CalSim 3 Results for 2070 Climate Change and Sea Level Projections and Sensitivity Analysis

To:	**Carrie Buckman, Environmental Program Manager, Delta Conveyance Office**
From:	**Amardeep Singh, PE, PMP, Delta Conveyance Office California Department of Water Resources**
Date:	**December 7, 2023**
Re	**Technical Memorandum regarding CalSim 3 Results for 2070 Climate Change and Sea Level Projections and Sensitivity Analysis for the Delta Conveyance Project**

Technical Memorandum

Executive Summary

This Draft Technical Memorandum (TM) presents a quantitative analysis of the operation of the proposed Delta Conveyance Project (DCP) under conditions 35 to 65 years into the future centered around year 2070 (referred to as "2070 conditions"). The purpose of the TM is twofold: first, to quantify the potential benefits of the proposed project at a more distant future; second, to identify potential impacts of the proposed project on the water resources of the Sacramento Valley and Delta for this more distant future than analyzed in the DCP Environmental Impact Report (EIR).

There is considerable uncertainty about California's future water resources. Defining water supply and water management conditions approximately 50 years in the future is highly speculative. This TM does not contain a projection of what these conditions may be, rather it considers a range of possible water management scenarios built on top of a single climate change scenario and two different sea level rise assumptions. Seven possible no project scenarios for 2070 conditions were developed that collectively include climate change (2070 Median scenario), 1.8 feet and 3.5 feet of sea level rise, land fallowing/demand reduction, reduced exports, and emergency drought actions. State Water Project (SWP) Delta exports are severely impacted under all seven of the scenarios for no project 2070 conditions with a possible reduction in annual average SWP exports of 0.43 to 0.68 million acre-feet (MAF) compared to existing conditions. The DCP proposed project was layered onto each of the seven no project scenarios. With the proposed project, changes in annual average SWP exports range from a reduction of 0.24 MAF to an increase of 0.02 MAF compared to existing conditions. The water supply benefits of the DCP appear to be broadly similar across a range of scenarios representing possible 2070 conditions. The average annual increase in DCP water supply benefits, as measured in terms of additional SWP exports relative to the seven no project scenarios, range from 0.44 to 0.46 MAF.

While these incremental water supply benefits of DCP are estimated to be lower compared to the benefits estimated under existing or 2040 conditions, the robustness of the estimated DCP benefits under 2070 conditions would avoid much of the reduction in SWP water supply reliability under 2070 conditions without DCP. In addition, the modeling shows the DCP's environmental impacts under 2070 conditions are generally less than or similar to those presented and discussed in the DCP EIR. The findings in this TM are consistent with the conclusions presented in Appendix 4A of the DCP EIR.

This TM is organized as follows:

- Section 1 describes possible scenarios for future 2070 conditions including changes to climate, sea level, and water management.
- Section 2 briefly describes the Delta Conveyance Project (DCP) and the proposed North Delta Diversion (NDD).
- Section 3 presents model results for a set of sensitivity analyses that are used to define seven possible scenarios for 2070 conditions in the absence of the proposed project.
- Section 4 presents model results for simulations of the proposed project layered onto seven possible scenarios identified in Section 3 for 2070 conditions.
- Section 5 lists the references cited in the TM.

Attachment 1—CalSim 3 Results for 2070 Climate Change and Sea Level Projections and Sensitivity Analysis

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

Abbreviations and Acronyms

%	*Percent*
ANN	*Artificial Neural Network*
BiOps	*biological opinions*
CCP	*Climate Change Program*
CCTAG	*Climate Change Technical Advisory Group*
CDF	*Cumulative Distribution Function*
CDFW	*California Department of Fish and Wildlife*
CEQA	*California Environmental Quality Act*
cfs	*cubic feet per second*
CO_2	*carbon dioxide*
COA	*Coordinated Operations Agreement*
CT	*Central Tendency*
CVP	*Central Valley Project*
DCP	*Delta Conveyance Project*
DSC	*Delta Stewardship Council*
DSM2	*Delta Simulation Model II*
DWR	*California Department of Water Resources*
EIR	*Environmental Impact Report*
ET	*Evapotranspiration*
FT	*foot*
GCM	*general circulation model*
GHG	*greenhouse gas*
GCM	*Global Circulation Model/Global Climate Model*
ITP	*incidental take permits*
LOCA	*Locally Constructed Analogs*
MAF	*million acre-feet*
M&I	*Municipal and Industrial*
OMR	*Old and Middle River*
OPC	*California Ocean Protection Council*
NDD	*North Delta Diversion*
NDOI	*Net Delta Outflow Index*
NMFS	*National Marine Fisheries Service,*
NOAA	*National Oceanic and Atmospheric Administration*
NP	*No Project*
PP	*Proposed Project*
RCP	*Representative Concentration Pathways*
Reclamation	*US Bureau of Reclamation*
ROC LTO	*Long-Term Operation of the Central Valley Project and State Water Project*
SGMA	*Sustainable Groundwater Management Act*
SOD	*South-of-Delta*
State	*State of California*
State Water Board	*California State Water Resources Control Board*
SWP	*State Water Project*
TAF	*thousand acre-feet*
TUCP	*Temporary Urgency Change Petitions*
USFWS	*US Fish and Wildlife service*
UWMP	*Urban Water Management Plans*
VIC	*Variable Infiltration Capacity*
WY	*Water Year*

1.0 Introduction

This Technical Memorandum (TM) summarizes the key findings from a sensitivity analysis performed to analyze operations of the proposed Delta Conveyance Project (DCP) and potential project water supply benefits under a range of potential scenarios for 2070 conditions. These scenarios consider climate change, sea level rise (SLR), and various water management responses. In addition, this sensitivity analysis also helps to identify whether proposed project operations and potential project impacts detailed in the Final DCP Environmental Impact Report (EIR) would remain similar or differ under a different climate change and SLR scenario under 2070 conditions, a more distant future.

The DCP EIR considers both existing conditions and climate change scenarios centered on the year 2040 coupled with a very aggressive SLR projection of 1.8 feet as supported by substantial evidence in the administrative record (see the list of appendices providing 2040 analyses in Chapter 4, *Framework for Environmental Analysis*, Section 4.1.1.2 *Baseline Assumptions and Alternatives Comparison*).[1] The sensitivity analysis presented in this TM uses a climate change scenario centered on the year 2070, i.e., 50 years beyond the DCP EIR baseline year of 2020, coupled with two SLR scenarios. A range of water management responses are also considered resulting in a total of seven possible scenarios for which the proposed project is analyzed.

California is facing many challenges in managing the State's water resources, including flooding, drought, and environmental protection. Water supply conditions in California over the next 35-65 years[2] are uncertain and will be affected by changes in climate, sea level, regulations, water demands and socioeconomic conditions. For the purposes of the sensitivity analysis presented in this TM, one scenario of climate change (2070 Median) and two scenarios of SLR (1.8 feet and 3.5 feet) at Golden Gate Bridge are considered as broadly representative of the potential water supply challenges that may confront the State of California (State) by year 2070. In response to these challenges, various water management scenarios are considered to better conserve reservoir storage during drought and protect groundwater from overdraft.

The selected 2070 Median scenario is broadly representative of 64 projections of climate change for the 30-year period 2056–2085 from available Global Circulation/Global Climate Model (GCM) output.

The 1.8 feet of SLR has more than a 0.5% (1 in 200) probability of occurrence by 2070 under a high emission scenario and is near the upper bound of the likely range (66% exceedance) for a high emission scenario. The 3.5 feet of SLR has a 0.5% (1 in 200) probability of occurrence by 2070 under a high emission scenario and is at the upper bound of the likely range (66% exceedance) for 2110 for a high emission scenario.

It is anticipated that the State's management of its water resources will continue to evolve driven by the effects of climate change and SLR. Predictions of 2070 water management operations are speculative, and there may be unanticipated, fundamental changes to both water infrastructure and the regulatory environment in the same timeframe. Various projects and programs to mitigate the effects of climate change may be implemented by 2070; however, these actions are currently undefined and have not been

[1] The 1.8 feet of sea level rise corresponds to the H++ projection associated with ice loss from the West Antarctic Ice Sheet. This is considered an extreme scenario that does not have an associated likelihood of occurrence.

[2] The climate change scenario for possible 2070 conditions considers climate projections for the 30-year period 2056-2085).

considered in discussing 2070 conditions as presented in this TM. The analysis presented in this TM assumes that the California Department of Water Resources (DWR) and the US Bureau of Reclamation (Reclamation) will continue to operate the State Water Project (SWP) and Central Valley Project (CVP) to divert, store, and convey water consistent with current applicable laws and contractual obligations. All of the scenarios presented in this TM assumed the following:

- No new water management projects and programs beyond those envisaged for the Future 2040 No Project Alternative described in the DCP EIR.
- No changes in SWP and CVP contract amounts and project obligations to contractors relative to exiting conditions.
- No changes in regulatory requirements and non-discretionary SWP and CVP operations beyond those envisaged for the Future 2040 No Project Alternative described in the EIR.

For modeling future Delta conditions, all scenarios assume there will be no flooding of Delta islands associated with the SLR. This is to avoid introducing additional speculation into the analysis.

Initial modeling of the 2070 Median climate change scenario with 3.5 feet SLR showed more frequent occurrence of SWP and CVP reservoirs at dead storage and additional drawdown of groundwater storage compared to existing conditions and 2040 scenarios presented in the DCP EIR. Therefore, a range of possible future water management actions were layered on top of the climate and SLR scenarios to conserve surface water storage during drought and avoid long-term drawdown of groundwater storage. The scenarios developed to represent 2070 conditions include a mix of the following water management actions that affect the Sacramento and San Joaquin Valleys and Delta:

- Increased agricultural irrigation efficiency (all scenarios).
- Reduction in irrigated crop area during dry and critical water years.
- Urban shortages and rationing in the driest years[3].
- Reduced SWP exports in dry and critical years.
- Emergency drought actions in driest years, similar to those approved by the State Water Board in 2014, 2015, and 2021.

The analysis presented in this TM is not required by the California Environmental Quality Act (CEQA) and is not used in support of the CEQA findings provided in Chapters 7 through 32 of the Final DCP EIR. Where appropriate, this sensitivity analysis references chapters, appendices, or content found in the Final DCP EIR. This information is identified by using the number and title of the Final DCP EIR chapter, appendix, or specific section, so readers can find that information in the final document.

[3]

1.1 Climate Change Assumptions

This section describes a climate change scenario for 2070 conditions and compares this to climate scenarios presented in the DCP EIR for 2040 conditions. For the purposes of this TM a single climate scenario (2070 Median) is considered based on an ensemble of GCM output.

The State's climate has changed significantly over the last 50 years, and this change is expected to continue. Climate change in the State is often characterized by increasing temperatures and reductions in the Sierra Nevada snowpack; however, climate change may also cause highly variable and shifting precipitation patterns, and increased frequency and intensity of weather extremes such as heat waves, droughts, and storms resulting from atmospheric rivers and 'bomb' cyclones. For the purposes of this TM, projected changes in temperature and precipitation are used to transform the historical weather sequence to generate transformed climate and runoff inputs for CalSim 3 modeling. This analysis does not explicitly consider possible increases in interannual climate variability or consider droughts of longer duration than have occurred in the observed record 1922-2015. The projected interannual variability in streamflow was considered in defining the climate scenario under 2070 conditions. While the duration of droughts has not been changed for the 2070 Median scenario, the changes in runoff reflect drier conditions under the same sequence of years as occurred historically (1922-2015).

1.1.1 GCM Selection

GCMs are the most advanced tools currently available for simulating changes to the climate from increasing greenhouse gas (GHG) concentrations. These models represent physical processes in the atmosphere, ocean, and land surface.

To model and predict future climate it is necessary to make assumptions about socioeconomic and physical changes to the environment that will influence climate change. Representative Concentration Pathways (RCPs) are a method for capturing those assumptions within a set of scenarios. RCPs represent different GHG concentration trajectories that are used for modeling purposes. RCP 4.5 is an intermediate scenario in which emissions peak around 2040 and then decline. RCP 8.5 assumes emissions continue to rise throughout the 21st century.

GCM output is not used directly but is spatially disaggregated to provide information at local spatial scales in a process known as downscaling. Data available for California at the time of the DCP EIR preparation comprise 32 GCMs from the Coupled Model Intercomparison Project Phase 5 (CMIP5) archive, each with two future emissions scenarios (RCP 4.5 and 8.5), downscaled to 1/16th degree spatial resolution (Pierce et al. 2014).[4] Statistical downscaling was undertaken using the Local Constructed Analogs (LOCA) method. The 2070 Median climate change scenario is informed by the resulting downscaled datasets of bias-corrected monthly precipitation and temperature.

Development of the 2070 Median climate scenario is consistent with the approach taken to develop the 2040 Median climate scenario presented in the DCP EIR. The 2040 Median scenario represents a

[4] The latest generation of GCMs (CMIP6) are now available, and these models are being reviewed and evaluated, and selected GCM projections are being downscaled to provide regional climate for evaluation of future conditions in California. Further data processing is subsequently required to provide data input for CalSim 3. CMIP6 data were not available when modeling for the Draft EIR was being conducted and will not be completed prior to the release of the Final EIR.

different set of GCMs compared to the 2040 Central Tendency (CT) scenario. Modeling Appendix 30A, *CalSim 3 Results Sensitivity to 2040 Climate Change and Sea Level Projections*, describes the steps and assumptions used in developing hydrology inputs for the CalSim 3 No Project Alternative models (2040 CT and 2040 Median).The 2040 CT scenario used the 20 GCM-RCP climate projections selected by the DWR Climate Change Technical Advisory Group (CCTAG) as the most appropriate projections for State water resources evaluation and planning (CCTAG 2015:18). The 20 climate model projections were generated with 10 GCMs and the two available emission scenarios (RCP 4.5 and 8.5) from the LOCA archive. For the 2040 Median scenario, 10 GCM-RCP climate projections were selected from the 64 datasets of the LOCA archive based on the median of three metrics of projected change over the future 30-year period centered at 2040 (2026–2055) relative to a 30-year historical reference period centered on 1995 (1981–2010).[5]

Similar to the 2040 Median approach, for the 2070 Median scenario, 10 GCM-RCP climate projections were selected from the 64 datasets of the LOCA archive based on three metrics of projected change over the future 30-year period but centered at 2070 (2056–2085) relative to a 30-year historical reference period centered on 1995 (1981–2010). The three change metrics used in selection of the 10 GCMs used in the 2040 Median and 2070 Median climate scenarios are as follows.

- **Percent change in mean annual streamflow (Q_u)**: calculated as determined by the Eight-river flow is the combined total of Sacramento 4-river flow (Sacramento River at Bend Bridge, Feather River inflow to Lake Oroville, Yuba River at Smartville, and American River inflow to Folsom Lake) and San Joaquin 4-river flow (Stanislaus River inflow to New Melones Lake, Tuolumne River inflow to New Don Pedro Reservoir, Merced River inflow to Lake McClure, and San Joaquin River inflow to Millerton Lake).
- **Percent change in coefficient of variation of streamflow (Q_{cv})**: a statistical measure of the potential interannual fluctuations in streamflow for the region. Increased climate variability indicates more significant year-to-year volatility, and hence, less predictability in the climate, which is critical to water management.
- **Absolute change in average annual temperature (T_{avg})**: spatially averaged over the region contributing flow to the Sacramento–San Joaquin Delta.

A “target” value is constructed as the median of each climate change metric across the 64 archive members. The 10 model-RCP scenarios with the nearest weighted normalized distance to the target metric are selected to represent the future median climate change scenario. The target values for the selection of ten model-RCPs representing the median climate change condition at 2070 are listed in Table 1. Figure 1 shows their position across the three metrics. The ten nearest CCTAG model-RCPs are also highlighted for reference. Table 2 presents values of the three metrics for the 10 selected model-RCPs sorted by their normalized distances to the median target value at 2070.

The 10 GCM-RCP climate projections were selected based on the collective similarity of the above three metrics to target values that represent the median climate change condition across all 64 archive members at 2070 compared to 1995. The 10 GCM-RCP climate projections with the nearest weighted

[5] This historical reference period was chosen for consistency with the NOAA 30-year climate normal period as of the date of the Notice of Preparation of this EIR. In addition, CMIP5 GCMs simulate historical climate conditions through 2005 and commence simulation of projected climate conditions beginning in 2006. This means it is inadvisable to use a more recent 30-year period as the historical reference period (e.g., 1991–2020) because the last 15 years of model output are projected rather than historical data.

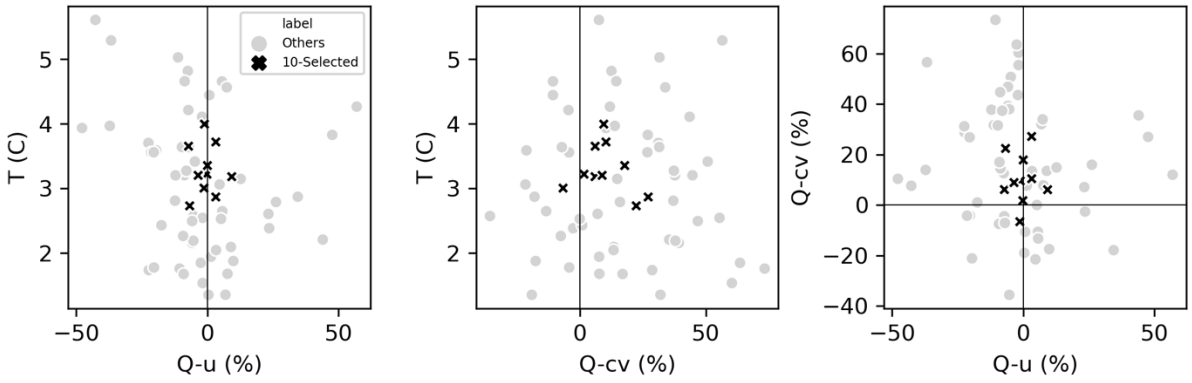
normalized distance to the target metrics were selected. The selection procedure used for the 2040 Median and 2070 Median incorporates the projected variability in the annual streamflow, which is identified as an important driver affecting California water supply (Delta Stewardship Council [DSC] 2021:5-58). Table 3 shows a comparison of GCM-RCP climate projections used in the 2040 CT, 2040 Median, and 2070 Median scenarios.

Table 1. Target Value for GCM Selection Metrics for 2070 Median Scenario

Metric	median (T_{avg})	Median (Q_u)	Median (Q_{cv})
Value	3.10C	-3.00%	13.50%

Table 2. Metrics for Ten Selected Model-RCPs to Represent 2070 Median Scenario

Model	RCP	Normalized Distance	Q_u	Q_{cv}	T_{avg} (°C)
HADGEM2-AO	rcp45	0.0043	-3%	9%	3.2
BCC-CSM1-1	rcp85	0.0070	0%	18%	3.4
GFDL-CM3	rcp45	0.0106	0%	2%	3.2
GISS-E2-H	rcp85	0.0112	-7%	22%	2.7
FGOALS-G2	rcp85	0.0129	-7%	6%	3.7
CMCC-CMS	rcp85	0.0140	3%	10%	3.7
IPSL-CM5A-MR	rcp45	0.0144	3%	27%	2.9
CESM1-BGC	rcp85	0.0163	9%	6%	3.2
BCC-CSM1-1-M	rcp85	0.0169	-1%	-7%	3.0
CMCC-CM	rcp85	0.0170	-1%	10%	4.0



Q-u = percent change in mean annual streamflow

Q-cv = percent change in coefficient of variation of streamflow

T = absolute change in average annual temperature

Figure 1. Metrics for Ten Selected Model-RCPs to Develop 2070 Median Scenario

Table 3. Global Climate Models Used for 2040 and 2070 Climate Scenarios

Model	2040 CT	2040 Median	2070 Median
ACCESS 1-0	rcp 4.5, rcp 8.5	–	–
ACCESS1-3	–	rcp 8.5	–
BCC-CSM1-1	–	–	rcp 8.5
BCC-CSM1-1-m	–	–	rcp 8.5
CCSM4	rcp 4.5, rcp 8.5	rcp 8.5	–
CESM1-BGC	rcp 4.5, rcp 8.5	rcp 4.5, rcp 8.5	rcp 8.5
CMCC-CM	–	–	rcp 8.5
CMCC-CMS	rcp 4.5, rcp 8.5	–	rcp 8.5
CNRM-CM5	rcp 4.5, rcp 8.5	–	–
CSIRO-MK3-6-0	–	rcp 4.5, rcp 8.5	–
CanESM2	rcp 4.5, rcp 8.5	–	–
FGOALS-G2	–	rcp 4.5	rcp 8.5
GFDL-CM3	rcp 4.5, rcp 8.5	–	rcp 4.5
GISS-E2-H	–	rcp 8.5	rcp 8.5
HadGEM2-AO	–	–	rcp 4.5
HADGEM2-CC	rcp 4.5, rcp 8.5	rcp 4.5	–
HADGEM2-ES	rcp 4.5, rcp 8.5	–	–
IPSL-CM5A-MR	–	–	rcp 4.5
MIROC5	rcp 4.5, rcp 8.5	rcp 4.5	–

1.1.2 Projected Change in Temperature

Figure 2 shows the projected change in long-term average temperature for California for the 2070 Median scenario. Average annual temperature increases are uniform across the state. Seasonal[6] changes (future period minus reference period) in temperature are greatest in Summer and Fall, and smallest in Winter and Spring. These increases to temperature will augment potential evapotranspiration (ET) in the upper watersheds (mainly comprised of forests) and lowlands (mainly comprised of cropland).

1.1.3 Projected Change in Precipitation

Projected relative change (future period as compared to reference period) in average annual precipitation for major watersheds in the Sacramento and San Joaquin River Basins are presented on Figure 3. Overall, all major watersheds are projected to have greater precipitation in 2040 Median and 2070 Median climate scenarios, with average precipitation increases of 0.1% to 4.2%. Large relative changes to precipitation in spring and summer are an artifact of small historical precipitation values in these seasons. Even small changes in already minimal precipitation will appear to be large relative changes expressed as percentages.

[6] Fall represents October through December; Winter represents January through March; Spring represents April through June; and Summer represents July through August.

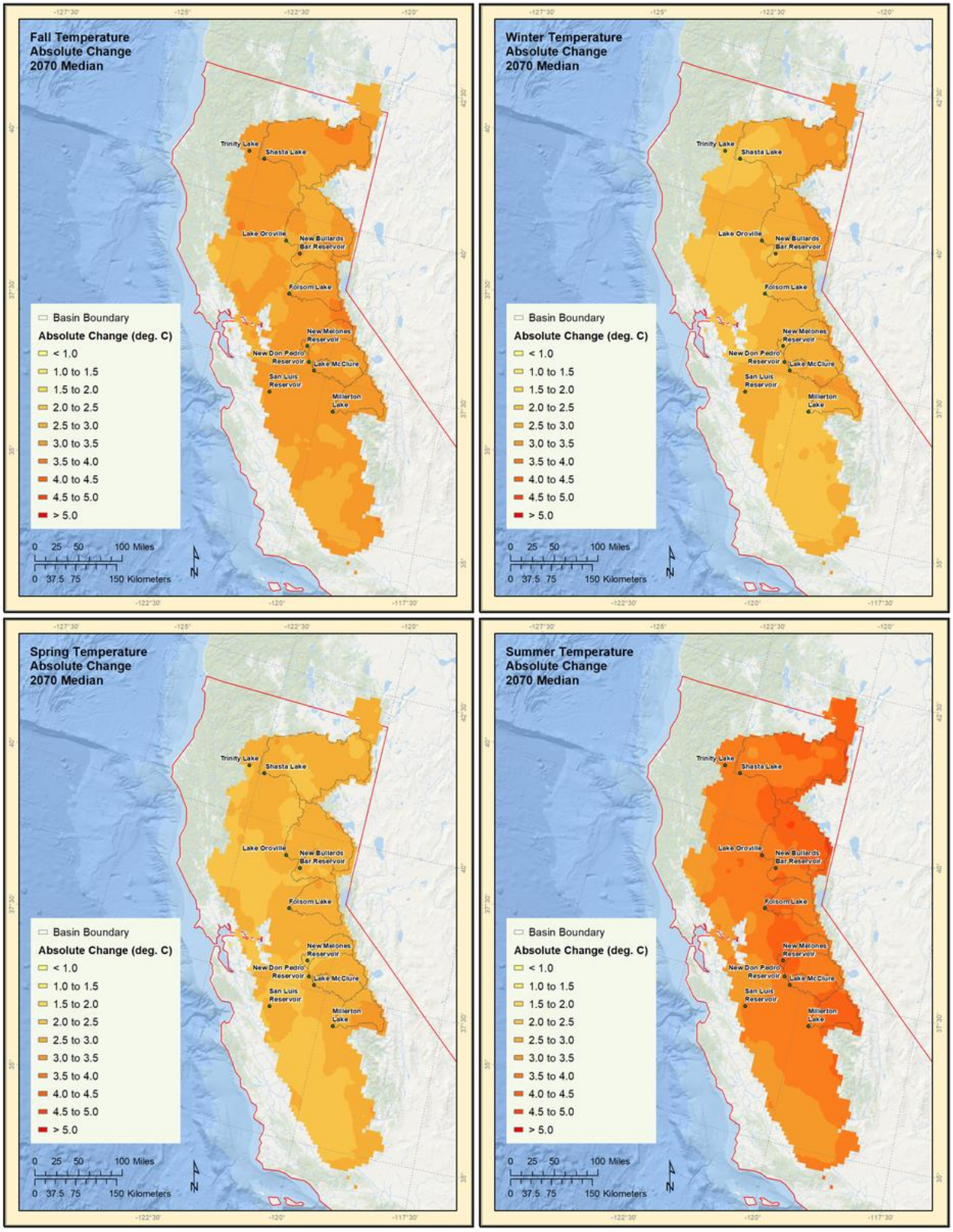


Figure 2. 2070 Median Scenario Projected Changes in Temperature Maps for Fall, Winter, Spring and Summer Seasons

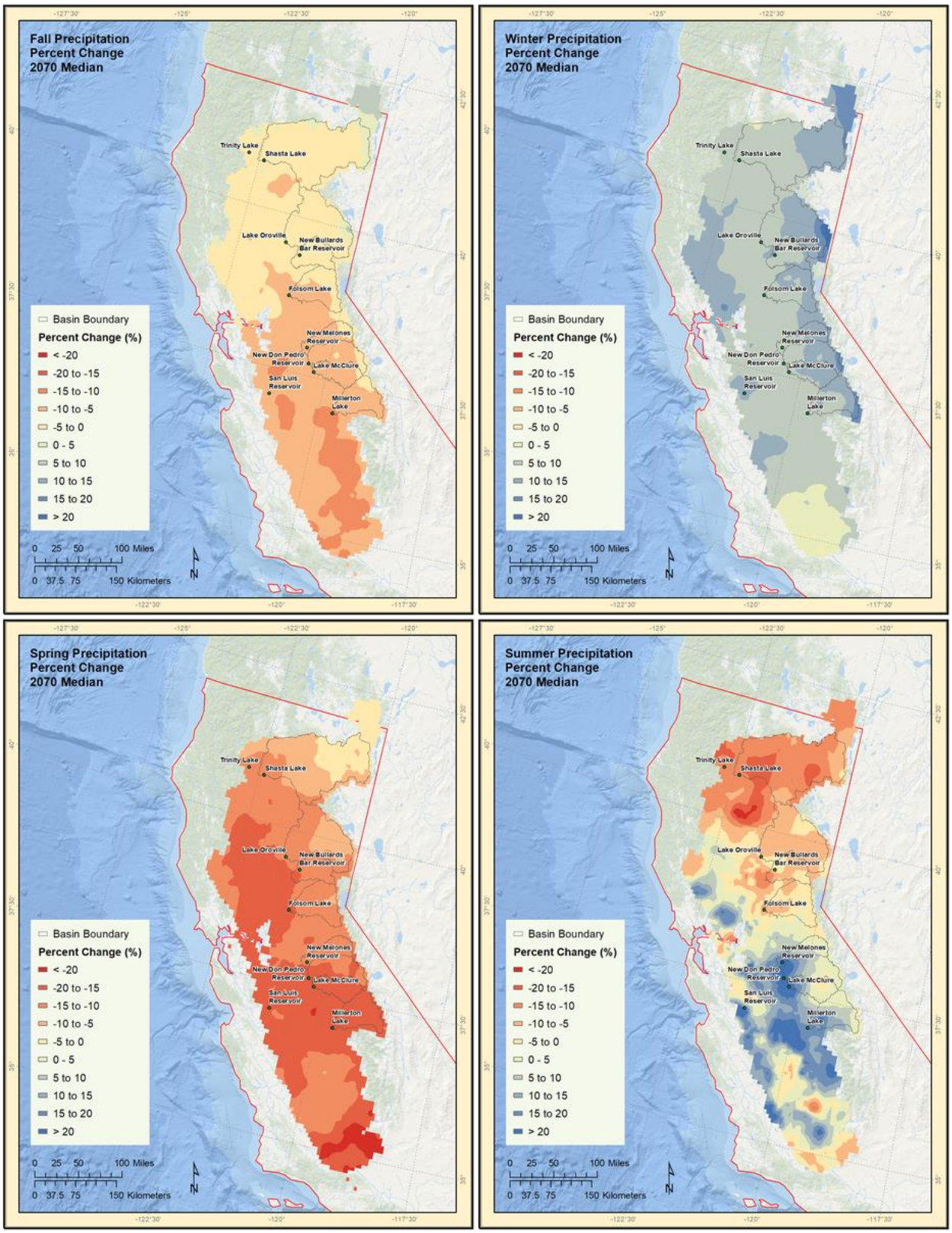


Figure 3. 2070 Median Scenario Projected Changes in Precipitation Maps for Fall, Winter, Spring and Summer Seasons

1.1.4 Projected Change in Runoff

This section discusses the effects of the selected climate scenario (2070 Median) on runoff with a particular focus on inflow to SWP and CVP reservoirs. Inflow hydrographs for the 2070 Median scenario are compared to the historical reference period (1981-2010) and the climate scenarios presented in the DCP EIR for 2040 conditions. The shift in the timing of the peak of the hydrograph and reduction in the spring runoff are two of the main drivers to changes in water resources and project operations.

