



2020 Annual Review

of the construction and operation of the

State Water Project

California 
WATER COMMISSION

2020 CALIFORNIA WATER COMMISSION

Armando Quintero, Chair

Carol Baker, Vice-Chair

Teresa Alvarado

Samantha Arthur

Danny Curtin

Alexandre Makler

Matthew Swanson

Introduction

The State Water Project (SWP or the system) is the backbone of California's water supply. SWP's system of canals, pipelines, reservoirs, and hydroelectric facilities stretches two-thirds the length of the state and supplies water to two out of every three Californians. In addition to supplying water, the system provides flood protection, generates power, and offers recreational opportunities. The Department of Water Resources (DWR or the Department) operates the SWP, balancing water delivery with environmental protection. This critical infrastructure, built in the 1960s, has made California what it is today: a state known for its strong economy, environmental ethic, and excellent quality of life.

Water Code section 165 requires the California Water Commission (Commission) to conduct an annual review of the progress of the construction and operation of the State Water Project. This review highlights SWP planning and operations in 2020 and includes findings and specific recommendations for DWR to keep the Commission apprised of operations and construction activities in 2021. The Commission reports its findings and recommendations to DWR and the Legislature. The Commission was tasked with this responsibility in 1967, during the original construction of the State Water Project. At that time, the Commission played an important and novel role in this massive public works project by providing public transparency before formal public processes existed.

California Water Commission

The nine-member California Water Commission uses its public forum to explore water management issues from multiple perspectives and to formulate recommendations to advise the director of the California Department of Water Resources, and as appropriate, the California Natural Resources Agency, the Governor and Legislature on ways to improve water planning and management in response to California's changing hydrology. For more information regarding the California Water Commission, visit cwc.ca.gov.

In 2020, the Department of Water Resources made seven presentations to the Commission on various SWP topics. These presentations are a continuum of the public transparency that the Commission has provided since 1967: they utilize the Commission's public forum to help the public stay informed of DWR's efforts, and they provide the basis of the recommendations that the Commission makes to the Department – and the Legislature – regarding operation of the SWP. This year, the Commission received briefings on the following topics:

- Delta conveyance
- Emissions reduction and power generation
- Hydropower license planning and compliance
- Incidental take permit
- Delta restoration
- Subsidence
- Construction update

Commission staff worked closely with Department staff to obtain additional information for this review.

On the cover: A drone view showing charred land from the Potters Fire that burned in August of 2020 near Potters Ravine Recreation area at Lake Oroville in Northern California's Butte County. Source: Department of Water Resources.

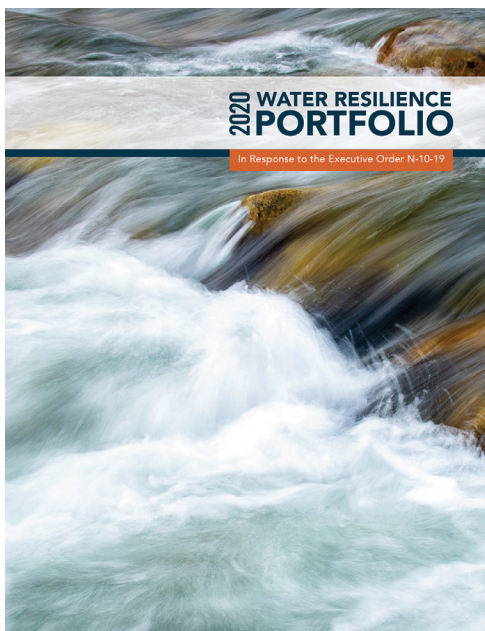
2020 HIGHLIGHTS

Water Resilience Portfolio

On July 28, 2020, Governor Newsom released the Water Resilience Portfolio (Portfolio), which lays out a blueprint for meeting California's water needs – for communities, the economy, and the environment – through the 21st century. The Portfolio's intent is to achieve the following broad goals:

1. Maintain and diversify water supplies
2. Protect and enhance natural systems
3. Build connections
4. Be prepared

To do this, the document lays out more than 100 separate actions to be implemented by various state agencies, including actions that specifically involve the SWP.



The Portfolio outlines actions to modernize inter-regional conveyance to help capture, store, and move water, and, in Action 19.1, directs DWR to plan, permit, and build new diversion and conveyance facilities in the Delta to safeguard State Water Project, and, potentially, Central Valley Project deliveries drawn from the Sacramento and San Joaquin river systems. The Portfolio specifies that new Delta conveyance should complement existing and improved through-Delta conveyance to promote operational flexibility, protect water quality, and improve aquatic habitat conditions while limiting local impacts. Action 19.5 tasks DWR with ensuring effective long-term State Water Project management by completing risk-informed asset management plans for critical

infrastructure that account for seismic, flood, and aging risks, among others. Together, these actions point to the future of the SWP, one that includes carefully planned and managed infrastructure that can continue to provide the many benefits on which Californians depend.

The California Natural Resources Agency, California Environmental Protection Agency, and Department of Food and Agriculture developed the Portfolio, soliciting broad input via more than 20 public listening sessions and considering more than 100 comment letters. The Portfolio integrates tribal interests and leadership, upper watershed health, and cross-border water issues.



An aerial view looking south along White Slough. In the foreground is Terminous Tract, part of the Sacramento-San Joaquin River Delta in San Joaquin County. Source: Department of Water Resources

Delta Conveyance

The Department of Water Resources is advancing the Delta Conveyance Project (DCP) to develop new diversion and conveyance facilities in the Delta in order to modernize the State Water Project. The intent of the DCP is to restore and protect the reliability of SWP water deliveries in a cost-effective manner, consistent with the State's Water Resilience Portfolio, by addressing sea level rise and climate change, minimizing water supply disruption due to seismic risk, and providing operational flexibility. As currently proposed, the DCP will consist of one tunnel designed to convey water under the Delta with a capacity ranging from 3,000 to 7,500 cubic feet per second. The project will include intake facilities, tunnel reaches and shafts, forebays, a pumping plant, and South Delta conveyance facilities. Operations of the new project would increase DWR's ability to capture water during high flow events.

In January 2020, DWR released a Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the DCP. This action marked the first step of environmental review of the project under the California Environmental Quality Act (CEQA). The NOP solicited comments from agencies, organizations, and members of the public regarding the scope and content of the environmental analysis in the EIR. The scoping period concluded on April 17, 2020. DWR published a Scoping Summary Report that describes the scoping process and summarizes the comments, with the full comment letters and public meeting transcripts attached. The United States Army Corps of Engineers (USACE) has issued a Notice of Intent to publish

an Environmental Impact Statement, which started a scoping process as part of compliance with the National Environmental Policy Act. The scoping comment period closed on October 20, 2020. In the second quarter of 2022, DWR and USACE will finalize administrative drafts of the EIR and EIS and revise and prepare drafts for public review during the third quarter of 2022. The final EIR and EIS are expected in mid-2023.

