genetic divergence through factorial correspondence analysis.

Genetic diversity.—Samples from each locality were analyzed to assess genetic diversity, estimate N_e, and detect bottlenecks. We tested for departures from Hardy–Weinberg equilibrium (HWE) and linkage disequilibrium (LD) by using GENEPOP version 4.2 (Raymond and Rousset 1995). A sequential Bonferroni correction ($\alpha = 0.05$) was applied to detect the significance of HWE and LD results. The number of private alleles (N_P), allelic frequencies, observed heterozygosity (H_o), and expected heterozygosity (H_e) were calculated by using GenAlEx version 6.5 (Peakall and Smouse 2006, 2012). We used HP-RARE (Kalinowski 2005) to calculate allelic richness (A_r) and private allelic richness (A_P); these genetic diversity measures use rarefaction to correct for the increased likelihood of detecting rare alleles in larger sample sizes (Kalinowski 2004). Values of A_r and A_P were calculated based on the minimum number of genomic copies (i.e., $N = 32$) found for any locus. Pairwise values of the genetic differentiation index F_{ST} were calculated using FSTAT version 2.9.3.2 (Goudet 1995), and P-values were obtained after 560 permutations. A Bonferroni correction to the α value (0.05) was used to determine the significance of F_{ST} values.

Population bottlenecks and effective population size.—We used two tests to detect population bottlenecks: (1) Wilcoxon's signed rank test for excess heterozygosity (H_k; Cornuet and Luikart 1996) was conducted with BOTTLENECK version 1.2.02 (Piry et al. 1999); and (2) the M-ratio test (Garza and Williamson 2001) was implemented in the program M_P_Val (National Oceanic and Atmospheric Administration–Fisheries; swfsc.noaa.gov/textblock.aspx?Division=FED&id=3298). First, to detect the probability of a more recent population bottleneck, the H_k test was performed by using Wilcoxon's two-tailed test for heterozygote excess or heterozygote deficiency with 5,000 replications. Two microsatellite mutation models were applied: the stepwise mutation model (SMM) and the two-phase model (TPM; Di Rienzo et al. 1994). The TPM parameters were 12% variance, 95% stepwise mutations, and 5% non-stepwise mutations, as recommended by Piry et al. (1999). Second, we calculated the M-ratio as the mean ratio of the number of alleles (k) over the range (r) of allele sizes (base pairs). A smaller-than-expected M-ratio indicates that a population likely has experienced a severe genetic bottleneck (Garza and Williamson 2001). Calculation of M was based on the following parameters (recommended by Garza and Williamson 2001): the proportion of one-step mutations (p_s) was 0.9; the average size of non-one-step mutations (delta_g) was 3.5; and $\theta = 4N_{e\mu}$ (where N_e = effective population size and μ = mutation rate) was 10.

We calculated N_e by using the program N_eEstimator version 2.01 (Do et al. 2014) and implementing the LD method (Waples and Do 2008), which assumes random mating. We used a $P_{critical}$ of 0.02 for populations with sample sizes greater than 25 and a $P_{critical}$ of 0.03 when sample size was 25 or lower.

RESULTS

MICRO-CHECKER detected possible null alleles at *Pmac24* in the LA/Pacoima Canyon and SJ samples; *Pmac01* in the SG/Walnut Creek samples; *Pmac29* in the SG/West Fork samples; *Pmac04* in the SA samples; and *Pmac32* in the SM samples. The MC, LA/Big Tujunga Creek, and SA populations exhibited significant deviations from HWE expectations ($P \leq 0.05$). In the MC population, only *Pmac01* significantly deviated from HWE ($P < 0.05$), and the deviation remained significant after Bonferroni correction ($\alpha = 0.05$). For the LA/Big Tujunga Creek population, *Pmac01* and *Pmac24* were the only loci that showed significant deviations from HWE ($P < 0.05$); after sequential Bonferroni adjustment ($\alpha = 0.05$), only *Pmac01* remained significant. In the SA samples, three loci (*Pmac04, Pmac21*, and *Pmac24*) were identified as deviating from HWE ($P < 0.05$); however, only *Pmac04* showed significant deviation after Bonferroni correction ($\alpha = 0.05$). Out of 360 tests for LD, 19 locus pairs were detected as demonstrating significant LD ($P < 0.05$); after the Bonferroni correction was applied, only six locus pairs remained significant (*Pmac15–Pmac32* for LA/Pacoima Canyon; *Pmac15–Pmac04* and *Pmac29–Pmac24* for LA/Big Tujunga Creek; *Cyp-G3–Gbi-G13* for SG/West Fork; and *Pmac01–Gbi-G13* and *Pmac32–Gbi-G13* for SJ). Because deviations from HWE or LD showed no consistent pattern across populations or loci, all loci were retained for further analysis.

Population Structure

Based on STRUCTURE analysis, the optimal K-value was 8, reflecting the following independent clusters: (1) MC, (2)

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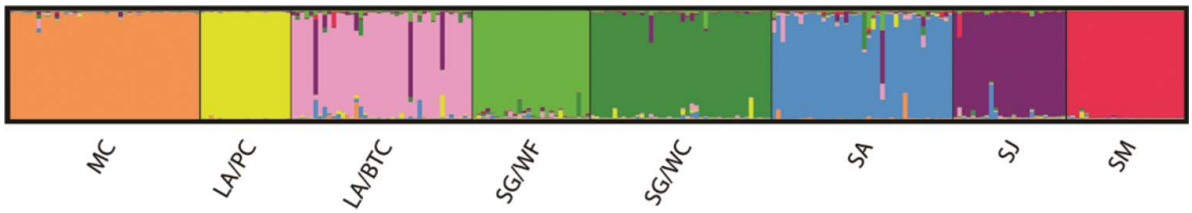

FIGURE 2. DISTRUCT bar plot with eight clusters ($K = 8$), showing Arroyo Chub population substructure among sampling sites (MC = Malibu Creek; LA/PC = Los Angeles River/Pacoima Canyon; LA/BTC = Los Angeles River/Big Tujunga Creek; SG/WF = San Gabriel River/West Fork; SG/WC = San Gabriel River/Walnut Creek; SA = Santa Ana River; SJ = San Juan Creek; SM = Santa Margarita River). Each vertical bar represents a single individual while the height of a color indicates probability of assignment to that cluster.

LA/Pacoima Canyon, (3) LA/Big Tujunga Creek, (4) SG/West Fork, (5) SG/Walnut Creek, (6) SA, (7) SJ, and (8) SM (Figure 2). The factorial correspondence analysis revealed a central cluster of more genetically similar populations (Figure 3). Arroyo Chub from the more central localities (LA/Big Tujunga Creek, SG/West Fork, SG/Walnut Creek, SA, and SJ) clustered more closely together, whereas fish from MC, LA/Pacoima Canyon, and SM exhibited greater separation from this central cluster.

Pairwise F_{ST} values ranged from 0.048 to 0.400 (Table 2), and all values were significant after correction for multiple tests ($P < 0.002$). Samples from LA/Pacoima Canyon and SM showed the greatest genetic differentiation, but the F_{ST} values for LA/Pacoima Canyon–MC and for MC–SM indicated that those pairs of populations were also quite distinct ($F_{ST} > 0.300$; Table 2). Populations in SA and LA/Big Tujunga Creek were the least differentiated ($F_{ST} = 0.048$; Table 2). Pairwise F_{ST} values between the central populations (LA/Big Tujunga Creek, SG/West Fork, SG/Walnut Creek, SA, and SJ) were lower than values for the edge groups but still indicated significant differentiation ($F_{ST} < 0.110$; Table 2).

Genetic Diversity

The average number of alleles per locus (N_A) ranged from 3.80 to 15.10, and the average N_A across all populations was 9.86 (Table 3). *Pmac01* was monomorphic in the LA/Pacoima Canyon samples. Values of H_e ranged from 0.543 to 0.890, and H_o ranged from 0.556 to 0.890 (Table 3). The LA/Pacoima Canyon and SM populations had the lowest heterozygosity, whereas the LA/Big Tujunga Creek population exhibited the highest levels of heterozygosity (H_o and $H_e = 0.890$). The average N_P was 6.25 (Table 3). The MC and SA populations showed the highest N_P (12 in each case). In contrast,

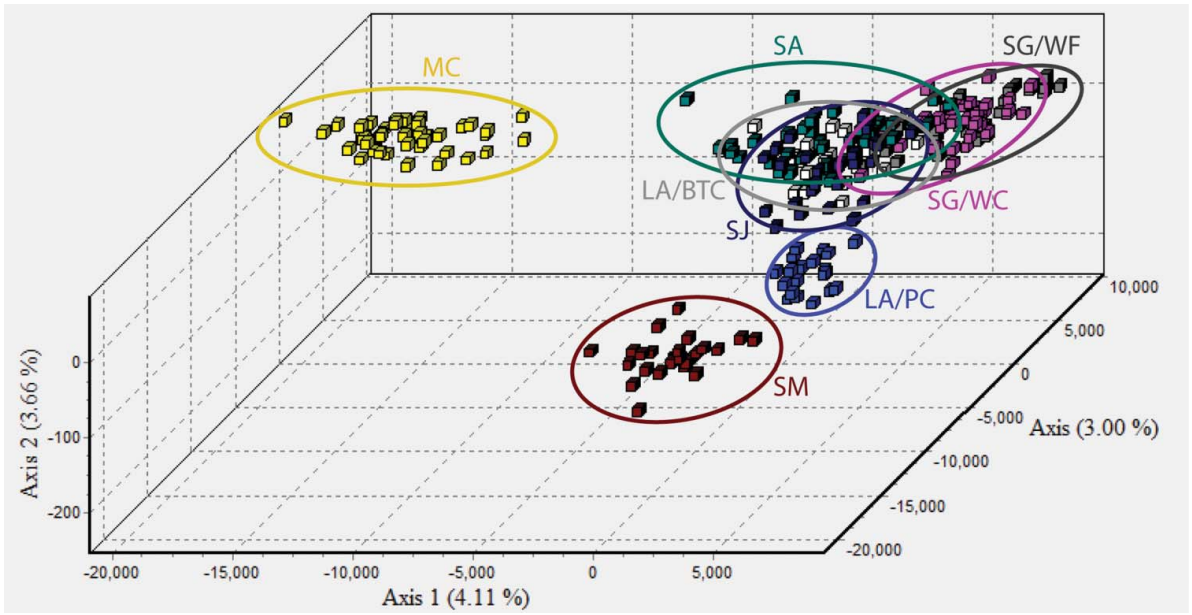

FIGURE 3. Orthogonal plot illustrating factorial correspondence analysis of individual Arroyo Chub (as implemented in GENETIX), with fish grouped in the populations identified by STRUCTURE analysis. The three principal axes explain the degree of genetic variation between individuals. Each square represents an individual from a particular site: Malibu Creek (MC; yellow), Los Angeles River/Pacoima Canyon (LA/PC; blue), Los Angeles River/Big Tujunga Creek (LA/BTC; white), San Gabriel River/West Fork (SG/WF; gray), San Gabriel River/Walnut Creek (SG/WC; fuchsia), Santa Ana River (SA; teal), San Juan Creek (SJ; navy), and Santa Margarita River (SM; maroon).

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TABLE 2. Pairwise values of the genetic differentiation index F_{ST} calculated for Arroyo Chub populations. All F_{ST} values presented here are significant ($P < 0.002$ with Bonferroni correction for multiple tests). Collection site codes are defined in Table 1.

Location	MC	LA/PC	LA/BTC	SG/WF	SG/WC	SA	SJ
MC							
LA/PC	0.354						
LA/BTC	0.167	0.188					
SG/WF	0.217	0.246	0.068				
SG/WC	0.217	0.235	0.064	0.070			
SA	0.163	0.223	0.048	0.071	0.086		
SJ	0.189	0.246	0.058	0.101	0.073	0.073	
SM	0.302	0.400	0.208	0.238	0.238	0.215	0.199

only one private allele was detected in the LA/Pacoima Canyon population, and no private alleles were found in the SM samples. See Supplementary Table S.1 (available in the online version of this paper) for allele frequencies at each locus.

Population Bottlenecks and Effective Population Size

Under both the TPM and SMM models, the H_k test indicated that the MC population underwent a bottleneck (TPM: $P = 0.002$; SMM: $P = 0.001$; Table 4). Additionally, the SG/Walnut Creek and SA populations showed evidence of bottlenecks under the SMM model ($P = 0.014$) but not under the TPM model. The *M*-ratio test provided evidence for bottlenecks in the following populations: LA/Pacoima Canyon ($P < 0.001$), SG/West Fork ($P < 0.001$), SG/Walnut Creek ($P = 0.002$), SJ ($P = 0.024$), and SM ($P < 0.001$; Table 4). Estimated N_e ranged from 5.8 to infinity (Table 4). The 95% confidence intervals for N_e tended to be wide, and four of the eight populations had infinity as an upper confidence limit, indicating that in combination with our low sample sizes, we had low power for estimating N_e by use of the LDN_e method (Waples and Do 2010).