Historical and projected surface runoff, baseflow, surface water evaporation and potential ET at 1/16th degree scale were generated by inputting downscaled GCM projected climate data into the Variable Infiltration Capacity (VIC) model. The VIC model (Liang et al., 1996; Nijssen et al., 1997) simulates land-surface-atmosphere exchanges of moisture and energy at each model grid cell. The VIC model incorporates spatially distributed parameters describing topography, soils, land use, and vegetation classes.

Changes in VIC simulated surface runoff, baseflow, surface water evaporation and potential evapotranspiration were used to perturb CalSim 3 boundary conditions. Surface runoff and baseflow were used to produce total runoff at all locations that correspond to CalSim 3 rim inflows and unimpaired flow. Potential ET was used to estimate crop ET throughout the Sacramento and San Joaquin Valleys. Surface water evaporation was used to estimate evaporation rates at reservoirs within the CalSim 3 model domain.[7] Fractional changes (simulated future data divided by simulated reference period data) were applied to the CalSim 3 inflow, precipitation, surface water evaporation, and ET boundary conditions. Absolute changes (difference in simulated future data and historical simulated data) were applied to CalSim 3 temperature boundary conditions.

Table 4 summarizes the methods used to develop CalSim 3 inputs for the 2070 Median scenario and compares these to the methods used for the 2040 CT and 2040 Median scenarios analyzed in the DCP EIR.

Figure 4 shows comparisons of changes in average annual precipitation, ET, and runoff for eight major watersheds for the 2040 CT, 2040 Median, and 2070 Median scenarios compared to a historical reference period centered on 1995. ET increases in all cases. Precipitation generally increases except there is a decrease in precipitation on the Sacramento River at Shasta in the 2040 Median scenario. Runoff generally increases under the 2040 CT scenario, decreases under the 2040 Median scenario, and is mixed under the 2070 Median scenario.

Figures 5 through 8 show monthly average unimpaired hydrology inputs to CalSim 3 for selected rivers and indexes for 2040 CT, 2040 Median and 2070 Median scenarios compared to existing conditions (2020). These figures show that when compared to the two 2040 scenarios considered in the DCP EIR, the 2070 Median scenario shows a more significant shift in the timing of runoff, with increases in winter runoff and decreases in spring runoff. These changes mean that less snowmelt runoff will be captured in reservoirs for later delivery to meet water demands.

[7] ET and temperature are not used directly in CalSim 3 but are inputs to various model preprocessors that are used to estimate crop water requirements and associated irrigation demands.

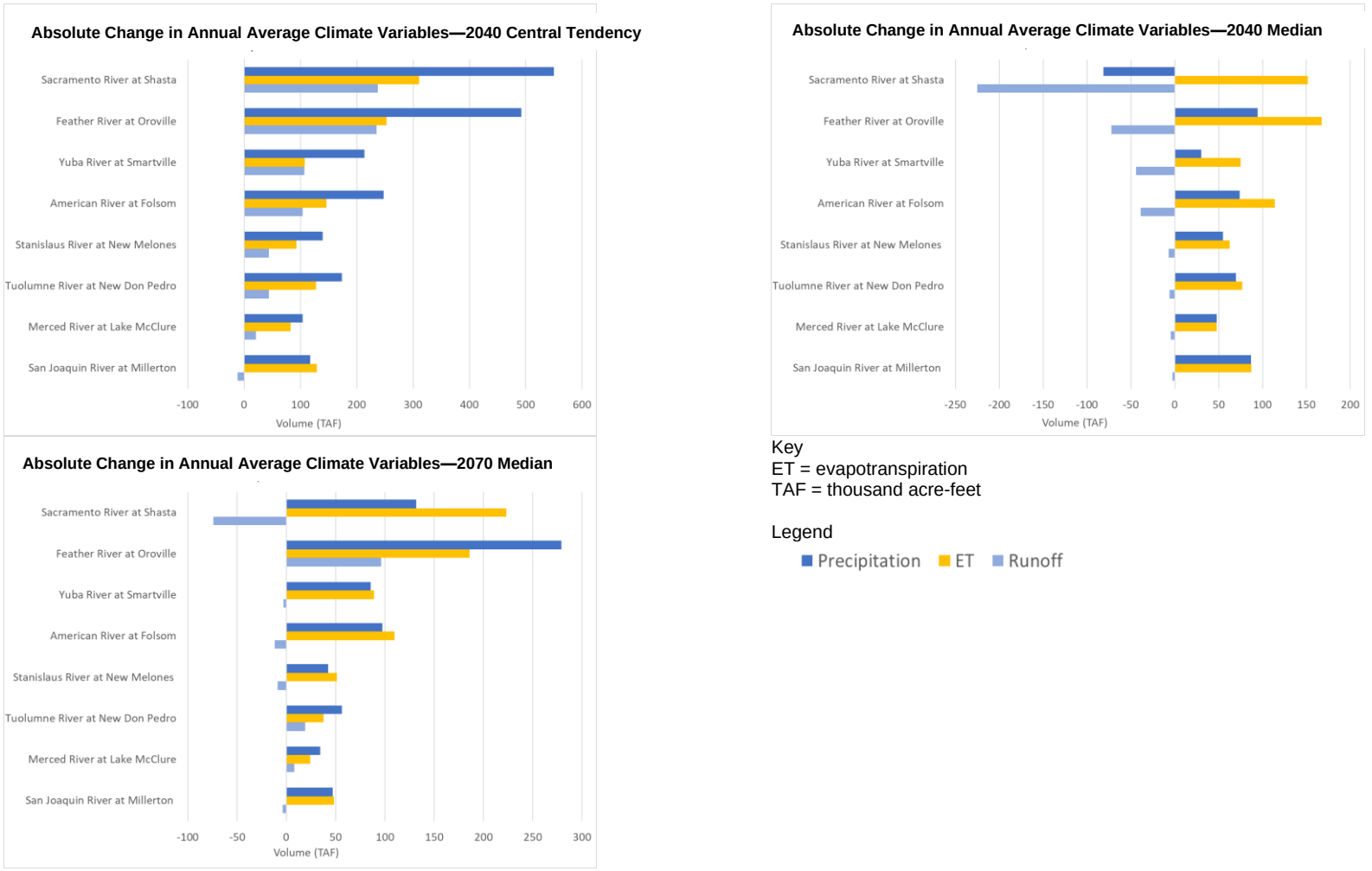


Figure 4. Projected Absolute Changes in Precipitation, Evapotranspiration, and Runoff for Major Watersheds in the Sacramento and San Joaquin River Basins for 2040 Central Tendency, 2040 Median, and 2070 Median Compared to Historical Reference Period (1995)

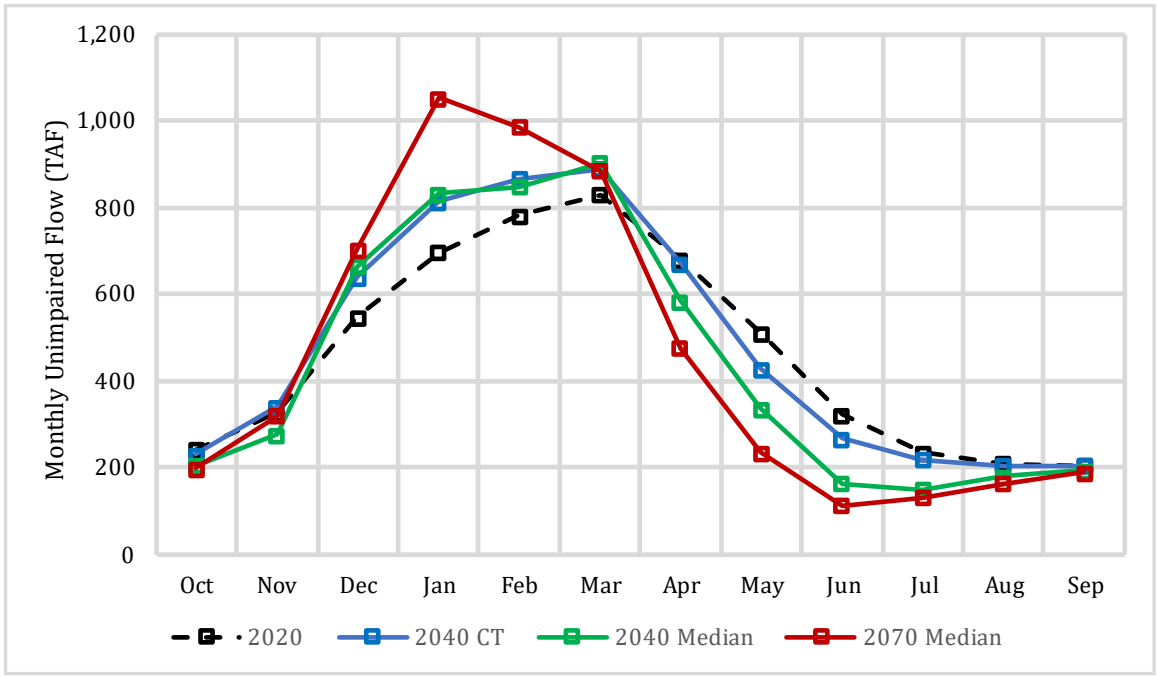


Figure 5. Shasta Monthly Average Unimpaired Inflow, 2020, 2040 CT, 2040 Median, and 2070 Median

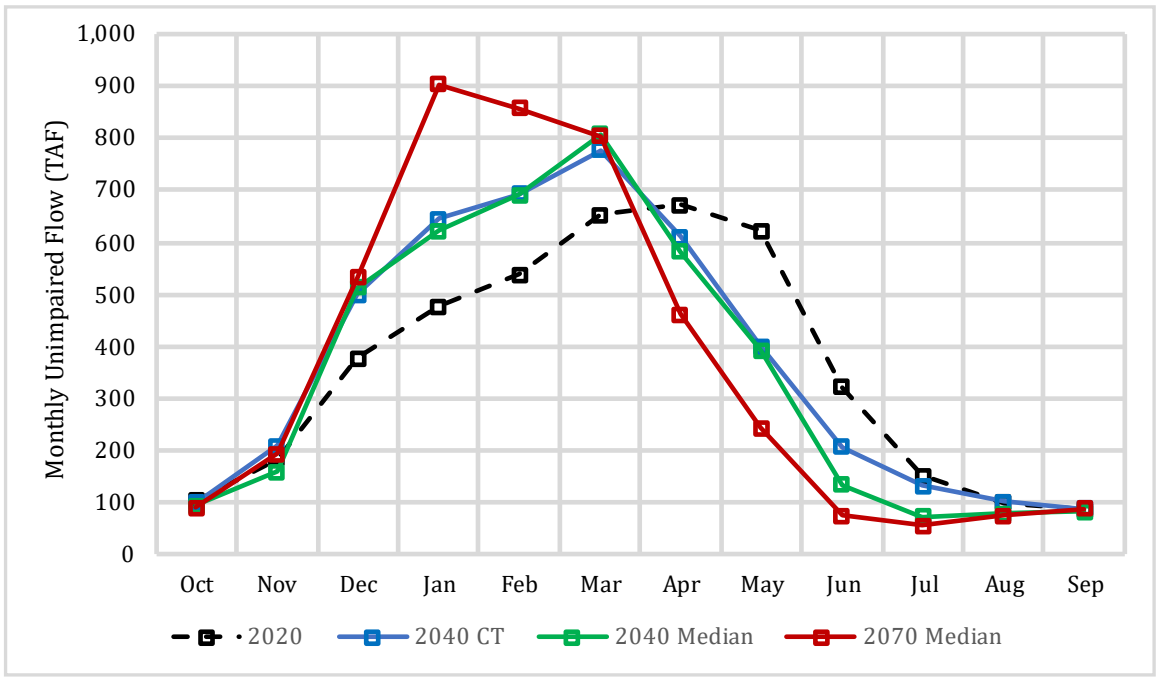


Figure 6. Oroville Monthly Average Unimpaired Inflow, 2020, 2040 CT, 2040 Median, and 2070 Median

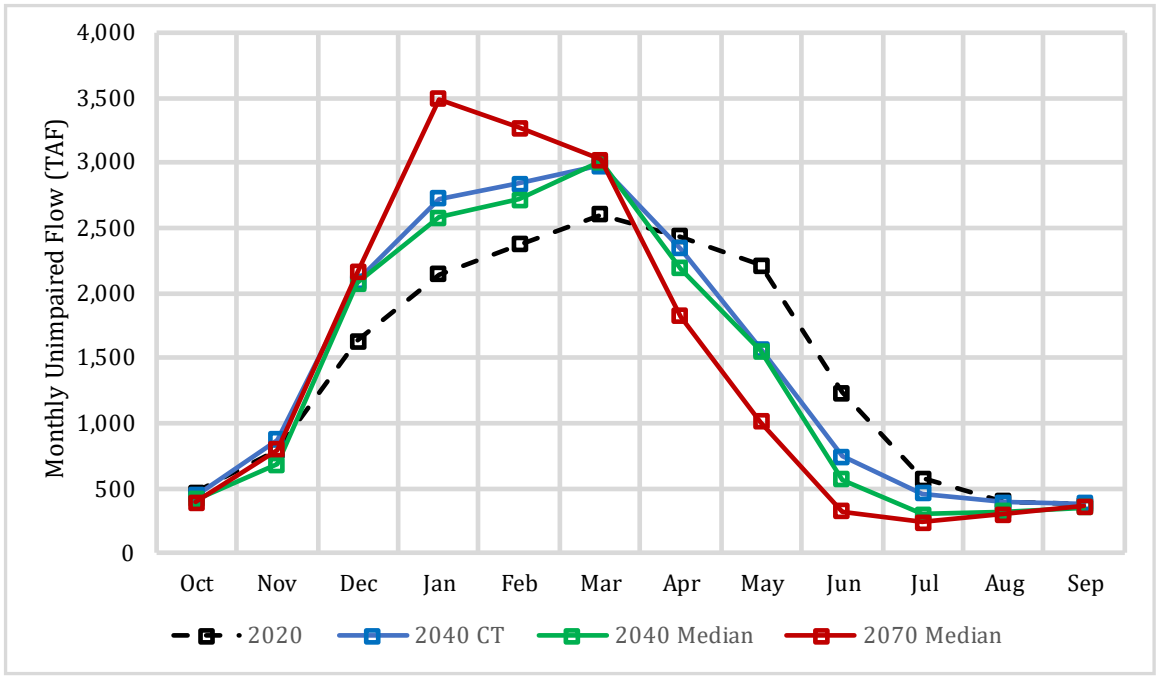


Figure 7. Four River Index Monthly Average Flow, 2020, 2040 CT, 2040 Median and 2070 Median

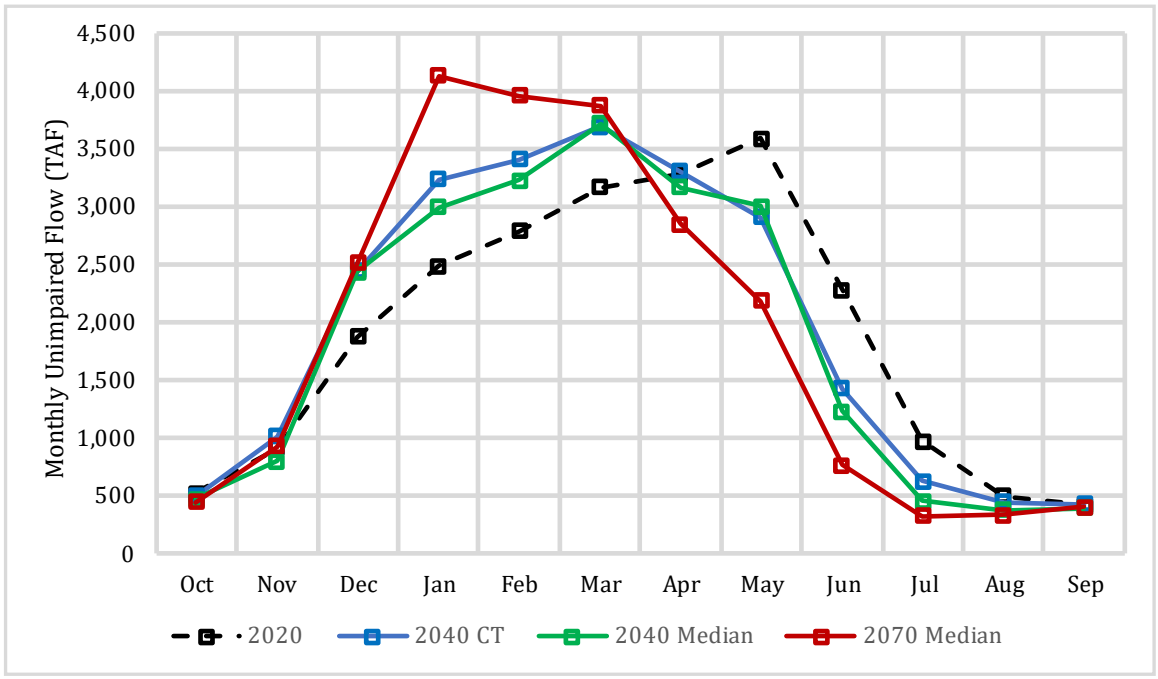


Figure 8. Eight River Index Monthly Average Flow, 2020, 2040 CT, 2040 Median, and 2070 Median

Table 4. Methods Used to Generate CalSim 3 Inputs for the 2040 CT, 2040 Median and 2070 Median Scenarios

Method	2040 CT	2040 Median and 2070 Median
GCM Selection	20 GCM-RCP projections selected by CCTAG. 10 GCMs and for each GCM two RCPs were.	10 GCM projections selected by DWR Climate Change Program (CCP)
Climate Change Scenarios	One climate scenario based on ensemble of the 20 CCTAG GCM. Perturbation of historical precipitation and temperature based on quantile mapping of projected and historical climate.	10 climate scenarios, one for each GCM_RCP projection.
Rim Inflows	Conduct two VIC simulations: (1) representing historical climate conditions; (2) representing future climate conditions (based on quantile mapping of precipitation and temperature) over the 1915–2015 period. Calculate timeseries of changes in VIC simulated streamflow (future divided by historical) at each rim inflow location. At each rim inflow location, for each monthly time step in the CalSim 3 planning simulation period, apply VIC simulated changes to streamflow. Apply second order correction to preserve annual shifts.	Develop CDF for historical CalSim 3 rim inflows. Develop CDFs for VIC simulated historical reference period (WY 1981–2010) and VIC simulated future period (WY 2026–2055 for 2040 and 2056–2085 for 2070) across all 10 selected GCM projections. Calculate ratio between VIC simulated future period and VIC simulated historical period for each quantile of the CDF. At each rim inflow location, for each monthly time step in the CalSim 3 planning simulation period, identify the quantile associated with the inflow value. Apply ratio (from step 3) to each value based on its quantile (from step 4) Apply second order correction to confirm annual shifts.
Valley Floor Flows	Similar to rim inflows. Perturbation based on the differences in historical and projected scenario.	Similar to rim inflows. Perturbation based on the ensemble of differences in the 10 VIC simulations and historical simulation.

Key:
CCP = Climate Change Program, CCTAG = Climate Change Technical Advisory Group, CDF = cumulative distribution function
GCM = general circulation model, RCP = Representative Concentration Pathway, VIC = Variable Infiltration Capacity, WY = water year

1.2 Sea Level Rise

Warming air temperatures resulting from GHG emissions raise ocean temperature, resulting in higher sea levels as sea water volume expands. Water from melting glaciers and ice sheets resulting from warming temperatures also contribute to global SLR. Climate change has already been observed to cause mass loss in the Greenland and Antarctic ice sheets and shrinking mountain glaciers (Intergovernmental Panel on Climate Change 2021:SPM-6, SPM-9–SPM-10A).

For the 2070 Median scenario, SLR of 3.5 feet at San Francisco tide gage is assumed. This assumption is based on the California Ocean Protection Council's (OPC) guidance updated in 2018, the *State of California Sea-Level Rise Guidance* (California Natural Resources Agency and California Ocean Protection Council 2018). This guidance includes science-based methodology for state and local governments to analyze and assess the risks associated with SLR, and to incorporate SLR into their planning, permitting, and investment decisions. The OPC guidance incorporates probabilistic SLR projections, which associate a likelihood of occurrence (or probability) with SLR heights and rates and are directly tied to a range of emissions scenarios. The 3.5-feet scenario is a conservative assumption because it carries a mere 0.5% probability of occurring (i.e., a 1-in-200 chance of occurring) by 2070 under a high GHG emissions scenario, which OPC considers a medium-high risk scenario for planning purposes (California Natural Resources Agency and California Ocean Protection Council 2018). That amount of SLR is not expected to reach a 50% median probability or 66% likely range probability under the high emissions scenario until after the year 2130 (California Natural Resources Agency and California Ocean Protection Council 2018).

The OPC guidance also includes an extreme scenario called the H++ scenario (resulting from loss of the West Antarctic ice sheet). But the probability of this scenario is currently unknown. Under the extreme H++ scenario, rapid ice sheet loss on Antarctica is assumed to drive rates of SLR in the State above 50 millimeters per year (2 inches/year) by the end of the century, leading to potential SLR of 10.2 feet at 2100. This rate of SLR would be about 30 to 40 times faster than the SLR experienced over the last century. While DWR is not using the H++ SLR scenario for the year 2070, it has designed the project alternatives to withstand 10.2 feet of SLR plus a 200-year flood event, as explained in Appendix 5A, Section F, *Sea Level Rise and Delta Water Quality Modeling*. The range of SLR projections at San Francisco are summarized in Table 5.

Table 5. Sea Level Rise Projections at San Francisco

Year	Emission Scenario	Sea Level Rise (feet) and Probability Meets or Exceeds				
		Median (50%)	Likely Range (66%)	1-in-20 Chance (5%)	1-in-200 Chance (0.5%)	H++
2040	High emission scenario	0.6	0.5–0.8	1.0	1.3	1.8
2050	High emission scenario	0.9	0.6–1.1	1.4	1.9	2.7
2070	Low emission scenario	1.1	0.8–1.5	1.9	3.1	-
	High emission scenario	1.4	1.0–1.9	2.4	3.5	5.2
2100	Low emission scenario	1.6	1.0–2.4	3.2	5.7	-
	High emission scenario	2.5	1.6–3.4	4.4	6.9	10.2
2130	Low emission scenario	2.1	1.3-3.1	4.4	8.5	-
	High emission scenario	3.3	2.4-4.6	6.0	10.0	16.6
2140	Low emission scenario	2.2	1.3-3.4	4.9	9.7	-
	High emission scenario	3.7	2.6-5.2	6.8	11.4	19.1

Source: *State of California Sea-Level Rise Guidance: 2018 Update*

Notes:
0.5% probability corresponds to the Medium-High Risk Aversion scenario in Ocean Protection Council's guidance.
H++ corresponds to Ocean Protection Council's extreme scenario resulting from loss of West Antarctic ice sheet.

By year 2070, the vulnerability of the central and western Delta to salinity intrusion caused by SLR, including the traditional freshwater corridor, is potentially severe; however, there remains uncertainty over the degree of salinity intrusion for a specific SLR assumption. Quantification of future Delta conditions requires addressing questions of future levee defense and island flooding, changes in Delta water use due to increased salinity, dredging of the ship channels, and channel morphology.

SLR will cause saltwater to intrude farther into the Delta unless additional freshwater is released to repel it, affecting water quality for agricultural diversions and Delta tidal wetland habitat. Assuming the current State Water Resources Control Board (State Water Board) salinity requirements in the Delta are not modified, which is a conservative assumption, the incremental water cost of meeting salinity requirements becomes increasingly severe with each increment of SLR, with the largest increase in the spring months when historically the Delta water has been fresher. Details of the effects of SLR on Delta operations are presented in Appendix 5A, *Modeling Technical Appendix*, Section F, *Sea Level Rise and Delta Water Quality Modeling*. During April to August, the Emmaton agricultural standard in the western Delta (closer to the Pacific Ocean) is likely to become the more prevalent controlling objective (i.e., releases of water from SWP and CVP reservoirs would be needed to meet this standard, not others) over a broader range of conditions as sea level increases.

The ability to maintain the existing Delta levee system is threatened by a combination of land subsidence, SLR, storm events, and earthquakes. SLR is also expected to put additional pressure on levees and increase the frequency and duration of extreme high-water events. This increased duration of high water against the levees would significantly increase the likelihood of future failures (Public Policy Institute of California 2008:8; Delta Stewardship Council 2021:6). Levee failure could result in the inundation of islands and sea water intrusion into the interior Delta. Sea water intrusion into the interior Delta would negatively affect Delta water quality and could jeopardize Delta agriculture and operations of the SWP and CVP. Delta levee failure could also jeopardize an extensive network of public utilities (e.g., municipal diversions, pipelines, highways, rail lines), farmland, and recreational opportunities in the Delta.

Levee failures may lead to large bodies of open water in the Delta, affecting circulation patterns, Delta salinity, and wildlife habitat with major implications for the conveyance of SWP and CVP water supplies across the Delta to the projects' export facilities in the south Delta.