DWR recognizes that stakeholder engagement in the planning phase of the DCP is critical. In 2020, the Department held eight CEQA scoping meetings and public hearings, developed a “Deep Dive” video series to share technical information, and continued regular updates through email and blog posts. DWR conducted a survey to better understand how disadvantaged communities rely on resources in and around the Delta and has planned a series of public technical workshops during summer 2021. DWR also worked with the Delta Conveyance Design and Construction Authority (DCA), a Joint Powers Authority (JPA) between public water agencies, to form a Stakeholder Engagement Committee in late 2019. The Committee is comprised of 18 members, with up to five ex-officio members, representing different key stakeholder groups in the Delta. Committee members help to identify ways to design and construct the project that would avoid or minimize effects to local communities and the Delta as a place. Committee members do not need to agree with the project. The Committee met 12 times in 2020 to discuss design and construction-related activities of the DCP. Based on Committee feedback, the DCA has incorporated changes into the project’s preliminary designs to address comments related to facility siting and access.

DWR is proposing to conduct soil investigations throughout the Delta to gather data that will be used to inform and evaluate alignment alternatives for Delta Conveyance and provide information to increase understanding of Delta geology. Investigations could include soil borings (on-land and over-water), cone penetration tests, and geophysical surveys, and will involve obtaining permission for temporary entry onto private lands. DWR worked with the DCA to develop an updated approach to obtain temporary entry and reached out to 38 landowners in 2020 and is planning to reach out to 30 more landowners in 2021. Soil investigations began in Fall 2020 but are currently on hold during the wet winter season. This work will continue starting in March 2021.

DWR does not have a regularly scheduled public forum at which to discuss the DCP. Presenting to the Commission provides DWR an opportunity to engage a larger audience in the discussion of this project.

Covid-19 and the Pandemic

Over the course of 2020, the State of California adapted to a global pandemic that has impacted communities throughout the state and the world. On March 19, 2020, Governor Newsom issued a statewide stay at home order to curtail the spread of COVID-19. The order exempted from the order a federal list of 16 “critical



Evan Kopshy, an Associate Safety Engineer with the Department of Water Resources' Division of Environmental Services, loads Personal Protective Equipment (PPE) into a vehicle outside of a DWR facility in West Sacramento on April 1, 2020. The PPE was gathered from various DWR divisions to be donated to the UC Davis Medical Center in Sacramento to help with the fight against the COVID-19 virus. Source: Department of Water Resources

infrastructure sectors whose assets, systems, and networks, whether physical or virtual, are considered so vital to the United States that their incapacitation or destruction would have a debilitating effect on security, national economic security, national public health or safety, or any combination thereof.” Included in this list of critical sectors are dams and water and wastewater systems.

In order to continue providing the critical service of water deliveries, power generation, and flood protection to 27 million Californians, most of the SWP staff has continued to work in person since the beginning of the pandemic, conducting required critical infrastructure activities in support of the health and safety of the public. SWP staff continued to perform regular operations, maintenance, real-time incident response, engineering site assessments and inspections, job walks, and equipment testing to maintain real-time, non-stop operations for water deliveries and power generation. They also performed surveillance, inspections, testing and construction/repair work on all SWP infrastructure including dams, powerplants, pumping plants, aqueducts and pipelines, and continued with engineering design and construction of reliability projects critical to the safe operation and reliability of the SWP. Associated administrative support services – such as contract development and management, procurement, documentation, invoice processing and staff services – also continued during the pandemic.

To ensure the safety of SWP employees during the pandemic, DWR developed a

Health and Safety Plan to mitigate hazards associated with the pandemic. The plans were designed according to Center for Disease Control and California Department of Public Health recommended protocols, as well as guidance received from subject matter experts; the plans were revised recently to adhere to the requirements of the new COVID-19 Emergency Regulation from California Division of Occupational Safety and Health. SWP managers and supervisors developed staff rotation schedules to minimize the number of staff onsite at any one time, trained staff on the COVID-19 prevention plan, and ensured that employees maintain physical distancing and follow safe work practices by providing and encouraging the use of face coverings, hand sanitizer, gloves, and wash stations. Employees were also trained on self-screening and encouraged to stay home if they exhibit any symptoms. SWP has robust cleaning protocols for all its facilities and has recently implemented additional measures including deep cleaning and testing for organic materials. Keeping these facilities clean and the staff safe is critical to ensuring on-going operations of the SWP. In 2020, there were not any major COVID-19 outbreaks among staff working in the SWP facilities.

DWR, in conjunction with its recreation partners, closed or limited public access to many SWP recreational facilities in an effort to limit the spread of the COVID-19 virus. In mid-March of 2020, access to SWP recreational areas was either limited to foot-traffic only or restricted altogether. Under this initial closure, vehicle and boater access to SWP reservoirs was restricted. Day use areas, boat launches, and campgrounds re-opened several months later at reduced capacity to facilitate social distancing. Under County orders, some recreational amenities and activities, such as boat rentals, concessions, and fishing tournaments, have been limited or prohibited. All SWP visitor centers, nature centers, and group campgrounds closed March 2020 and remain closed to the public.

FINDINGS AND RECOMMENDATIONS

The Commission adopted a revised Strategic Plan in January 2020. The Plan includes a goal of carrying out its statutory authority to monitor and report on the construction and operation of the State Water Project, with three objectives that support the Commission's findings and recommendations within this annual review.

1. Coordinate with the Department to remain apprised of the operations and construction activities of the State Water Project, focusing on how the SWP adapts and responds to hydrological extremes expected with climate change, restores critical ecosystems, and addresses aging infrastructure.
2. Coordinate with the Department to enhance public engagement for the new Delta Conveyance Project.
3. Monitor the Department's efforts to address aging infrastructure through implementation of the asset management program, utilizing gray and green infrastructure.