DISCUSSION

We observed a high level of Arroyo Chub population differentiation both within and between the native drainages; this is likely a result of barriers to gene flow (e.g., dams) as well as historical and contemporary watershed boundaries. Overall, the Arroyo Chub populations were each observed to be genetically distinct, and they exhibited genetic diversity that was average or high in comparison with the diversity that has been reported for other freshwater fishes.

Population Structure

Our STRUCTURE results suggested that the MC, LA/Pacoima Canyon, LA/Big Tujunga Creek, SG/West Fork, SG/Walnut Creek, SA, SJ, and SM populations are all distinct. Population fragmentation in combination with genetic drift was likely responsible for generating the observed population structure, as the two LA populations (Pacoima Canyon and Big Tujunga Creek) and the two SG populations (West Fork and Walnut Creek) were genetically distinct despite occupying the same watershed. The pattern of population fragmentation likely stems from dams and other migration barriers, such as culverts,

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TABLE 3. Expected heterozygosity (H_e), observed heterozygosity (H_o), average number of alleles (N_A) across all loci, allelic richness (A_r), number of private alleles (N_P), private allelic richness (A_P), and effective population size (N_{eLD} [calculated via the linkage disequilibrium method]; with 95% confidence interval [CI]) for Arroyo Chub after data were jackknifed over loci. Collection site codes are defined in Table 1.

Location	N	H_e	H_o	N_A	A_r	N_P	A_P	N_{eLD} (95% CI)
MC	42	0.676	0.680	9.00	7.21	12	1.22	171 (55.7–∞)
LA/PC	20	0.543	0.604	3.80	3.71	1	0.16	5.8 (2.9–10.2)[a]
LA/BTC	40	0.890	0.890	15.10	11.82	7	0.79	149 (94.7–325.5)
SG/WF	26	0.825	0.819	10.30	9.05	2	0.48	38.1 (27.7–57.5)
SG/WC	40	0.820	0.815	10.70	8.63	8	0.68	2,122.3 (198–∞)
SA	40	0.871	0.847	14.60	11.36	12	0.83	∞ (198.3–∞)
SJ	25	0.845	0.854	11.30	10.23	8	0.99	39.7 (26–73.4)[a]
SM	26	0.580	0.556	4.10	3.84	0	0.06	∞ (42.2–∞)
Mean		0.756	0.758	9.86	8.23	6.25	0.65	

[a]The N_{eLD} was calculated using a $P_{critical}$ of 0.03 when N was 25 or lower. For all other populations ($N > 25$), $P_{critical}$ was 0.02.

TABLE 4. Results of the *M*-ratio test and the heterozygosity excess (H_k) test used to detect bottlenecks in Arroyo Chub populations (TPM = two-phase model; SMM = stepwise mutation model). Significant values are shown in bold (NS = not significant). Collection site codes are defined in Table 1.

Location	*M*	*P*-value	H_k model significance
MC	0.790	0.558	**TPM ($P = 0.002$); SMM ($P = 0.001$)**
LA/PC	0.498	<0.001	NS
LA/BTC	0.752	0.274	NS
SG/WF	0.521	<0.001	NS
SG/WC	0.618	0.002	**SMM ($P = 0.014$)**
SA	0.738	0.218	**SMM ($P = 0.014$)**
SJ	0.642	0.024	NS
SM	0.548	<0.001	NS

drop structures, and dry reaches, which either eliminate or drastically reduce the potential for genetic exchange between Arroyo Chub populations. Specifically, within the LA drainage, the Pacoima Dam in Pacoima Canyon and the Hansen Dam in Big Tujunga Creek serve as historical and contemporary barriers isolating the two LA Arroyo Chub populations from each other as well as from the remainder of the drainage. Similarly, in SG, barriers such as the Santa Fe, Morris, and San Gabriel dams separate the West Fork and Walnut Creek populations and have likely prevented interbreeding and gene flow since the 1920s. Alternatively, introductions of Arroyo Chub from other watersheds may have contributed to the observed differentiation within the LA and SG systems, but analyses based on other genetic markers or comparisons with historical samples would be necessary to elucidate such relationships.

We only observed population fragmentation within the LA and SG drainages. This difference may be due to the limited number of individuals sampled from SA and SM, as genetic structure analysis was based on fish collected from only one site in each of those rivers. Because migration barriers similarly fragment SA and SM, genetic analysis of individuals from more distant sections of those drainages could reveal fragmentation levels that are comparable to those observed in the LA and SG populations. Unfortunately, drought conditions as well as the general decline of native Arroyo Chub populations prevented us from finding fish at a wide variety of sampling sites. In fact, no Arroyo Chub were found in the seventh native drainage—the San Luis Rey River. Thus, extirpation of the San Luis Rey River population may have already occurred.

Historical and contemporary watershed boundaries can largely explain the genetic differentiation between Arroyo Chub populations. Of the eight populations we analyzed, the MC, LA/Pacoima Canyon, and SM populations had the highest pairwise F_{ST} values, suggesting that they were the most genetically distinct from each other as well as distinct from the other populations. These three populations represent the edge groups: MC and LA/Pacoima Canyon are the northernmost locations in the native range, and SM is the southernmost location. Vandergast et al. (2007) provided a map suggesting that during the Quaternary Period, the lower reaches of LA, SG, and SA were once inundated, thus connecting the populations. Although portions of LA, SG, and SA are now highly fragmented, these rivers share a common mouth, and large flood events taking place as recently as the 20th century caused the rivers to spill their banks and intermix, likely facilitating the migration of Arroyo Chub among these more centrally located drainages (J. O'Brien, personal observation). Analysis with different genetic markers would be necessary to confirm these historical relationships; however, the past watershed boundaries in combination with the observed genetic differentiation indicate that Arroyo Chub population structure among MC, SM, and the central watersheds is more ancient, whereas substructure among populations in the central watersheds has emerged more recently.

Genetic Diversity

Arroyo Chub populations exhibited a moderate to high level of genetic diversity. The mean H_e for Arroyo Chub (0.756) exceeded the mean heterozygosity reported for most freshwater fishes (0.54; DeWoody and Avise 2000). The Arroyo Chub populations with the lowest pairwise F_{ST} values (LA/Big Tujunga Creek, SA, SG/West Fork, SG/Walnut Creek, and SJ) also demonstrated the highest genetic diversity. The low pairwise F_{ST} values suggested that these five centrally located populations have experienced greater and/or more recent gene flow than populations at the distributional edge, thus enabling better preservation of genetic diversity and reducing genetic differentiation (Allendorf 1983; Epps et al. 2005). Because larger populations maintain genetic diversity better than small populations, river size and population size may also explain the observed differences in genetic diversity between Arroyo Chub populations. The largest river in the Arroyo Chub's native range is SA, followed by SG and LA. The larger sizes of these rivers may partially explain the higher genetic diversity observed among these Arroyo Chub populations, although it is difficult to quantify the proportion of suitable habitat and the degree of fragmentation occurring in each drainage. Furthermore, while there is very little comprehensive survey data on Arroyo Chub, the LA/Big Tujunga Creek and SA populations are known to have been relatively large

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historically, and LA/Big Tujunga Creek appears to contain the largest and most robust population at present (J. O'Brien, personal observation). Although the SJ population is smaller now, it was also large historically (J. O'Brien, personal observation). Thus, the most genetically diverse populations of Arroyo Chub are also the largest, allowing them to maintain more diversity over time (Frankham 1996). These five populations (LA/Big Tujunga Creek, SA, SG/West Fork, SG/Walnut Creek, and SJ) all had H_e and H_o values above 0.80, which is greater than the heterozygosity observed in a sympatric species, the Santa Ana Speckled Dace *Rhinichthys osculus* subsp. ($H_e = 0.65$; Nerkowski 2015). Like the Arroyo Chub, the Santa Ana Speckled Dace has drastically declined in abundance due to anthropogenic destruction of habitat and the effects of invasive species. The CDFW classifies the Santa Ana Speckled Dace as a species of critical concern; populations still remain in the SA and SG watersheds, whereas the LA population was extirpated (Moyle et al. 1995, 2015).

The LA/Pacoima Canyon and SM populations of Arroyo Chub exhibited the lowest genetic diversity observed among the sampled populations. The significant *M*-ratio tests indicated that historical bottlenecks were more severe in the LA/Pacoima Canyon and SM populations, which may account for their reduced genetic diversity and low N_e values. A population with a low N_e is subject to increased levels of genetic drift, which reduces genetic diversity; populations with low genetic diversity may experience a loss of evolutionary potential (Reed and Frankham 2003). In particular, the LA/Pacoima Canyon population had the lowest N_e (5.8 fish) observed among the study populations, suggesting that it is highly susceptible to a continued loss of genetic diversity through genetic drift. Although the LD method lacked the necessary power to determine the N_e for SM, the lower 95% confidence limit (42.4 fish) was still far below the N_e thresholds (500 individuals: Franklin 1980; 5,000 individuals: Lande 1995) recommended for population maintenance.

The reduced genetic diversity, population bottlenecks, and low N_e values in Arroyo Chub populations are most likely attributable to habitat loss. Arroyo Chub once occupied a 32.2–48.3-km (20–30-mi) range in LA/Pacoima Canyon; however, CDFW biologists only found the fish in a 0.402-km (0.25-mi) section of wetted habitat within the canyon. Similarly, during sampling conducted in SM from the ocean to Temecula Creek, CDFW biologists only found Arroyo Chub in a small pool within Temecula Creek. In both LA/Pacoima Canyon and SM, Arroyo Chub were congregated together in one section of wetted habitat, suggesting that habitat degradation, habitat fragmentation, and drought are responsible for the reduced number and decreased genetic diversity of fish in these populations.

Conservation Implications

Due to the high level of genetic distinctiveness of Arroyo Chub from the different drainages, we recommend that conservation efforts recognize the following eight populations as separate management units: MC, LA/Pacoima Canyon, LA/Big Tujunga Creek, SG/West Fork, SG/Walnut Creek, SA, SJ, and SM. Due to their isolation and low census sizes, all of the remaining native populations of Arroyo Chub are vulnerable to extirpation through the combined effects of genetic diversity loss and stochastic events.

Despite the threats associated with habitat loss and invasive species, most of the Arroyo Chub populations were found to possess reasonably high levels of genetic diversity. In terms of prioritizing populations for conservation efforts, the LA/Big Tujunga Creek and SA populations are important reservoirs of genetic diversity due to their high heterozygosity, high A_r, and larger habitat size. The SG/West Fork, SG/Walnut Creek, and SJ populations also exhibited relatively high levels of genetic diversity, and they should be preserved to maintain the species' adaptive potential. The upper SG is one of the last mostly protected basins that contain Arroyo Chub, potentially making it the best location for management efforts, such as habitat preservation or restoration (O'Brien 2011).

In contrast, the LA/Pacoima Canyon and SM populations of Arroyo Chub are at the greatest risk of continued genetic diversity losses. Because the Arroyo Chub in LA/Pacoima Canyon have the lowest N_e and are isolated from the remainder of the LA drainage, they face a greater risk of inbreeding depression and the random accumulation of deleterious alleles (e.g., Gilpin and Soulé 1986; Caughley 1994; Frankham et al. 2010). In these cases, it is necessary to weigh the risks of continued genetic isolation against the potential costs of admixture among management units (Moritz 1999). Translocation of individuals could beneficially increase gene flow and might increase fitness, but it could alternatively result in outbreeding depression and a loss of adaptive diversity. However, the probability of outbreeding depression is lower for situations in which populations are located in similar environments and have experienced genetic exchange within the past 500 years (Frankham et al. 2011). Arroyo Chub are physiologically adapted to a wide range of habitats and temperature fluctuations, have proliferated when introduced outside their native range, and have experienced genetic differentiation exacerbated by drift and bottlenecks; these characteristics suggest that the need for genetic rescue currently exceeds the risk of outbreeding depression (Moyle et al. 2015). Consequently, translocations should be considered as a method of supplementing genetic diversity if the LA/Pacoima Canyon and SM populations continue to decline. If managers decide to supplement these at-risk populations, we recommend the translocation of Arroyo Chub from areas that have the highest within-population genetic diversity and the greatest genetic similarity to the receiving population. Due to genetic similarity, the LA/Big Tujunga Creek population would be the best source for translocations to LA/Pacoima Canyon. The SM population, while highly genetically distinct, is least differentiated from the SJ population. The SJ population also exhibits high genetic

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diversity; therefore, it is the optimal source population for translocations to SM. However, translocations are unlikely to be successful unless conservation managers address the greatest threats facing the Arroyo Chub—habitat degradation and loss, fragmentation of populations, and the presence of invasive species. Although some streams may be permanently eradicated due to urbanization, efforts to either restore habitat or maintain the existing habitat will be essential in securing genetic stability for the Arroyo Chub.