SLR is incorporated into CalSim 3 through use of an Artificial Neural Network (ANN), which is trained on Delta hydrodynamic model (Delta Simulation Model II [DSM2]) salinity results. For the 2070 analysis, separate ANNs were developed for the 3.5-foot scenario. SLR modeling for 2070 was undertaken using existing Delta geometry. This assumption is conservative. A likely outcome of any increased inundation is a combination of a geometry-dependent local change in dispersion and a muting of tides upstream. Two DCP impacts, reverse flows that affect fish passage and the propagation of salinity upstream of Rio Vista, will likely be smaller in a scenario with inundation. In fact, deliberate levee breach and tidal marsh restoration has been proposed as a mitigation measure for DCP impacts on fish passage.

For the purposes of the analysis presented in this TM, it is assumed that the SWP and CVP would generally continue to operate to meet State Water Board Water Right Decision 1641 (D-1641) water quality objectives, although this would require significant increases in the quantity of water required to maintain compliance. It is also assumed that the configuration and hydrodynamics of the Delta would not change significantly with continued levee defense and the ability to protect Delta islands from permanent flooding.

1.3 Water Management Assumptions

For the purposes of the 2070 sensitivity analysis various water management actions were considered to address the projected imbalance between water supply availability and water demand, both in the long-term and during periods of extended drought. These are described in the following sections. Individual scenarios developed for the sensitivity analysis may contain none, some, or all of these management actions.

1.3.1 SWP and CVP Operations

Under 2070 conditions, the SWP and CVP operations are assumed to continue in a manner similar to their operations under existing conditions. DWR and Reclamation would continue to operate the SWP and CVP to divert, store, and convey water consistent with applicable laws and contractual obligations; however, changes to inflow hydrology coupled with significant water demands on the upper Sacramento River make the CVP particularly vulnerable to the effects of climate change. Under the Coordinated Operations Agreement (COA), the CVP is responsible for meeting 60% to 80% of in-basin use depending on the water year type, including Delta outflow to meet regulatory requirements.

Past modeling using CalSim has used SWP and CVP simulated reservoir storage as a metric of water shortage or system "stress" under drought conditions when the projects are operated to meet all non-discretionary requirements. During these drought periods, low simulated storage demonstrates that a large imbalance between water supply and water demand makes continued operation under standard conditions and regulatory requirements impossible. Past model simulation during these drought periods is not representative of actual project operations, which would likely be subject to emergency actions by the State.

By 2070, drought periods are expected to be more frequent, of prolonged duration, and drier. It is expected that emergency actions with temporary relaxation of standards will occur more often and may include actions that have not occurred to date.

Modeling conducted for the DCP EIR assumes a continuation of current operations of the SWP and CVP by DWR and Reclamation, respectively. This includes meeting the regulatory requirements of the 2019 National Marine Fisheries Service (NMFS) and US Fish and Wildlife Service (USFWS) biological opinions (BiOps) for the Long-Term Operation of the Central Valley Project and State Water Project and 2020 California Department of Fish and Wildlife (CDFW) incidental take permit (ITP) for the Long-Term Operations for the SWP. The modeled regulatory and contractual requirements also include continued operations under the COA and State Water Board water rights decision D-1641, which implements the 1995 State Water Board Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta Estuary (Bay-Delta Plan). Modeling does not assume implementation of the 2018 Phase 1 update to the Bay-Delta Plan or the recently proposed Phase 2 update regulations issued by the State Water Board in 2023 or the alternative proposed Agreements to Support Healthy Rivers and Landscapes analyzed in the 2023 State Water Board staff report.

In the 2020 and 2040 model simulations presented in the DCP EIR, CalSim 3 attempts to meet full regulatory requirements and contract obligations in both normal years and drought years. In these simulations, the model does not consider emergency actions that may be instituted during extended drought conditions such as occurred in 2014, 2015, and 2021 as a result of Temporary Urgency Change Petitions (TUCP) submitted by DWR and Reclamation to and approved by the State Water Board.

In the 2020 and 2040 model simulations presented in the EIR, CalSim 3 also maintains a constant agricultural land use throughout the period of simulation. The model does not simulate land fallowing that may occur as a result of low SWP and CVP water allocations or drought curtailment actions, voluntary or instituted by the State Water Board. The above simplifying assumptions results with excessive simulated drawdown of SWP and CVP storage during extended drought; in some months simulated storage falls to dead pool.

For the purposes of the 2070 analysis presented in this TM, the following actions are assumed for all years of the period of simulation:

- Reductions in CVP allocations to municipal and industrial (M&I) water service contractors in drier years.[8]
- Limits to storage transfers from CVP reservoirs north of Delta to San Luis Reservoir.[9]
- Reductions in discretionary operational flow targets, e.g., the Sacramento River below Wilkins Slough.[10]

[8] During shortage conditions, M&I CVP allocations are based on a contractor's historical use and historical use adjustments. Minimum allocations are based on providing Health and Safety needs when considering all sources of water available to each M&I contractor.

[9] During the fall, winter, and spring, the CVP may transfer water stored in reservoirs north of the Delta (Trinity, Shasta, Folsom) to the CVP share of San Luis Reservoir to meet peak water demands in the summer.

[10] Known as the Navigational Control Point requirement, a target flow of 5,000 cubic feet per second (cfs) was established by Reclamation to facilitate river diversions. Long-time water users diverting from the Sacramento River have set their pump intakes

1.3.2 Groundwater Pumping

Under 2070 conditions, precipitation patterns are expected to change such that an increase in the frequency of both dry and wet extremes as well as the frequency of rapid transitions between these extremes would occur (DSC 2021:3-17). Groundwater recharge from precipitation may decrease because of increased frequency of high-intensity storms with a corresponding decreased occurrence of less intense storms. Vertical recharge from irrigation is likely to decrease because of adoption of more efficient irrigation technology and improvements in surface water distribution systems. In some areas, groundwater pumping may increase to make up for diminished surface water availability; however, this action may be limited by requirements of the Sustainable Groundwater Management Act (SGMA).

During droughts, the ability to meet future consumptive use demands from groundwater may depend on the expansion of artificial groundwater recharge programs; however, these are yet unquantified. Groundwater pumping may be limited to achieve long-term sustainable groundwater conditions. Maintaining groundwater levels may become increasingly challenging if prolonged droughts become more frequent with insufficient wet years to allow groundwater levels to recover after periods of prolonged groundwater extraction.

For the purposes of the 2070 modeling, various actions were developed to limit long-term groundwater overdraft in the Sacramento and San Joaquin Valleys to levels simulated under existing and 2040 conditions. These actions are discussed under the Section *Water Demands* of this TM.

1.3.3 State Water Board Drought Actions

Long-term changes in climate and water supply conditions will increase the imbalance between water supplies and water demands, including environmental flows. Under drought conditions, DWR and Reclamation may request that the State Water Board temporarily modify certain terms in their water right permits from the requirements specified in D-1641. TUCPs were submitted by the two agencies and approved by the State Water Board in 2014, 2015, 2021, and 2022, when SWP and CVP storage and projected inflow were insufficient to meet D-1641 requirements while providing for other critical water supply needs in the State. The purpose of the TUCPs were to provide operational flexibility in meeting a range of priorities, which include maintaining minimum health and safety supplies to water contractors; preserving upstream storage for release later in the summer to control saltwater intrusion into the Delta; preserving cold water in Shasta Lake and other reservoirs to manage river temperatures for various runs of Chinook salmon and steelhead; maintaining protections for State and federally endangered and threatened species and other fish and wildlife resources; and meet critical water supply needs.

By 2070, TUCP-like actions are likely to become more frequent—potentially occurring in about 15% of years. Four of the seven no project scenarios presented in this TM to analyze the operation of the

based on water levels that historically were maintained for navigation purposes. At flows below 5,000 cfs at Wilkins Slough, diverters have reported increased pump cavitation as well as greater pumping head requirements. Diverters are able to operate for extended periods at flows as low as 4,000 cfs at Wilkins Slough, but pumping operations become severely affected and some pumps become inoperable at flows lower than this. Since the beginning of the 1976/1977 drought, observed monthly flows have dropped below 3,500 cfs in four months, dropped below 4,000 cfs in 15 months, and fallen below 5,000 cfs in 66 months (7% of the time). For 2070 conditions, it is anticipated that flows in the Sacramento River at Wilkins Slough may be less than 5,000 cfs for significant lengths of time. This may require reconstruction of pump sumps or result in prolonged periods of no water diversion.

proposed project under 2070 conditions include TUCP-like actions in the driest years[11] (14 out of 94 years). These actions include:

- **Habitat Protection Outflow (Spring X2):** from February to June standards may be relaxed and/or limits imposed on reservoir storage withdrawals to support X2.
- **Western Delta Agriculture, Emmaton water quality objective:** relocation of compliance point from the Sacramento River at Emmaton to Threemile Slough.
- **San Joaquin River at Airport Way Bridge, Vernalis**: reduction in releases from New Melones Reservoir to meet Vernalis flow requirements.
- **Delta outflow, fish and wildlife objective**: reduction in critical year requirements for Net Delta Outflow Index.
- **Sacramento River at Rio Vista, fish and wildlife objective**: reduction in critical year fall flow objectives.

For modeling purposes, it is assumed that under any future TUCP-like actions, SWP and CVP exports would be limited to Health and Safety needs at times when D-1641 Delta standards are not met.

In 2015 and 2021/2022 DWR constructed a temporary emergency drought barrier on the West False River in the Delta to help slow the movement of saltwater into the central Delta and associated degradation of water supplies for Delta agriculture and for SWP and CVP exports. Previous modeling by DWR suggest that the drought barrier reduces salinity in the interior Delta, particularly on the Old River, by as much as 300 µS/cm electrical conductivity (DWR, 2019). The drought barrier is credited with saving over 100,000 acre-feet of project water. However, the installation of this barrier is not considered in the analysis presented in this TM. Its inclusion would have required substantial additional analysis and DWR (2019) concluded that the benefits of the drought barrier installed in 2015 may not be apparent in modeling. Water savings in 2015 probably occurred through simplifying operations to meet water quality targets and reducing the amount of project water that needed to be released to reduce the risk of non-compliance. Modeling of the drought barrier installed in 2021 (DWR, 2022) suggested an upper bound of water cost savings of 150,000 acre-feet.

Regulatory flow and water quality objectives are typically based on hydrologic indices and water year types. Figure 9 compares the frequency of occurrence of water year types for the Sacramento Valley Water Year Hydrologic Classification as defined in D-1641. Under the 2070 Median scenario, the probability of occurrence for wet, dry, and critical years increases compared to existing conditions. This is offset by a reduced probability of above normal and below normal years. Similarly, Figure 10 compares the frequency of occurrence of water year types for the San Joaquin Valley Water Year Hydrologic Classification as defined in D-1641.

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[11] Driest years refer to the 12 driest years on record using ranked values of the Sacramento Valley 40-30-30 Index and two years (1929 and 1932) which are part of the 1929-1934 six-year historical drought. In model simulation, these were the years of extremely low storage.

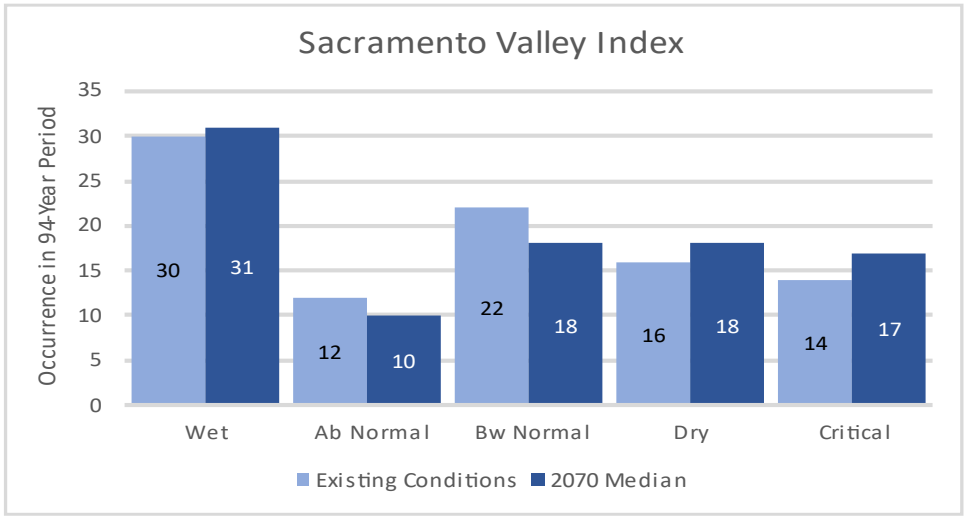

Figure 9. Occurrence of Sacramento Valley Water Year Types under Existing Conditions and 2070 Median Scenario

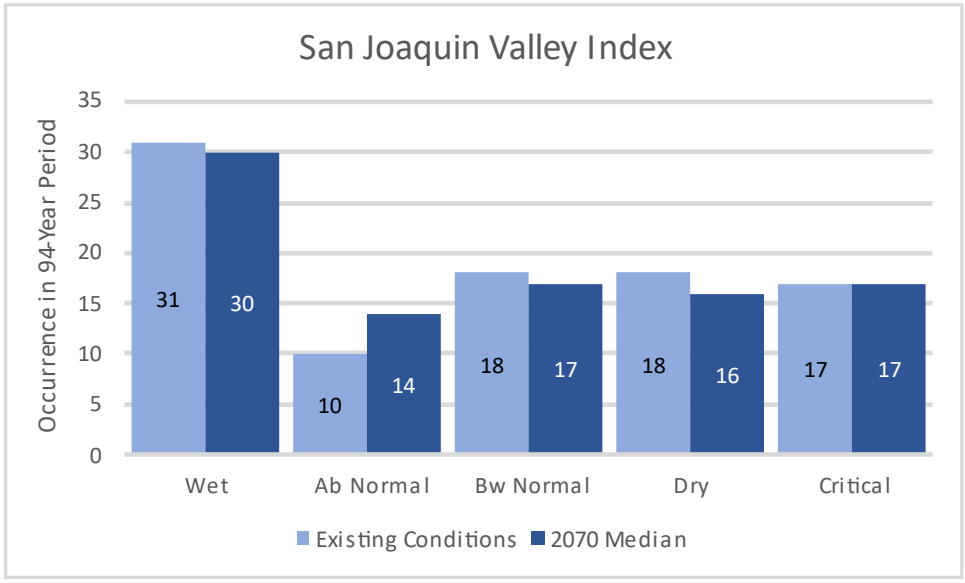

Figure 10. Occurrence of San Joaquin Valley Water Year Types under Existing Conditions and 2070 Median Scenario

The Shasta Lake Critical Year index is an important metric that influences CVP operations. CVP settlement contracts are subject to reduction of contract allocations only in Shasta Lake critical years. Shasta Lake critical years are defined as years when the forecasted inflow to Shasta Lake is less than 3.2 million acre-feet (MAF), or the total accumulated deficiencies below 4.0 MAF in the immediately prior water year, or series of successive prior water years (each of which had inflows of less than 4.0 MAF), together with the forecasted deficiency for the current water year, exceed 0.8 MAF. In these years, Sacramento River settlement contractors receive 75% of their full contract amount. Under existing conditions, there are 11 Shasta Lake critical years in the 94-year period of simulation. For the 2070 Median scenario, the number of Shasta Lake critical years increases from 11 to 18 with a particularly dry 12-year sequence containing 8 Shasta Lake critical years.

1.3.4 Local Project Operations

Water available to the SWP and CVP and the amount and timing of water reaching the Delta is influenced by water management projects operated by local water agencies. Local water supply projects are likely to face similar pressures to the SWP and CVP in delivering water to customers during more frequent and more severe droughts while maintaining regulatory requirements for streamflows and other operational requirements. For many water supply projects, reservoir carryover storage provides a measure of insurance against future drought and the ability to maintain minimum deliveries. Local agencies may need to increase carryover storage targets if the State's climate becomes more extreme with greater fluctuations between wet and dry years. Maintaining reservoir water levels may also require changes to annual discretionary water allocations and reductions of water supplies to agricultural water users.

An analysis of how local water supply projects may adapt to climate change is beyond the scope of this report and for the purposes of the analysis presented in this TM, local project operations remain as modeled in the DCP EIR for 2040 conditions.

1.3.5 Water Demands

The following sections present assumptions for agricultural and urban water use for all scenarios developed to represent possible 2070 conditions.

1.3.5.1 Urban Water Demands

Urban water use includes indoor and outdoor residential use and commercial, institutional, and industrial use. Residential water use accounts for about two-thirds of total urban water use in the State. Future residential water use depends on both population growth and per capita water use. Outdoor watering accounts for approximately half of statewide urban water use.

Following decades of increasing urban water demand, urban water use began to plateau in the mid-1990s, increasing population being offset by increasing efficiency and declining per capita water use (PPIC, 2018). Future per capita water use for the residential sector may decline faster than population growth. Ongoing and future changes in landscaping may make urban water use less affected by climate change. Current Urban Water Management Plans (UWMP) contain projections of urban water demands through 2045. The 2020 UWMPs contain water shortage contingency plans for shortages of up to 50 percent. This level of shortage may occur in the driest years to conserve reservoir storage while meeting fishery flow requirements, and to limit long-term drawdown of the groundwater aquifer. Of particular concern is the lower American River basin, which has a large and growing population, is largely dependent on surface water supplies, and whose municipal agencies hold water right entitlements that in dry years exceed basin supplies.

In model simulation, urban water demands in the Sacramento and San Joaquin Valleys are met by a mix of surface water diversions and groundwater pumping. Major surface water diversions in the Sacramento Valley for M&I water use include CVP deliveries to M&I contractors in the Redding Basin, American River diversions, and lower Sacramento River diversions to the Sacramento metropolitan area. For the purposes of the 2070 analysis, urban water demands in the Sacramento and San Joaquin Valleys are unchanged from the 2040 analysis presented in the DCP EIR.

1.3.5.2 Agricultural Water Demands

Agricultural production in the State is highly sensitive to climate change (Pathak et al. 2018). Most croplands are irrigated and are thus vulnerable to changes in water supply and increases in permanent crops over the last two decades has made the sector more vulnerable to drought. Changes in the temperature and the amount and timing of precipitation may also affect irrigation demands. Less reliable future water supplies may affect cropping patterns, the mix of annual and permanent crops, and lead to a reduction in cropped area. The future agricultural footprint in the Central Valley may also depend partly on urban encroachment.

In recent droughts, when surface water supplies were limited, groundwater pumping increased significantly; however, future groundwater use may be limited under the requirements of SGMA, which requires water users to develop and implement plans to bring their basins into long-term balance.

Unit or per acre agricultural water demands are likely to decrease with improved irrigation technology and efficiency; however, the effects of climate change on agricultural water use is less clear. Applied water demands vary significantly with the timing and amount of precipitation. Increased winter precipitation combined with decreased precipitation in the spring may increase applied water demands. Crop water demands will increase because of rising temperatures and increased vapor pressure deficits. In contrast, projected decreases in solar radiation and increases in carbon dioxide (CO_2) concentration may decrease crop water demands.

For the purposes of the 2070 analysis presented in this TM, the agricultural footprint and cropping pattern are unchanged from the 2040 analysis presented in the DCP EIR; however, during dry and critical years, it is assumed that some non-permanent cropland would be fallowed throughout the Sacramento and San Joaquin Valleys in three of the seven scenarios. This land fallowing may be required to maintain long-term groundwater elevations and to prevent surface reservoir storage dropping to dead pool (i.e., below or at inactive storage). Additionally, for the purposes of the 2070 analysis it is assumed that irrigation efficiency increases through recapture and reuse of tailwater in all scenarios.

2.0 Proposed Project Alternative (2070)

Under the 2070 scenarios developed for this TM, operation of the proposed north Delta intakes would remain consistent with proposed operations described in Chapter 3, *Description of the Proposed Project and Alternatives* of the DCP EIR. The proposed north Delta intakes would continue to augment the SWP ability to capture excess flows and improve the flexibility of SWP operations for meeting State Water Board D-1641 Delta flow and salinity requirements.

The operation of the proposed north Delta intakes is sensitive to the magnitude and daily variability of Sacramento River flows. Short duration, highly variable storms may permit significant diversion but only for a brief period of time. Under 2070 conditions, storms may become more intense leading to greater river flows but may become less frequent. Increased atmospheric moisture may enhance the intensity of atmospheric river-related precipitation; however, these hydrologic processes and how they may change in the future are not fully understood by the scientific community. Changes in the daily variability of Sacramento River flows under 2070 conditions is not considered in the analysis presented in this TM.

In model simulation, shifting of exports from south Delta intakes to the proposed north Delta intakes only occurs when there is an operational advantage to doing so in terms of carriage water savings. Carriage water benefits of these operations are split between the SWP and CVP according to COA, with a priority placed on exporting this water. Any carriage water savings that cannot be exported are backed up into north-of-Delta storage. South Delta exports are not allowed to fall below 3,000 cfs during the July to September period due to shifting the point of diversion, to prevent degradation of south Delta water quality. Under 2070 conditions, south Delta exports are expected to be significantly lower compared to those under existing conditions. By 2070, during the summer and fall, Delta outflow for salinity control is more likely to control Delta operations compared to existing conditions. Although there may be more potential for carriage water savings through shifting the point of diversion, concerns over south-of-Delta water quality are likely to be more limiting.

3.0 Sensitivity Analysis—No Project

A series of 11 model simulations were conducted to explore the sensitivity of SWP and CVP operations using differing assumptions for possible 2070 conditions and to define a set of 7 possible 2070 scenarios for further analysis. Model runs 1np and 2np, described below, provide a sensitivity analysis on the separate effects of (1) a changing climate and (2) sea level rise. Model run 3np provides the foundation for further sensitivity analysis (runs 4np–10np). Run 11np considers a smaller amount of SLR (1.8 feet). Model simulations for the no project are as follows:

- Run 1np: 2040 CT[12] scenario modified for 2070 climate and runoff but maintains 1.8 feet SLR.
- Run 2np: 2040 CT scenario modified for 3.5 feet SLR but maintaining 2040 climate and runoff.[13]
- Run 3np: 2040 CT scenario modified for 2070 climate, runoff, and SLR.
- Run 4np: Run 3np with 25% cut in irrigated area of annual crops in dry and critical years (Sacramento Valley Hydrologic Classification).
- Run 5np: Run 3np with 50% cut in irrigated area of annual crops in dry and critical years (Sacramento Valley Hydrologic Classification).
- Run 6np: Run 3np with drought-year regulatory actions/relaxations.
- Run 7np: Run 3np with no south-of-Delta (SOD) exports in all years other than those needed for Health and Safety.[14]
- Run 8np: Run 3np with limited SOD exports in dry and critical years i.e., those needed for Health and Safety and those derived from Delta surplus flows with no storage withdrawals to support additional exports.
- Run 9np: Run 3np with 50% cut in irrigated area of annual crops in dry and critical years and with drought-year regulatory actions/relaxations.
- Run 10np: Run 3np with 50% cut in irrigated area of annual crops in dry and critical years and with drought-year regulatory actions/relaxations and limited SOD exports in dry and critical years (i.e., no storage withdrawals to support additional exports).
- Run 11np: Run 1np (2070 Median climate scenario with 1.8 feet SLR) with 50% cut in irrigated area of annual crops in dry and critical years and with drought-year regulatory actions/relaxations

[12] 2040 CT is the No Project Alternative described in the DCP EIR.

[13] The purpose of this run is to identify the effects of sea level rise independent of the effects of changes in temperature and precipitation.

[14] The purpose of this run is to understand whether minimizing SOD exports in all years could offset the reservoir drawdown and groundwater impacts resulted under the Run 3np scenario.

and limited SOD exports (i.e., no storage withdrawals to support additional) in dry and critical years.

3.1 Sensitivity to Climate Change and Runoff (Run 1np)

The CalSim 3 simulation for the 2040 CT No Project Alternative (2040 CT), as presented in the DCP EIR, was modified by replacing the unimpaired runoff from the mountain, foothill, and valley watersheds with those developed for 2070 Median scenario. Additionally, agricultural water demands were modified to reflect 2070 Median crop evapotranspiration. The purpose of Run 1np is to separate the effects of changing temperature and precipitation from SLR on SWP and CVP operations. Figure 11 compares the resulting Lake Shasta end-of-September storage (known as carryover storage) with that simulated for existing conditions and 2040 CT. Figure 12 presents a similar comparison for Lake Oroville carryover storage. This model run demonstrates the effect of changes in climate and runoff (2040 CT vs 2070 Median scenario) on SWP and CVP operations. As shown in Figures 11 and 12, Lake Shasta and Lake Oroville carryover storage are reduced because of changes in the climate and runoff.

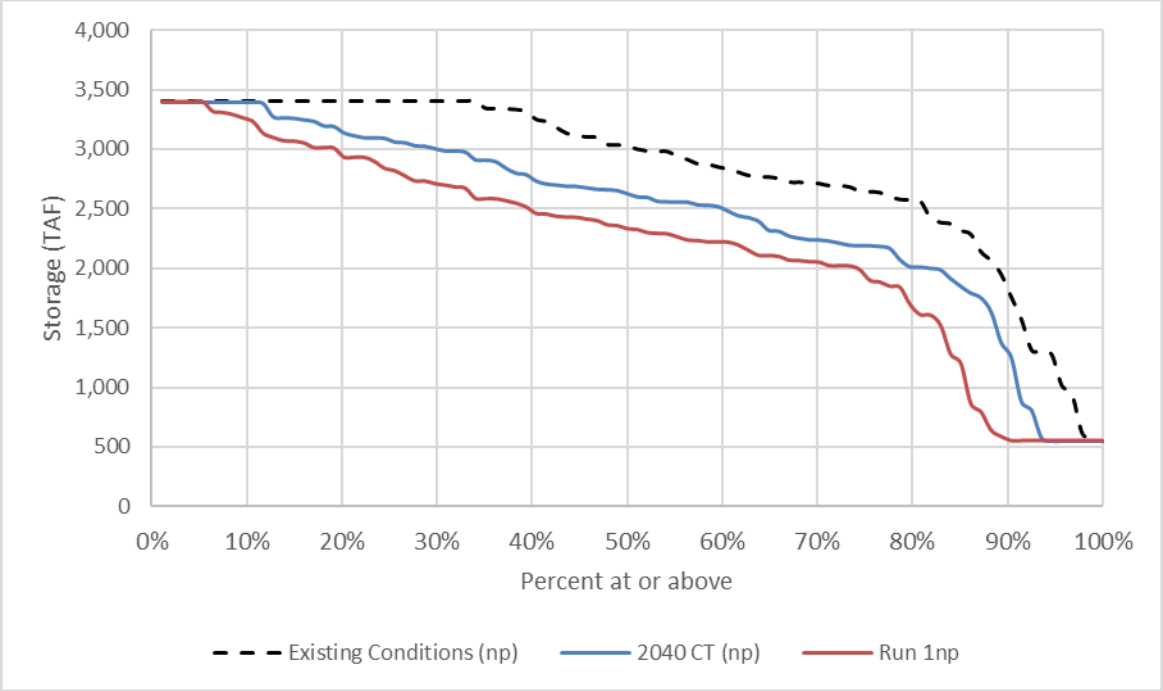

Figure 11. Lake Shasta End-of-September Storage Exceedance, Existing Conditions, 2040 CT, and Run 1np

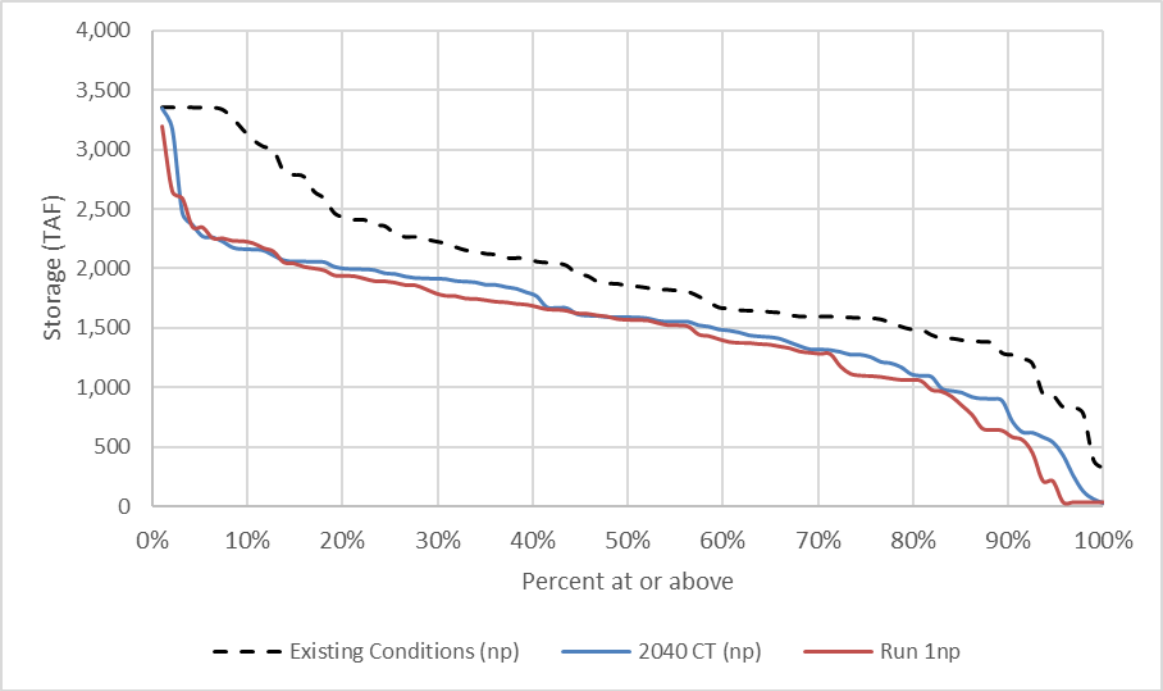

Figure 12. Lake Oroville End-of-September Storage Exceedance, Existing Conditions, 2040 CT, and Run 1np

3.2 Sensitivity to Sea Level Rise (Run 2np)

The CalSim 3 simulation for 2040 CT No Project Alternative, as presented in the DCP EIR was modified by replacing the 1.8 feet SLR ANN with the 3.5 feet SLR ANN. No other changes were made to the model. The purpose of Run 2np is to determine the incremental effects of SLR on SWP and CVP storage and Delta outflow requirements for a given climate scenario. Figure 13 compares the resulting Lake Shasta carryover storage with that simulated for existing conditions and 2040 CT. Figure 14 presents a similar comparison for Lake Oroville carryover storage.