The Commission finds that, in 2020:

- DWR continued to operate the SWP during the pandemic, providing its core services of water delivery, flood protection, dam safety, and infrastructure maintenance, and has adopted special measures to ensure that its essential workers can safely carry out their service to the public.
- DWR kept the Commission and the public informed as to its plans for a single-tunnel Delta conveyance and is advancing a process that is inclusive of diverse stakeholders.
- DWR continued to take significant steps to reduce greenhouse gas emissions, putting it on track to meet its target of zero emissions for the SWP by 2045, and is studying how best to utilize and provide renewable energy resources more broadly to advance statewide emissions reduction goals.
- DWR advanced a stakeholder-driven process for the renewal of its Federal Energy Regulatory Commission licensing for the Devil Canyon and South State Water Project hydropower facilities.
- DWR implemented its 10-year incidental take permit (ITP) to ensure that operation of the SWP provides robust environmental safeguards for state-listed endangered species and used adaptive management to adjust real-time operations and monitoring protocols.
- In compliance with federally-issued Biological Opinions, DWR continued its work to mitigate the effects of the long-term operations of the SWP on numerous federal and state protected fish species by restoring more than 8,000 acres of intertidal and subtidal habitat in the Delta and Suisun marshes, and is on track to complete this work by 2024.
- DWR developed and began implementation of short- and long-term objectives to deal with the California Aqueduct's capacity and conveyance loss due to subsidence in the San Joaquin Valley.
- DWR kept the Commission apprised of the progress of its numerous construction efforts within the SWP, including the restoration of the Ronald B. Robie Thermalito Pumping–Generating Plant, which suffered a catastrophic fire in 2012 that rendered the plant inoperable. The plant returned to full operation in August 2020.

The following recommendations reflect the Commission's long-term interests in, and ongoing issues associated with, SWP operations, not all of which will be addressed in 2021. **The Commission recommends that:**

- DWR, in its briefings to the Commission, consider the beneficiaries of the multiple benefits that the SWP provides.
- DWR continue to keep the Commission apprised of on-going efforts to repair and modify aging infrastructure and to develop new infrastructure in a manner that accounts for and addresses the impacts of a changing climate.

Specifically:

- how asset management is being applied to key SWP maintenance and infrastructure investments, including those that are a response to climate change vulnerabilities;
 - how planning for new Delta Conveyance is progressing, and how it is considering impacts to the Delta as place; and
 - how projects to address the near-term impacts of subsidence on the California Aqueduct are being coupled with efforts to stem the underlying causes of subsidence.
- DWR keep the Commission apprised of how it plans to adapt the operation of the SWP over the long term to accommodate and mitigate the expected effects of climate change. Specifically:
 - progress in meeting greenhouse gas reduction goals and the status of the Flexible Resources Study to assess the SWP's potential to support the state's clean energy policy, as required by SB-49, Energy: appliance standards and State Water Project assessment;
 - how the Department is addressing dam safety and emergency planning in light of changing climatic conditions;
 - how infrastructure, including levees, and flows in the Delta will be managed and maintained to meet the co-equal goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem; and
 - opportunities to apply Forecast-Informed Reservoir Operation to better manage multi-benefit water storage under changing hydrologic conditions.
 - DWR update the Commission on watershed planning in the Upper Feather River watershed and the possibility for green infrastructure projects to enhance SWP operations, including how watershed management and green infrastructure could be used to address the damages associated with wildfires.
 - DWR keep the Commission apprised of the role of the SWP in supporting the implementation of Groundwater Sustainability Plans and increasing groundwater recharge efforts in the state, including the SWP's nexus with flood-managed aquifer recharge efforts, water transfers, and DWR's work, under Action 19.3 of the Water Resilience Portfolio, to conduct a feasibility analysis for improved and expanded conveyance facilities to enhance water transfers and markets.
 - DWR provide information to the Commission about how the SWP is promoting the Human Right to Water and serving diverse beneficiaries across the state, including Disadvantaged Communities.



An aerial photo taken on March 8, 2019, looking south along Old River in the center is Fay Island, part of the Sacramento-San Joaquin River Delta in San Joaquin County. Source: Department of Water Resources

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State Water Project Facilities



Public Affairs Office 11/7/2018



Left, the dam on Antelope Lake, a section of the California State Water Project located on Upper Indian Creek, a tributary of North Fork Feather River in Plumas County. Center, an aerial view of the Thermalito Diversion Dam on the Feather River downstream from Oroville Dam in Butte County. The State Water Project dam diverts water into the Thermalito Power Canal and the Thermalito Forebay, which leads to the Thermalito Pumping-Generating Plant, right. Source: Department of Water Resources

OVERVIEW OF THE STATE WATER PROJECT (SWP)

The California State Water Project is an enduring example of a multi-benefit water project. Built in the 1960s, the system consists of 36 water storage facilities and 700 miles of rivers, pipelines, and canals that supply water to 27 million people and irrigate 750,000 acres of farmland. Twenty-three pumping plants move water around the state, powered by a system of power-generation and power-recovery plants. In addition to its primary purpose of supplying water, the SWP also provides flood protection, generates hydroelectric power, and offers recreational opportunities such as boating and hiking. The system's fish hatcheries, fish screens, and passages help to preserve and protect endangered and threatened fish species, and its restricted pumping schedules and cool water releases fulfill its operational obligation to support species.

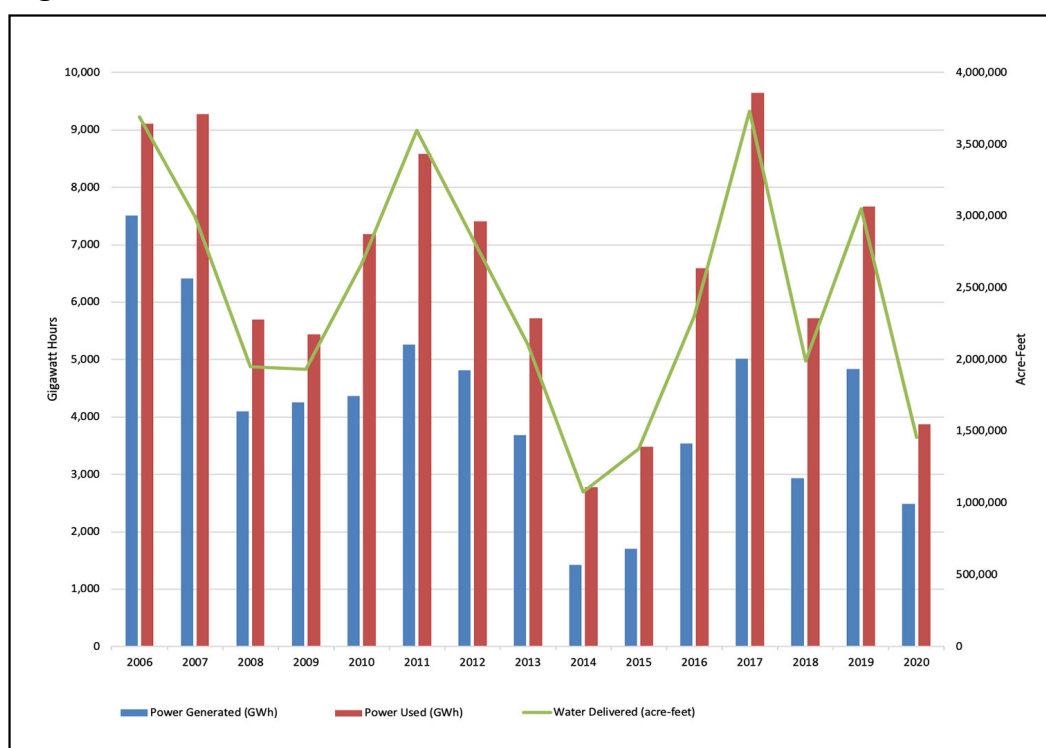
California's water sustainability depends on the water quality and environmental health of the Sacramento-San Joaquin Delta. The SWP operates to limit salinity intrusion into the Delta and Suisun Marsh by allowing fresh water to flow through the Delta to the ocean. During certain times of the year, water exports are limited to protect sensitive species. As the operator of the SWP, DWR maintains the delicate balance between fulfilling the state's need for fresh water and protecting the environment.