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VISTA IRRIGATION DISTRICT

STAFF REPORT

Agenda Item: 9

Board Meeting Date:	**November 18, 2020**
Prepared By:	**Greg Keppler**
Reviewed By:	**Randy Whitmann**
Approved By:	**Brett Hodgkiss**

SUBJECT: FOUR RESERVOIRS SEISMIC/STRUCTURAL ANALYSIS AND RESERVOIR IMPROVEMENT PLANS

RECOMMENDATIONS: Receive informational report on the primary findings and recommendations from the Four Reservoirs Seismic/Structural Analysis and an update on the District's near-term reservoir improvement plans.

PRIOR BOARD ACTION: On March 4, 2020, the Board authorized the General Manager to enter into an Agreement for Professional Services with Murray Smith for the Four Reservoirs Seismic and Structural Analysis project in an amount not-to-exceed $175,739.

FISCAL IMPACT: Planning level rehabilitation, replacement, or demolition construction costs are estimated to be $12.95 million in today's dollars for the recommended alternatives in the Four Reservoirs Seismic/Structural Analysis, which includes the Virginia Place (A), Summit Trail (C), Cabrillo Circle (E-1), and Deodar reservoirs. The District's estimated total construction costs for near-term improvements (within ten years) to system storage are estimated to range between $47.55 million - $55.75 million in today's dollars (see table below).

Storage Project	Estimated Cost
Edgehill (E) Reservoir Replacement (increase from 1.5 million gallon [mg] to 2.9 mg) and New Pump Station	$11.50 million
Deodar Reservoir Rehabilitation (1.0 mg)	$ 1.35 million
New Pechstein II Reservoir (5.0 - 10.0 mg)	$9.0 million – $17.20 million
Pechstein I Reservoir Rehabilitation (20.0 mg)	$14.10 million
Virginia Place (A) Reservoir Replacement (increase from 0.8 mg to 3.0 mg)	$ 9.0 million
Summit Trail (C) Reservoir Demolition (0.8 mg) and Pressure Regulator Upgrades	$ 0.80 million
Cabrillo Circle (E-1) Reservoir Demolition (0.6 mg) and New Pressure Regulator Feed	$ 1.80 million
Total	**$47.55 million - $55.75 million**

SUMMARY: In 2018, the District completed a Water Master Plan (Master Plan) which included a cursory inspection and preliminary condition assessment of all the reservoirs and developed a priority ranking matrix to assist the District in proceeding with further investigations to implement future reservoir improvement and upgrade projects. Since the Master Plan, projects for the highest ranked reservoirs are underway including:

- Rehabilitation of the Buena Creek (HB) Reservoir is currently under construction and expected to be completed by early 2021.
- Design of the Edgehill (E) Reservoir is nearly complete and will be ready for construction by early 2021.
- A seismic/structural analysis and roof rehabilitation/replacement alternatives evaluation have been completed for the Pechstein Reservoir. Temporary short-term repairs to the glulam roof beams are underway and full roof replacement is planned following construction of a new Pechstein II Reservoir.

In addition to the above, Murray Smith has completed a seismic/structural analysis for the Virginia Place (A), Summit Trail (C), Cabrillo Circle (E-1) and Deodar reservoirs, including an evaluation of rehabilitation, replacement and/or demolition alternatives and recommendations for each reservoir. The results of this study are presented below and have assisted District staff in determining the priority and timing of near-term reservoir improvements.

DETAILED REPORT: Virginia Place (A), Summit Trail (C) and Cabrillo Circle (E-1) are all cast-in-place, reinforced concrete reservoirs constructed in the 1920s and are nearly identical in design. Deodar Reservoir is a pre-stressed concrete reservoir, very similar in design to Pechstein Reservoir, constructed in 1978. All reservoirs have a timber framed wood or corrugated metal roof. Based on the preliminary condition assessment in the Master Plan, the possibility of roof retrofits or replacements were identified as was the possibility of needing full reservoir replacement under a worst-case scenario; seismic and structural evaluations were recommended as the next step.

Murray Smith performed the following tasks for the study:

- Conducted interior and exterior inspections at each reservoir to assess overall condition.
- Performed geophysical surveys to ascertain subsurface soil conditions and current seismic design parameters.
- Reviewed original plans of the existing reservoirs to understand design parameters.
- Structurally analyzed and performed building code assessments to determine structural deficiencies.
- Provided rehabilitation requirements to address condition and structural deficiencies.
- Compared rehabilitation needs to building a new reservoir.
- Evaluated operational storage needs based on the Master Plan and developed alternative projects (e.g., construct larger reservoir or decommission reservoir without replacement).

The key findings and results are as follows:

Inspection Findings

Virginia Place (A), Summit Trail (C) and Cabrillo Circle (E-1) reservoirs – The exterior roof top surfaces are in poor to fair condition, while the underside roof framing and sheathing are in serious to poor condition. An assessment on the interior wall, floor slab, and columns were not possible with the reservoirs having urethane/epoxy coatings. The exterior walls are generally in fair condition, although full height vertical cracks are present at various locations.

Deodar Reservoir – Similar to the findings from inspecting the Pechstein Reservoir in 2018, portions of the roof are in serious condition from dry rot occurring from the outside exterior of the valley glulam beams. The interior wall, floor slab, and columns are generally in good condition, and the exterior walls are in fair condition. Hammer testing the exterior gunite identified multiple hollow sounding areas around the reservoir, which the consultant believes to be minor delamination in the gunite material that has not progressed to the circumferential pre-stressed wire wrapping (in which case corrosion would be a concern). The latter typically results in more pronounced delamination and hollow sounds when struck with a hammer.

Seismic/Structural Evaluation

Virginia Place (A), Summit Trail (C) and Cabrillo Circle (E-1) reservoirs – The roof girders and vertical wall reinforcing are substantially overstressed for normal gravity and hydrostatic loading per current design standards. With additional hydrodynamic loading during a design level earthquake, the circumferential wall reinforcing would also become overstressed. Additionally, the reservoir roof design is inadequate to resist and transfer seismic loading, making it susceptible to damage and partial or total collapse. These seismic deficiencies would transfer down the walls, columns and connecting foundation elements and damage and partial collapse of the reservoir would be likely.

Deodar Reservoir – The circumferential pre-stressed wire wrapping is slightly under-designed for normal gravity and hydrostatic loading per current design standards when evaluated with the reservoir completely full at the overflow elevation (water level at 30 feet). This deficiency is eliminated when the operational water level is reduced to a maximum of 26 feet (note the District's typical operating high-water elevation is 23 feet). Under additional hydrodynamic loading during a design level earthquake, the roof design is inadequate to resist and transfer the seismic loading, making it susceptible to damage and partial or total collapse. The remaining reservoir elements meet current seismic standards with a maximum operating water level of 26 feet.

Reservoir Alternatives and Costs

As indicated in the inspection and seismic/structural evaluation, the improvements required for the Deador Reservoir are minimal and only a new roof is recommended. However, the improvements required to rehabilitate the Virginia Place (A), Summit Trail (C) and Cabrillo Circle (E-1) reservoirs are extensive and would require full roof/column replacement and wall/base slab strengthening. The planning level estimated cost per reservoir for rehabilitation is $3.9 million, slightly less expensive than an estimated full replacement cost of $4.1 million (for a same sized reservoir). Alternative projects are proposed for these reservoirs based on a review of system storage needs.

The District's storage requirements for the entire system and per pressure zone are dependent on the large, high-elevation storage reservoirs (herein referred to as "regional storage") including Pechstein, Buena Creek (HB) and Edgehill (HP). From the analysis in the Master Plan, there is only a 4 mg system-wide deficit at build-out (which would be met by Pechstein II). However, many individual pressure zones have deficits and therefore rely on regional storage. This works when there is adequate conveyance capacity to deliver peak flows from the regional reservoir to the lower zone. If there is not adequate capacity, the lower zones become more dependent on closer, lower-elevation reservoirs (herein referred to as "local storage"). Based on this concept and hydraulic analyses performed by staff for this study, the alternates developed include expansion of the Virginia Place (A) Reservoir and decommissioning the Summit Trail (C) and Cabrillo Circle (E-1) reservoirs without replacement.

The recommended projects for each reservoir are summarized below:

Virginia Place (A) Reservoir – This 0.8 mg reservoir provides local storage to the 707 Pressure Zone and is subject to significant water level fluctuations due to demand peaking and the existing lack of regional storage support (future pipeline upgrades to the area would be required). With the current dependence on local storage in this pressure zone, it is desired to increase the existing 0.8 mg storage volume. The existing site and surrounding same-elevation parcels were evaluated for the ability to construct a new, larger reservoir. Of the many alternatives evaluated, the following project is recommended:

- Replace the existing reservoir with a 3.0 mg circular pre-stressed concrete reservoir on a combined parcel consisting of the existing District-owned site and an acquired adjacent parcel to the north and east. The planning level estimate for this improvement is $9.0 million including property acquisition costs. Should the adjacent parcel not be available for purchase, it is estimated that a new 1.1 mg reservoir can be constructed on the existing site with an estimated cost of $4.9 million.

Summit Trail (C) Reservoir – This 0.8 mg reservoir provides local storage for the 637 Pressure Zone and has significant support from regional storage; hydraulic modeling indicates this pressure zone can operate without a reservoir. The following project is recommended:

- Decommission and demolish the existing reservoir without replacement. Prior to decommissioning, upgrade the existing pressure regulator feed to the reservoir to increase capacities for peak flows. The planning level estimate for this project is approximately $800,000. Construction of a third pressure regulator feed to this zone, as recommended in the Master Plan, to increase supply reliability should also be made prior to decommissioning the reservoir.

Cabrillo Circle (E-1) Reservoir – This 0.6 mg reservoir along with the 3.1 mg San Luis Rey Reservoir provides local storage for the 565 Pressure Zone and they have significant support from regional storage; hydraulic modeling indicates this pressure zone can operate with only the San Luis Rey Reservoir in service. The following project is recommended:

- Decommission and demolish the existing reservoir without replacement. Prior to decommissioning and to increase supply reliability, install another pressure regulator feed to the pressure zone near the San Luis Rey Reservoir including approximately 2,000 feet of new transmission main. The planning level estimate for this project is approximately $1.8 million.

Deodar Reservoir – Replace the existing roof with an aluminum dome roof. Planning level roof replacement and other needed improvements are estimated to be $1.35 million.

Schedule

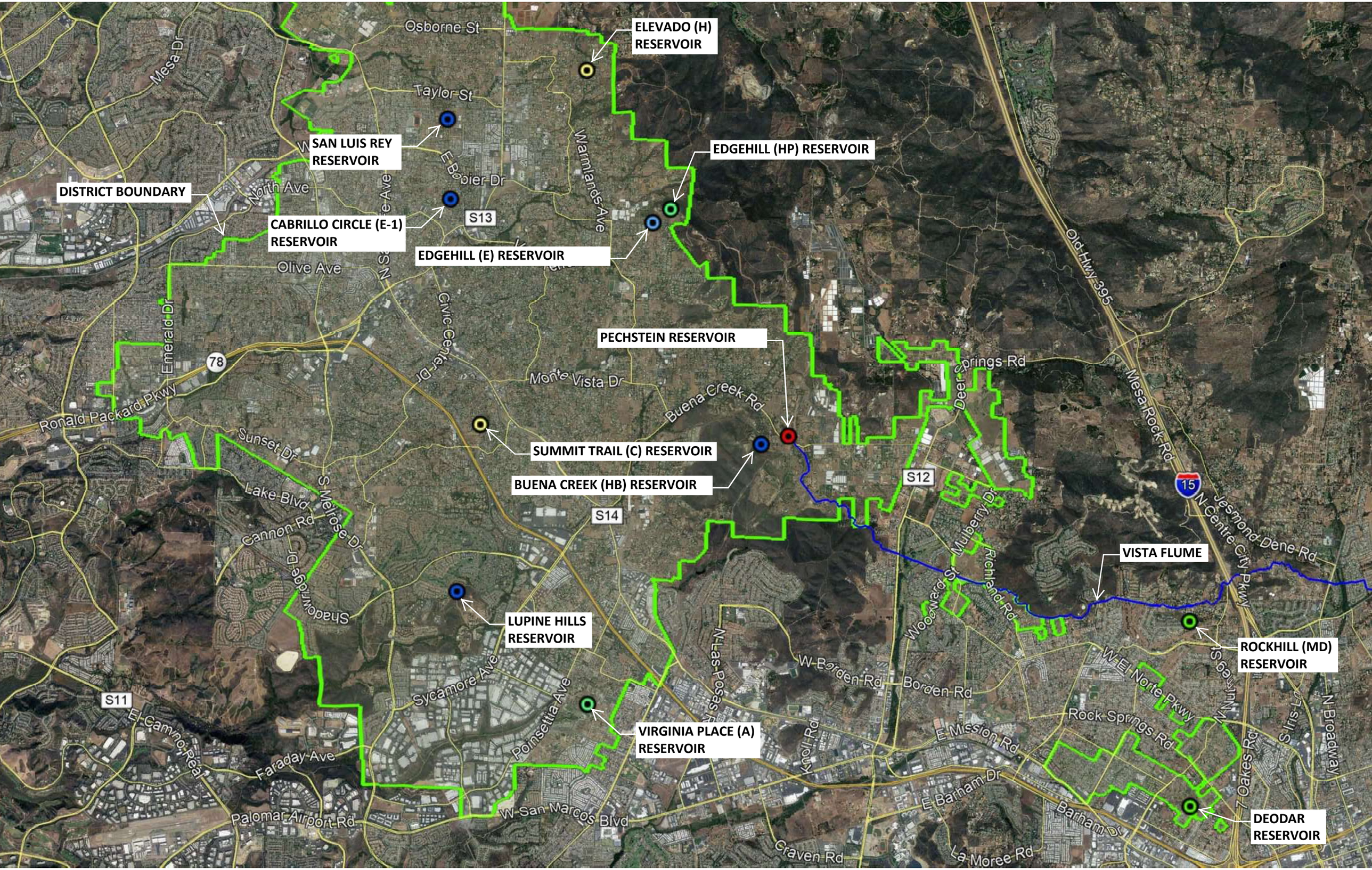
The proposed project schedule below was developed by Murray Smith; it contemplates completing all of the District's near-term reservoir projects using a phased approach based on the various factors, including inspection findings, documented deficiencies, project prioritization, and input from staff regarding engineering and operational constraints. The District's scheduling of these projects in a future fiscal year will largely depend on the availability of financial and staff resources; staff is currently updating its long-term capital project summary to determine timing and funding recommendations.