No further analysis was conducted for Run 2np assumptions and this model run was not carried forward to Section 4 that discusses the operation and impacts of the proposed project. The majority of the analysis presented in this TM is based on a 3.5 feet SLR assumption (exceptions are Run 1np and Run 11np).

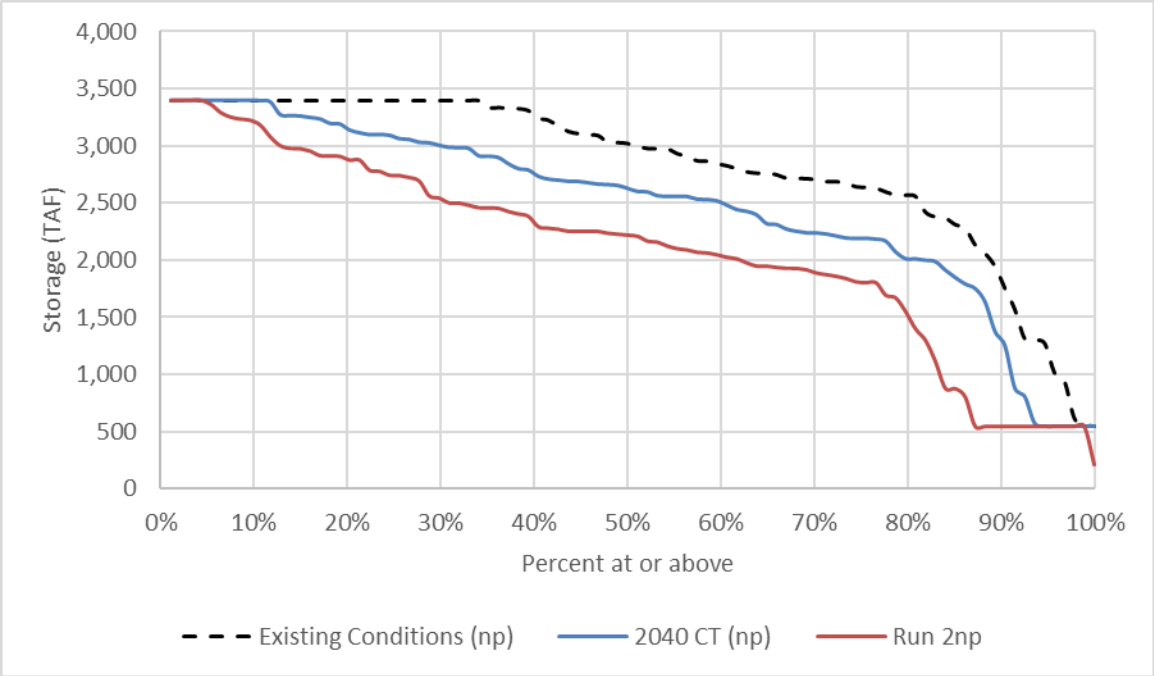

Figure 13. Lake Shasta End-of-September Storage Exceedance, Existing Conditions, 2040 CT, and Run 2np

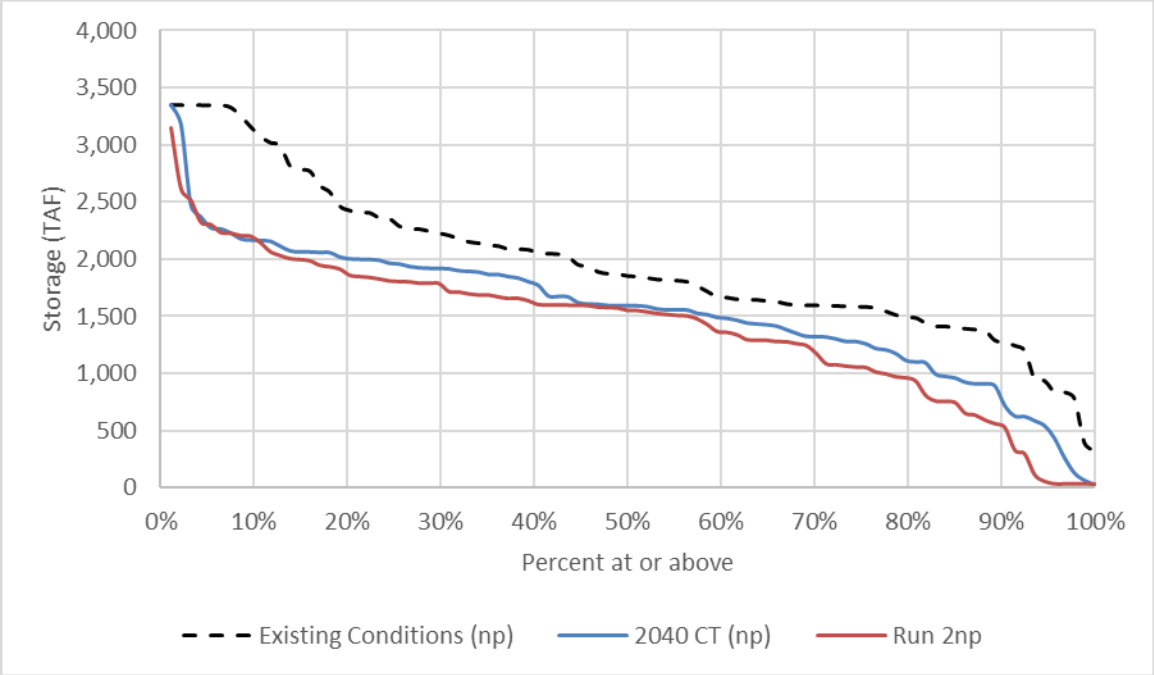

Figure 14. Lake Oroville End-of-September Storage Exceedance, Existing Conditions, 2040 CT, and Run 2np

3.3 Sensitivity to Climate Change and Sea Level Rise (Run 3np)

Run 3np combines the effects of a changing climate (2070 Median scenario) and runoff with the effects of 3.5 feet of SLR, both superimposed on the 2040 CT No Project Alternative. The purpose of Run 3np is to determine the effects of climate change and SLR in the absence of any water management response or adaptation.

Figures 15 and 16 present Run 3np results for Lake Shasta and Lake Oroville carryover storage compared to existing conditions and 2040 CT scenario. In Run 3np, there are a greater number ‘of months when storage in Lake Shasta and Lake Oroville is at or below dead pool compared to existing conditions and 2040 CT No Project Alternative.

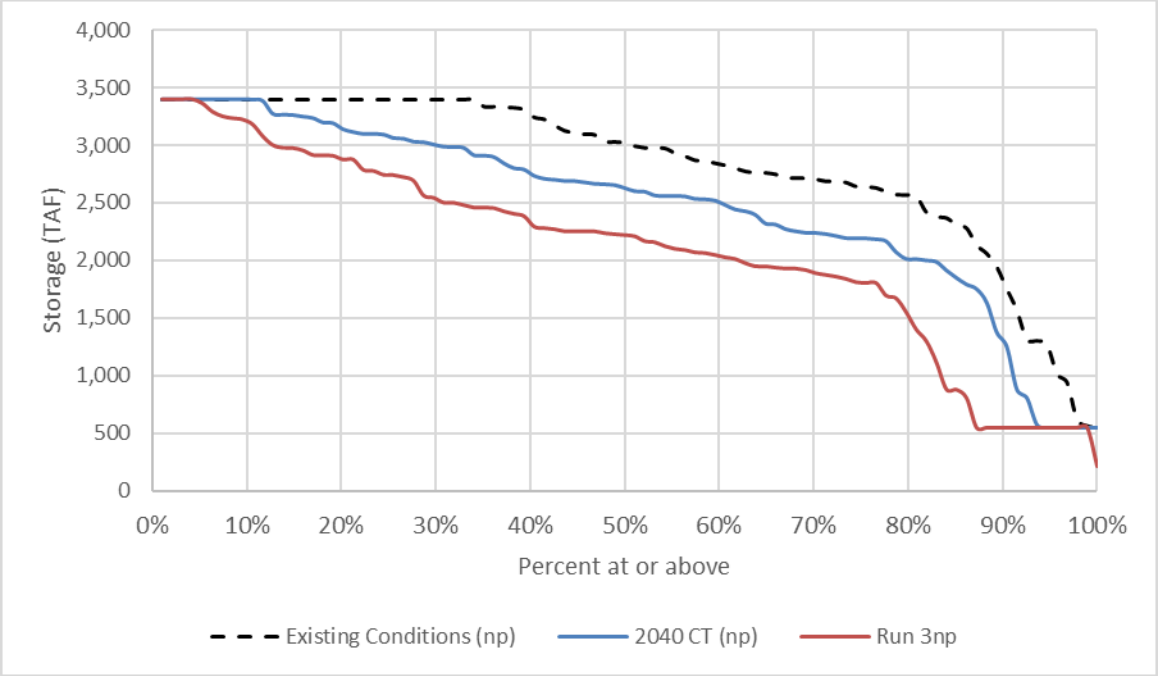

Figure 15. Lake Shasta End-of-September Storage Exceedance, Existing Conditions, 2040 CT, and Run 3np

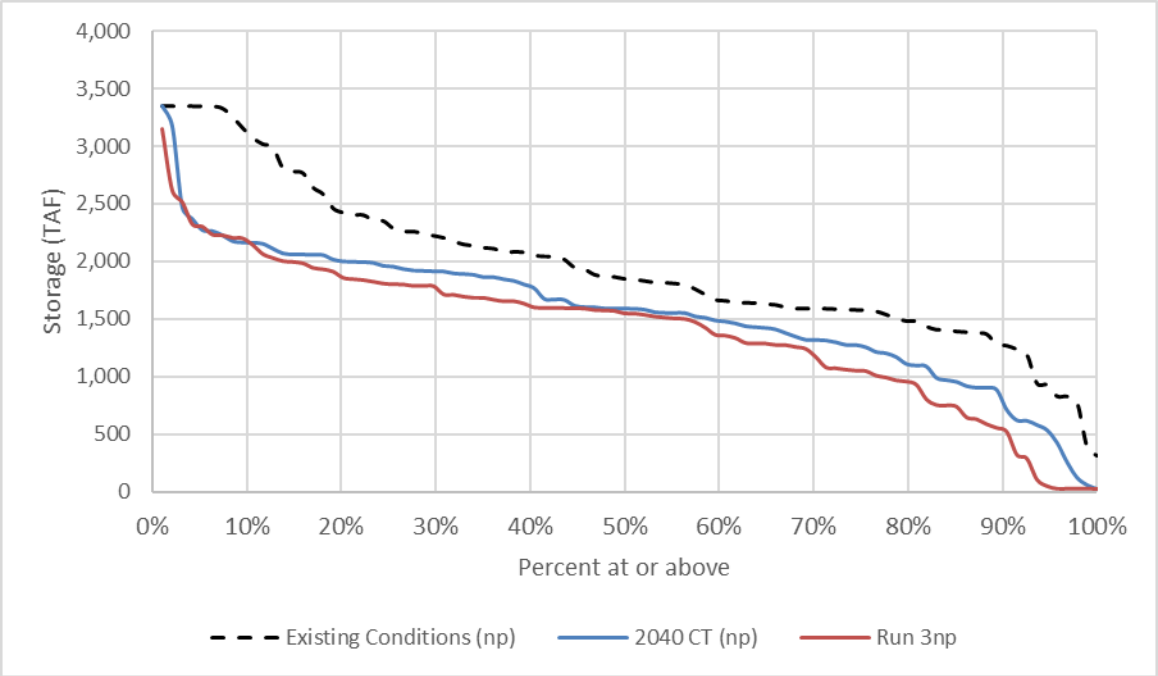

Figure 16. Lake Oroville End-of-September Storage Exceedance, Existing Conditions, 2040 CT, and Run 3np

3.4 Sensitivity to Land Use Changes (Runs 4np, 5np)

Run 3np combines the effects of changing climate and runoff (2070 Median scenario) with the effects of 3.5 feet SLR, both superimposed on the 2040 CT No Project Alternative. Changes to irrigated land use were layered on to Run 3np to: (a) reduce or eliminate periods when SWP and CVP simulated storage reaches dead pool; and (b) alleviate long-term groundwater overdraft. The simulation runs include:

- Run 4np: Valley-wide 25% reduction in the irrigated area of annual crops[15] in dry and critical years.
- Run 5np: Valley-wide 50% reduction in the irrigated area of annual crops in dry and critical years.

The purpose of the two runs is to determine whether reduction in land use, by itself, can solve issues of low reservoir storage during drought and long-term drawdown of the aquifer.

Figures 17 through 20 present exceedance values for Lake Shasta and Lake Oroville carryover storage compared to existing conditions, 2040 CT, and Run 3np under two different land use assumptions for the 2070 scenario. The 25% irrigated area reduction in dry and critical years scenario shows slight improvement in elimination of periods when SWP and CVP simulation storage reaches dead pool. However, considerable improvement in number of months with dead pools was observed in run 5np with 50% reduction in irrigated area in dry and critical years.

[15] Crops which were irrigated in dry and critical years include olives, citrus, deciduous orchards, and vines.

No further analysis was conducted for Run 4np and Run 5np and these model runs were not carried forward to Section 4 that discusses the yield and impacts of the proposed project. Runs 4np and 5np showed that land fallowing in dry and critical years, on its own, was not sufficiently protective of project storage under extended drought conditions. However, 50% land fallowing in dry and critical years was carried forward as one of a suite of water management actions.

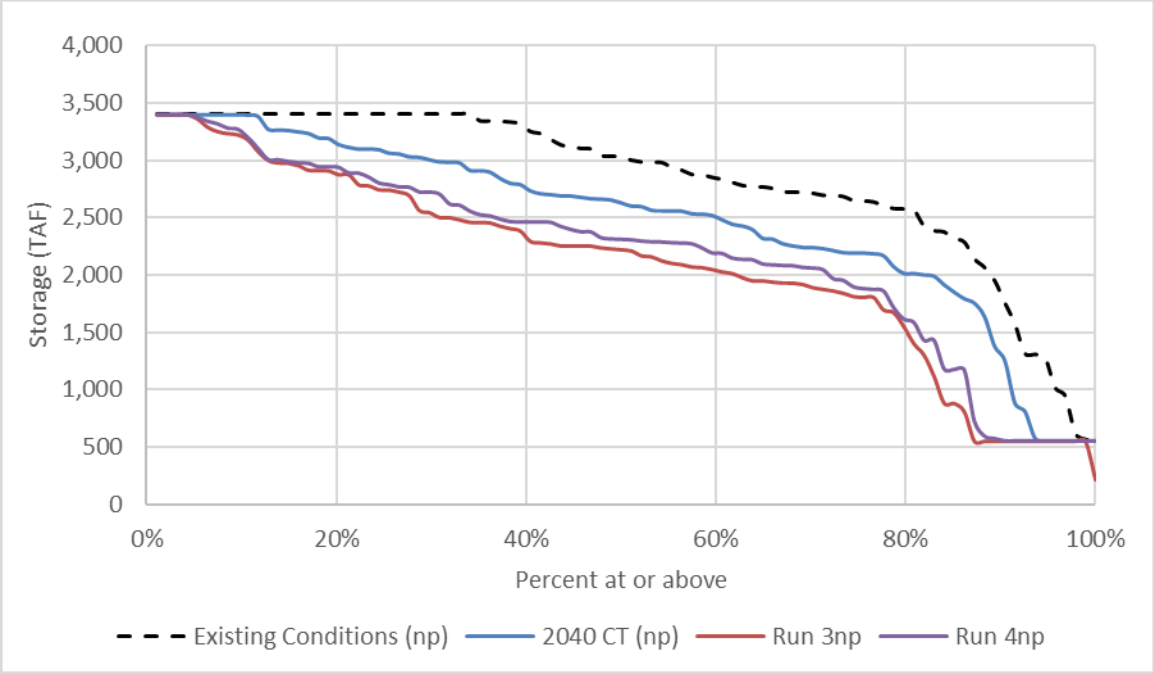

Figure 17. Lake Shasta End-of-September Storage Exceedance, Existing Conditions, 2040 CT, Run 3np, and Run 4np

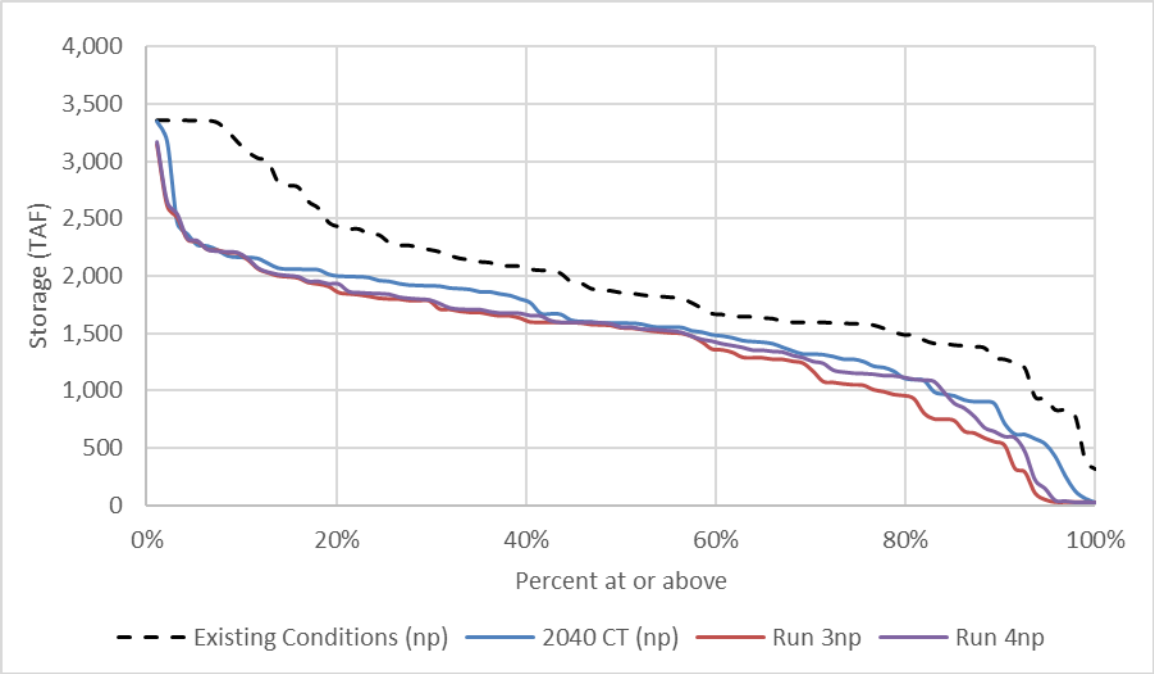

Figure 18. Lake Oroville End-of-September Storage Exceedance, Existing Conditions, 2040 CT, Run 3np, and Run 4np

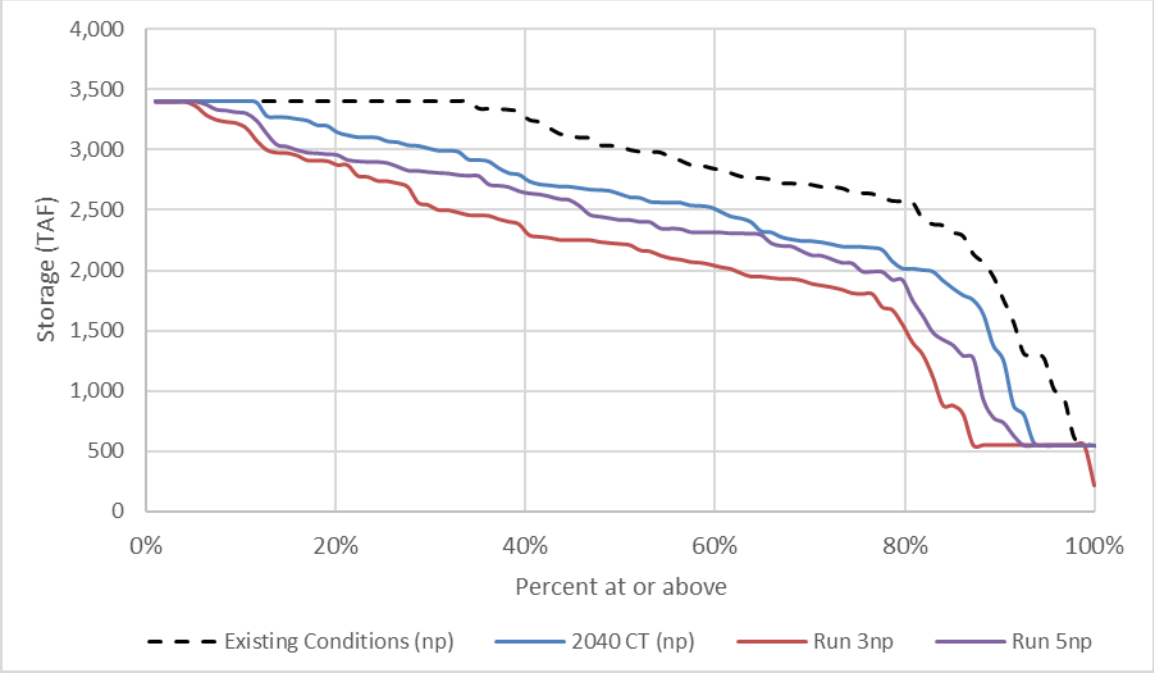

Figure 19. Lake Shasta End-of-September Storage Exceedance, Existing Conditions, 2040 CT, Run 3np, and Run 5np

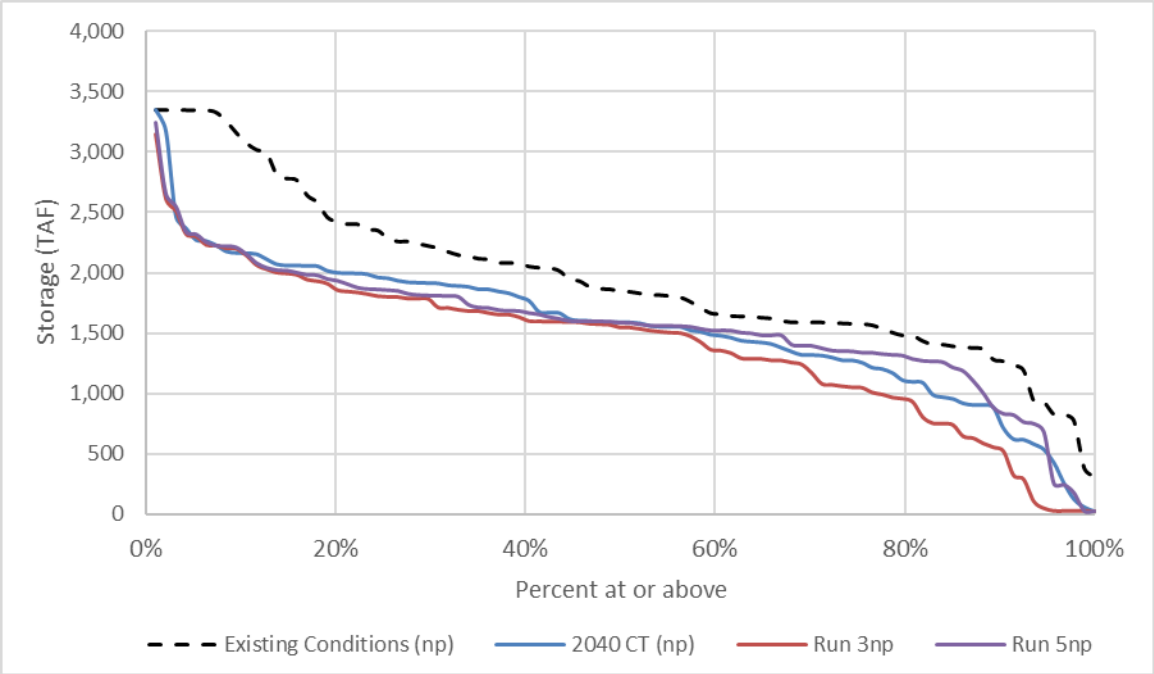

Figure 20. Lake Oroville End-of-September Storage Exceedance, Existing Conditions, 2040 CT, Run 3np, and Run 5np

3.5 Sensitivity to Regulatory Requirements (Run 6np)

A model simulation was performed to assess the sensitivity of SWP and CVP reservoir storage to temporary relaxation of regulatory requirements during drought, as described in Section 1.3.3. The following TUCP-like assumptions were implemented in Run 6np, layered on to Run 3np:

- Spring X2 requirement replaced with 3,000 cfs outflow requirement.
- 1,000 cfs reduction in flow requirements at Rio Vista from September–November.
- NDOI flow requirement reduced by 25%.
- Emmaton salinity requirement relocated to Threemile Slough.
- San Joaquin River at Vernalis flow requirement reduced to 710 cfs.
- SWP and CVP combined exports limited to 1,500 cfs when D-1641 standards are not met.

The purpose of the Run 6np is to determine whether TUCP-like actions, by itself, can solve issues of low reservoir storage during drought.

Figures 21 and 22 present exceedance values for Lake Shasta and Lake Oroville carryover storage under 2070 conditions but with drought year actions, compared to existing conditions, 2040 CT, and Run 3np.