In the 1960s, while the SWP was under construction, the public agencies and local water districts that receive water from the SWP signed long-term water supply contracts with DWR. Today, these 29 public agencies and local water districts are collectively known as the SWP water contractors, and they serve communities in the Central Valley, desert, and coast of California, providing the water on which agriculture, industry, and human households depend. The water supply contracts that were signed six decades ago specify the maximum amount of SWP water a contractor may request annually. However, the amount of SWP water available for delivery varies, based on rainfall, snowpack, runoff, water in reservoirs, pumping capacity in the Delta, and operating constraints that protect fish, wildlife, and Delta water quality. As the climate continues to change, California's hydrologic patterns will shift, and water deliveries will become increasingly variable, impacting water supply reliability for the SWP's users.

Table 1: SWP Water and Power Statistics¹			
Year	Water Delivered (acre-feet)	Power Generated (GWh/year)	Power Used (GWh/year)
2000	3,584,667	6,832	8,518
2001	2,042,118	4,588	6,358
2002	2,850,215	5,631	8,191
2003	3,167,604	6,117	8,862
2004	3,119,578	6,887	9,661
2005	3,627,004	5,661	8,282
2006	3,691,568	7,515	9,109
2007	2,996,629	6,410	9,276
2008	1,950,968	4,100	5,701
2009	1,933,735	4,255	5,438
2010	2,660,960	4,368	7,184
2011	3,596,749	5,258	8,583
2012	2,848,082	4,810	7,404
2013	2,107,572	3,679	5,721
2014	1,079,839	1,426	2,780
2015	1,375,536	1,699	3,483
2016	2,299,679	3,535	6,598
2017	3,732,527	5,011	9,652
2018	1,984,723	2,933	5,723
2019	3,049,485	4,842	7,662
2020 ²	1,457,500	2,490	3,875

[1] Source: Department of Water Resources' State Water Project Analysis Office. (In addition to Table A, reported deliveries include Carryover, Article 21, other SWP deliveries such as Settlement, Permit and Flexible Storage, and other non-SWP deliveries such as Dry Purchase, Temporary Transfer and Water Bank Recoveries.)

[2] As of February 1, 2021

Figure 1: SWP Water Deliveries and Power

[1] The contractors' allocations were based on their maximum Table A amount, which equals 4,172,786 acre-feet for all 29 contractors combined.

SWP WATER DELIVERIES AND POWER AND GENERATION USE

The SWP delivered 1,457,500 acre-feet in 2020. The State Water Project contractors received an initial allocation of 10 percent which eventually increased to 20 percent by May 22, 2020.¹ During 2020, the SWP facilities generated 2,490 gigawatt hours (GWh) of energy. During the same period, the SWP used 3,875 GWh of energy.

Table 1 displays recent years' water deliveries and energy generation and usage. In general, SWP power usage increases with SWP water deliveries. Figure 1 shows that 2020 water deliveries, power generation, and power use were the third lowest since 2000. These numbers were driven by the limited rainfall in 2020.

EMISSIONS REDUCTION AND POWER GENERATION

The SWP is both a buyer and seller of power. The system requires power mainly to move water from South of Delta facilities, down the San Joaquin Valley, and over the Tehachapi Mountains, where the Edmonston Pumping Plant, the largest water lift in the United States, pumps water more than 1,900 feet up and over the Tehachapi Mountains and into Southern California. In total, the SWP lifts water approximately 3,300 feet between the Delta and Southern California. The energy



A film crew for Discovery Channel's Shifting Gears with Aaron Kaufman films an episode at Edmonston Pumping Plant in Arvin on March 12, 2019. Kaufman gets a hands-on look inside the engines and new technologies that pumps water over the mountains to Southern California. Source: Department of Water Resources

demands associated with moving water fluctuate on an annual basis, and correlate with how much water is moving through the system. In 2020, 65 percent of the energy used to run the SWP came from zero-emission sources. The Department is on track to meet its goal of using 75 percent zero-emission sources by 2030 and 100 percent by 2045.

SWP facilities are interconnected to the California Independent System Operator (California ISO) grid, which provides electricity to approximately 80 percent of California. Due to the implementation of policies and mandates meant to promote clean energy portfolios, more renewable energy sources are coming online. As a result, California ISO market design, reliability needs, and price trends are evolving. As a participant in California ISO wholesale electricity market, SWP has to adapt to these changes and emerging trends by continuously adjusting its operational profile (when it generates and uses power) and its bidding strategies. SWP operations are being optimized along the following parameters: first, the SWP meets its water delivery obligations; second, it operates within California ISO power market design constraints by consuming more energy during solar hours, which reduces greenhouse gas emissions, and by generating power during super peak hours, which helps displace fossil generation, again reducing greenhouse gas emissions.

DWR is leading a Flexible Resources Study to assess the SWP's potential to support the state's clean energy policy, as required by SB-49, Energy: appliance standards and State Water Project assessment, which was approved on October



The Devil Canyon Powerplant second afterbay, located in San Bernardino. Source: Department of Water Resources

9, 2019. The study is comprised of multiple tracks that consider the following: the SWP's physical setup (civil, mechanical, and electrical), operational needs and constraints, and emerging and projected wholesale energy market design changes. The implementation of the recommended actions will be a staged process, ultimately driven by SWP reliability needs, economic viability, and strategic timing and portfolio fit of the actions identified by the study. It is the intent of DWR to summarize the findings of the first phase of the Flexible Resources Study in a report that would be submitted to the legislature by January 2022, in conformance with SB-49. DWR anticipates providing the Commission with regular briefings on this effort in 2021.