Reservoir	FY* 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
E										
Deodar										
Pechstein II										
A										
Pechstein I										
C										
E-1										

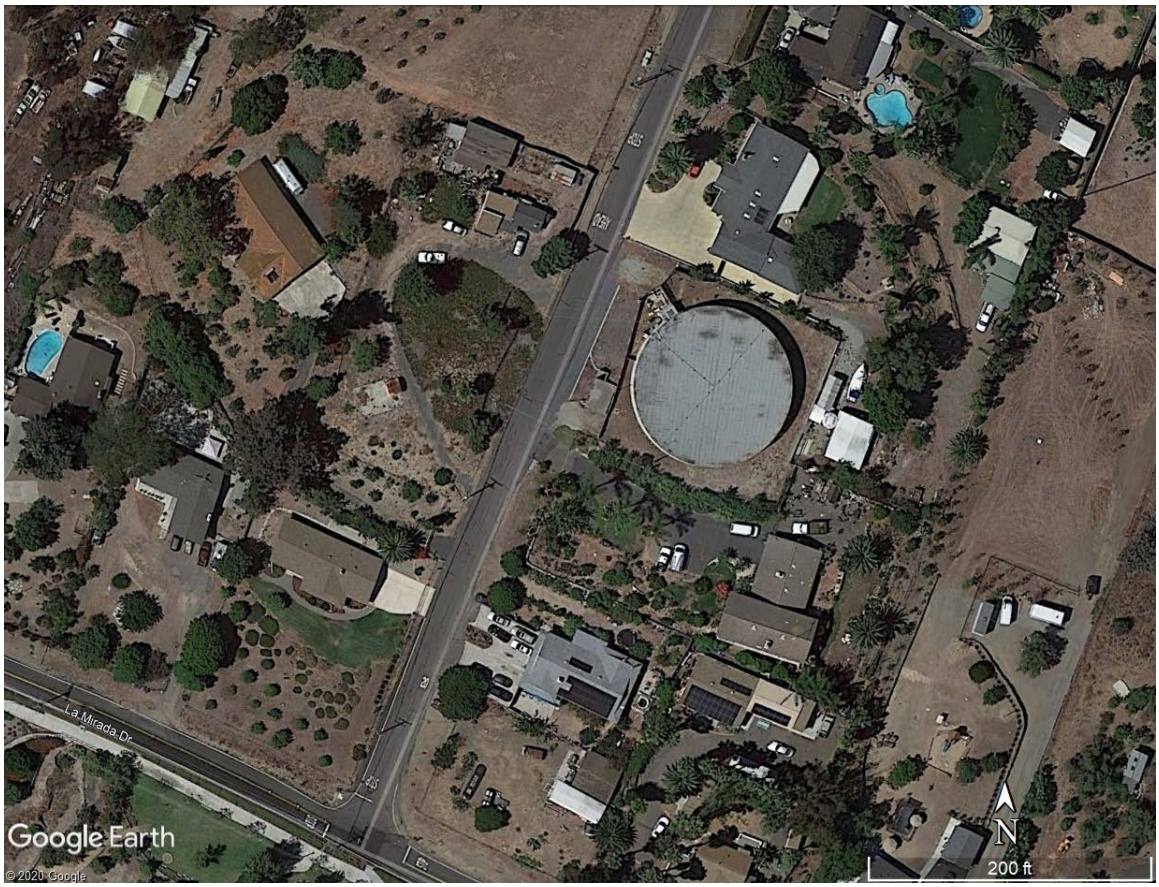
*FY – Fiscal Year

ATTACHMENTS:

- Reservoir Summary Map
- Aerial Vicinity Maps
- Murray Smith Visual Condition Assessment
- Virginia Place (A) Reservoir Replacement Alternatives

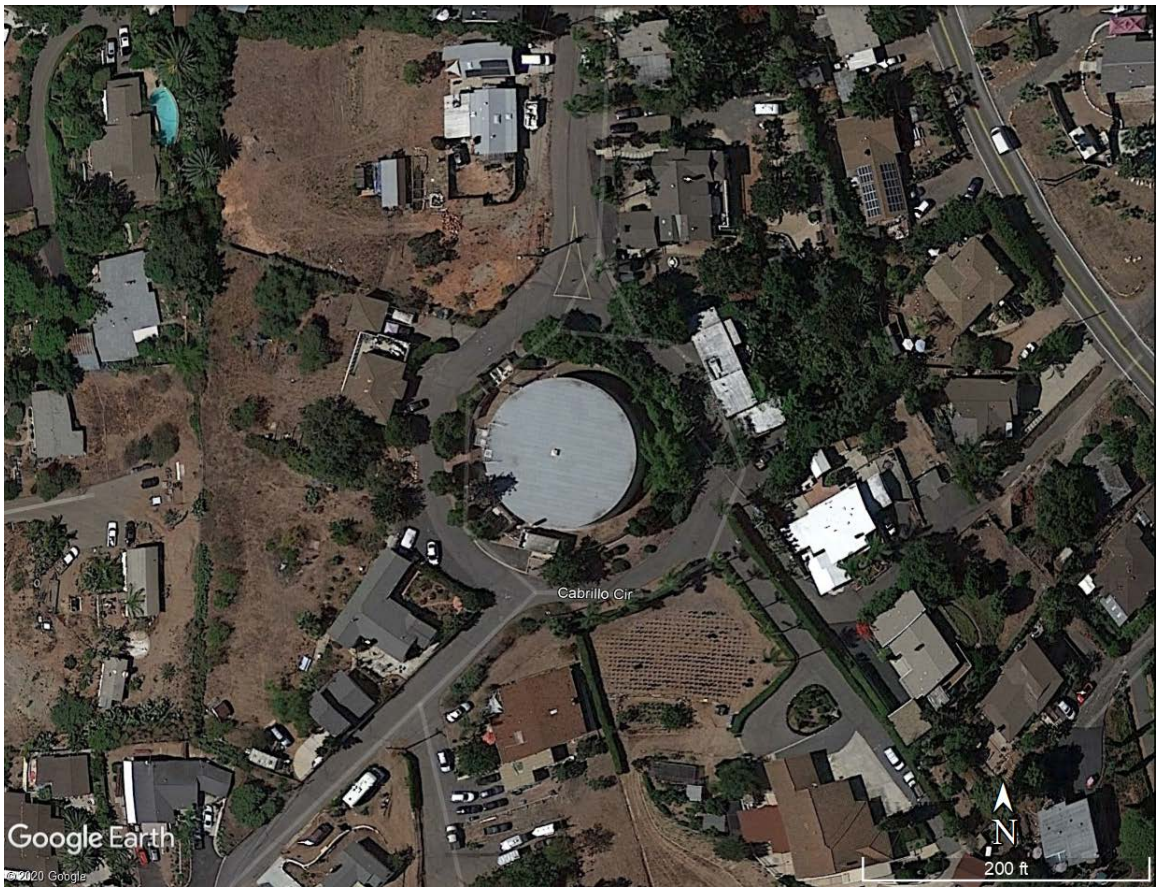

ELEVADO (H) RESERVOIR
SAN LUIS REY RESERVOIR
EDGEHILL (HP) RESERVOIR
DISTRICT BOUNDARY
CABRILLO CIRCLE (E-1) RESERVOIR
EDGEHILL (E) RESERVOIR
PECHSTEIN RESERVOIR
SUMMIT TRAIL (C) RESERVOIR
BUENA CREEK (HB) RESERVOIR
VISTA FLUME
LUPINE HILLS RESERVOIR
ROCKHILL (MD) RESERVOIR
VIRGINIA PLACE (A) RESERVOIR
DEODAR RESERVOIR
Osborne St
Taylor St
Mesa Dr
E Bobier Dr
Warmlands Ave
North Ave
S13
Olive Ave
Civic Center Dr
Emerald Dr
78
Ronald Packard Pkwy
Monte Vista Dr
Buena Creek Rd
Sunset Dr
Lake Blvd
S Melrose Dr
Cannon Rd
Shadowridge Dr
S14
S12
Deer Springs Rd
Old Hwy 395
Mesa Rock Rd
15
N Centre City Pkwy
Jesmond Dene Rd
Mulberry Dr
Richland Rd
Woodward St
W Borden Rd
Borden Rd
W El Norte Pkwy
Rock Springs Rd
E Mission Rd
E Barham Dr
Barham Dr
La Moree Rd
Craven Rd
Knoll Rd
N Las Posas Rd
Sycamore Ave
Poinsettia Ave
W San Marcos Blvd
Palomar Airport Rd
Faraday Ave
El Camino Real
S11
7 Oakes Rd
S Iris Ln
N Broadway

Virginia Place (A) Reservoir

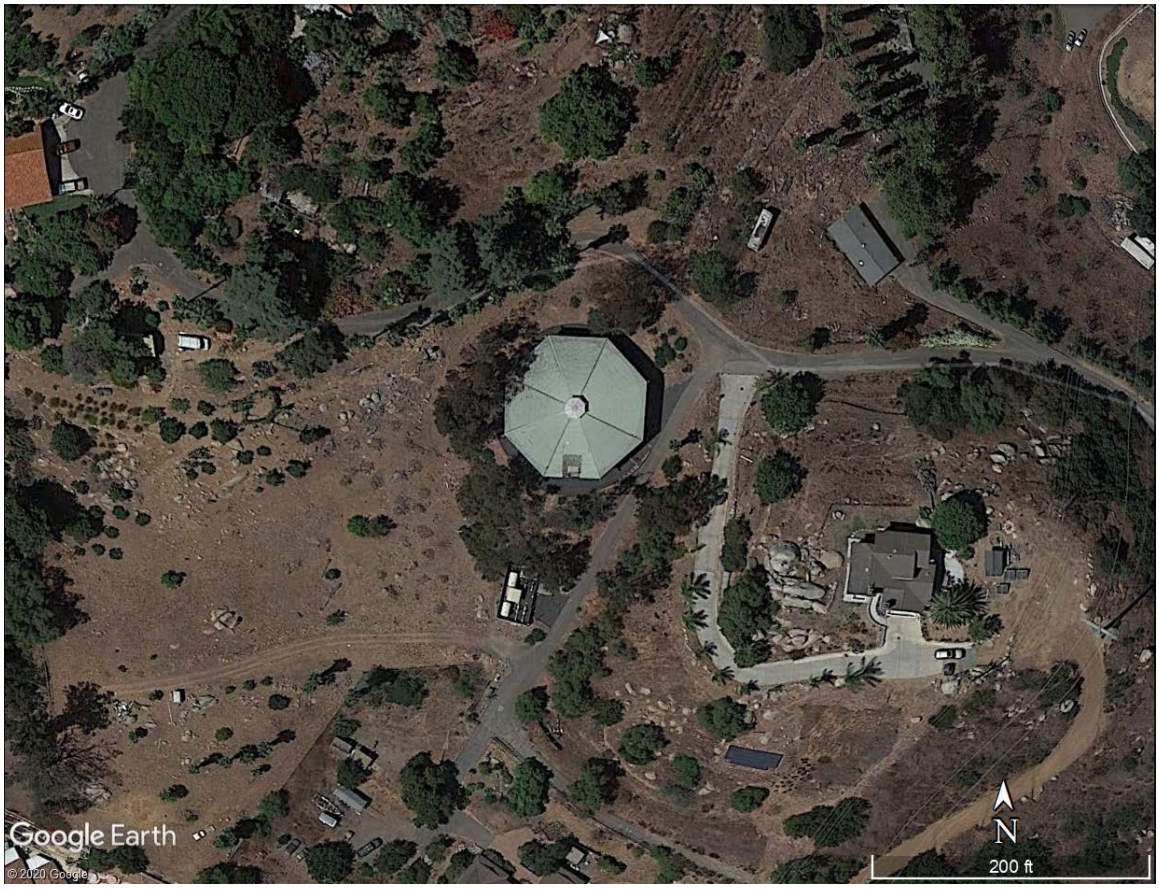


Summit Trail (C) Reservoir

Cabrillo Circle (E-1) Reservoir



Deodar Reservoir



4 VISUAL CONDITION ASSESSMENT

PSE, Murraysmith, and Group Delta performed site visits to observe the current as-built condition of the interior, exterior, and surrounding sites of A, C, E-1, and Deodar Reservoirs. The dates of inspection and inspection type are shown in Table 4-1 below.