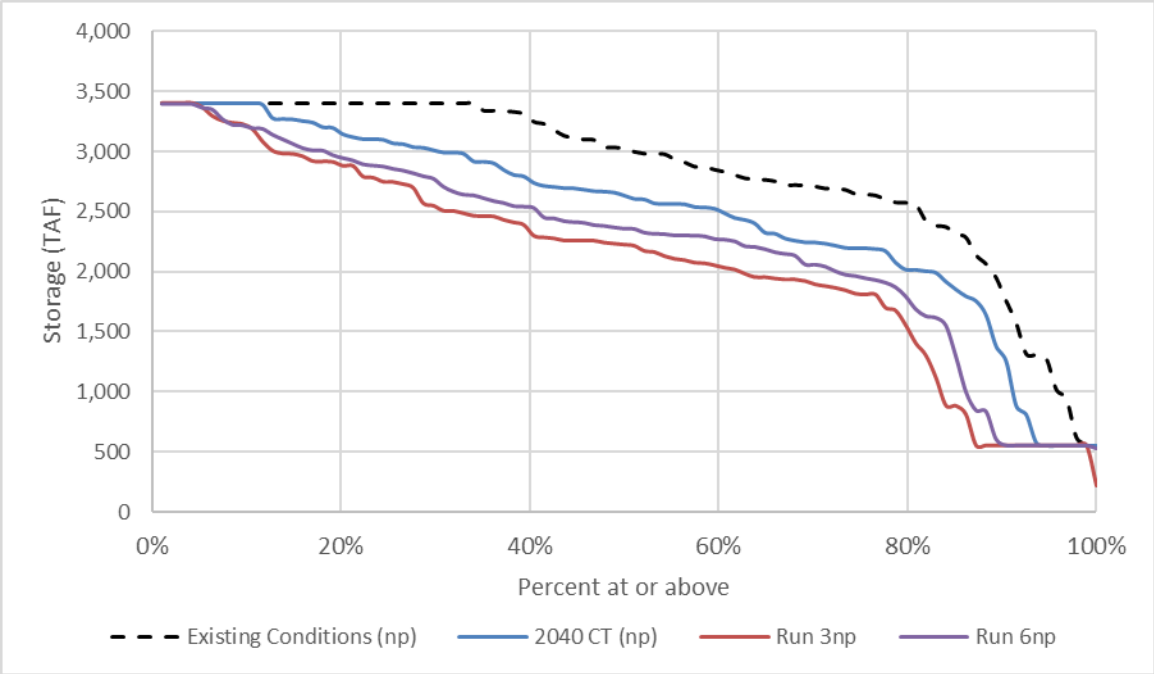

Figure 21. Lake Shasta End-of-September Storage Exceedance, Existing Conditions, 2040 CT, Run 3np, and Run 6np

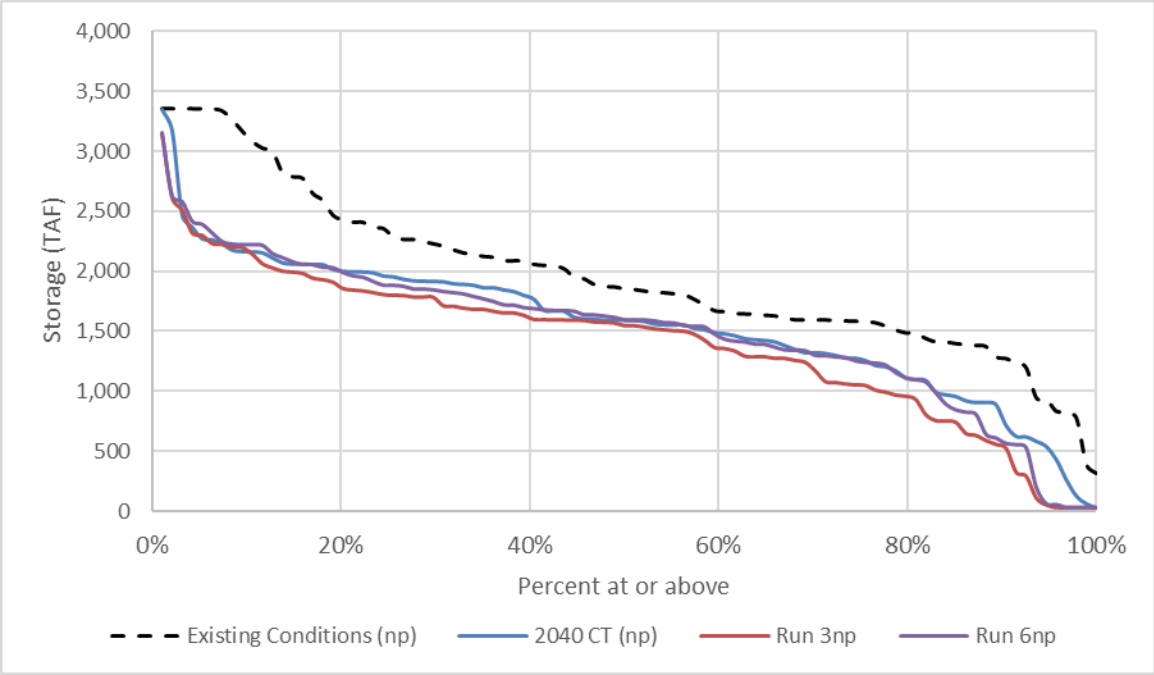

Figure 22. Lake Oroville End-of-September Storage Exceedance, Existing Conditions, 2040 CT, Run 3np, and Run 6np

3.6 Sensitivity to Limits on Exports (Runs 7np, 8np)

Climate change and associated SLR will increase stress on both the SWP and CVP and decrease the project abilities to provide water to their contractors while meeting their regulatory obligations. In the absence of adaptive measures, climate change will result in lower storage in SWP and CVP reservoirs. A sensitivity analysis was undertaken to establish whether changes in SOD exports by the two projects could, on its own, sustain SWP and CVP storage to levels similar to those under existing conditions and 2040 conditions. Reservoir storage was compared for two scenarios:

- 2070 conditions with exports limited to Health and Safety in all years (Run 7np).
- 2070 conditions with exports limited in dry and critical years to a minimum of Health and Safety levels and additional exports in those year types limited to times when the Delta is in excess conditions or there is unstored water for export i.e., no storage releases to support exports (Run 8np).

The purpose of Run 7np is to demonstrate that issues of low reservoir storage during drought and long-term drawdown of the aquifer are not being caused by SWP and CVP exports. It is not a scenario of future conditions. The purpose of Run 8np is similar in nature.

Figures 23 and 24 present exceedance values for Lake Shasta and Lake Oroville carryover storage with no SOD exports other than Health and Safety (Run 7np), and with SOD additional exports in dry and critical years limited to use of unstored water for export (Run 8np). Run 8np demonstrates that low project storage in dry and critical years is not caused by SOD exports (other than those for Health and Safety). No further analysis was conducted for Run 7np assumptions and this scenario was not carried forward to Section 4 that discusses the operation and impacts of the proposed project.

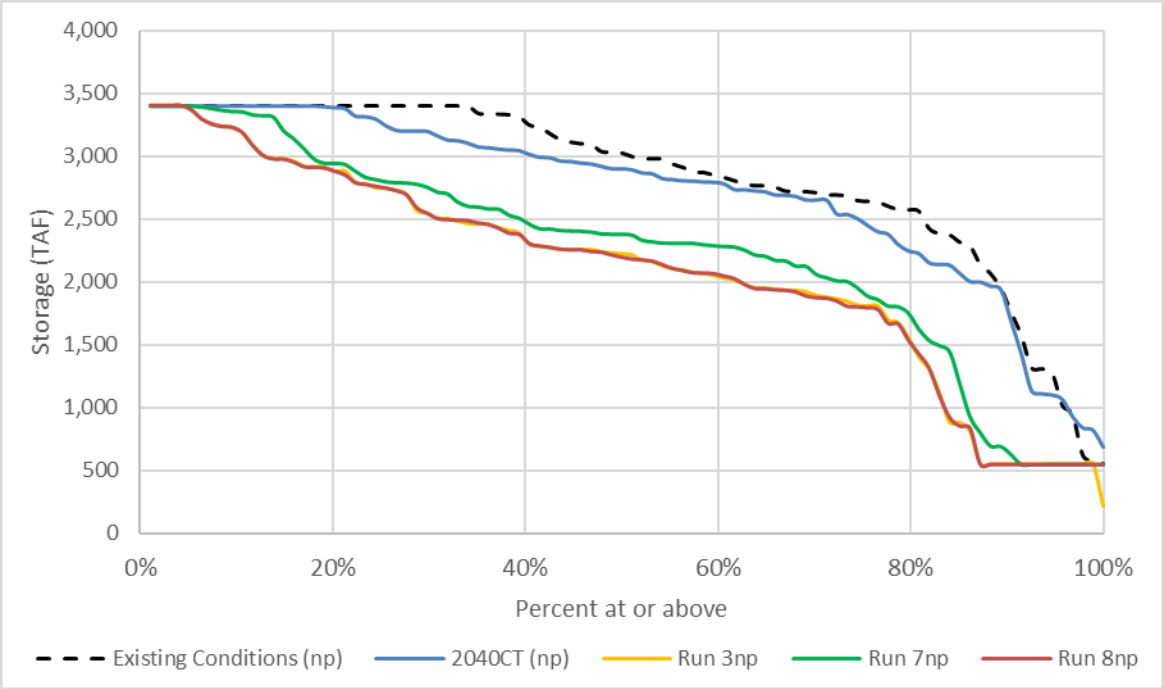

Figure 23. Lake Shasta End-of-September Storage Exceedance for Existing, 2040CT, Run 3np, Run 7np, and Run 8np

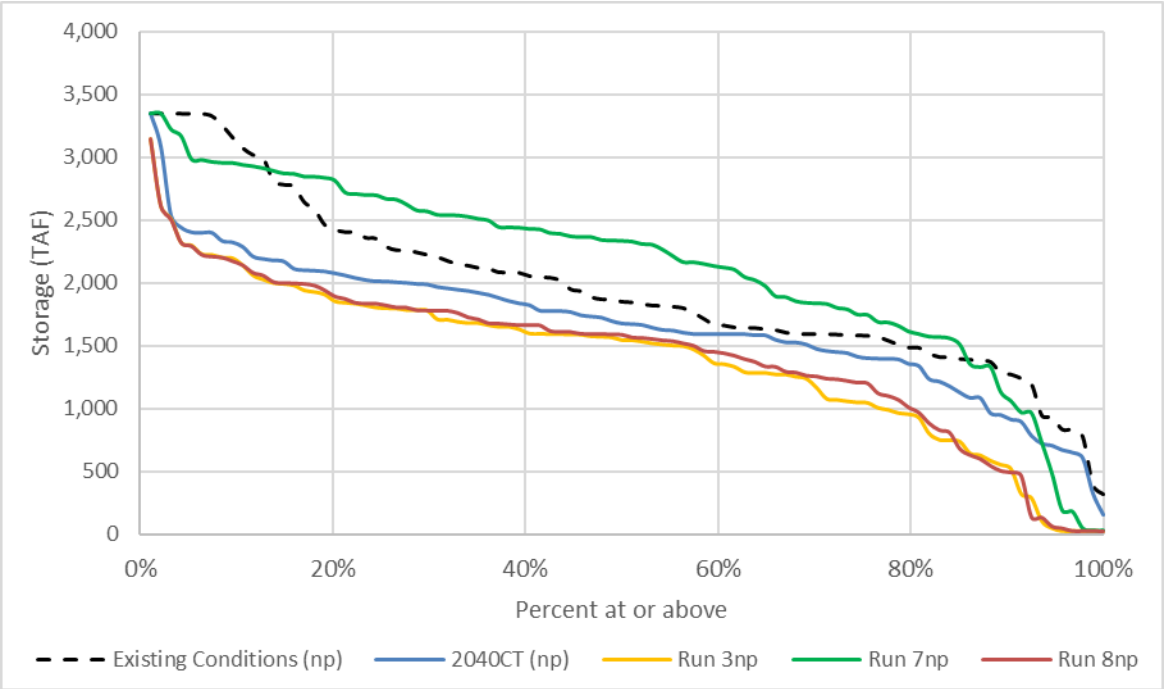

Figure 24. Lake Oroville End-of-September Storage Exceedance for Existing, 2040CT, Run 3np, Run 7np, and Run 8np

3.7 Sensitivity to Combined Water Management Assumptions (Runs 9np, 10np, 11np)

Run 9np modifies Run 3np to incorporate: (a) 50% cut in irrigated land area in dry and critical years; (b) drought-year regulatory actions; and (c) various additional demand management measures including increase in irrigation efficiency and urban conservation and rationing.

Run 10np modifies Run 3np to incorporate: (a) 50% cut in irrigated land use in dry and critical years; (b) drought-years regulatory actions; (c) various additional demand management measures including increase in irrigation efficiency and urban conservation and rationing and (d) limited exports in dry and critical years (i.e., no storage withdrawals to support exports above Health and Safety levels).

Run 11np modifies the 2070 Median (climate) with 1.8 feet SLR scenario (Run 1np) to incorporate: (a) 50% cut in irrigated land area in dry and critical years; (b) drought-years regulatory actions; (c) various additional demand management measures including increase in irrigation efficiency and urban conservation and rationing and (d) limited exports in dry and critical years (i.e., no storage withdrawals to support exports above Health and Safety levels).

The purpose of these runs is to identify which mux of water management actions solve issues of low SWP and CVP storage during drought and long-term drawdown of the groundwater aquifer.

Figures 25 and 26 present exceedance values for Lake Shasta and Lake Oroville carryover storage for the combined water management scenarios (Runs 9np, 10np, 11np) compared to existing conditions, 2040 CT, and Run 3np.

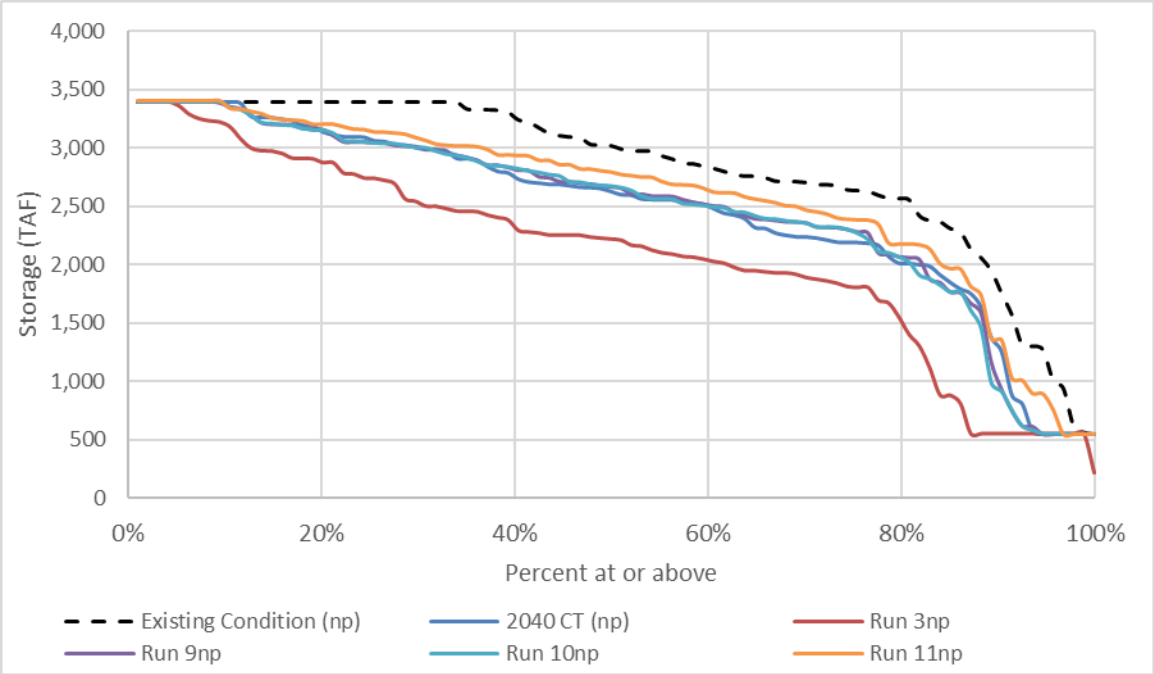

Figure 25. Lake Shasta End-of-September Storage Exceedance Under Existing Conditions, 2040CT, Run 3np, Run 9np, Run 10np, and Run 11np

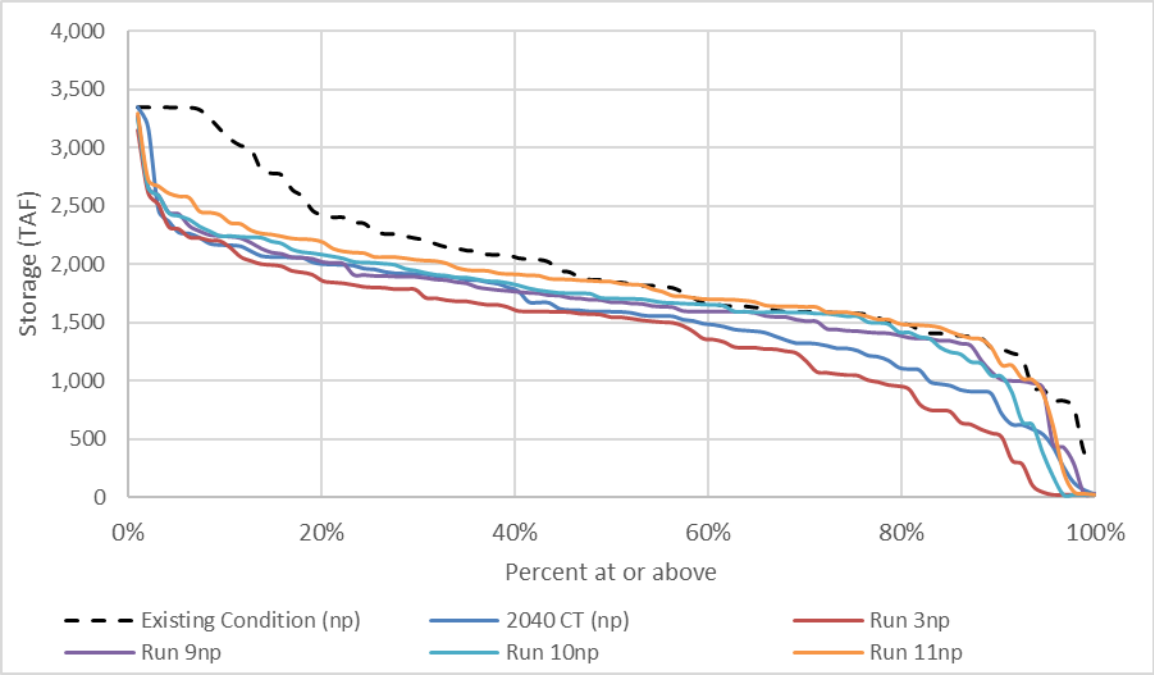

Figure 26. Lake Oroville End-of-September Storage Exceedance Under Existing Conditions, 2040CT, Run 3np, Run 9np, Run 10np, and Run 11np

3.8 Summary Results

Seven scenarios were selected for water supply benefits and impact analysis for the DCP proposed project under 2070 conditions (see Section 4). The selected scenarios are as follows:

- 2070 Median with 1.8 feet SLR (Run 1np).
- 2070 Median with 3.5 feet SLR (Run 3np).
- 2070 Median with 3.5 feet SLR with drought year regulatory actions (Run 6np)
- 2070 Median with 3.5 feet SLR with limited exports in dry and critical years (Run 8np).
- 2070 Median with 3.5 feet SLR with combined water management (Run 9np).
- 2070 Median with 3.5 feet SLR with combined water management and limited SOD exports (Run 10np).
- 2070 Median with 1.8 feet SLR with combined water management and limited SOD exports (Run 11np).

These seven scenarios were selected for water supply benefits and impact analysis for the proposed project under 2070 conditions in Section 4. Four model runs that were not further considered are as follows:

- Run 2np: 2040 CT scenario modified for 3.5 feet SLR but maintaining 2040 climate and runoff. This model run was developed to show the incremental effects of SLR and was not considered representative of possible 2070 conditions.
- Run 4np: Run 3np with 25% cut in irrigated area of annual crops in dry and critical years. This model run did not sufficiently conserve reservoir storage during drought or prevent groundwater overdraft.
- Run 5np: Run 3np with 50% cut in irrigated area of annual crops in dry and critical years (Sacramento Valley Hydrologic Classification). This model run did not sufficiently conserve reservoir storage during drought or prevent groundwater overdraft.
- Run 7np: Run 3np with no SOD exports in all years other than those needed for Health and Safety. This model run was developed to demonstrate that SWP and CVP exports are not the direct cause of low reserve storage during drought nor the cause of groundwater overdraft and was not considered representative of possible 2070 conditions.

Model results for the selected no project scenarios are presented in the following sections. These include simulated SWP and CVP reservoir storage, SWP and CVP Delta exports, Net Delta Outflow Index (NDOI), groundwater storage, and groundwater pumping.

3.8.1 Reservoir Storage

Figures 27 and 28 present exceedance values for Lake Shasta and Lake Oroville carryover storage for the following range of scenarios discussed above.

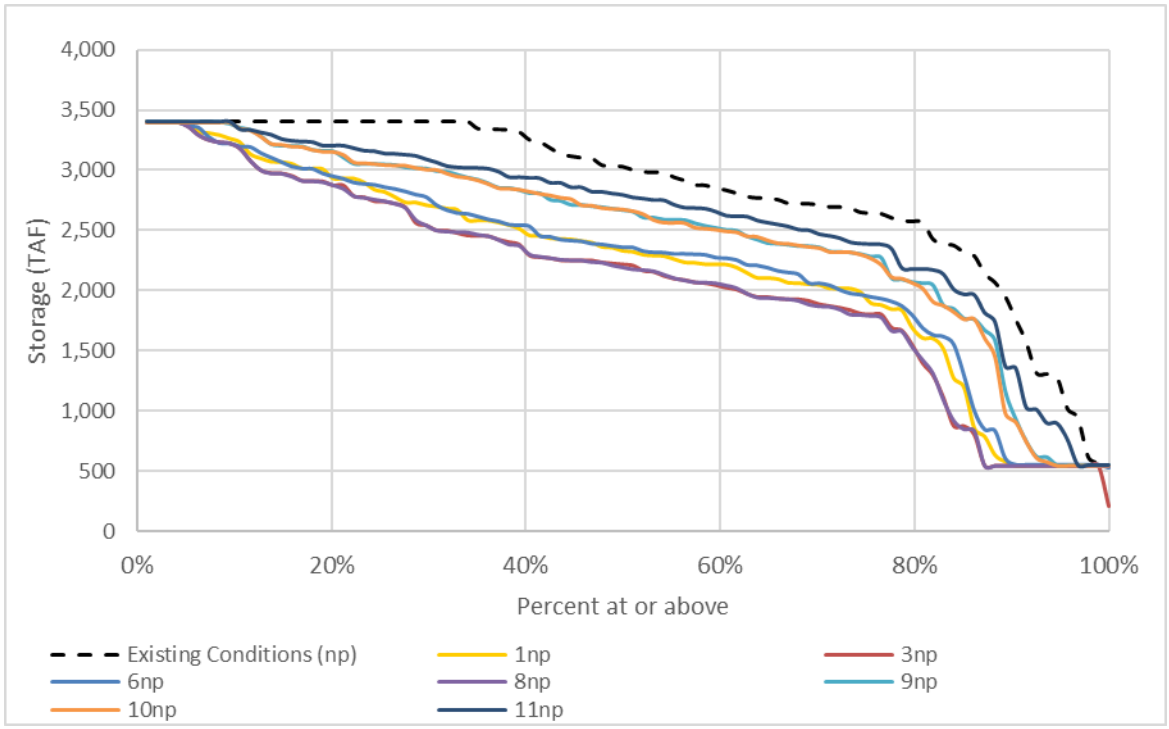

Figure 27. Lake Shasta End-of-September Storage Exceedance Under Existing Conditions, 2040CT, and Various 2070 Median Scenarios

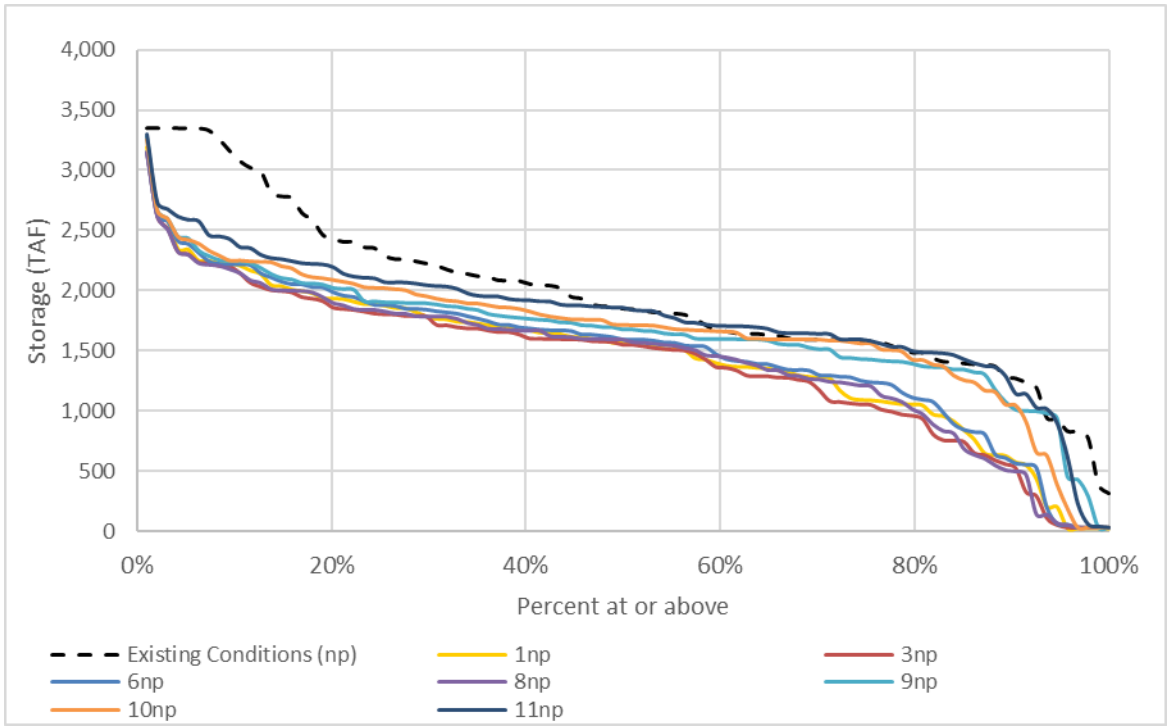

Figure 28. Lake Oroville End-of-September Storage Exceedance Under Existing Conditions, 2040CT, and Various 2070 Median Scenarios

3.8.2 Delta Exports

Figure 29 summarizes SOD combined exports by the SWP and CVP.