HYDROPOWER LICENSE PLANNING AND COMPLIANCE

The State Water Project's hydropower generation facilities fall under the authority of the Federal Power Act, which gives the Federal Energy Regulatory Commission (FERC) the exclusive authority to license most non-federal hydropower projects located on navigable waterways or federal lands, or connected to the interstate electric grid. Currently, DWR has three hydropower licenses and two conduit exemptions, which exempt facilities from relicensing requirements under the Federal Power Act but allow FERC to retain jurisdiction. Together, these licenses and exemptions give FERC jurisdiction over 85 percent of the 1,560 Megawatts of hydropower capacity of the SWP and 70 percent of the 5.6 million-acre-foot storage capacity in SWP reservoirs. The hydropower licenses contain terms and conditions related to:

- Public safety and recreation
- Operational reliability
- Dam safety
- Water and energy supply
- Environmental and cultural resources

Two power projects, the Devil Canyon Power Plant and the South SWP, which includes Warne and Castaic Power Plants, have licenses that are set to expire in January of 2022. The original FERC license, issued in 1972, combined the facilities. At the completion of the current relicensing effort, DWR and its partner, Los Angeles Department of Water and Power (LADWP), are requesting that FERC issue one new license to DWR and LADWP as co-licensees for the South SWP Hydropower facilities and one new license to DWR for the Devil Canyon Project. To continue operating the facilities after the initial license term expires, DWR and LADWP must complete the FERC relicensing processes.

In 2015, DWR launched a multi-year stakeholder-driven relicensing process. The FERC license “re-balances” the power and non-power beneficial uses of project; to prepare for this, DWR has gathered and presented all known information, performed studies to fill information gaps, and worked with stakeholders to develop Protection, Mitigation, and Enhancement measures to address potential resource impacts. Stakeholders include federal, state, and local agencies, non-governmental organizations, local and other special interest groups, landowners, tribes, business interests, and industry.

DWR filed its final license application for the Devil Canyon project in November of 2019 and for the South SWP in January of 2020. These included an analysis of the projects’ effects on the environment and addressed stakeholder comments. In July of 2020, DWR submitted materials in response to FERC’s request for additional information. On December 2, 2020, FERC issued a notice of application acceptance for filing for the South SWP, which gives stakeholders the opportunity to submit motions to intervene, should they want to participate in the process, or protests, if they are opposed to the project. At the same time that it issued its acceptance of the South SWP application, FERC deemed the project ready for environmental analysis, which triggers the solicitation of comments and recommendations, and the development of preliminary terms and conditions and preliminary fishway prescriptions. The Devil Canyon project is currently awaiting FERC’s determination that it is ready for environmental analysis. The designation of “ready for environmental analysis” starts the timeline for preparing CEQA and NEPA environmental documents, complying with Section 106 of the National Historic Preservation Act, and completing the Clean Water Act Section 401 Water Quality Certification process.

Upon completion of the relicensing process, FERC will issue new licenses for the two power projects with terms of 30 to 50 years.



This 2008 photo shows a juvenile delta smelt inside a rearing tank at the U.C. Davis Fish Conservation and Culture Lab in Contra Costa County. Source: Department of Water Resources.

INCIDENTAL TAKE PERMIT UNDER THE CALIFORNIA ENDANGERED SPECIES ACT (CESA)

In March 2020, DWR secured a 10-year Incidental Take Permit (ITP) for four state-listed species: spring-run Chinook, winter-run Chinook, Delta smelt, and longfin smelt. The ITP regulates operation of the SWP under the California Endangered Species Act (CESA), which requires DWR to minimize, avoid, and fully mitigate impacts to species designated as threatened or endangered. Previously, incidental take of state and federally-listed species – spring-run Chinook, winter-run Chinook, Delta smelt – was permitted under federal biological opinions issued by federal fishery agencies with a consistency determination from the California Department of Fish and Wildlife (CDFW). Longfin smelt were covered under a separate ITP. Under DWR’s new approach, the SWP will have a state permit for all four species; CESA coverage will be independent of any changes in the federal law.

The ITP ensures environmental protections by safeguarding water flows to aid fish survival, providing operational flexibility for when fish need it most, and carrying over water from wetter years through reservoir storage to use as outflow during drier years. It also sets clear limits on SWP water operations during storm events to reduce entrainment risk and requires DWR and CDFW to collaboratively assess operations according to scientific monitoring, updated modeling, and quantitative analyses.

DWR intends to ensure that operation of the SWP meets state environmental protections and standards which provide robust environmental safeguards for CESA species. The ITP represents a nimble and sophisticated way to protect species. Some

of the improvements for species protection include the following:

- CDFW has final discretion for recommending real-time SWP operations when CESA species are located in the direct entrainment area of the SWP export facilities.
- New, quantitative analyses and newer science, including updated modeling, more fully describes how mandated flows actions, export reductions and habitat will affect listed species.
- Adaptive management provides greater transparency around decision making, real-time operations, financial commitments, and monitoring protocols.

The ITP requires DWR to complete tidal marsh and floodplain restoration objectives required under the previous 2008 and 2009 Federal Biological Opinions (BiOps). Total acreage objectives in these BiOps were approximately 8,000 acres of tidal marsh and 17,000 acres of floodplain restoration. These objectives were carried forward into the current ITP and restoration projects addressing these objectives are either completed or underway. In addition, the ITP added 396 acres of tidal marsh restoration to address SWP impacts to Delta and longfin smelt. The ITP also requires DWR to invest in restoration projects in the Sacramento River basin for winter-run and spring-run Chinook salmon.

The ITP requires targeted actions to protect species, including the installation of a new barrier in the North Delta to improve the survival of migrating juvenile salmon, and several specific actions to protect longfin smelt which are not protected under the Federal Endangered Species Act. To meet the terms of the ITP, the Department will provide more than \$10 million per year in new funding to implement a comprehensive adaptive management program, which includes mitigation projects and scientific research.

DWR finalized two key ITP work plans in 2020. The Longfin Smelt Science Plan was approved by CDFW in 2020. The Juvenile Spring-Run management plan is waiting to be approved.

DELTA RESTORATION

In addition to its compliance with the California Endangered Species Act through the recently-issued ITP, DWR must comply with the Federal Endangered Species Act (ESA), which it does by coordinating operations of the SWP and the U.S. Bureau of Reclamation's (BOR) Central Valley Project (CVP). On October 21, 2019, U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) issued new biological opinions for the long-term operation of the CVP and SWP. These new biological opinions replace the previous opinions issued by NMFS and USFWS. In compliance with these biological opinions and the ITP, DWR is undertaking restoration efforts to mitigate the effects of the long-term operations of the SWP on numerous federal and state protected fish.



A section of farmland and a portion of a levee near Lookout Slough in Solano County's Yolo Bypass. California's Department of Water Resources and EcoRestore/DES are coordinating the Lookout Slough Tidal Restoration Project, recreating approximately 3,000 acres of tidal wetland. Source: Department of Water Resources

TIDAL RESTORATION

DWR is pursuing implementation of required tidal restoration through the Fish Restoration Program (FRP), in partnership with CDFW. The Fish Restoration Program is focused on restoring at least 8,396.3 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh to benefit Delta smelt and 1,196.3 acres of low salinity habitat to benefit longfin smelt. These actions will also provide benefits for winter-run and spring-run Chinook salmon, steelhead, green sturgeon, and other native species. The directors of both DWR and CDFW signed the FRP Agreement on October 18, 2010. DWR anticipates completing all required tidal restoration acres by 2026. The drivers for this restoration are the CDFW ITP for long-term operations of the SWP and USFWS 2019 biological opinion.