Table 4-1
Planned Inspection Dates for A, C, E-1, and Deodar Reservoirs

Reservoir	Date of Inspection	Inspection Condition
A	05/20/2020	Interior and Exterior, Dry
C	05/14/2020	Interior and Exterior, Dry
E-1	05/14/2020	Interior and Exterior, Dry
Deodar	05/27/2020	Interior and Exterior, Dry
Deodar	05/20/2020	Interior, Wet

4.1 Purpose

The purpose of an on-site visual condition assessment is to verify general conformance of existing construction and/or identify significant alterations to those described in available documents, supplement any information not made available, and observe the general condition of the existing reservoirs. For efficiency, thumbnails of photographs are shown in the body of the report. Larger versions of the photographs shown can be seen in APPENDIX D.

4.2 Schmidt Rebound Hammer Results

To assess the general condition of the concrete strength of the reservoirs, PSE performed non-destructive in-situ testing of the structures with use of a Proceq silver-schmidt rebound hammer. A schmidt hammer measures the rebound of a spring-loaded mass impacting against the surface of a sample and converts the measured rebound to determine a calculated compressive strength for the material. A Schmidt hammer is intended to be calibrated to tested sample specimens of the in-place concrete. Use on existing concrete is less reliable and can be affected by a number of parameters (cement type, aggregates, surface calcification or weathering, carbonation of the concrete, etc.). As such, in-situ estimates of strength by rebound hammer method should not be used exclusively for analysis purposes but are useful for providing an expected upper limit of the compressive strength and identifying regions of deviation within a structure. A summary of schmidt hammer testing results are shown in Table 4-2 below.

Table 4-2
Schmidt Rebound Hammer Results

Compressive Strength (psi)				
Reservoir	**Min**	**Max**	**Average**	**Standard Deviation**
A	3700	8150	5800	2200
C	2600	7600	5350	1800
E-1	5100	6300	5550	700
Deodar	7200	10000	8000	1400

4.3 A, C, and E-1 Reservoir Inspections

PSE performed the inspection of A, C, and E-1 Reservoirs on the dates shown in Section 4 of this report. The reservoirs were drained/dry at the time of the inspections.

4.3.1 Exterior Backfill

Based on exterior and interior measurements, PSE was able to estimate an approximate backfill range at each reservoir, which has been summarized in the Table 4-3 below:

Table 4-3
A, C, and E-1 Reservoirs Backfill Summary

	A Reservoir	C Reservoir	E-1 Reservoir
Maximum	5’-6”	4’-0”	2’-0”
Minimum	2’-0”	3’-0”	1’-0”

4.3.2 Roof Exterior

In general, the roof top surfaces were noted to be in poor to fair condition. The roofs are flat and consists of a built-up membrane. Visible sagging and evidence of ponding along the roof edge was observed throughout the roofs (see Photographs 1-3 below). When walking on each of the roof surfaces, it was noted to be very “springy” with areas of excessive deflection, indicating the sheathing is undersized for the framing spans or there may be damage to the sheathing or underlying framing. A Reservoir was noted to be considerably more springy than C and E-1 Reservoirs. The underlaying diaphragms as observed from the interiors comprised of straight lumber sheathing on C and E-1 Reservoirs which likely contributed to the more firm walking surface, as the diaphragm at A Reservoir was observed to consist of structural sheathing. Based on the provided Santa Fe Roofing invoice number 2646 dated 6/19/2006, we understand the roof of C Reservoir should consist of 7/16” roof sheathing panels with a three-ply built-up hot mopped roof system. As part of work, we understand District Staff repaired damaged roof members prior to the installation of the new roof system atop the straight lumber sheathing of C Reservoir in 2006.

A Reservoir	C Reservoir	E-1 Reservoir
Photograph 1	Photograph 2	Photograph 3

4.3.3 Roof Underside and Framing (interior)

In general, the roof framing and sheathing was noted to be in serious to poor condition. The 1x bridging between rafters was noted in a few locations (see Photographs 4 -7 below). Typically, this bridging would be installed between all roof rafters. That only a few areas of bridging were observed indicates that these members may have been removed or separated since original construction. The roof framing appears to be in general conformance with the historical drawings, with the exception of E-1 Reservoir where two 2x6 knee braces where observed between the girders and posts, one on each side (see Photograph 7).

A Reservoir	C Reservoir	E-1 Reservoir
Photograph 4	Photograph 5	Photograph 6
		Photograph 7

Staining, areas of wood distress, and deterioration were noted throughout the underside of the sheathing and framing of the roof structures. Leakage through the roof membrane is evident based on the wood staining and deterioration observed (see Photographs 8-15 below). Previous replacement and/or modifications of existing roof framing members were noted at multiple locations throughout the roofs. Many of the existing roof members had been mechanically attached to new 2x wood members (a

strengthening technique commonly to referred to as “sistering”), indicating that original framing members had previously required strengthening.

At the time of the inspection of A Reservoir, new 2x wood members had recently been sistered to an existing deteriorating girder and we understand additional strengthening was to be performed on a different deteriorating girder (see Photograph 10) following our inspection. Similarly, at the time of the inspection of C Reservoir, water putty was being applied to deteriorated girders, primarily as a protective coating from what appeared to be termite damage. Ends of many of the original rafters have been cut indicating previous deterioration, and subsequent alterations and strengthening, mostly by sistering of new wood members. Moisture readings taken of the wood roofs ranged from 16% to 24% at A Reservoir, 8% to 16% at C Reservoir, and 19% to 23% at E-1 Reservoir. Deterioration appears to be a combination of moisture damage and termite damage. In conjunction with the sagging observed from the rooftop, noticeable bowing of the rafters and girders was noted during the inspection. Overall, the roof framing at A Reservoir was observed to be in overall worse condition than observed at C Reservoir and E-1 Reservoir. Physical inspection of the interior roof members was limited to areas that could be accessed from a platform that was in place at the time of the inspection at A Reservoir. Close up physical inspection of the interior roof members was not performed due to accessibility and safety concerns at C and E-1 Reservoirs.

A Reservoir	C Reservoir	E-1 Reservoir
Photograph 8	Photograph 11	Photograph 14
Photograph 9	Photograph 12	Photograph 15
Photograph 10	Photograph 13	

4.3.4 Infill Wall

The Infill walls were noted to be in generally poor to fair conditions. The infill walls consist of a 2x8 sill plate, 8x8 posts (6x6 post at C Reservoir), and 2x studs that attach to the 2x exterior sheathing and metal cloth screen (see Photographs 16 – 18 below). While probing the wall members with a scratch awl, it was noted that the wood was "soft", indicating that the exterior surface of the members have exhibited decay and deterioration, which may result in a loss of structural capacity of the members.

A Reservoir	C Reservoir	E-1 Reservoir
Photograph 16	Photograph 17	Photograph 18

With the exception of E-1 Reservoir, the sill plate appeared to be anchored with a 5/8" diameter bolt and spaced on average at approximately 4' on center as indicated in the historical drawings. At E-1 Reservoir, the anchors appeared to be spaced well in excess of 4' on center and without the use of a nut or washer to create a positive connection to the wall below, indicating that the nuts may have either been lost/removed over time or potentially were not installed during construction. Surface rust and deterioration was noted at the bolts and nuts (see Photographs 19-21 below). In addition, what appeared to be signs of a termite infestation and corresponding damage was observe at the infill wall framing.

A Reservoir	C Reservoir	E-1 Reservoir
Photograph 19	Photograph 20	Photograph 21

Where the 4x12 roof girders bear on the notched 8x8/6x6 wall posts, it was noted that the available notched space provided little to no bearing area for the perimeter 2x12 girders. In some cases, the 2x12 girders rely almost exclusively on nailing to the ends of the interior girders for transfer of roof loads to the posts (see Photographs 22 – 24 below). Given the deterioration of the 4x12 girder ends and the exposed shank, the connections do not appear adequate to transfer the roof loads to the posts and are a structural concern.

A Reservoir	C Reservoir	E-1 Reservoir
Photograph 22	Photograph 23	Photograph 24

4.3.5 Columns

The interior concrete columns were confirmed to be 8" square in section as indicated in the historical drawings. Due to the presence of the liner around all the posts, we were not able to visually observe the condition of the concrete. The liner covers the entire column surface, thereby obstructing views to any cracking or minor deformations that may be present in the columns. However, it was noted that several of the posts had been modified/repaired or showed loss of section, which appear to have occurred prior to, or at the time the reservoir walls and columns were lined (see Photograph 25 – 27 below).

A Reservoir	C Reservoir	E-1 Reservoir
Photograph 25	Photograph 26	Photograph 27

4.3.6 Slab Floor

Similar to the columns, the top surface of the interior floor slabs was observed to be coated with an interior liner, obstructing view to any minor cracking or deformations that may be present. Areas of bubbling, delamination, and patching of the liner was noted at various locations along the floors of A and C Reservoirs, typically near the base of the columns or perimeter wall (see Photographs 28 - 30). With the exception of a few areas of blistering near the perimeter wall, the liner at E-1 Reservoir appears in generally good condition.

A Reservoir	C Reservoir	E-1 Reservoir
Photograph 28	Photograph 29	Photograph 30

4.3.7 Reservoir Walls

Based on the areas that could be observed, the reservoir walls were noted to be in generally fair condition. The interior of the reservoir walls was observed to be coated with the same liner as the columns and slab which obstructs view to any minor cracking or deformations that may be present. Areas of bubbling, delamination, and patching of the liner was noted at various locations along the interior walls (see Photographs 31 - 33 below). The wall liner at E-1 Reservoir appeared in better condition than at A and C Reservoirs.

A Reservoir	C Reservoir	E-1 Reservoir
Photograph 31	Photograph 32	Photograph 33

From the exterior, full height vertical cracks were noted in various locations along the walls, typically spaced at intervals of 8 to 10 feet on center and measured to be approximately 0.006 inches thick. Based on observations made, the cracks do not appear to be newly formed and are likely a result of temperature expansion and contraction of the concrete. Wall staining was also observed from the exterior of the reservoirs (see Photographs 34 – 39 below). This staining was determined to likely be a result of runoff from ponding and drainage issues observed at the roof, causing streaking and staining onto the exterior wall surfaces. In addition, it appears a flexible crack sealant had been previously installed at areas along some of the cold joints prior to application of the exterior paint layer, indicating active leakage may have been present or this sealant could have been installed as a preventative measure. Water staining was also noted at the south-west quadrant of the exterior wall at A Reservoir, along the bottom horizontal cold joint, approximately 24" above grade (see Photograph 35), indicating potential active leakage. The water staining was felt to be dry to the touch. However, the reservoir had been drained when this stain was observed. In addition, efflorescence (a sign of dried water seepage) was noted at the north quadrant of

the exterior wall of E-1 Reservoir, along the bottom horizontal cold joint, approximately 30" above grade (see Photograph 39). Similar efflorescence was noted in the HDR condition assessment in 2017.

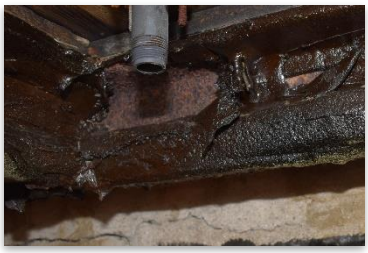
A Reservoir	C Reservoir	E-1 Reservoir
Photograph 34	Photograph 36	Photograph 38
Photograph 35	Photograph 37	Photograph 39

4.3.8 Control Box

The condition of the reservoir control boxes varied and were noted to be in generally serious to fair conditions. With the exception of the roof framing members, the control box at A Reservoir was noted to be in serious to poor condition. Based on conversations with District staff, we understand the control box roof framing at A Reservoir was recently replaced and based on PSE's observations, appears in good condition. Concrete spalling was observed at the top of the interior control box wall (see Photograph 40), at the overflow opening (see Photograph 41) during the inspection of A Reservoir. In addition, concrete staining and discoloration was observed near the top of the exterior control box walls of A Reservoir (See Photograph 42). We understand that when the existing roof was removed, concrete was formed and poured around the top of the existing wall as part of the installation of the new roof which is the likely cause for the staining and discoloration. The rebar was exposed at the overflow opening and showed significant deterioration.