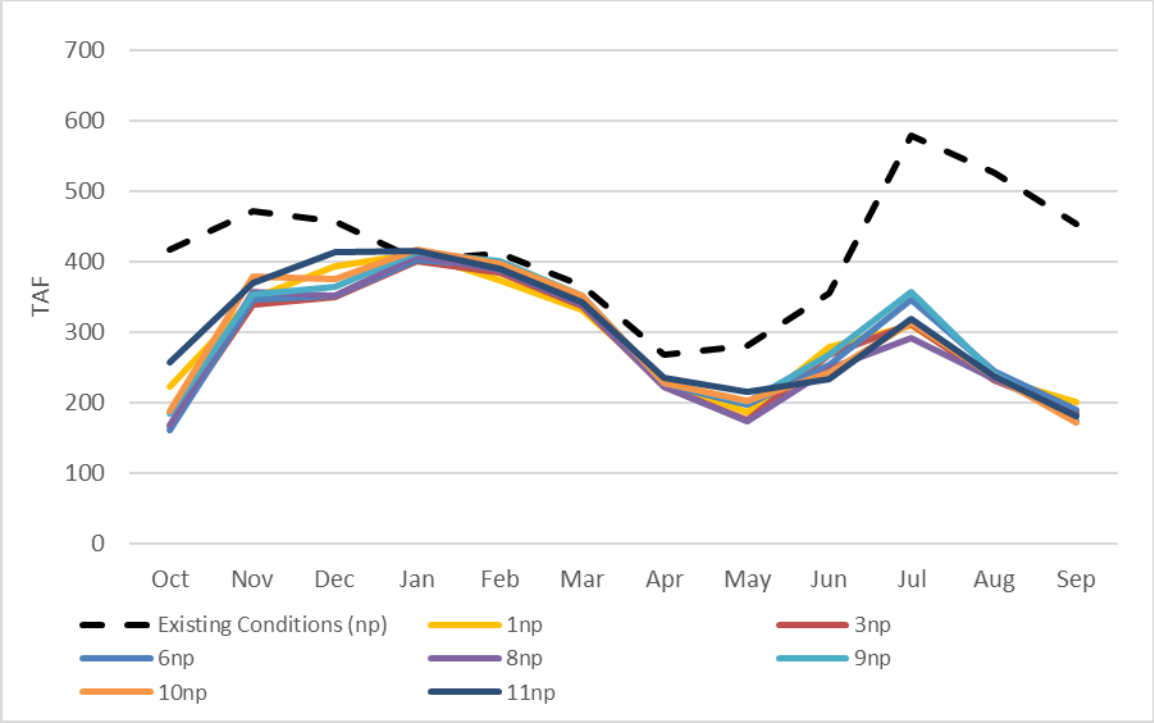

Figure 29. South-of-Delta Combined Exports, Existing Conditions, 2040 CT, and Various 2070 Median Scenarios

3.8.3 Net Delta Outflow Index

Figure 30 shows the modeled Net Delta Outflow Index under the seven 2070 No Project scenarios compared to the Existing Conditions and 2040 CT scenarios.

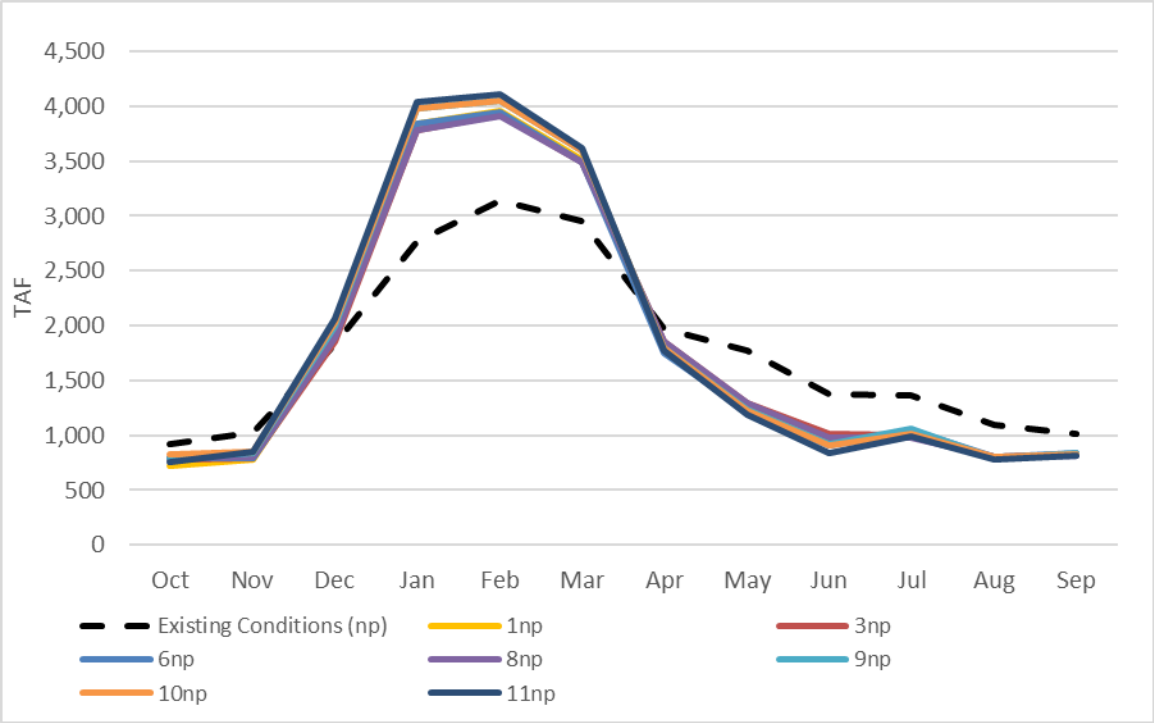

Figure 30. Net Delta Outflow Index, Existing Conditions, 2040 CT, and Various 2070 Median Scenarios

3.8.4 Groundwater Storage

Figures 31 and 32 summarize simulated groundwater storage in the Sacramento and San Joaquin Valleys for the same range of scenarios considered in the previous section. These figures show simulated conditions for a 74-year period. The initial 20 years of simulation are not presented as they are significantly affected by assumed groundwater initial conditions.

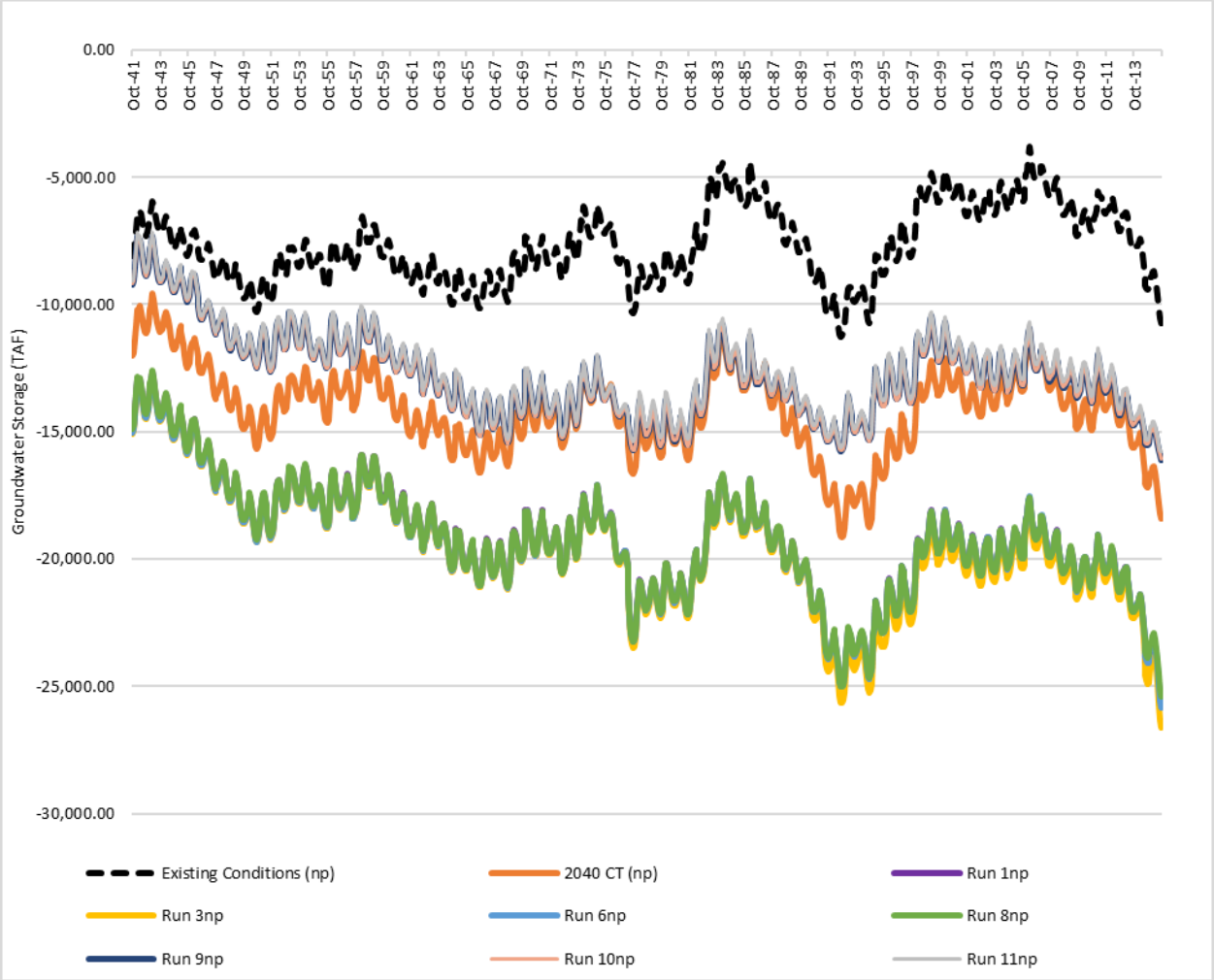

Figure 31. Sacramento Valley Groundwater Storage, Existing Conditions, 2040 CT, and Various 2070 Median Scenarios

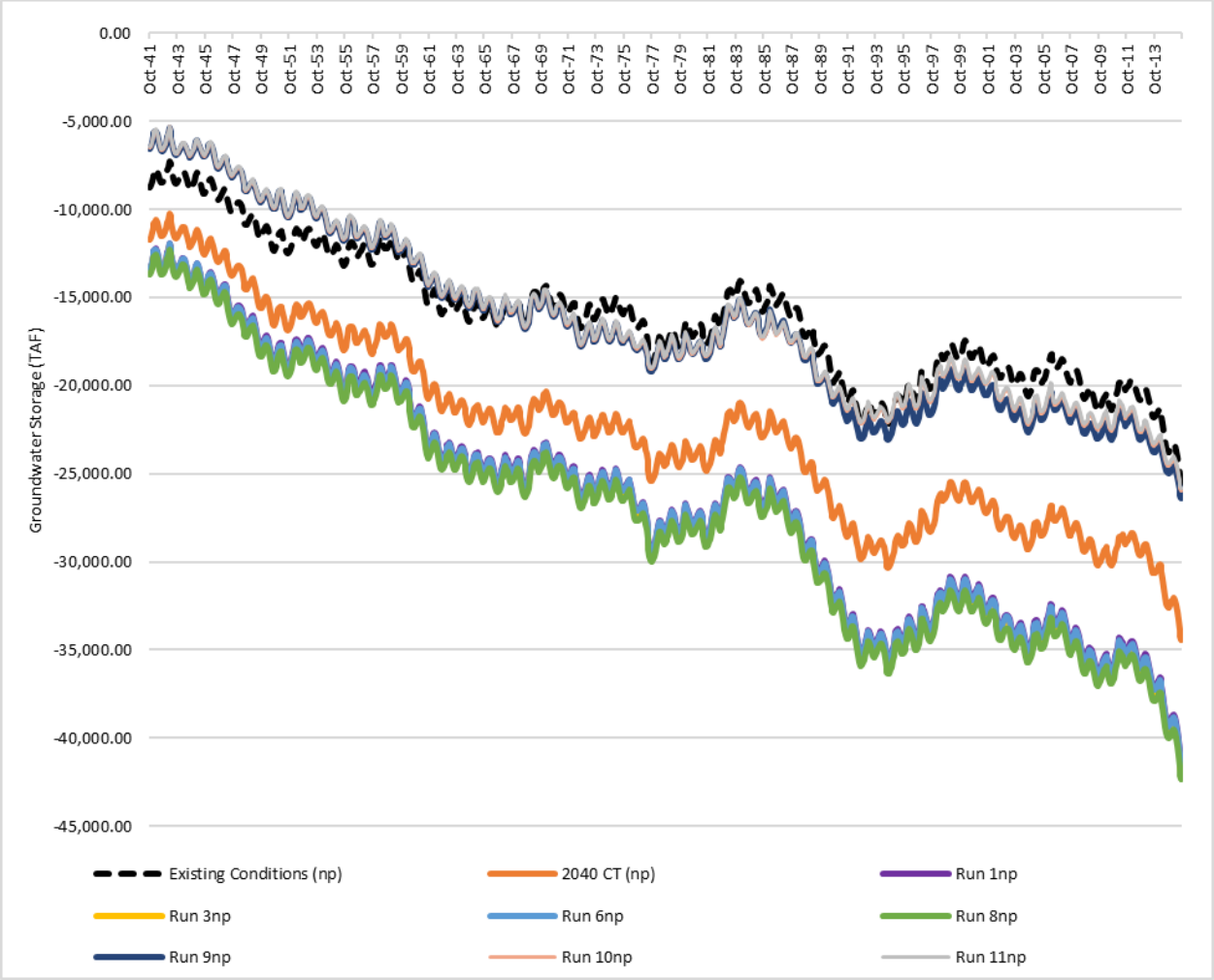

Figure 32. San Joaquin Valley Groundwater Storage, Existing Conditions, 2040 CT, and Various 2070 Median Scenarios

3.8.5 Groundwater Pumping

Figures 33 and 34 summarize simulated groundwater pumping in the Sacramento and San Joaquin Valleys for the same range of scenarios considered in the previous section.

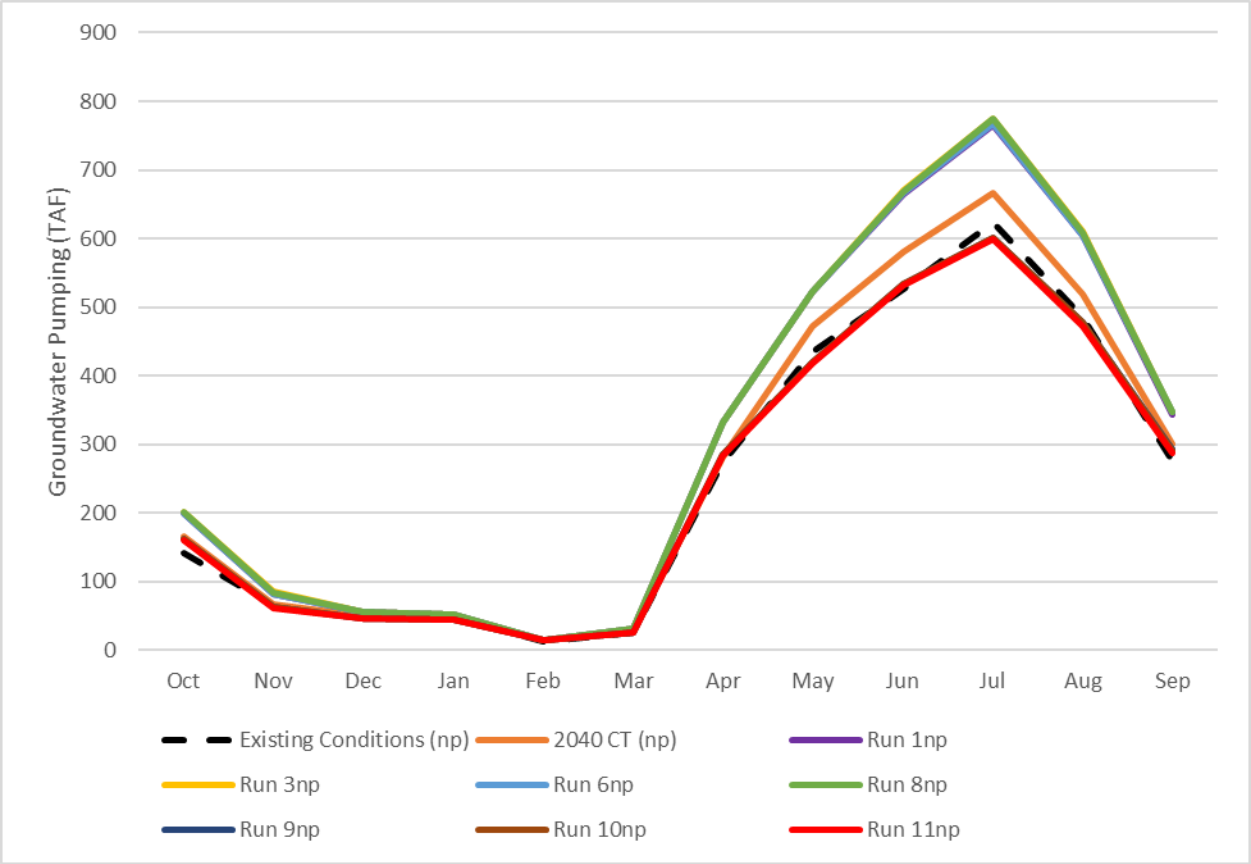

Figure 33. Sacramento Valley Groundwater Pumping, Existing Conditions, 2040 CT, and Various 2070 Median Scenarios

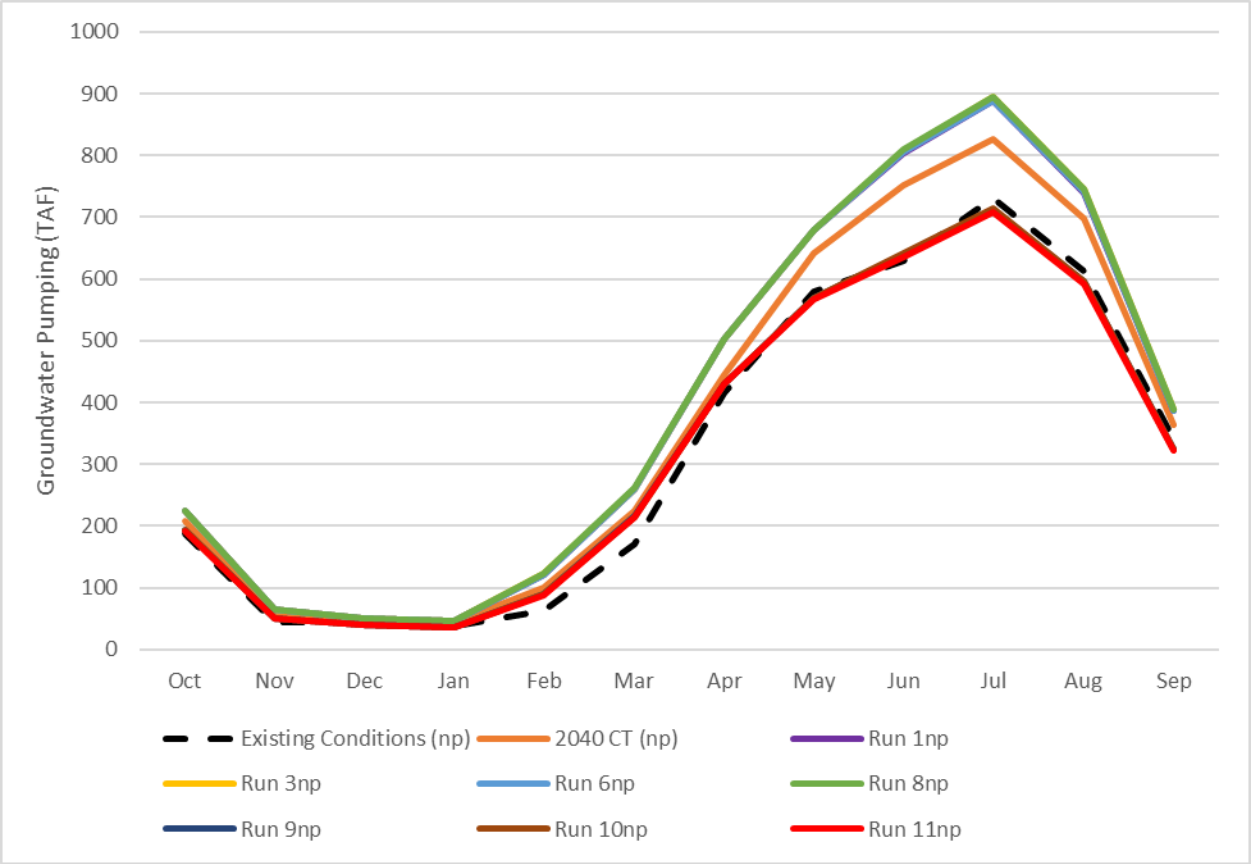

Figure 34. San Joaquin Valley Groundwater Pumping, Existing Conditions, 2040 CT, and Various 2070 Median Scenarios

4.0 Sensitivity Analysis—With Proposed Project

A sensitivity analysis was conducted to investigate: (1) the yield of the proposed project; and (2) the project's potential effects on the water resources of the Sacramento Valley and Delta under different scenarios for possible 2070 conditions. Proposed project simulations include the following:

- 2070 Median with 1.8-feet SLR (Run 1pp).
- 2070 Median with 3.5 feet SLR (Run 3pp).
- 2070 Median with 3.5 feet SLR with drought year regulatory actions (Run 6pp).
- 2070 Median with 3.5 feet SLR with limited exports in dry and critical years (Run 8pp).
- 2070 Median with 3.5 feet SLR with combined water management actions (Run 9pp).
- 2070 Median with 3.5 feet SLR with combined water management actions and limited exports (Run 10pp).
- 2070 Median with 1.8 feet SLR with combined water management actions and limited exports (Run 11pp).

Drought year regulatory actions (Run 6pp) comprise TUCP-like actions in the 14 driest years out of 94 years of simulation.

Under limited exports (Run 8pp, 10pp, 11pp) there are no storage withdrawals from north-of-Delta project reservoirs to support SOD exports in dry and critical years.

Combined water management actions (Run 9pp, 10pp, 11pp) include reductions in irrigated crop acreage in dry and critical years, reductions in M&I surface water deliveries in the driest 14 years, and TUCP-like regulatory actions in the 14 driest years.

4.1 Project Water Supply Benefits

Table 6 summarizes the results of the sensitivity analysis of combined SWP and CVP exports (including NDD flows, as applicable) under the proposed project for various scenarios for 2070 conditions. The results indicate that the proposed project water supply benefits are relatively stable under a variety of possible scenarios for 2070 conditions.

Table 6. SWP Exports (C_CAA003_SWP + C_CAA003_WTS) for Existing, 2040 CT, and Various 2070 Scenarios

Model Run	Scenario	Average Annual Export (TAF)
Existing Conditions		
N/A	No Project	2,426
N/A	With Proposed Project	2,969
N/A	Proposed Project less No Project	+543
2040 Central Tendency with 1.8 feet SLR		
N/A	No Project	2,213
N/A	With Proposed Project	2,733
N/A	Proposed Project less No Project	+520
2070 Median with 1.8 feet SLR		
1np	No Project	1,883
1pp	With Proposed Project	2,327
	Proposed Project less No Project	+444
2070 Median with 3.5 feet SLR		
3np	No Project	1,780
3pp	With Proposed Project	2,232
	Proposed Project less No Project	+452
2070 Median with 3.5 feet SLR with Drought Year Regulatory Actions		
6np	No Project	1,842
6pp	With Proposed Project	2,297
	Proposed Project less No Project	+456
2070 Median with 3.5 feet SLR with Limited Exports (no storage withdrawals)		
8np	No Project	1,747
8pp	With Proposed Project	2,187
	Proposed Project less No Project	+440
2070 Median with 3.5 feet SLR and Combined Water Management (land use reductions, regulatory actions)		
9np	No Project	1,965
9pp	With Proposed Project	2,400
	Proposed Project less No Project	+435
2070 Median with 3.5 feet SLR and Combined Water Management and Limited Exports		
10np	No Project	1,914
10pp	With Proposed Project	2,363
	Proposed Project less No Project	+449
2070 Median with 1.8 feet SLR and Combined Water Management and Limited Exports		
11np	No Project	1,992
11pp	With Proposed Project	2,450
	Proposed Project less No Project	+457

4.2 Project Impact Analysis

For the proposed project impact analysis, model results for the following metrics were considered:

- Streamflows for major rivers
- Delta channel flows and net Delta outflow
- Delta exports
- Delta salinity
- SWP and CVP reservoir storage (end-of-September and end-of-May)

For each of these metrics, tables summarize the potential impacts of the proposed project by comparing changes between ‘with project’ and ‘without project’ alternatives, as follows.

- Existing conditions (as presented in DCP EIR)
- 2040 CT with 1.8 feet SLR (as presented in DCP EIR)
- 2070 Median with 1.8 feet SLR (Runs 1np, 1pp)
- 2070 Median with 3.5 feet SLR (Runs 3np, 3pp)
- 2070 Median with 3.5 feet SLR with drought year regulatory actions (Runs 6np, 6pp)
- 2070 Median with 3.5 feet SLR with limited exports in dry and critical years (Runs 8np, 8pp)
- 2070 Median with 3.5 feet SLR and combined water management (Runs 9np, 9pp)
- 2070 Median with 3.5 feet SLR, combined water management and limited exports in dry and critical years (Runs 10np, 10pp).
- 2070 Median with 1.8 feet SLR, combined water management and limited exports in dry and critical years (Runs 11np, 11pp).

The tables are formatted to highlight potential impacts of the proposed project that exceed the range of impacts assessed in the EIR existing conditions simulations and future 2040 CT simulations. Light shading indicates that changes (proposed project less no project) under the 2070 simulations are positive and greater than those at 2020 and 2040 CT. Dark shading indicates that changes at 2070 conditions are negative and absolute changes greater than those at 2020 and 2040 CT.

As discussed in the DCP EIR, results from a comparative analysis using CalSim 3 may show minor differences in simulated flows, storage, and water quality that are not the result of the proposed project but are caused by limitations of representing a complex water resources system in a mathematical model. An approximate rule-of-thumb criteria for considering the potential significance of an observed difference in modeling results from a comparative analysis is that observed changes in monthly flow and/or storage of less than 10 TAF or less than 5% may be caused by unintended effects of the modeling process.

4.2.1 Streamflows

Tables 7 to 13 summarize changes in simulated streamflows for with project and without project scenarios at the following key locations (model variables are given on parenthesis):

- Sacramento River at Keswick (C_KSWCK)—changes in flows below Keswick are presented as a surrogate to describe project impacts on Sacramento River flows.
- Feather River at Thermalito (C_FTR059)—changes in flows below Thermalito are presented as a surrogate to describe project impacts on Feather River flows.
- American River at Nimbus (C_NTOMA)—changes in flows below Nimbus Dam are presented as a surrogate to describe project impacts on American River flows.
- Sacramento River at Freeport (C_SAC049)—changes in flows below Freeport are presented to describe project impacts on Delta inflows from the Sacramento Valley.
- Yolo Bypass at Lisbon Weir (C_YBP016)—changes in flows at Lisbon Weir are presented to describe project impacts on Delta inflows from the Yolo Bypass
- San Joaquin River at Vernalis (C_SJR070)—changes in flows at Vernalis are presented to describe project impacts on Delta inflows from San Joaquin River basin.
- Sacramento River below North Delta Diversion (C_SAC041)—changes in flows in downstream from the proposed North Delta Diversion are used to describe the project impacts on Delta inflows from the Sacramento River.