Lookout Slough Tidal Habitat Restoration and Flood Improvement: In partnership with Ecosystem Investment Partners, DWR is undertaking a multi-benefit tidal restoration and flood improvement project at Lookout Slough. The project aims to restore approximately 3,000 acres to a tidal wetland, creating habitat and producing food for Delta smelt and other listed fish species. The project will also provide flood protection by expanding flood conveyance and storage for the Yolo Bypass. The draft EIR was released in December 2019 for public review (65 days), and the Final EIR was certified by DWR November 2020. The project is seeking final permits and approvals, working toward beginning construction in Spring 2021. Ownership of the site will be conveyed to DWR before construction can begin.

Arnold Slough Tidal Habitat Restoration: The Arnold Slough project will restore approximately 161 acres of managed wetland to tidal wetland. Located in eastern Suisun Marsh, the slough was seasonally flooded as a duck club. Construction of the restoration site is planned to begin and be completed in either 2021 or 2022, depending on permitting.

Bradmoor Island Tidal Habitat Restoration: DWR purchased 744 acres at Bradmoor Island for the purpose of restoring approximately 500 acres of managed wetland to tidal habitat. The project's restoration activities include water management, revegetation, and removal of levee segments to restore tidal inundation to the property and promote the establishment of emergent marsh vegetation. Construction of the restoration site is planned to begin in 2021 or 2022, depending on permitting, and will require two years for construction.

Wings Landing Tidal Habitat Restoration: Wings Landing is adjacent to Paytonia Ecological Reserve and contains ideal elevations for the restoration of approximately 254 acres of tidal marsh habitat. The project is designed to restore tidal and sub-tidal marsh habitat through the excavation of channels, breaching of an existing levee, and the removal of an interior levee and water control structures. Construction of the restoration site was completed in fall 2020.

Chippis Island Tidal Habitat Restoration: DWR is currently in the design phase to improve aquatic habitat at Chippis Island for native fishes, plants, and wildlife. Primary objectives of the restoration include increasing connectivity within the island, increasing tidal exchange, enhancing pelagic and marsh-based productivity, and increasing aquatic edge habitat. Chippis Island restoration will be designed to be self-sustaining and promote resilience to future change, including climate change, sea level rise, and invasive species.

Lower Yolo Ranch Tidal Habitat Restoration Project: This project created 1,682 acres of tidal marsh restoration, 35 acres of enhanced existing tidal marsh, 47 acres of enhanced existing riparian habitat, and 364 acres of transitional upland buffer habitat. This project was completed in fall 2020.

FLOODPLAIN ACCESS AND FISH PASSAGE IMPROVEMENTS

DWR, in partnership with BOR, has made substantial progress on implementing various floodplain access and passage infrastructure projects within the Yolo Bypass to benefit several anadromous fish species. The drivers for this restoration are the CDFW ITP for long-term operations of the SWP and NMFS 2019 biological opinion.

DWR and BOR are currently working on designing and permitting the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project. This project will improve volitional access to seasonal floodplain habitat in the Yolo Bypass and increase juvenile rearing habitat. Construction is expected to be completed by the end of 2022. In addition, DWR and BOR have completed several other projects to benefit fish passage in the Yolo Bypass including the Wallace Weir Fish Rescue Facility Project and the Fremont Weir Adult Fish Passage Modification Project. These facilities are now in full operation and are successfully increasing fish passage and reducing stranding in the Yolo Bypass.



A west view of the West Washington Road Bridge over the high water in the Eastside Bypass in Merced County. Photo taken January 25, 2017. Source: Department of Water Resources

AQUEDUCT SUBSIDENCE

Central to the 700-mile-long State Water Project system is the California Aqueduct (Aqueduct), a portion of which is a 220-mile-long canal running along the west side of the San Joaquin Valley from the San Luis Reservoir to Edmonston Pumping Plant south of Bakersfield. Subsidence, due to groundwater overdraft in the valley, has reduced delivery capacity and operational flexibility, efficiency, and compliance of the Aqueduct, with adverse impacts extending throughout the SWP, including increased costs to deliver water, decreased system reliability, and increased operations and maintenance. Subsidence has damaged numerous structures including the canal liner, embankments, bridges, turnouts, utility crossings, recorder stations, and check structures. Over two feet of subsidence from the 2013-2016 drought cannot be recovered, and the Aqueduct's design capacity has been reduced up to 33 percent in some locations. Subsidence is projected to continue if no action is taken.

By making interim repairs and modifying Aqueduct operations, DWR has managed to make deliveries; however, these measures are becoming less effective given the recent increase in the ongoing rate of subsidence. Continuing subsidence could increase the cost to deliver water and could significantly reduce the availability of delivered water during peak demand periods. To compensate, higher loading conditions (beyond the original designed capacity) could increase the frequency of aqueduct failures, resulting in more unplanned outages. Loss of aqueduct capacity will also reduce DWR's ability to shift the largest load on California's electrical power grid to periods when renewable generation is abundant.

The California Aqueduct Subsidence Program (CASP) was established in 2019 to address this problem through a mix of both near-term tactical measures and long-term strategic planning actions. The problem identification phase of the program is complete and is documented in two reports: the 2017 California Aqueduct Subsidence Study and the 2019 California Aqueduct Subsidence Study Supplemental Report. Among several significant findings were the dramatic increase in subsidence rates during the 2013-2016 drought and potentially catastrophic consequences to SWP operations should these drought conditions reoccur. In addition, these two studies found that Aqueduct subsidence poses adverse impacts to agricultural land use, Delta Conveyance Project planning, energy use, water supply, and the aging infrastructure of the canal and related facilities. As a result of these adverse impacts there are increasing demands for local, state, and federal funding of water supply and flood projects in the Central Valley. Through CASP, DWR is engaged in actions to maintain deliveries to water users while addressing the longer-term impacts of subsidence on the Aqueduct.