The control box interior of C Reservoir, including portions of the steel roof framing was coated with a CIM liner, visibly obstructing ability to view any cracking or deformations that may be present. However, significant cracking at the overflow opening was noted during the inspection (see Photograph 43). While the CIM liner provides a protective coating, exposed areas of steel roof framing were noted to exhibit signs of moderate deterioration (see Photograph 44).

The control box interior of E-1 Reservoir was also coated with an epoxy liner, obstructing ability to view any cracking or deformations that may be present. However, moderate to severe corrosion and section loss of the control box roof framing was noted at the time of the observation (see Photograph 45).

A Reservoir	C Reservoir	E-1 Reservoir
Photograph 40	Photograph 43	Photograph 45
		
Photograph 41	Photograph 44	
Photograph 42		

4.3.9 Appurtenances

Based on the site observations, appurtenances were found to be in generally good condition. No separation or failure of the elements were noted during the site visit, and coatings appeared intact. As such, the existing interior appurtenances appear to be functional and in good condition. Minor corrosion blooms and rusting were noted at the fixed ladders at control boxes and at the reservoir roof hatches, but the exterior appurtenances appeared in overall good condition.

4.3.10 Liner/ Coating

During the interior inspection of A, C, and E-1 Reservoirs, observations of the interior coating condition were made as follows:

A Reservoir: The existing CIM coating applied by Guardian Waterproofing & Caulking in 2007 has widespread small bubbling across the entire extent of the floor area, and also in the lower portions of the walls within about 4 vertical feet of the floor. Overall, however, the coating is in very good condition, with minimal delamination observed. See Photographs 46 and 47 below, which show the bubbling. Bubbles over ½-inch in diameter were observed only in a small number of locations along floor joints between

interior columns. Annual spot repairs are recommended until such time as the reservoir is demolished in the near future.

C Reservoir: The existing CIM coating applied in 2014 is in adequate condition for approximately 90% of the interior surface area of the walls and floors. The remaining 10% of the interior surface area has the following two main issues:

- Around the entire circumference of the entire floor area, coating patching has taken place. The coating appears to have been ponded in excessive amounts to "push" the coating into the scrim along the joint between the floor slab and the base of the wall. Thus, there is a two to three-foot wide band of built up coating around the outer portion of the floor, along the entire wall circumference. Much of this coating is cracked or delaminated. See Photograph 49 below.
- The coating is delaminated at the base of several of the interior columns. See Photograph 48 below.

Although this tank is slated for near-term demolition, it is recommended that the damaged 10% of interior concrete surface area be repaired, if the District plans to continue use of this tank past January 2021.

E-1 Reservoir: The existing Warren Environmental Epoxy applied in 2016 is in very good condition. There was only one location of observed coating delamination (less than 0.5 square feet in area). Less than 5 percent of the floor area has bubbling in the floor, but the bubbling has not resulted in any delamination. See Photographs 50 and 51 below.

A Reservoir	C Reservoir	E-1 Reservoir
Photograph 46	Photograph 48	Photograph 50
Photograph 47	Photograph 49	Photograph 51

4.4 Deodar Reservoir

PSE performed the first inspection of Deodar Reservoir on May 20th, 2020. The reservoir was full at the time and the inspection was performed from an inflatable raft to observe the interior condition of the roof framing. PSE also performed a second inspection of Deodar Reservoir on May 27th, 2020. The reservoir was drained/dry at the time of the second inspection.

4.4.1 Exterior Backfill

Exterior measurements estimated a backfill range of approximately 11'-2" inches to approximately 20'-8" +/- 6 inches around the reservoir. The reservoir is located on a sloped site, and can be accessed via private road that adjoins Deodar Road in Escondido, California.

4.4.2 Roof Exterior

In general, the roof top surface and center vent was noted to be in fair condition. Isolated damage/denting of the aluminum roof decking was noted. This damage is likely due to routine use by District staff indicating the support conditions and strength of decking is under designed for operational use. Corroded deck fasteners were noted throughout the roof structure. In addition, at ridge seams, elongated, missing, and/or sheared fasteners (see Photograph 52) were observed indicating damage due to thermal expansion of the aluminum deck.

At the drain channels, a build up of debris has formed at the perimeter ends which has allowed for growth of plant life and is impeding the drainage of the roof (see Photograph 53). In its observed condition, the drain can be expected to overflow during times of heavy rainfall, allowing for water intrusion of the exterior portions of the valley glulam beams (shown later in the report). We understand that shortly after PSE's site visit, leaves and debris were cleaned out of the drain channels. In addition, light was observed at deck seams from the interior (see Photograph 54), indicating weatherproofing and water quality concerns.

Deodar		
Photograph 52	Photograph 53	Photograph 54

4.4.3 Roof Framing (interior)

Per the original roof system specification "all wooden roofing and roof framing material, including rafters, glue laminated beams and plywood, shall be pressure treated with pentachlorophenal". This could not be verified based on visual observations, however the use of this preservative, while common during the era of original construction, is not permitted per current design and water quality standards.

4.4.3.1 *Ridge Glulam Beams*

In general, the roof ridge beams as observed from the interior of the reservoir appeared in good condition. Minor water staining of the beam and CMU wall was observed (see Photograph 55) but overall the ridge beam and ridge beam connectors were noted to be in better condition than the valley and lateral Beams (described below).

Deodar
Photograph 55

4.4.3.2 *Valley Glulam Beams*

In general, the roof valley beams as observed from the interior of the reservoir appeared in fair condition. Water staining was observed and appeared to get progressively more severe moving from the center column to exterior wall (see Photograph 56), indicating potential drainage and/or ventilation concerns. Minor delamination was observed at the valley beams but appears to mostly be present near the wall (see Photograph 57). In some cases, it appears the laminations were strengthened by means of epoxy injection (see Photograph 58). Moisture readings of the valley beams typically ranged from 13% - 18% with the exception of the valley beam east of the entry hatch opening which, measured a moisture content of approximately 23%. While probing the beams with an awl during the full/wet inspection, the wood that could be accessed was noted to be competent.

Deodar		
Photograph 56	Photograph 57	Photograph 58

4.4.3.3 *Lateral Glulam Beams*

In general, the roof lateral beams as observed from the interior of the reservoir appeared in fair condition. Water staining was observed primarily at rafter intersections and appeared to get progressively more severe moving from ridge to valley (see Photograph 59), indicating potential drainage and/or ventilation concerns. Lateral beam hardware and connections appeared in generally good condition. However, minor

deterioration was noted at some of the lateral beam hardware (see Photograph 60). Minor delamination was observed at the valley beams. In some cases, it appears the laminations were strengthened by means of epoxy injection (see Photograph 61). Moisture reading taken of lateral beams ranged from 14% - 25%.

Deodar		
Photograph 59	Photograph 60	Photograph 61

4.4.3.4 Rafters

In general, the roof rafters as observed from the interior of the reservoir appeared in poor to fair condition. Due to the limitations of the wet/full inspection, we were unable to closely examine the condition of all the existing rafters. Water staining and deterioration was observed and appeared to be concentrated at laps above lateral beams (see Photograph 62). Rafter hardware and connections appeared in generally poor conditions with moderate deterioration noted at most connections (see Photograph 63). In some extreme cases the hardware and connections have failed completely (see Photograph 64).

Deodar		
Photograph 62	Photograph 63	Photograph 64

4.4.4 Roof Framing (Exterior)

Close up physical observations of the exterior roof framing were limited to areas that could be safely and easily accessed with an extension ladder.

4.4.4.1 Ridge Glulam Beams

In general, the roof ridge beams as observed from the exterior of the reservoir appeared in fair condition. Checks and delamination were noted (see Photograph 65), but no visual signs of overstress were observed.

Deodar
Photograph 65

4.4.4.2 Valley Glulam Beams

In general, the roof valley beams as observed from the exterior of the reservoir appeared in serious to poor condition. The beam ends were observed to show signs of severe deterioration with active moisture and algae growth (see Photograph 66). When probed with a scratch awl, the beam ends were noted to be very soft, allowing the awl to penetrate in excess of 1-inch. In addition, moisture readings were measured to be in excess of 39% at the beam ends. This appears to be a result of the poor drain design mentioned earlier in this report. The beams were determined to be in fair condition approximately 1-foot from the ends based on probing and moisture readings of less than 19%. However, the top surface of the glulam beam that supports the drains was not able to be observed due to the presence of wood framing (see Photograph 67) and this area may be subject to similar damage as observed at the beam ends based upon the drainage design. It was noted that the downspouts are located at the reservoir face, interior from the ends of the valleys, so the overhang portions of the valley gutter do not have any method to allow it to drain without overflowing over the end of the beam or along the length of the gutter channel. It is probable that areas of additional damage may be hidden along the top of this valley beam overhang that cannot be observed without removing the roofing in this area.

Deodar	
Photograph 66	Photograph 67

4.4.4.3 Exterior Framing

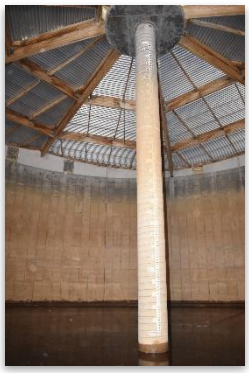
In general, the roof framing as observed from the exterior of the Reservoir appeared in poor condition with the exception of where the rim boards bear on the valley beams where signs of severe deterioration with active moisture and algae growth were observed (see Photograph 68), likely a result of the poor drain design mentioned earlier in this report. In addition, minor to moderate deterioration was noted at the overlook framing in contact with the aluminum deck (see Photograph 69). Damage at the reservoir wall

blocking was also observed from what appears to be a result of termites or local wildlife (see Photograph 70).

Deodar		
Photograph 68	Photograph 69	Photograph 70

4.4.5 Column

The column was confirmed to be 30” in diameter as indicated in the historical drawings. Based on observations made during the inspection, the column appears in generally good condition (see Photograph 71).

Deodar

Photograph 71

4.4.6 Slab Floor

Based on observations made during the inspection, the base slab appears in generally good condition. However, it was noted that the slab joint filler was protruding from the joints and has likely reached the end of its useful life (see Photograph 72).

Deodar

Photograph 72

4.4.7 Concrete Masonry Unit (CMU) Walls

The CMU walls were noted to be in generally good condition. Surface staining from the interior (see Photograph 73) was noted, indicating potential drainage and/or ventilation concerns of the roof framing.

Deodar

Photograph 73

4.4.8 Reservoir Walls (interior)

The prestressed concrete core wall was observed from the interior and was determined to be in generally good condition. Areas of pitting/bug holes (see Photograph 74) were noted during the drained inspection. In addition, water staining was noted below valley beams (see Photograph 75), indicating potential drainage and/or ventilation concerns of the roof framing.