Table 7. Sacramento River at Keswick (C_KSWCK) for Existing, 2040 CT, and various 2070 Scenarios

Scenario	Average Annual (TAF)	Average Monthly (TAF)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Existing Conditions (2020)													
No Project (NP)	6,150	361	379	470	498	600	533	371	500	597	808	602	428
With Proposed Project (PP)	6,146	362	379	470	500	603	533	373	501	598	798	604	424
Difference (PP-NP)	-4	0	0	1	2	3	0	2	0	1	-10	2	-4
% Difference	-0.1%	0.1%	0.1%	0.1%	0.4%	0.5%	0.0%	0.6%	0.1%	0.1%	-1.2%	0.3%	-1.0%
2040 CT													
No Project (NP)	6,303	355	336	496	603	691	590	413	487	588	774	579	389
With Proposed Project (PP)	6,297	354	335	499	605	684	596	404	489	587	774	580	388
Difference (PP-NP)	-6	-1	-1	3	2	-7	7	-9	2	-1	0	0	-1
% Difference	-0.1%	-0.4%	-0.3%	0.6%	0.4%	-1.0%	1.2%	-2.2%	0.5%	-0.2%	0.1%	0.1%	-0.3%
2070 Median with 1.8 ft Sea Level Rise (Run 1)													
No Project (NP)	6,041	304	267	431	752	813	611	302	428	528	711	519	369
With Proposed Project (PP)	6,040	304	268	434	751	814	609	304	430	526	710	517	369
Difference (PP-NP)	-1	0	1	3	-1	0	-2	2	2	-2	-1	-2	0
% Difference	0.0%	0.1%	0.3%	0.6%	-0.1%	0.0%	-0.4%	0.8%	0.4%	-0.5%	-0.1%	-0.4%	-0.1%
2070 Median with 3.5 ft Sea Level Rise (Run 3)													
No Project (NP)	6,070	349	256	402	714	793	600	322	461	554	724	521	368
With Proposed Project (PP)	6,069	350	255	405	717	795	601	316	461	554	722	521	367
Difference (PP-NP)	-1	0	-1	3	3	2	0	-6	0	0	-1	0	-1
% Difference	0.0%	0.1%	-0.5%	0.7%	0.5%	0.2%	0.0%	-1.7%	0.0%	0.0%	-0.2%	-0.1%	-0.2%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)													
No Project (NP)	6,043	359	267	434	744	805	598	278	430	511	727	514	371
With Proposed Project (PP)	6,045	362	263	438	744	804	598	279	430	512	731	510	372
Difference (PP-NP)	2	2	-4	4	0	-1	0	1	0	0	4	-4	1
% Difference	0.0%	0.6%	-1.6%	1.0%	0.0%	-0.1%	0.0%	0.4%	0.0%	0.1%	0.5%	-0.8%	0.2%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)													
No Project (NP)	6,068	349	256	401	714	794	603	318	460	555	725	522	368
With Proposed Project (PP)	6,068	351	255	404	716	794	603	313	460	551	726	524	368
Difference (PP-NP)	-1	2	-2	3	3	0	0	-5	-1	-4	1	2	0
% Difference	0.0%	0.5%	-0.6%	0.7%	0.4%	0.0%	0.0%	-1.4%	-0.1%	-0.7%	0.1%	0.4%	0.0%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)													
No Project (NP)	5,993	343	289	484	797	835	622	270	373	462	678	469	368
With Proposed Project (PP)	5,997	344	283	488	798	836	621	270	377	463	675	473	365
Difference (PP-NP)	4	1	-6	3	0	2	-1	0	4	0	-3	4	-3
% Difference	0.1%	0.3%	-2.1%	0.6%	0.0%	0.2%	-0.2%	0.1%	1.0%	0.1%	-0.5%	0.9%	-0.8%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)													
No Project (NP)	5,991	347	282	486	799	839	622	273	370	460	668	476	367
With Proposed Project (PP)	5,992	338	284	487	800	842	624	270	374	461	670	474	366
Difference (PP-NP)	1	-9	2	2	1	3	2	-4	4	1	2	-1	-2
% Difference	0.0%	-2.6%	0.8%	0.3%	0.1%	0.3%	0.4%	-1.3%	1.1%	0.2%	0.3%	-0.2%	-0.4%
2070 Median with 1.8 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)													
No Project (NP)	5,960	299	287	514	832	865	631	253	355	438	640	478	368
With Proposed Project (PP)	5,961	299	288	514	832	867	630	253	355	438	639	479	366
Difference (PP-NP)	1	0	1	-1	0	1	0	0	0	0	0	1	-1
% Difference	0.0%	0.1%	0.4%	-0.1%	0.0%	0.1%	0.0%	-0.1%	0.1%	0.0%	-0.1%	0.3%	-0.3%

Table 8. Feather River at Thermalito (C_FTR059) for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Annual (TAF)	Average Monthly (TAF)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Existing Conditions (2020)													
No Project (NP)	2,994	138	112	182	265	315	366	214	247	234	432	312	176
With Proposed Project (PP)	2,993	147	113	180	267	314	368	215	246	236	429	307	171
Difference (PP-NP)	-1	9	1	-2	2	0	2	1	-1	1	-4	-5	-4
% Difference	0.0%	6.3%	0.5%	-0.9%	0.8%	-0.1%	0.5%	0.4%	-0.4%	0.5%	-0.9%	-1.8%	-2.5%
2040 CT													
No Project (NP)	3,192	141	114	190	338	403	463	238	166	310	427	292	107
With Proposed Project (PP)	3,187	147	116	195	337	399	463	234	169	309	413	298	106
Difference (PP-NP)	-5	6	1	5	-2	-4	0	-4	3	-1	-14	6	-1
% Difference	-0.1%	4.4%	1.1%	2.4%	-0.6%	-1.0%	0.0%	-1.6%	2.1%	-0.4%	-3.3%	2.0%	-0.9%
2070 Median with 1.8 ft Sea Level Rise (Run 1)													
No Project (NP)	3,130	124	104	177	449	532	516	192	126	256	338	209	103
With Proposed Project (PP)	3,124	131	104	177	449	525	514	193	125	257	321	222	102
Difference (PP-NP)	-6	7	0	1	-1	-7	-2	1	-1	1	-18	13	-1
% Difference	-0.2%	5.3%	-0.1%	0.4%	-0.1%	-1.2%	-0.4%	0.6%	-1.1%	0.5%	-5.2%	6.3%	-0.5%
2070 Median with 3.5 ft Sea Level Rise (Run 3)													
No Project (NP)	3,139	136	107	169	440	520	512	210	143	267	326	207	103
With Proposed Project (PP)	3,138	144	107	169	441	516	513	206	141	265	309	224	101
Difference (PP-NP)	-2	8	0	0	2	-4	1	-4	-2	-2	-16	17	-1
% Difference	-0.1%	5.6%	0.1%	-0.1%	0.4%	-0.7%	0.2%	-2.0%	-1.6%	-0.6%	-5.0%	8.1%	-1.3%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)													
No Project (NP)	3,126	137	104	183	454	531	511	169	116	213	371	219	116
With Proposed Project (PP)	3,126	150	103	183	450	535	508	171	118	212	349	235	110
Difference (PP-NP)	-1	13	-2	1	-4	4	-3	2	2	-1	-22	16	-6
% Difference	0.0%	9.3%	-1.5%	0.4%	-1.0%	0.7%	-0.6%	1.4%	1.3%	-0.4%	-5.9%	7.5%	-5.0%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)													
No Project (NP)	3,135	135	108	183	442	522	512	209	140	252	313	214	103
With Proposed Project (PP)	3,132	144	109	189	441	521	518	206	140	238	296	226	102
Difference (PP-NP)	-3	9	1	6	-1	-2	6	-3	-1	-14	-16	12	-1
% Difference	-0.1%	7.0%	1.3%	3.1%	-0.3%	-0.3%	1.1%	-1.4%	-0.4%	-5.5%	-5.2%	5.8%	-1.4%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)													
No Project (NP)	3,297	139	108	201	467	554	539	177	124	228	397	238	123
With Proposed Project (PP)	3,296	148	105	203	465	558	532	180	125	224	380	251	123
Difference (PP-NP)	0	9	-2	2	-2	3	-7	3	1	-4	-17	13	0
% Difference	0.0%	6.3%	-2.2%	1.0%	-0.5%	0.6%	-1.4%	1.9%	1.0%	-1.8%	-4.3%	5.4%	-0.3%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)													
No Project (NP)	3,295	143	111	213	471	567	541	184	119	210	372	242	120
With Proposed Project (PP)	3,293	147	111	216	469	565	538	187	123	211	352	251	121
Difference (PP-NP)	-2	4	0	3	-2	-2	-2	2	4	1	-20	9	1
% Difference	-0.1%	3.1%	-0.3%	1.6%	-0.4%	-0.3%	-0.4%	1.3%	3.1%	0.3%	-5.3%	3.9%	0.7%
2070 Median with 1.8 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)													
No Project (NP)	3,286	134	112	224	486	589	556	176	105	181	369	237	116
With Proposed Project (PP)	3,284	142	113	227	482	587	551	178	108	182	355	244	114
Difference (PP-NP)	-2	8	1	3	-4	-2	-4	2	3	0	-14	7	-2
% Difference	-0.1%	5.6%	1.0%	1.4%	-0.8%	-0.4%	-0.8%	1.2%	2.6%	0.2%	-3.7%	3.0%	-1.7%

Table 9. American River at Nimbus (C_NTOMA) for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Annual (TAF)	Average Monthly (TAF)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Existing Conditions (2020)													
No Project (NP)	2,428	88	152	192	251	268	199	187	303	290	225	162	110
With Proposed Project (PP)	2,428	89	154	192	250	269	199	189	303	291	222	159	109
Difference (PP-NP)	0	2	2	0	-1	1	0	1	0	1	-3	-3	0
% Difference	0.0%	2.0%	1.5%	0.0%	-0.3%	0.2%	0.2%	0.6%	-0.1%	0.4%	-1.3%	-1.9%	-0.3%
2040 CT													
No Project (NP)	2,387	89	142	246	323	331	266	224	213	162	148	123	118
With Proposed Project (PP)	2,386	89	142	247	324	329	265	221	215	163	150	122	117
Difference (PP-NP)	-1	0	0	1	1	-2	-1	-3	2	1	2	-1	0
% Difference	0.0%	0.0%	0.3%	0.4%	0.3%	-0.7%	-0.4%	-1.4%	1.1%	0.5%	1.2%	-0.7%	-0.1%
2070 Median with 1.8 ft Sea Level Rise (Run 1)													
No Project (NP)	2,366	79	111	209	349	349	292	225	182	163	163	124	117
With Proposed Project (PP)	2,365	80	111	209	349	349	291	224	182	164	162	125	117
Difference (PP-NP)	0	1	0	0	0	0	-1	0	0	1	-1	2	0
% Difference	0.0%	1.0%	0.0%	0.0%	0.0%	-0.1%	-0.5%	-0.1%	-0.3%	0.9%	-0.7%	1.2%	-0.2%
2070 Median with 3.5 ft Sea Level Rise (Run 3)													
No Project (NP)	2,369	81	111	205	343	345	291	237	187	170	154	124	120
With Proposed Project (PP)	2,369	81	111	204	343	345	292	235	188	171	153	125	119
Difference (PP-NP)	0	0	0	-1	0	0	0	-2	1	1	-1	1	0
% Difference	0.0%	0.2%	0.1%	-0.4%	0.1%	0.0%	0.1%	-0.6%	0.3%	0.5%	-0.7%	0.7%	-0.1%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)													
No Project (NP)	2,365	85	112	208	350	345	290	209	187	165	169	122	120
With Proposed Project (PP)	2,365	86	113	208	349	344	291	210	187	164	170	122	120
Difference (PP-NP)	0	1	0	0	-1	-1	0	0	1	0	0	0	0
% Difference	0.0%	1.7%	0.2%	0.1%	-0.3%	-0.2%	0.1%	0.2%	0.3%	-0.2%	0.1%	-0.3%	-0.2%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)													
No Project (NP)	2,369	81	113	204	343	345	291	237	187	169	155	123	120
With Proposed Project (PP)	2,369	81	113	204	343	345	291	236	187	169	156	123	120
Difference (PP-NP)	0	0	0	0	0	-1	0	-1	0	0	1	0	0
% Difference	0.0%	0.2%	0.1%	-0.1%	0.0%	-0.2%	0.1%	-0.4%	0.0%	-0.2%	0.7%	0.2%	0.0%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)													
No Project (NP)	2,358	85	117	214	357	352	293	207	182	152	161	115	123
With Proposed Project (PP)	2,358	85	116	214	359	352	291	207	182	153	162	115	121
Difference (PP-NP)	0	-1	0	1	1	0	-1	0	-1	1	1	1	-2
% Difference	0.0%	-0.6%	-0.4%	0.3%	0.4%	0.1%	-0.5%	-0.1%	-0.3%	0.5%	0.8%	0.8%	-2.0%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)													
No Project (NP)	2,358	87	117	213	359	352	292	207	182	153	159	114	121
With Proposed Project (PP)	2,358	87	115	214	358	352	292	207	182	154	160	114	123
Difference (PP-NP)	0	0	-1	1	-1	0	0	0	0	0	0	0	2
% Difference	0.0%	-0.2%	-1.1%	0.6%	-0.3%	0.0%	0.0%	0.1%	-0.2%	0.2%	0.2%	-0.3%	1.7%
2070 Median with 1.8 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)													
No Project (NP)	2,355	81	121	218	367	362	290	205	175	136	165	114	118
With Proposed Project (PP)	2,355	81	121	218	367	362	290	205	175	136	166	114	118
Difference (PP-NP)	0	0	0	0	0	0	0	0	0	0	1	0	0
% Difference	0.0%	0.2%	0.3%	-0.1%	0.1%	0.0%	-0.1%	-0.1%	0.1%	-0.3%	0.4%	-0.3%	-0.2%

Table 10. Sacramento River at Freeport (C_SAC049) for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Annual (TAF)	Average Monthly (TAF)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Existing Conditions (2020)													
No Project (NP)	15,288	694	807	1,392	1,858	2,052	1,988	1,346	1,267	1,006	1,112	905	851
With Proposed Project (PP)	15,279	703	810	1,391	1,860	2,054	1,991	1,349	1,267	1,009	1,097	899	841
Difference (PP-NP)	-8	9	3	-1	2	2	3	4	0	3	-15	-6	-10
% Difference	-0.1%	1.2%	0.3%	0.0%	0.1%	0.1%	0.2%	0.3%	0.0%	0.3%	-1.4%	-0.7%	-1.2%
2040 CT													
No Project (NP)	14,599	602	772	1,468	1,983	2,144	2,075	1,362	978	797	923	766	722
With Proposed Project (PP)	14,584	606	773	1,475	1,986	2,135	2,073	1,348	984	795	912	768	721
Difference (PP-NP)	-15	4	1	7	3	-9	-2	-14	6	-2	-11	3	-2
% Difference	-0.1%	0.7%	0.1%	0.4%	0.2%	-0.4%	-0.1%	-1.0%	0.7%	-0.2%	-1.2%	0.3%	-0.2%
2070 Median with 1.8 ft Sea Level Rise (Run 1)													
No Project (NP)	13,596	524	586	1,325	2,131	2,204	2,089	1,160	769	671	809	640	680
With Proposed Project (PP)	13,583	530	587	1,326	2,131	2,199	2,083	1,162	770	669	789	649	679
Difference (PP-NP)	-13	7	1	1	0	-4	-6	2	1	-2	-20	9	-1
% Difference	-0.1%	1.3%	0.1%	0.1%	0.0%	-0.2%	-0.3%	0.2%	0.1%	-0.3%	-2.5%	1.3%	-0.1%
2070 Median with 3.5 ft Sea Level Rise (Run 3)													
No Project (NP)	13,734	577	591	1,305	2,109	2,186	2,075	1,201	823	721	809	653	677
With Proposed Project (PP)	13,731	586	588	1,305	2,115	2,184	2,076	1,192	823	720	792	666	674
Difference (PP-NP)	-2	9	-3	1	6	-1	1	-8	0	-1	-17	14	-2
% Difference	0.0%	1.5%	-0.4%	0.1%	0.3%	-0.1%	0.1%	-0.7%	-0.1%	-0.1%	-2.1%	2.1%	-0.3%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)													
No Project (NP)	13,587	594	592	1,329	2,132	2,188	2,072	1,103	753	617	856	650	694
With Proposed Project (PP)	13,592	611	586	1,333	2,131	2,191	2,070	1,106	755	616	840	659	689
Difference (PP-NP)	5	17	-6	4	-2	3	-2	3	2	0	-16	9	-5
% Difference	0.0%	2.9%	-1.0%	0.3%	-0.1%	0.2%	-0.1%	0.3%	0.3%	-0.1%	-1.9%	1.4%	-0.8%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)													
No Project (NP)	13,703	576	591	1,306	2,109	2,186	2,076	1,198	821	705	795	657	674
With Proposed Project (PP)	13,690	587	590	1,309	2,111	2,185	2,080	1,192	820	689	780	667	672
Difference (PP-NP)	-13	10	0	3	2	-2	4	-6	-1	-16	-16	11	-2
% Difference	-0.1%	1.8%	-0.1%	0.2%	0.1%	-0.1%	0.2%	-0.5%	-0.2%	-2.3%	-2.0%	1.6%	-0.2%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)													
No Project (NP)	13,792	585	626	1,369	2,187	2,225	2,120	1,121	750	622	862	635	684
With Proposed Project (PP)	13,800	597	618	1,371	2,189	2,233	2,114	1,125	754	620	845	650	677
Difference (PP-NP)	8	11	-7	2	2	7	-7	3	4	-3	-17	15	-7
% Difference	0.1%	1.9%	-1.2%	0.1%	0.1%	0.3%	-0.3%	0.3%	0.5%	-0.4%	-1.9%	2.3%	-1.0%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)													
No Project (NP)	13,756	594	620	1,368	2,194	2,232	2,119	1,130	746	604	827	641	673
With Proposed Project (PP)	13,760	589	622	1,372	2,192	2,235	2,121	1,130	752	606	811	646	678
Difference (PP-NP)	4	-5	2	4	-2	4	2	-1	6	2	-16	5	5
% Difference	0.0%	-0.8%	0.4%	0.3%	-0.1%	0.2%	0.1%	-0.1%	0.8%	0.4%	-1.9%	0.7%	0.7%
2070 Median with 1.8 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)													
No Project (NP)	13,613	533	621	1,389	2,218	2,265	2,133	1,107	709	537	801	629	666
With Proposed Project (PP)	13,619	541	625	1,390	2,218	2,265	2,129	1,107	712	537	789	634	663
Difference (PP-NP)	5	8	3	2	0	1	-3	1	3	0	-12	5	-2
% Difference	0.0%	1.4%	0.5%	0.1%	0.0%	0.0%	-0.2%	0.1%	0.4%	0.1%	-1.5%	0.8%	-0.3%

Table 11. Yolo Bypass at Lisbon Weir (C_YBP016) for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Annual (TAF)	Average Monthly (TAF)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Existing Conditions (2020)													
No Project (NP)	2,345	12	37	241	592	726	499	136	43	20	13	11	14
With Proposed Project (PP)	2,347	12	37	240	593	727	499	136	43	20	13	11	14
Difference (PP-NP)	1	0	1	0	1	1	-1	0	0	0	0	0	0
% Difference	0.1%	1.3%	1.4%	-0.1%	0.1%	0.1%	-0.1%	-0.1%	0.2%	-0.2%	0.0%	-0.1%	-0.1%
2040 CT													
No Project (NP)	3,550	9	41	435	948	1,019	783	226	32	18	13	10	13
With Proposed Project (PP)	3,554	9	41	437	947	1,017	789	226	32	18	13	10	13
Difference (PP-NP)	4	0	0	1	-1	-2	6	0	0	0	0	0	0
% Difference	0.1%	-2.0%	0.3%	0.3%	-0.1%	-0.2%	0.8%	-0.1%	0.2%	-0.1%	-0.2%	0.1%	0.4%
2070 Median with 1.8 ft Sea Level Rise (Run 1)													
No Project (NP)	3,963	7	21	356	1,273	1,265	835	131	25	14	12	9	10
With Proposed Project (PP)	3,964	7	21	358	1,272	1,264	835	132	25	14	12	10	10
Difference (PP-NP)	1	0	0	2	-1	-1	1	0	0	0	0	0	0
% Difference	0.0%	-0.8%	-0.2%	0.5%	-0.1%	-0.1%	0.1%	0.3%	-0.1%	0.4%	-0.2%	0.4%	0.2%
2070 Median with 3.5 ft Sea Level Rise (Run 3)													
No Project (NP)	3,889	7	21	338	1,241	1,245	830	132	25	14	12	10	11
With Proposed Project (PP)	3,888	7	21	339	1,240	1,244	830	132	25	14	12	10	11
Difference (PP-NP)	-1	0	0	1	0	-1	0	0	0	0	0	0	0
% Difference	0.0%	0.1%	-0.1%	0.4%	0.0%	-0.1%	0.0%	-0.3%	-0.3%	0.0%	-0.5%	-0.1%	-0.1%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)													
No Project (NP)	3,964	7	22	360	1,269	1,265	834	130	26	15	12	10	11
With Proposed Project (PP)	3,960	7	22	360	1,266	1,265	833	131	26	15	12	10	11
Difference (PP-NP)	-4	0	1	0	-3	-1	-1	0	0	0	0	0	0
% Difference	-0.1%	-0.3%	3.1%	0.0%	-0.2%	-0.1%	-0.1%	0.2%	0.1%	-0.7%	-0.1%	0.2%	-2.5%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)													
No Project (NP)	3,906	7	21	348	1,244	1,249	832	131	25	14	12	10	11
With Proposed Project (PP)	3,911	7	21	353	1,243	1,246	833	131	25	16	12	10	11
Difference (PP-NP)	5	0	0	5	0	-2	1	0	0	2	0	0	0
% Difference	0.1%	-0.8%	0.9%	1.4%	0.0%	-0.2%	0.1%	-0.4%	-0.6%	11.8%	2.3%	-1.0%	-0.1%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)													
No Project (NP)	4,173	7	28	398	1,332	1,315	872	140	28	16	12	9	11
With Proposed Project (PP)	4,170	7	27	401	1,330	1,313	870	140	28	16	12	9	11
Difference (PP-NP)	-3	0	-1	3	-2	-2	-2	0	0	0	0	0	0
% Difference	-0.1%	-0.3%	-2.2%	0.8%	-0.1%	-0.1%	-0.3%	0.2%	0.1%	0.0%	0.1%	0.5%	1.1%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)													
No Project (NP)	4,201	7	29	409	1,333	1,325	874	141	28	17	12	9	11
With Proposed Project (PP)	4,200	7	29	412	1,333	1,323	873	142	28	17	12	9	11
Difference (PP-NP)	-1	0	-1	3	0	-2	-2	1	0	0	0	0	0
% Difference	0.0%	1.1%	-2.6%	0.6%	0.0%	-0.1%	-0.2%	0.5%	0.0%	0.0%	0.0%	0.1%	-0.3%
2070 Median with 1.8 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)													
No Project (NP)	4,289	7	32	429	1,363	1,349	885	142	28	17	12	9	11
With Proposed Project (PP)	4,284	7	32	430	1,360	1,348	884	142	28	17	12	9	11
Difference (PP-NP)	-5	0	0	1	-3	-2	-1	1	0	0	0	0	0
% Difference	-0.1%	0.1%	-0.3%	0.1%	-0.2%	-0.1%	-0.1%	0.5%	0.1%	-0.4%	0.1%	-0.2%	-0.1%

Table 12. San Joaquin River at Vernalis (C_SJR070) for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Annual (TAF)	Average Monthly (TAF)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Existing Conditions (2020)													
No Project (NP)	2,648	170	118	157	247	284	341	359	340	254	157	111	107
With Proposed Project (PP)	2,654	171	118	157	247	284	341	360	341	255	157	112	108
Difference (PP-NP)	6	0	0	0	0	0	0	1	1	1	1	1	1
% Difference	0.2%	0.3%	0.3%	0.2%	0.2%	0.1%	0.1%	0.1%	0.2%	0.3%	0.5%	0.6%	0.5%
2040 CT													
No Project (NP)	2,694	155	113	184	293	324	375	368	351	223	121	89	96
With Proposed Project (PP)	2,695	155	113	184	293	325	375	368	351	223	122	89	96
Difference (PP-NP)	1	0	0	0	0	0	0	0	0	0	0	0	0
% Difference	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%
2070 Median with 1.8 ft Sea Level Rise (Run 1)													
No Project (NP)	2,646	142	100	157	322	351	411	377	342	184	100	73	84
With Proposed Project (PP)	2,647	142	100	157	322	351	411	377	342	185	100	73	84
Difference (PP-NP)	1	0	0	0	0	0	0	0	0	0	0	0	0
% Difference	0.0%	0.0%	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.1%	0.2%	0.1%	0.1%
2070 Median with 3.5 ft Sea Level Rise (Run 3)													
No Project (NP)	2,643	142	100	156	322	351	411	377	342	184	100	73	84
With Proposed Project (PP)	2,643	142	100	156	322	351	411	377	342	184	100	73	84
Difference (PP-NP)	1	0	0	0	0	0	0	0	0	0	0	0	0
% Difference	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)													
No Project (NP)	2,645	142	100	157	322	351	411	377	342	184	100	73	84
With Proposed Project (PP)	2,646	142	100	157	322	351	411	377	342	184	100	73	84
Difference (PP-NP)	2	0	0	0	0	0	0	0	0	0	0	0	0
% Difference	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	0.2%	0.2%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)													
No Project (NP)	2,642	142	100	156	322	350	411	377	342	184	100	73	84
With Proposed Project (PP)	2,643	142	100	156	322	351	411	377	342	184	100	73	84
Difference (PP-NP)	0	0	0	0	0	0	0	0	0	0	0	0	0
% Difference	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)													
No Project (NP)	2,832	150	109	170	346	378	434	396	360	199	111	83	93
With Proposed Project (PP)	2,832	150	109	170	347	378	434	396	360	199	112	82	93
Difference (PP-NP)	0	0	0	0	0	0	0	0	0	0	0	0	0
% Difference	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	-0.5%	0.1%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)													
No Project (NP)	2,830	150	108	170	346	378	434	396	359	199	111	83	93
With Proposed Project (PP)	2,831	150	108	170	346	378	434	396	359	199	111	82	93
Difference (PP-NP)	2	0	0	0	0	0	0	0	0	0	0	0	0
% Difference	0.1%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.1%	-0.1%	0.0%
2070 Median with 1.8 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)													
No Project (NP)	2,832	151	108	170	346	378	434	396	360	199	112	83	93
With Proposed Project (PP)	2,833	151	108	170	346	378	434	396	360	199	112	83	93
Difference (PP-NP)	1	0	0	0	0	0	0	0	0	0	0	0	0
% Difference	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.2%	0.2%	0.1%

Table 13. Sacramento River Downstream from North Delta Diversion (C_SAC041) for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Annual (TAF)	Average Monthly (TAF)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Existing Conditions (2020)													
No Project (NP)	15,507	711	823	1,415	1,883	2,082	2,011	1,364	1,281	1,019	1,124	918	866
With Proposed Project (PP)	14,752	700	772	1,328	1,746	1,961	1,881	1,348	1,249	977	1,054	903	826
Difference (PP-NP)	-755	-11	-51	-87	-138	-121	-130	-16	-32	-42	-71	-15	-40
% Difference	-4.9%	-1.6%	-6.2%	-6.2%	-7.3%	-5.8%	-6.5%	-1.2%	-2.5%	-4.1%	-6.3%	-1.7%	-4.6%
2040 CT													
No Project (NP)	14,965	631	800	1,506	2,022	2,186	2,110	1,392	1,003	821	947	790	749
With Proposed Project (PP)	14,327	613	743	1,406	1,878	2,065	1,981	1,363	996	815	935	792	731
Difference (PP-NP)	-638	-18	-57	-100	-144	-121	-129	-29	-7	-5	-12	2	-18
% Difference	-4.3%	-2.8%	-7.2%	-6.6%	-7.1%	-5.5%	-6.1%	-2.1%	-0.7%	-0.6%	-1.2%	0.2%	-2.4%
2070 Median with 1.8 ft Sea Level Rise (Run 1)													
No Project (NP)	14,031	556	621	1,369	2,180	2,249	2,128	1,194	800	702	840	671	711
With Proposed Project (PP)	13,527	558	599	1,291	2,031	2,130	2,015	1,189	798	699	820	680	710
Difference (PP-NP)	-503	2	-22	-77	-149	-120	-113	-5	-3	-3	-20	9	-1
% Difference	-3.6%	0.3%	-3.5%	-5.7%	-6.8%	-5.3%	-5.3%	-0.4%	-0.4%	-0.4%	-2.4%	1.3%	-0.1%
2070 Median with 3.5 ft Sea Level Rise (Run 3)													
No Project (NP)	14,169	610	625	1,349	2,158	2,231	2,114	1,235	855	752	840	684	708
With Proposed Project (PP)	13,667	606	602	1,271	2,016	2,115	2,004	1,220	850	749	823	697	705
Difference (PP-NP)	-502	-4	-23	-78	-142	-116	-110	-15	-5	-2	-17	14	-3
% Difference	-3.5%	-0.6%	-3.7%	-5.8%	-6.6%	-5.2%	-5.2%	-1.2%	-0.6%	-0.3%	-2.0%	2.0%	-0.4%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)													
No Project (NP)	14,022	626	626	1,373	2,182	2,234	2,112	1,136	785	648	887	681	726
With Proposed Project (PP)	13,509	629	602	1,296	2,032	2,116	1,998	1,132	776	646	870	689	718
Difference (PP-NP)	-514	3	-24	-78	-150	-117	-114	-4	-8	-2	-17	9	-7
% Difference	-3.7%	0.4%	-3.9%	-5.7%	-6.9%	-5.3%	-5.4%	-0.4%	-1.0%	-0.3%	-1.9%	1.3%	-1.0%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)													
No Project (NP)	14,137	609	625	1,350	2,158	2,232	2,115	1,232	852	736	826	688	705
With Proposed Project (PP)	13,620	607	606	1,273	2,012	2,114	2,004	1,219	847	718	811	698	703
Difference (PP-NP)	-517	-2	-19	-77	-146	-118	-111	-13	-5	-18	-16	10	-3
% Difference	-3.7%	-0.3%	-3.1%	-5.7%	-6.8%	-5.3%	-5.2%	-1.1%	-0.6%	-2.4%	-1.9%	1.5%	-0.4%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)													
No Project (NP)	14,198	615	658	1,410	2,234	2,268	2,158	1,153	779	651	890	664	713
With Proposed Project (PP)	13,683	612	628	1,328	2,090	2,158	2,035	1,148	773	647	873	679	704
Difference (PP-NP)	-516	-3	-30	-82	-144	-111	-123	-5	-6	-4	-17	15	-8
% Difference	-3.6%	-0.5%	-4.6%	-5.8%	-6.5%	-4.9%	-5.7%	-0.4%	-0.7%	-0.6%	-1.9%	2.2%	-1.2%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)													
No Project (NP)	14,162	624	652	1,409	2,241	2,275	2,156	1,162	775	632	856	670	702
With Proposed Project (PP)	13,627	604	635	1,329	2,090	2,156	2,038	1,147	772	633	840	674	704
Difference (PP-NP)	-535	-20	-17	-80	-151	-119	-118	-14	-3	1	-16	5	2
% Difference	-3.8%	-3.2%	-2.6%	-5.7%	-6.7%	-5.2%	-5.5%	-1.2%	-0.4%	0.1%	-1.9%	0.7%	0.3%
2070 Median with 1.8 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)													
No Project (NP)	14,020	563	653	1,430	2,265	2,308	2,170	1,138	738	565	829	658	694
With Proposed Project (PP)	13,507	564	636	1,348	2,115	2,192	2,048	1,127	734	564	817	663	692
Difference (PP-NP)	-512	1	-18	-82	-151	-116	-122	-11	-4	-1	-12	5	-2
% Difference	-3.7%	0.2%	-2.7%	-5.7%	-6.7%	-5.0%	-5.6%	-1.0%	-0.5%	-0.2%	-1.5%	0.8%	-0.3%

4.2.2 Delta Channels and Delta Outflow

Tables 14 to 16 summarize the potential project impacts on Delta channels and Delta outflow using the following three indices/metrics:

- Net Delta Outflow Index (NDOI)
- X2 Position (X2_PRV)[16]
- Combined Old and Middle River flow (C_OMR014)

[16] In CalSim 3, X2_PRV is the X2 location in the previous month. Values presented in this TM have been adjusted to show X2 location in the current month.