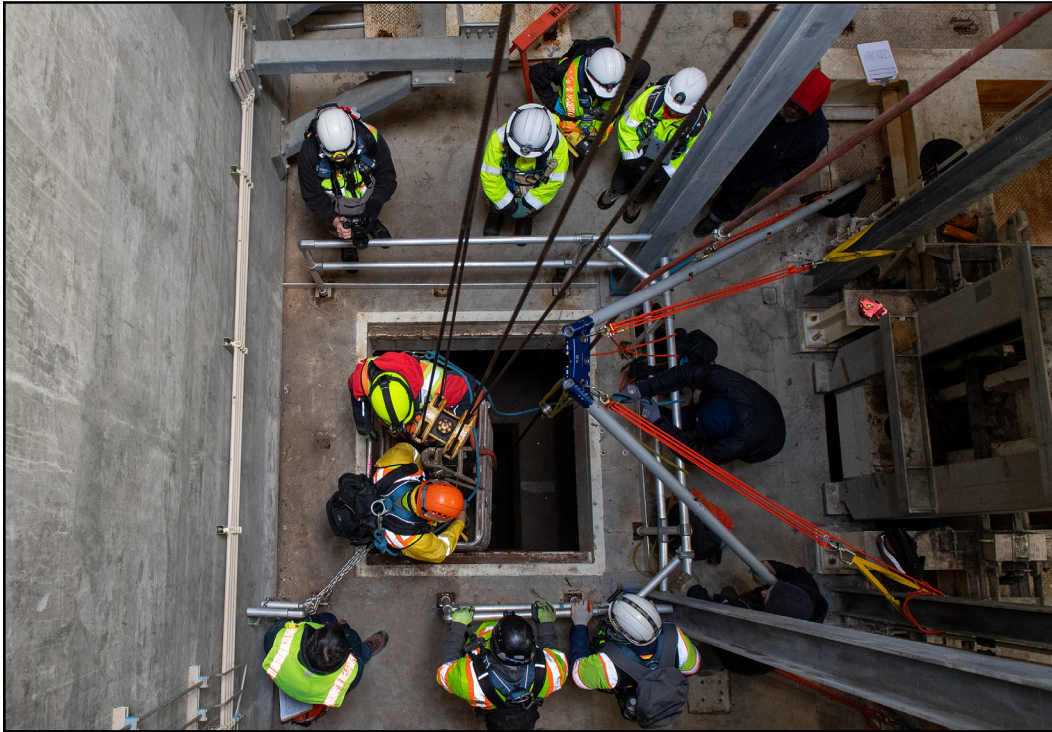
DWR's objectives are split into two general categories, rehabilitation and recovery. The Rehabilitation Project deliverables include actual and necessary construction work required to deliver allocated water in the near-term, including raising 35 miles of Aqueduct, reconstructing and raising Check Structure 17, raising bridges, and relocating utilities that cross the Aqueduct. Over the next three years, the Recovery Project is developing a plan and studies – including an alternatives study and a study of the needs, opportunities, challenges, and constraints that have arisen on the Aqueduct since its initial design and that will emerge across this century. Through its planning process, the Recovery Project will develop and implement the alternative determined to best remediate the consequences of long-term subsidence. In an effort to ensure acceptance and commitment to the plan, outreach and collaboration with multiple stakeholders, including Groundwater Sustainability Agencies, is a key element of the planning process.

STATUS OF SWP CONSTRUCTION PROJECTS

This section highlights key projects and those projects of interest to the Commission. It is not a comprehensive list of State Water Project construction projects.

Thermalito Restoration Project

The Ronald B. Robie Thermalito Pumping-Generating Plant, part of the Oroville complex, is located about four miles west of the city of Oroville in Butte County. The plant suffered a catastrophic fire in 2012 that rendered it inoperable. A fire clean-up project removed damaged plant components and hazardous materials resulting from suppressing the fire and was completed in April 2014. The Restoration Project commenced in 2015 to restore the plant's electrical, protection, controls, and communications systems. The plant has been modernized to maximize fire protection and life safety, enhance reliability, reduce maintenance, and minimize unplanned outages. Full operation of the plant provides as much as 300,000



Department of Water Resources inspection crew work with confined space rescue support for entry/exit method at the access point for San Bernardino Intake Tower Tunnel as part of the East Branch Maintenance Outage in San Bernardino. Photo taken January 9, 2020. Source: Department of Water Resources.

megawatt hours annually and restores SWP pump-back operational flexibility. The restoration project, which includes all four units restored to full operation, was completed in August 2020. The plant is fully operational and has operated reliably since September 1, 2020.

SWP Fire and Life Safety Modernization Project

This program, implemented in response to the 2012 fire at Thermalito Pump-Generating Plant, includes fire detection and alarms, fire suppression systems, protected egress routes, HVAC modifications, and new domestic and raw water lines for the majority of State Water Project facilities, with a focus on aging facilities. In the Oroville Field Division, testing and commissioning activities are near completion, with an estimated completion in March 2021. The San Luis Field Division design is currently under review by the Office of the State Fire Marshal, with construction estimated to begin in August 2021. In the San Joaquin Field Division, the program is at 10 percent design review, with construction expected to start July 2023.

California Aqueduct Canal Liner and Embankment Repair Project

This project continues on-going maintenance of the California Aqueduct by performing concrete liner and embankment repairs through 2023. The scope of work and repair sites were identified from the State Water Project Condition Assessment Program, which includes the inspection of over 440 miles of the California Aqueduct

canal liner and embankment. Maintenance will include replacing concrete liner and/or grouting where needed. This project and the repair sites identified is separate from the California Aqueduct Subsidence Program, which will address ongoing subsidence within the Central Valley and subsequent impacts to State Water Project operations, flexibility, and reliability.

SWP Pipeline Condition Assessment Project

As part of its Condition Assessment Program covering conveyances, DWR is investing in new technologies for performing pipeline condition assessments that do not require dewatering, including SmartBall technologies for leak detection and PipeDiver technologies for detecting broken prestressed wires in a prestressed concrete cylinder pipe. Because they do not require dewatering of the pipeline, use of these technologies results in faster, less labor-intensive assessments with less operational impacts than previous methods. Recently, DWR has implemented the use of these new technologies to identify or validate leaks along the South Bay Aqueduct pipelines, North Bay Aqueduct pipelines, Santa Ana Pipeline, and Peace Valley Pipeline. Repairs were performed to address all validated leaks.

Southern Field Division East Branch Maintenance Outage

The East Branch conveys water easterly from the Alamo Power Plant near the Kern County/Los Angeles County line, continuing to the Devil Canyon Power Plant in San Bernardino County, and the Santa Ana Valley Pipeline to Lake Perris in Riverside County. Condition assessments, maintenance, and repairs were conducted at four facilities: the San Bernardino Tunnel and Intake Tower, Devil Canyon Powerplant Penstock, Devil Canyon Second Afterbay, and the Santa Ana Valley Pipeline. The maintenance activities for the four facilities were coordinated under one outage to minimize impact on the SWP operations and water deliveries. DWR completed all work identified in March 2020. A current outage is underway to address planned repairs for the Devil Canyon Powerplant Penstock; this work will be completed in spring 2021. Additional annual outages will be planned accordingly based on condition assessments documented and analyzed from these facilities.