Deodar

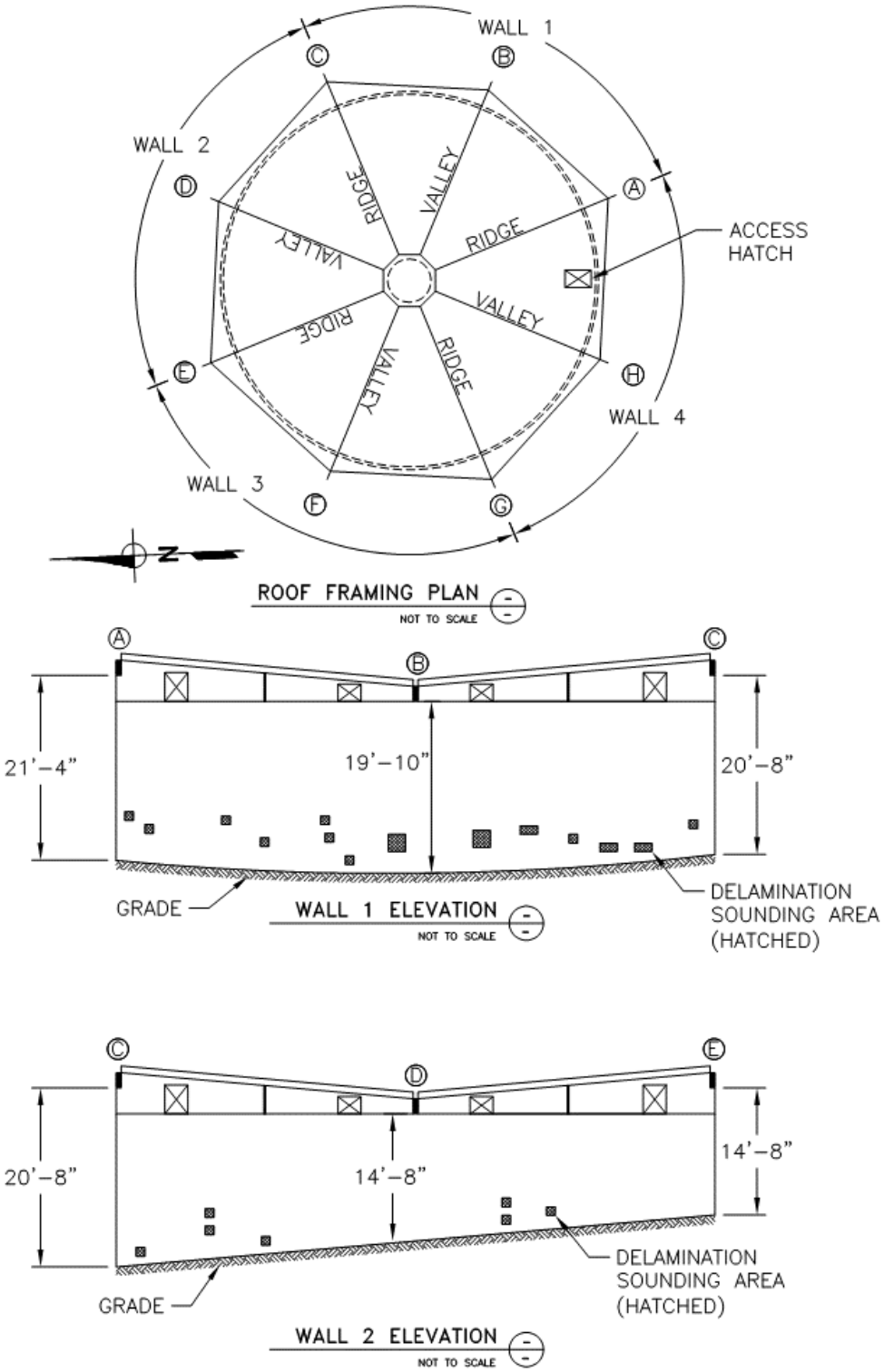
Photograph 74

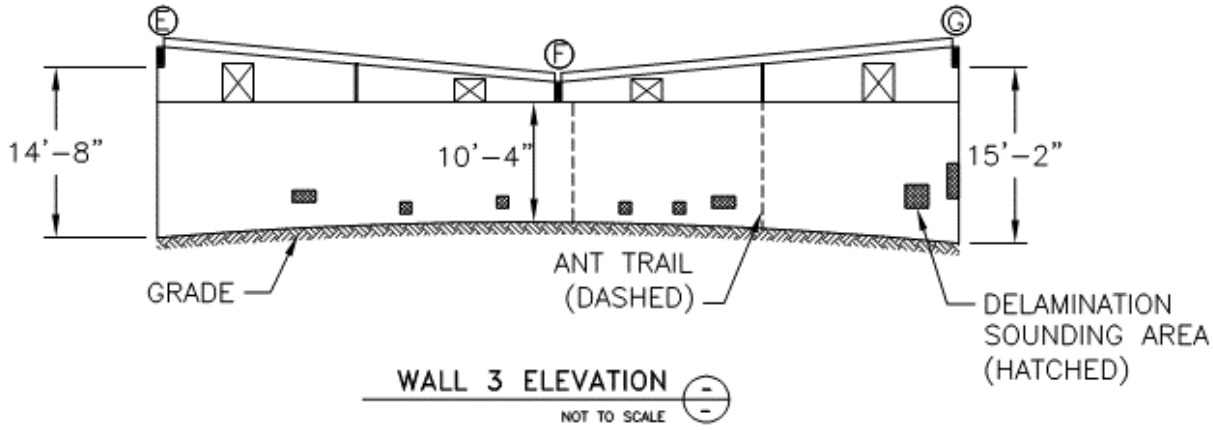
Photograph 75

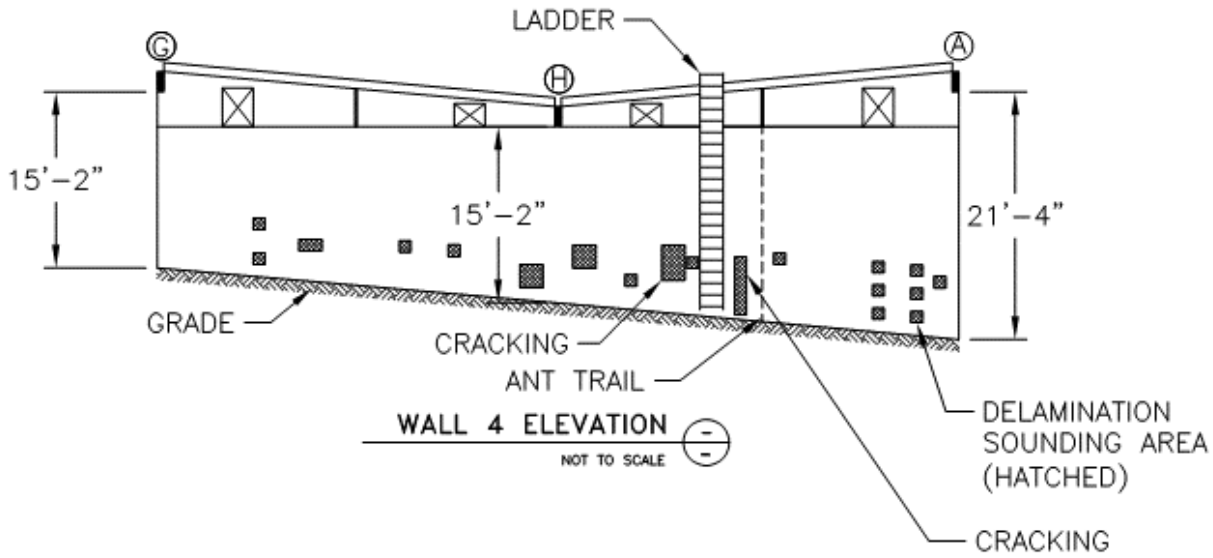
4.4.9 Reservoir Walls (exterior)

The exterior gunite wall layer was visually inspected and the bottom 7-feet sounded with a rock hammer during the drained/dry inspection of Deodar and was noted to be in generally fair condition. "Hollow" sounding areas (which identify possible gunite delamination and/or spalling that could allow water intrusion and corrosion of the circumferential prestressing wire) were noted throughout the reservoir and were observed more frequently on the south-east quadrant of the reservoir (see Figure 4-1). Additionally, minor surface cracking (see Photograph 76) was noted at some of the hollow sounding areas. Based on experience with structures of similar age and construction, the sounding results indicated that delamination has likely occurred between gunite layers and has not progressed to the prestressed galvanized strands. This delamination is likely a result of temperature expansion and contraction of the gunite and/or the result of initial imperfections during the gunite application. Delamination that is present at the prestressing material typically materializes in more significant spalling of the gunite than was observed at Deodar. Additionally, such extent of delamination is typically results in more pronounced hollow sounds when struck with a hammer. Full height vertical ant trails were noted along the wall, indicating a potential infestation of organisms that could affect the quality of the reservoir's contents. Additionally concrete staining below CMU expansion joints (see Photograph 77) was observed indicating a potential ventilation and/or drainage concern.

Figure 4-1: Deodar Reservoir Sounding Map







Deodar	
Photograph 76	Photograph 77

4.4.10 Appurtenances

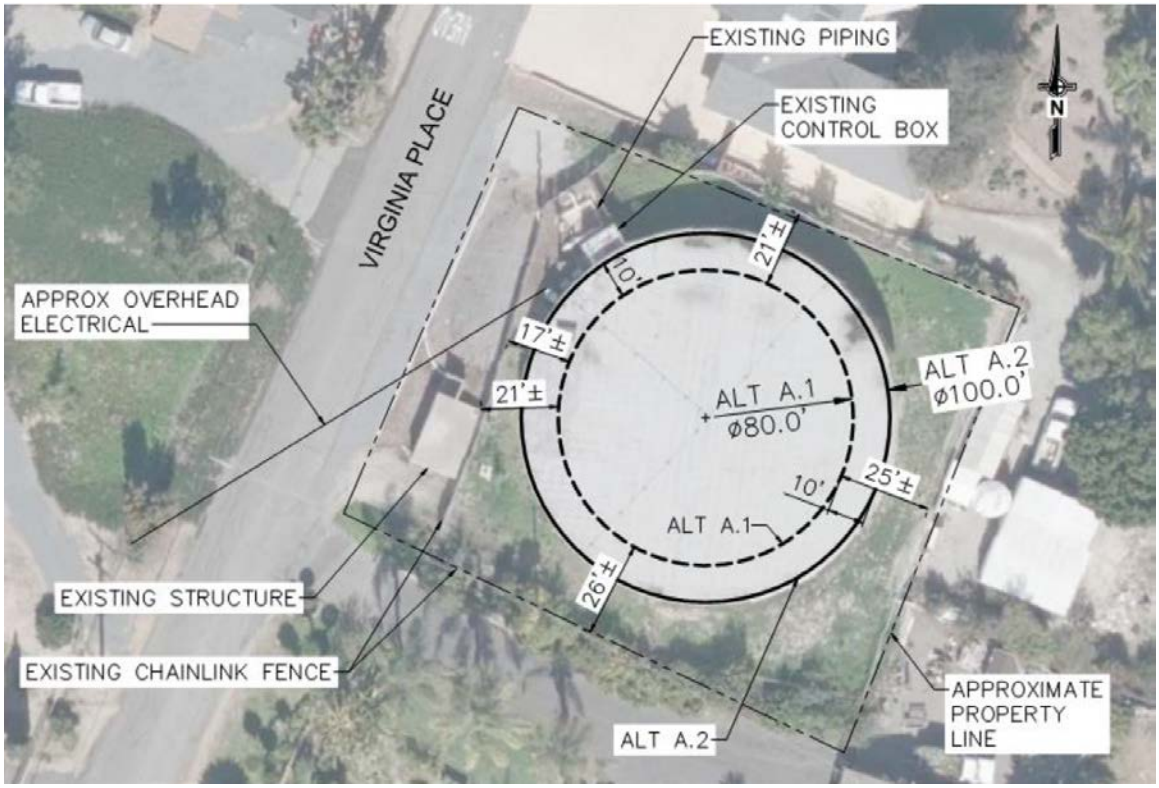
Based on our observations, the condition of appurtenances varied but was noted to be in generally fair conditions. While inside the reservoir during the dry/drained inspection, moderate surface deterioration

and what appeared to be previous repair work of the overflow pipe was observed (see Photograph 78). Cathodic protection has been installed to control the corrosion of the overflow pipe and other metal surfaces and we understand new anodes were to be installed following our inspection. The overflow pipe was noted to be braced near the base slab. As the base slab is seismically isolated from the tank walls, this bracing condition could result in damage to the overflow pipe if the flexible coupling joint can't accommodate the imposed seismic deflections in a large seismic event which could significantly limit the capacity or results in the loss of the full storage capacity of the reservoir in immediate post-earthquake applications. Other metal surfaces had been coated with a protective layer (see Photograph 79), obstructing the condition of these elements. With the exception of these items, the internal appurtenances appeared in generally fair condition with some minor surface corrosion noted (see Photograph 80). Valves in the valve pit are in good condition. The sacrificial anodes appear to be working well in minimizing corrosion of the valves (see Photograph 81). The exterior appurtenances were found to be in generally good condition. No separation or failure of the elements were noted during the site observation, and coatings appeared intact. Minor corrosion blooms and rusting were noted at the fixed ladder (see Photograph 82).

Deodar		
Photograph 78	Photograph 79	Photograph 80
Photograph 81	Photograph 82	

New 3.0 mg Virginia Place (A) Reservoir

New 0.8 – 1.1 mg Virginia Place (A) Reservoir



VISTA IRRIGATION DISTRICT

STAFF REPORT

Agenda Item: 10

Board Meeting Date: November 18, 2020
Prepared By: Marlene Kelleher
Approved By: Brett Hodgkiss

SUBJECT: REVISIONS TO COMPENSATION SCHEDULE

RECOMMENDATION: Adopt Resolution No. 20-XX approving revisions to the Compensation Schedule effective January 1, 2021.

PRIOR BOARD ACTION: At least annually, the Board approves a Compensation Schedule for all employees to facilitate California Public Employees' Retirement System (CalPERS) reporting requirements under state pension law. Most recently, the Board adopted revisions to the Compensation Schedule on December 18, 2019.

FISCAL IMPACT: Revisions to the Compensation Schedule effective January 1, 2021 will increase annual labor costs by approximately $104,000.

SUMMARY: CalPERS retirement law requires that the governing body of all public agencies approve a salary schedule and any revisions thereto for all employees in an open public forum.

DETAILED REPORT: The California Code of Regulations (CCR) at Section 570.5 requires public agencies to make duly adopted and approved pay schedules publicly available prior to including the compensation as a part of the members' retirement benefit. CCR Section 570.5 requires that the employee pay rate be limited to the amount listed on a pay schedule that has been duly approved and adopted by the employer's governing body in accordance with the requirements of applicable public meeting laws.

Increases in the proposed 2021 schedule reflect negotiated salary adjustments in accordance with the Board Approved Memorandum of Agreement (MOA) with the Teamsters Union, and established terms and conditions of employment for unrepresented employees, for a four-year term beginning on January 1, 2018 and ending on December 31, 2021. The economic terms that were negotiated with the new employee agreements included a salary range adjustment effective January 1, 2021; the salary adjustment is equal to 95% of the San Diego Consumer Price Index for All Urban Consumers for the twelve-month period ended June 30, 2020, which is 1.24%.

In addition to the salary adjustment previously described, the Administrative Secretary and Accounting Technician job titles have been deleted from the Compensation Schedule. The Administrative Secretary position was eliminated and replaced by the Administrative Office Assistant in 2016; the Accounting Technician position was eliminated and replaced with the Accountant position in 2020. The staffing level remains at 89 positions.

ATTACHMENT: Resolution No. 20-XX approving revisions to the Compensation Schedule effective January 1, 2021.

RESOLUTION NO. 20-XX

RESOLUTION OF THE BOARD OF DIRECTORS OF
VISTA IRRIGATION DISTRICT
APPROVING REVISIONS TO THE COMPENSATION SCHEDULE EFFECTIVE
JANUARY 1, 2021

WHEREAS, the Vista Irrigation District's negotiation team completed meet and confer labor negotiations for 2018, 2019, 2020 and 2021 salaries and benefits as set forth in various Memorandum of Agreement for represented employees and a Resolution for unrepresented employees; and

WHEREAS, the District has previously negotiated and the Board of Directors has previously approved in each of these labor agreements certain adjustments to salary for each of the four years of the contract term; and

WHEREAS, California Code of Regulations (CCR) Section 570.5 requires public agencies to have a pay schedule duly approved and adopted by the employer's governing body in accordance with requirements of applicable public meeting laws in order for CalPERS to consider pay as "compensation earnable" for purposes of calculating a member's retirement benefit.

NOW, THEREFORE, BE IT RESOLVED that the Board of Directors of Vista Irrigation District does hereby approve and adopt revisions to the Compensation Schedule to reflect the changes set forth in the attached "Exhibit A", incorporated herein by reference.

BE IT FURTHER RESOLVED that the Board of Directors has authorized execution of documents by the General Manager and Human Resources Manager that may be required to carry out this Resolution.

PASSED AND ADOPTED by the Board of Directors this 18th day of November 2020, by the following roll call vote:

AYES:
NOES:
ABSTAIN:
ABSENT:

Richard L. Vásquez, President

ATTEST:

Lisa Soto, Secretary
Board of Directors
Vista Irrigation District

EXHIBIT A

Vista Irrigation District
COMPENSATION SCHEDULE
Effective January 1, 2021

Job Title	Range - Monthly			Non-Exempt	Exempt
Accountant	$6,800	-	$8,265	X	
Accounts Payable Clerk	$4,821	-	$5,860	X	
Administrative Assistant	$6,067	-	$7,374	X	
Administrative Office Assistant	$5,366	-	$6,523	X	
Construction Worker *(New Series)*	$4,821	-	$5,860	X	
Construction Worker *(Terminal)*	$5,045	-	$6,132	X	
Customer Service Representative *(New Series)*	$4,821	-	$5,860	X	
Customer Service Representative *(Terminal)*	$5,045	-	$6,132	X	
Engineering Inspector	$7,276	-	$8,844	X	
Engineering Office Assistant	$5,045	-	$6,132	X	
Engineering Specialist I	$6,800	-	$8,265	X	
Engineering Specialist II	$7,276	-	$8,844	X	
Equipment Mechanic	$5,801	-	$7,051	X	
Equipment Operator	$5,801	-	$7,051	X	
Executive Assistant/Secretary of the Board	$7,276	-	$8,844	X	
Facilities Locator	$5,366	-	$6,523	X	
Facilities Office Assistant	$5,045	-	$6,132	X	
Facilities Worker	$5,801	-	$7,051	X	
Finance Associate	$7,276	-	$8,844	X	
GIS Specialist	$6,800	-	$8,265	X	
GIS Systems Associate	$7,671	-	$9,324	X	
Heavy Equipment Operator	$6,067	-	$7,374	X	
Human Resources Office Assistant	$5,366	-	$6,523	X	
Information Technology System Administrator	$7,671	-	$9,324	X	
Inventory Control Clerk	$4,821	-	$5,860	X	
Laborer *(New Series)*	$4,373	-	$5,315	X	
Laborer *(Terminal)*	$4,821	-	$5,860	X	
Laborer Trainee	$4,165	-	$5,062	X	
Maintenance Worker	$4,821	-	$5,860	X	
Management Analyst	$7,671	-	$9,324	X	
Meter Reader	$4,165	-	$5,062	X	
Meter Reader Trainee	$3,966	-	$4,821	X	
Meter Repair Technician	$5,045	-	$6,132	X	
Purchasing Agent	$6,800	-	$8,265	X	
Receptionist/Cashier	$4,821	-	$5,860	X	
Senior Accountant	$7,671	-	$9,324	X	
Senior Construction Worker	$6,800	-	$8,265	X	
Senior Customer Service Representative	$5,366	-	$6,523	X	
Senior Equipment Mechanic	$6,800	-	$8,265	X	
Senior Facilities Worker	$6,800	-	$8,265	X	
System Controls Technician I	$6,800	-	$8,265	X	
System Controls Technician II	$7,276	-	$8,844	X	
System Controls Technician III	$7,671	-	$9,324	X	
System Operator I	$6,067	-	$7,374	X	
System Operator II	$6,427	-	$7,812	X	

EXHIBIT A

Vista Irrigation District
COMPENSATION SCHEDULE
Effective January 1, 2021

Job Title	Range - Monthly			Non-Exempt	Exempt
Water Conservation Specialist I	$6,800	-	$8,265	X	
Water Conservation Specialist II	$7,276	-	$8,844	X	
Water Quality Operator I	$6,067	-	$7,374	X	
Water Quality Operator II	$6,427	-	$7,812	X	
Water Quality Operator III	$6,800	-	$8,265	X	
Water Resources Aide	$5,366	-	$6,523	X	
Water Resources Office Assistant	$5,045	-	$6,132	X	
Water Resources Specialist	$7,671	-	$9,324	X	
Welder/Equipment Operator	$6,427	-	$7,812	X	
Welder Helper	$5,801	-	$7,051	X	
Welder I	$6,067	-	$7,374	X	
Welder II	$6,427	-	$7,812	X	
Construction Supervisor	$8,902	-	$10,820		X
Customer Service Supervisor	$8,022	-	$9,751		X
Director of Administration	$12,841	-	$15,608		X
Director of Engineering	$14,719	-	$17,891		X
Director of Operations and Field Services	$12,841	-	$15,608		X
Director of Water Resources	$14,719	-	$17,891		X
Engineering Project Manager	$11,847	-	$14,400		X
Engineering Services Manager	$11,847	-	$14,400		X
Facilities Supervisor	$8,902	-	$10,820		X
Finance Manager	$11,847	-	$14,400		X
Finance Supervisor	$8,902	-	$10,820		X
General Manager	$20,366	-	$20,366		X
Human Resources Manager	$11,847	-	$14,400		X
Information Technology Supervisor	$8,902	-	$10,820		X
Safety/Risk Manager	$10,655	-	$12,952		X
System Controls Supervisor	$8,902	-	$10,820		X
Water Distribution Supervisor	$8,902	-	$10,820		X
Water Resources Supervisor	$7,086	-	$8,613		X
Board of Director (per meeting)	$200	-	$200		

VISTA IRRIGATION DISTRICT

STAFF REPORT

Agenda Item: 11

Board Meeting Date: **November 18, 2020**
Approved By: **Brett Hodgkiss**

SUBJECT: DECEMBER 2020 BOARD MEETING DATE

RECOMMENDATION: Consider adding a second Board of Directors meeting date in December 2020.

PRIOR BOARD ACTION: On October 16, 2019, the Board established the 2020 Board meeting calendar, scheduling only one meeting in December 2020 on December 9.

FISCAL IMPACT: None.

SUMMARY: In October 2019, the Board established its 2020 Board meeting schedule, taking into consideration known conflicts such as holidays, conferences, and other anticipated commitments of the individual Board members. Taking into consideration scheduling conflicts associated with as the Association of California Water Agencies Fall Conference in the first week of December and the Colorado River Water Users Association Conference in the third week of December as well as the holidays and vacation schedules, the Board elected to schedule only one meeting in December on December 9. With the latter conference being cancelled due to the COVID-19 pandemic and with several complex agenda items needing Board consideration in addition to regular business items, a second meeting in December may be needed. With this in mind, staff recommends scheduling a second meeting in December on Wednesday, December 16 at 9 AM.

VISTA IRRIGATION DISTRICT

STAFF REPORT

Agenda Item: 12

Board Meeting Date: **November 18, 2020**
Prepared By: **Brett Hodgkiss**

SUBJECT: MATTERS PERTAINING TO THE ACTIVITIES OF THE SAN DIEGO COUNTY WATER AUTHORITY

SUMMARY: Informational report by staff and directors concerning the San Diego County Water Authority. No action will be required.

VISTA IRRIGATION DISTRICT

STAFF REPORT

Agenda Item: 13.A

Board Meeting Date:	**November 18, 2020**
Prepared By:	**Lisa Soto**
Approved By:	**Brett Hodgkiss**

SUBJECT: REPORTS ON MEETINGS AND EVENTS ATTENDED BY DIRECTORS

SUMMARY: Directors will present brief reports on meetings and events attended since the last Board meeting.

VISTA IRRIGATION DISTRICT

STAFF REPORT

Agenda Item: 13.B

Board Meeting Date: November 18, 2020
Prepared By: Lisa Soto
Approved By: Brett Hodgkiss

SUBJECT: SCHEDULE OF UPCOMING MEETINGS AND EVENTS

SUMMARY: The following is a listing of upcoming meetings and events. Requests to attend any of the following events should be made during this agenda item.

	SCHEDULE OF UPCOMING MEETINGS AND EVENTS	ATTENDEES
1 *	**Vista Chamber of Commerce Business Mixer** *Nov. 18, 2020; 5:00 p.m. – 6:00 p.m.; virtual via Zoom* *RSVP's are not necessary*	
2	**Central Valley Water Tour** (Water Education Foundation) *November 19, 2020, 2:30-5:30 p.m.; Virtual tour* *Reservation deadline: November 19, 2020*	
3 *	**Council of Water Utilities Meeting** *(No meeting in December)*	
4 *	**CSDA Quarterly Dinner Meeting** *Nov. 19, 2020, 6:00 p.m.; virtual via Zoom* *RSVP's are not necessary*	
5	**ACWA Fall Conference** *Dec. 2-3, 2020; Virtual* *Registration deadline: 11/20/2020*	Sanchez (R) MacKenzie (R)
6	**San Joaquin River Restoration Tour** (Water Education Foundation) *Dec. 10, 2020, 2:30-5:30 p.m.; Virtual tour* *Reservation deadline: TBD*	

* Non-per diem meeting except when serving as an officer of the organization

The following abbreviations indicate arrangements that have been made by staff:
R=Registration; **H**=Hotel; **A**=Airline; **S**=Shuttle; **C**=Car; **T**=Tentative

VISTA IRRIGATION DISTRICT

STAFF REPORT

Agenda Item: 14

Board Meeting Date: **November 18, 2020**
Prepared By: **Lisa Soto**

SUBJECT: ITEMS FOR FUTURE AGENDAS AND/OR PRESS RELEASES

SUMMARY: This item is placed on the agenda to enable the Board to identify and schedule future items for discussion at upcoming Board meetings and/or identify press release opportunities.

Staff-generated list of tentative items for future agendas:

- Permanent Special Agricultural Water Rate program
- Renewal of lease and license agreements for Remote Training Site Warner Springs
- Fiscal Year 2021 Capital Budget Phase II review
- General Manager Performance Evaluation
- Monthly billing
- Warner Wellfield Assessment

VISTA IRRIGATION DISTRICT

STAFF REPORT

Agenda Item: 15

Board Meeting Date: **November 18, 2020**
Prepared By: **Lisa Soto**

SUBJECT: COMMENTS BY DIRECTORS

SUMMARY: This item is placed on the agenda to enable individual Board members to convey information to the Board and the public not requiring discussion or action.

VISTA IRRIGATION DISTRICT

STAFF REPORT

Agenda Item: 16

Board Meeting Date: **November 18, 2020**
Prepared By: **Brett Hodgkiss**

SUBJECT: COMMENTS BY GENERAL COUNSEL

SUMMARY: Informational report by the General Counsel on items not requiring discussion or action.

VISTA IRRIGATION DISTRICT

STAFF REPORT

Agenda Item: 17

Board Meeting Date: **November 18, 2020**
Prepared By: **Brett Hodgkiss**

SUBJECT: COMMENTS BY GENERAL MANAGER

SUMMARY: Informational report by the General Manager on items not requiring discussion or action.

VISTA IRRIGATION DISTRICT

STAFF REPORT

Agenda Item: 18

Board Meeting Date: **November 18, 2020**
Prepared By: **Brett Hodgkiss**

SUBJECT: CLOSED SESSION: CONFERENCE WITH LEGAL COUNSEL-EXISTING LITIGATION (Existing Litigation per Government Code Sections 54956.9(a) and (d)(1))

Name of Case: Kessner et al. v. City of Santa Clara, et al.;
Santa Clara Superior Court Case No. 20CV364054