South Bay Aqueduct Short Term Reliability Improvement Project

South Bay Aqueduct (SBA) provides water for 2.5 million people in the East Bay Area and serves Zone 7, Alameda County Water District, and Valley Water; these entities also receive water from the Anderson reservoir. The South Bay Water Contractors requested DWR to improve SBA reliability prior to the Anderson reservoir outage scheduled from late 2020 to 2030. This project will help ensure stable and reliable water supply during the Anderson reservoir outage. This short-term project was identified to minimize unplanned outage. The project objective was to perform visual and electromagnetic inspection, preventative maintenance, and repairs along the South Bay Aqueduct Pipeline. DWR started the project in late 2020 and completed it in January 2021.

Aqueduct Radial Gate Maintenance and Repairs

The California Aqueduct consists of more than 60 check structures that are outfitted with radial gates which provide flow and elevation control for each of the



Department of Water Resources crews prepare to insert a bulkhead head after removing a roll-out section of the Santa Ana Pipeline, to allow water to be pump back from Perris, during the East Branch Maintenance Outage in San Bernardino on January 17, 2020. Santa Ana Pipeline transfers water from the Devils Canyon Powerplant to the Lake Perris Reservoir. Source: Department of Water Resources.

aqueduct sections. DWR performs ongoing improvements to condition assessment, maintenance, and refurbishments to improve the structural capabilities of the radial gates along the Aqueduct. This effort includes corrosion repair, welding repairs, and blasting and coating. DWR refurbishes approximately five to 10 gates each year. In addition, plans and specifications are being developed for the replacement of 10 radial gates within Delta Field Division, beginning in 2022.

Cedar Springs Dam Spillway Under Drain Repairs and Access Road Improvements

Cedar Springs Dam on Silverwood Lake stores 75,000 acre-feet of water on the SWP's East Branch, overlooking San Bernardino. The dam has an uncontrolled (ungated) spillway in need of improvements. This project is an outcome of the Phase I Spillway Inspection and Condition Assessment effort. The project includes excavation of original backfill, replacement of longitudinal drain, inspection and cleaning of underdrains, new construction of access roads, and access to the spillway for long-term monitoring and accessibility. The project was substantially completed in 2020. The remaining work consists of the installation of drainage features in the areas of construction.

Pyramid Emergency and Concrete Spillways Investigation

Pyramid Dam and Lake are in Los Angeles County near Castaic and provide water storage for the greater Los Angeles area. Following a 2018 Phase I investigation, this project is Phase II of the Spillway Inspection and Condition Assessment effort.



An aerial view of Castaic Lake, dam, auxiliary spillway, and lagoon located in Los Angeles County. Photo taken November 5, 2019. Source: Department of Water Resources.

The project's objective is to collect subsurface data for evaluation of stability and erodibility of both the emergency and concrete gated spillways. Subsurface geophysics (depth of weathering) data collection was completed in July 2019. Rock coring, geologic mapping, and laboratory testing of rock core samples for the emergency spillway geotechnical properties was completed in March 2020. Concrete coring and samples of the gated spillway was completed in January of 2020, including other activities such as connectivity testing, instrument installation, and outfall drain cleaning and reinspection. Initial findings have been presented to regulatory agencies, and the final data reports are nearing completion. Data and findings from the investigation will be utilized in a risk informed decision process to determine what, if any, rehabilitation efforts are necessary for either spillway.

Bethany Dam Restoration and Rodent Burrow Prevention Project

Bethany Dam is a reservoir that provides water to the California Aqueduct, as well as for the South Bay Pumping Plant and the South Bay Aqueduct. DWR will repair damage to the dam caused by extensive rodent burrowing and provide permanent armoring to prevent future burrowing. This project has been highlighted as urgent. An Incidental Take Permit was secured in July 2020 and Division of Safety of Dams (DSOD) approval was obtained in October 2020. Construction is scheduled to begin Spring 2021.

Castaic Dam Outlet Tower Bridge Seismic Retrofit

Castaic Dam, Lake, and Lagoon are located 45 miles northwest of Los Angeles and provide water for the greater Los Angeles area. Castaic Lake supplied water to more than 5.2 million Californians in 2019. The objective of this project is to prevent collapse of the Castaic Dam Tower Bridge in greater than a 50th percentile maximum credible earthquake. This project requires reservoir drawdown in order

to seismically retrofit all four of the High Tower Access Bridge piers and the bridge superstructure. DSOD approved the project in December 2020, with plans and specifications to be advertised for bid in February 2021. DWR anticipates that construction will begin late Spring 2021 and that the project will be completed in 2022.

Edmonston East Motor-Generator Failure

Edmonston Pumping Plant is the largest single vertical lift in the world, providing 1,900 feet of vertical lift to move water over the Tehachapi Mountains for millions of customers in Southern California. These 80,000 horsepower pumps require a pair of motor-generators to gradually get up to full speed. A failure to the east motor-generator occurred in May 2020 and was identified to be a shorted rotor field pole on the generator. The component removal and repair were completed in July 2020. Reliability enhancements include protective relay upgrade, identification and procurement of long-lead items to store as spare parts, and increased testing and inspection frequency to identify problems before failure.

Switchyard Instrument Transformer Modernization

Banks Pumping Plant lies in the southern portion of the Sacramento-San Joaquin Delta, about 20 miles southwest of the city of Stockton. In February 2020, an explosive failure occurred at Banks Switchyard involving an instrument transformer used for equipment protection. Equipment replacements were installed and the yard re-energized in May 2020. Further upgrades to Banks equipment are planned, with work commencing in February 2021. Increased testing of all SWP devices more than 25 years old is underway and inspection frequency has been adjusted so testing is more frequent. Planned replacement of all devices more than 25 years old is also underway, along with the procurement of spares to mitigate long lead times that could extend outages.

Control, Protection, and Regulatory Compliance Asset Safety

The State Water Project facilities rely on sophisticated electronic equipment for safe and reliable operations. The scope of this project includes replacing end-of-life electrical and control equipment, including supervisory control and data acquisition systems, automatic voltage regulators, protective relays, and programmable logic controllers. It will be a multi-year effort to upgrade all SWP facilities.

CONCLUSION

This document fulfills the Commission's requirement to review the progress of the construction and operation of the State Water Project. The Commission has determined that DWR is working to maintain the operations of the State Water Project to provide multiple benefits to the people, the environment, and the economy of California, and that DWR should continue to keep the Commission apprised of operations and construction activities in 2021. These findings and recommendations will be presented to the Department and the Legislature.



California Water Commission
P.O. Box 942836
Sacramento, CA 94236-0001

www.cwc.ca.gov