Table 14. Net Delta Outflow Index (NDOI) for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Annual (TAF)	Average Monthly (TAF)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Existing Conditions (2020)													
No Project (NP)	15,227	413	542	1,393	2,442	2,822	2,620	1,651	1,347	787	490	308	400
With Proposed Project (PP)	14,637	412	513	1,323	2,310	2,709	2,500	1,645	1,311	745	462	306	389
Difference (PP-NP)	-590	-1	-29	-70	-132	-113	-120	-6	-36	-42	-28	-3	-11
% Difference	-3.9%	-0.3%	-5.3%	-5.0%	-5.4%	-4.0%	-4.6%	-0.4%	-2.6%	-5.3%	-5.6%	-0.8%	-2.8%
2040 CT													
No Project (NP)	16,764	428	546	1,741	2,989	3,294	3,068	1,797	1,112	575	448	316	436
With Proposed Project (PP)	16,219	417	520	1,647	2,846	3,174	2,958	1,777	1,102	573	447	316	430
Difference (PP-NP)	-545	-11	-27	-94	-143	-121	-110	-21	-10	-2	0	0	-6
% Difference	-3.3%	-2.6%	-4.9%	-5.4%	-4.8%	-3.7%	-3.6%	-1.1%	-0.9%	-0.3%	-0.1%	0.0%	-1.3%
2070 Median with 1.8 ft Sea Level Rise (Run 1)													
No Project (NP)	16,945	419	412	1,537	3,536	3,682	3,226	1,525	921	463	417	317	478
With Proposed Project (PP)	16,477	415	399	1,462	3,388	3,557	3,124	1,528	917	462	418	316	477
Difference (PP-NP)	-468	-5	-12	-74	-148	-125	-102	3	-4	0	1	-1	0
% Difference	-2.8%	-1.1%	-3.0%	-4.8%	-4.2%	-3.4%	-3.1%	0.2%	-0.4%	-0.1%	0.1%	-0.2%	-0.1%
2070 Median with 3.5 ft Sea Level Rise (Run 3)													
No Project (NP)	17,153	529	424	1,541	3,493	3,633	3,203	1,573	987	523	413	333	489
With Proposed Project (PP)	16,695	528	400	1,465	3,354	3,521	3,105	1,569	982	522	415	335	489
Difference (PP-NP)	-459	-1	-24	-76	-139	-112	-98	-4	-5	0	2	1	0
% Difference	-2.7%	-0.3%	-5.7%	-4.9%	-4.0%	-3.1%	-3.1%	-0.3%	-0.5%	-0.1%	0.4%	0.4%	-0.1%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)													
No Project (NP)	16,994	550	420	1,586	3,543	3,646	3,192	1,468	895	433	427	318	503
With Proposed Project (PP)	16,529	552	401	1,513	3,394	3,530	3,089	1,475	886	433	432	316	500
Difference (PP-NP)	-465	2	-19	-73	-149	-117	-104	7	-10	0	6	-2	-3
% Difference	-2.7%	0.4%	-4.5%	-4.6%	-4.2%	-3.2%	-3.2%	0.5%	-1.1%	0.0%	1.3%	-0.5%	-0.6%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)													
No Project (NP)	17,175	541	418	1,555	3,493	3,637	3,203	1,571	986	522	413	333	490
With Proposed Project (PP)	16,726	535	404	1,493	3,351	3,521	3,103	1,568	982	521	414	334	489
Difference (PP-NP)	-448	-5	-14	-63	-142	-116	-101	-3	-3	-2	1	1	-1
% Difference	-2.6%	-1.0%	-3.4%	-4.0%	-4.1%	-3.2%	-3.1%	-0.2%	-0.3%	-0.3%	0.2%	0.3%	-0.1%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)													
No Project (NP)	17,477	527	456	1,666	3,673	3,752	3,293	1,507	903	435	431	312	514
With Proposed Project (PP)	17,038	537	427	1,587	3,537	3,661	3,178	1,512	899	433	429	318	507
Difference (PP-NP)	-439	11	-29	-78	-136	-91	-115	5	-4	-1	-3	5	-7
% Difference	-2.5%	2.0%	-6.4%	-4.7%	-3.7%	-2.4%	-3.5%	0.3%	-0.4%	-0.3%	-0.6%	1.7%	-1.3%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)													
No Project (NP)	17,533	545	449	1,678	3,681	3,770	3,295	1,518	899	435	425	320	505
With Proposed Project (PP)	17,080	534	442	1,596	3,541	3,669	3,184	1,512	900	435	426	319	510
Difference (PP-NP)	-453	-11	-7	-82	-140	-100	-110	-6	1	0	1	-1	5
% Difference	-2.6%	-1.9%	-1.5%	-4.9%	-3.8%	-2.7%	-3.3%	-0.4%	0.1%	0.0%	0.2%	-0.2%	1.0%
2070 Median with 1.8 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)													
No Project (NP)	17,360	418	451	1,678	3,732	3,834	3,326	1,489	849	380	396	305	491
With Proposed Project (PP)	16,888	411	439	1,597	3,579	3,725	3,220	1,486	851	379	396	305	489
Difference (PP-NP)	-471	-7	-12	-81	-153	-108	-106	-3	2	-1	0	0	-2
% Difference	-2.7%	-1.6%	-2.7%	-4.8%	-4.1%	-2.8%	-3.2%	-0.2%	0.2%	-0.3%	0.1%	0.1%	-0.3%

Table 15. X2 Position (X2_PRV) for Existing, 2040 CT,and Various 2070 Scenarios

Scenario	Average (KM)	Average Monthly (KM)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Exiting Conditions (2020)													
No Project (NP)	76	85	85	78	70	64	63	66	70	75	81	85	85
With Proposed Project (PP)	76	86	86	79	71	65	64	67	70	76	81	86	86
Difference (PP-NP)	1	0	1	1	1	1	1	0	0	1	1	0	0
% Difference	0.8%	0.3%	0.6%	0.9%	1.6%	1.7%	1.7%	0.5%	0.4%	0.7%	0.7%	0.4%	0.4%
2040 CT													
No Project (NP)	78	87	87	79	71	65	65	68	73	79	84	87	87
With Proposed Project (PP)	78	87	87	79	72	66	66	68	73	79	84	87	87
Difference (PP-NP)	0	0	0	1	1	1	1	0	0	0	0	0	0
% Difference	0.6%	0.3%	0.5%	1.0%	1.4%	1.5%	1.5%	0.7%	0.2%	0.0%	0.0%	0.0%	0.1%
2070 Median with 1.8 ft Sea Level Rise (Run 1)													
No Project (NP)	78	87	88	80	70	64	65	69	75	82	86	88	87
With Proposed Project (PP)	79	87	89	81	70	65	65	70	75	82	86	88	87
Difference (PP-NP)	0	0	0	1	1	1	1	0	0	0	0	0	0
% Difference	0.4%	0.1%	0.2%	0.7%	1.1%	1.1%	1.2%	0.4%	0.1%	0.1%	0.0%	0.0%	0.0%
2070 Median with 3.5 ft Sea Level Rise (Run 3)													
No Project (NP)	79	85	87	81	71	67	67	71	77	82	87	89	88
With Proposed Project (PP)	80	86	88	81	72	68	68	71	77	82	87	89	88
Difference (PP-NP)	0	0	0	0	1	1	1	0	0	0	0	0	0
% Difference	0.3%	0.0%	0.4%	0.6%	0.9%	0.8%	0.8%	0.3%	0.1%	0.1%	0.0%	0.0%	0.0%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)													
No Project (NP)	80	85	87	81	71	67	68	72	78	84	88	90	88
With Proposed Project (PP)	80	85	87	81	71	68	68	73	78	84	87	90	88
Difference (PP-NP)	0	0	0	0	1	1	1	0	0	0	0	0	0
% Difference	0.3%	0.0%	0.3%	0.4%	0.8%	0.8%	0.9%	0.2%	0.2%	0.1%	-0.1%	0.0%	0.2%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)													
No Project (NP)	79	85	87	81	71	67	67	71	77	82	87	89	88
With Proposed Project (PP)	80	85	88	81	72	68	68	71	77	82	87	89	88
Difference (PP-NP)	0	0	0	0	1	1	1	0	0	0	0	0	0
% Difference	0.3%	0.1%	0.2%	0.5%	0.9%	0.9%	0.9%	0.3%	0.1%	0.1%	0.0%	0.0%	0.0%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)													
No Project (NP)	80	85	87	80	70	67	67	72	78	84	87	90	87
With Proposed Project (PP)	80	85	87	81	71	67	68	72	78	84	87	90	87
Difference (PP-NP)	0	0	0	1	1	0	1	0	0	0	0	0	0
% Difference	0.3%	-0.2%	0.4%	0.8%	0.9%	0.6%	0.9%	0.2%	0.1%	0.1%	0.1%	-0.1%	0.0%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)													
No Project (NP)	80	85	87	80	70	67	67	72	78	84	88	90	87
With Proposed Project (PP)	80	85	87	81	71	67	68	72	78	84	88	90	87
Difference (PP-NP)	0	0	0	1	1	0	1	0	0	0	0	0	0
% Difference	0.3%	0.2%	0.2%	0.7%	0.9%	0.7%	0.8%	0.3%	0.1%	0.0%	0.0%	0.0%	-0.1%
2070 Median with 1.8 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)													
No Project (NP)	79	87	88	80	69	64	65	70	77	84	87	89	88
With Proposed Project (PP)	79	87	88	80	70	65	65	70	77	84	87	89	88
Difference (PP-NP)	0	0	0	1	1	1	1	0	0	0	0	0	0
% Difference	0.4%	0.1%	0.2%	0.7%	1.1%	0.8%	0.9%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%

Table 16. Combined Old and Middle River Flow (C_OMR014) for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Annual (TAF)	Average Monthly (TAF)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Existing Conditions (2020)													
No Project (NP)	-3,506	-306	-391	-345	-245	-219	-159	-82	-113	-256	-520	-484	-385
With Proposed Project (PP)	-3,358	-297	-371	-329	-241	-211	-149	-74	-117	-256	-480	-472	-359
Difference (PP-NP)	148	9	20	16	4	7	10	9	-3	0	39	12	26
% Difference	-4.2%	-2.9%	-5.1%	-4.6%	-1.6%	-3.3%	-6.3%	-10.6%	3.1%	0.0%	-7.6%	-2.4%	-6.6%
2040 CT													
No Project (NP)	-2,729	-208	-366	-311	-231	-184	-128	-58	-54	-237	-369	-343	-238
With Proposed Project (PP)	-2,648	-202	-338	-308	-229	-181	-117	-51	-56	-234	-358	-345	-227
Difference (PP-NP)	81	6	28	3	2	2	11	8	-3	3	11	-2	11
% Difference	-3.0%	-2.8%	-7.6%	-1.1%	-1.1%	-1.1%	-8.9%	-13.1%	4.8%	-1.3%	-2.9%	0.5%	-4.6%
2070 Median with 1.8 ft Sea Level Rise (Run 1)													
No Project (NP)	-2,074	-152	-274	-271	-181	-135	-71	12	-27	-228	-315	-252	-180
With Proposed Project (PP)	-2,043	-157	-265	-269	-179	-139	-61	17	-29	-225	-295	-260	-179
Difference (PP-NP)	31	-6	9	2	2	-4	10	5	-1	3	19	-8	0
% Difference	-1.5%	3.8%	-3.2%	-0.7%	-1.2%	2.7%	-14.5%	38.0%	3.7%	-1.2%	-6.2%	3.4%	-0.3%
2070 Median with 3.5 ft Sea Level Rise (Run 3)													
No Project (NP)	-1,944	-100	-267	-231	-172	-145	-76	16	-17	-219	-317	-248	-166
With Proposed Project (PP)	-1,906	-98	-268	-231	-168	-140	-65	23	-17	-217	-300	-260	-163
Difference (PP-NP)	38	2	-1	0	4	5	10	7	-1	2	17	-11	2
% Difference	-2.0%	-2.1%	0.3%	-0.2%	-2.1%	-3.2%	-13.8%	47.9%	4.5%	-0.9%	-5.5%	4.5%	-1.4%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)													
No Project (NP)	-2,022	-96	-272	-232	-173	-153	-85	11	-36	-206	-348	-260	-169
With Proposed Project (PP)	-1,979	-97	-267	-229	-169	-152	-75	18	-40	-204	-327	-270	-166
Difference (PP-NP)	44	-1	5	4	4	1	10	7	-3	2	21	-10	4
% Difference	-2.2%	0.8%	-1.7%	-1.7%	-2.3%	-0.5%	-12.1%	62.9%	8.3%	-1.0%	-5.9%	3.8%	-2.3%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)													
No Project (NP)	-1,910	-89	-272	-229	-174	-144	-77	16	-16	-205	-305	-252	-163
With Proposed Project (PP)	-1,852	-92	-267	-220	-171	-140	-69	24	-15	-191	-289	-260	-161
Difference (PP-NP)	58	-3	4	9	4	4	9	7	2	14	16	-9	2
% Difference	-3.0%	3.2%	-1.6%	-3.8%	-2.1%	-2.7%	-11.4%	42.8%	-9.4%	-6.7%	-5.3%	3.4%	-1.2%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)													
No Project (NP)	-2,002	-113	-276	-238	-170	-145	-76	21	-32	-212	-353	-254	-153
With Proposed Project (PP)	-1,934	-100	-275	-238	-161	-126	-67	27	-31	-210	-340	-262	-151
Difference (PP-NP)	68	13	1	0	9	19	9	6	1	3	14	-8	1
% Difference	-3.4%	-11.5%	-0.4%	-0.1%	-5.2%	-13.1%	-12.4%	29.2%	-1.9%	-1.3%	-3.8%	3.2%	-1.0%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)													
No Project (NP)	-1,942	-103	-279	-236	-170	-144	-76	22	-32	-194	-327	-252	-151
With Proposed Project (PP)	-1,871	-95	-269	-240	-160	-124	-67	26	-29	-195	-311	-257	-148
Difference (PP-NP)	71	9	10	-4	10	19	8	4	3	-1	16	-5	2
% Difference	-3.7%	-8.3%	-3.4%	1.7%	-5.9%	-13.6%	-11.1%	16.6%	-8.8%	0.5%	-4.8%	1.9%	-1.6%
2070 Median with 1.8 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)													
No Project (NP)	-2,049	-164	-280	-274	-173	-137	-69	17	-44	-184	-331	-254	-157
With Proposed Project (PP)	-2,010	-171	-275	-273	-172	-128	-54	22	-40	-184	-319	-259	-157
Difference (PP-NP)	38	-7	5	0	1	9	15	5	3	0	12	-5	0
% Difference	-1.9%	4.4%	-1.8%	-0.1%	-0.5%	-6.4%	-21.4%	32.7%	-7.8%	0.0%	-3.5%	1.8%	-0.3%

4.2.3 Delta Exports

Tables 17 to 20 summarize changes in simulated SWP and CVP Delta exports for with project and without project scenarios including:

- Total Delta Exports (C_CAA003 + C_DMC000)
- SWP Exports (C_CAA003_SWP + C_CAA003_WTS)[17]
- CVP Exports (C_CAA003_CVP + C_DMC000)
- North Delta Diversion Exports (D_SAC041_ISF001)

[17] Includes lower Yuba River Accord water.

Table 17. Total Delta Exports (C_CAA003 + C_DMC000) for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Annual (TAF)	Average Monthly (TAF)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Existing Conditions (2020)													
No Project (NP)	4,965	418	471	458	403	412	363	244	279	355	580	526	455
With Proposed Project (PP)	5,558	428	504	527	539	527	486	256	316	400	593	523	456
Difference (PP-NP)	592	10	32	69	136	115	123	12	37	45	13	-3	2
% Difference	11.9%	2.4%	6.9%	15.1%	33.8%	27.9%	33.9%	4.8%	13.4%	12.8%	2.3%	-0.6%	0.4%
2040 CT													
No Project (NP)	4,161	302	444	439	416	399	352	216	220	319	401	363	288
With Proposed Project (PP)	4,695	318	472	542	561	509	466	221	238	319	390	366	292
Difference (PP-NP)	534	15	28	102	145	110	115	4	18	0	-10	3	4
% Difference	12.8%	5.0%	6.3%	23.3%	34.8%	27.5%	32.6%	2.0%	8.1%	0.1%	-2.6%	0.8%	1.5%
2070 Median with 1.8 ft Sea Level Rise (Run 1)													
No Project (NP)	3,473	223	348	394	411	374	328	184	185	278	310	235	202
With Proposed Project (PP)	3,931	234	361	470	559	494	424	185	190	276	289	245	201
Difference (PP-NP)	458	11	13	77	148	119	96	2	5	-1	-21	9	0
% Difference	13.2%	5.1%	3.8%	19.5%	35.9%	31.9%	29.3%	1.0%	2.7%	-0.5%	-6.7%	4.0%	-0.2%
2070 Median with 3.5 ft Sea Level Rise (Run 3)													
No Project (NP)	3,328	166	340	350	401	385	333	180	173	268	313	231	186
With Proposed Project (PP)	3,788	176	361	428	545	495	433	178	178	268	294	244	185
Difference (PP-NP)	459	10	21	78	144	110	100	-2	6	0	-19	12	-2
% Difference	13.8%	5.9%	6.3%	22.3%	35.8%	28.4%	30.2%	-1.0%	3.2%	0.0%	-6.0%	5.4%	-0.9%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)													
No Project (NP)	3,415	162	346	351	403	394	343	184	195	254	346	244	190
With Proposed Project (PP)	3,887	177	359	428	547	514	445	184	209	253	324	255	188
Difference (PP-NP)	473	16	13	77	144	120	102	0	14	0	-21	11	-2
% Difference	13.8%	9.6%	3.9%	21.9%	35.8%	30.5%	29.6%	-0.1%	7.1%	-0.2%	-6.2%	4.6%	-1.1%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)													
No Project (NP)	3,292	154	345	347	404	384	334	179	172	253	299	235	184
With Proposed Project (PP)	3,734	169	359	417	548	497	440	178	175	240	282	245	182
Difference (PP-NP)	442	15	14	70	144	112	106	-1	2	-13	-17	9	-1
% Difference	13.4%	10.0%	4.1%	20.2%	35.7%	29.2%	31.7%	-0.5%	1.4%	-5.0%	-5.8%	4.0%	-0.7%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)													
No Project (NP)	3,492	184	355	365	413	400	347	184	200	267	357	242	176
With Proposed Project (PP)	3,942	185	376	448	550	498	453	186	209	266	343	251	176
Difference (PP-NP)	450	0	22	83	137	97	106	2	9	-1	-14	9	0
% Difference	12.9%	0.2%	6.2%	22.8%	33.1%	24.3%	30.6%	1.0%	4.6%	-0.5%	-4.0%	3.7%	-0.1%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)													
No Project (NP)	3,427	174	358	363	413	399	346	183	200	248	329	239	175
With Proposed Project (PP)	3,889	180	367	451	551	501	457	192	206	251	312	245	174
Difference (PP-NP)	462	6	9	88	139	102	111	9	7	3	-17	5	0
% Difference	13.5%	3.3%	2.5%	24.4%	33.6%	25.6%	32.2%	5.2%	3.3%	1.0%	-5.1%	2.2%	-0.3%
2070 Median with 1.8 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)													
No Project (NP)	3,546	241	359	404	416	392	338	189	212	236	333	242	182
With Proposed Project (PP)	4,022	255	375	487	565	499	441	195	216	238	321	247	181
Difference (PP-NP)	476	14	16	83	150	108	102	6	3	2	-12	5	0
% Difference	13.4%	6.0%	4.3%	20.6%	36.0%	27.5%	30.3%	3.0%	1.6%	0.7%	-3.6%	2.1%	-0.2%

Table 18. SWP Exports (C_CAA003_SWP + C_CAA003_WTS) for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Annual (TAF)	Average Monthly (TAF)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Existing Conditions (2020)													
No Project (NP)	2,426	199	227	228	195	204	183	93	84	156	349	301	206
With Proposed Project (PP)	2,969	211	255	295	330	314	294	100	112	193	353	297	211
Difference (PP-NP)	543	12	28	68	136	109	112	7	27	37	3	-3	6
% Difference	22.4%	6.2%	12.4%	29.8%	69.7%	53.4%	61.1%	7.1%	32.3%	23.9%	1.0%	-1.1%	2.8%
2040 CT													
No Project (NP)	2,213	135	216	218	210	212	196	99	82	232	308	216	87
With Proposed Project (PP)	2,733	151	243	315	357	322	305	103	97	233	296	220	92
Difference (PP-NP)	520	16	27	96	147	110	109	4	15	1	-13	4	5
% Difference	23.5%	11.5%	12.5%	44.0%	70.0%	51.8%	55.4%	4.0%	17.7%	0.4%	-4.1%	1.7%	5.7%
2070 Median with 1.8 ft Sea Level Rise (Run 1)													
No Project (NP)	1,883	107	163	201	202	195	191	92	84	206	234	141	65
With Proposed Project (PP)	2,327	118	175	276	347	307	284	92	86	205	217	155	65
Difference (PP-NP)	444	10	12	75	145	112	93	-1	2	-1	-17	14	0
% Difference	23.6%	9.6%	7.3%	37.1%	71.8%	57.2%	48.5%	-0.6%	2.4%	-0.6%	-7.3%	10.1%	-0.6%
2070 Median with 3.5 ft Sea Level Rise (Run 3)													
No Project (NP)	1,780	79	159	175	194	199	184	89	82	201	224	135	57
With Proposed Project (PP)	2,232	89	179	252	339	305	282	86	83	200	207	152	56
Difference (PP-NP)	452	10	20	77	144	106	97	-2	1	-1	-17	17	-1
% Difference	25.4%	12.9%	12.3%	44.0%	74.3%	53.3%	52.6%	-2.6%	1.5%	-0.3%	-7.5%	12.4%	-1.8%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)													
No Project (NP)	1,842	74	162	178	196	202	193	90	86	178	263	156	63
With Proposed Project (PP)	2,297	89	178	256	340	316	287	89	92	178	240	170	61
Difference (PP-NP)	456	14	16	78	144	114	94	-1	6	0	-22	14	-2
% Difference	24.7%	19.0%	9.8%	43.7%	73.4%	56.2%	48.6%	-0.8%	7.5%	0.0%	-8.4%	9.1%	-2.6%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)													
No Project (NP)	1,747	71	162	176	197	197	185	87	81	185	210	141	56
With Proposed Project (PP)	2,187	84	179	249	341	306	287	85	82	172	193	152	55
Difference (PP-NP)	440	13	18	73	145	109	102	-1	1	-13	-18	12	-1
% Difference	25.2%	18.1%	10.9%	41.8%	73.6%	55.3%	55.0%	-1.6%	1.4%	-6.9%	-8.4%	8.3%	-2.2%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)													
No Project (NP)	1,965	94	162	181	206	217	207	95	91	193	282	173	64
With Proposed Project (PP)	2,400	101	184	263	345	314	303	92	94	190	265	185	63
Difference (PP-NP)	435	7	22	82	139	96	96	-3	4	-3	-17	12	-1
% Difference	22.1%	7.7%	13.6%	45.4%	67.7%	44.4%	46.4%	-3.6%	4.0%	-1.5%	-6.1%	7.2%	-1.8%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)													
No Project (NP)	1,914	88	166	181	207	216	205	94	90	174	258	171	63
With Proposed Project (PP)	2,363	97	180	267	349	318	304	97	93	175	238	180	63
Difference (PP-NP)	449	10	15	85	142	102	99	3	3	1	-20	9	0
% Difference	23.4%	11.2%	8.8%	47.1%	68.7%	47.1%	48.4%	3.3%	3.2%	0.6%	-7.8%	5.1%	-0.1%
2070 Median with 1.8 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)													
No Project (NP)	1,992	126	171	200	211	218	208	97	95	162	264	174	64
With Proposed Project (PP)	2,450	140	186	284	359	322	304	100	94	163	251	181	64
Difference (PP-NP)	457	14	15	84	148	104	96	3	-1	1	-13	7	-1
% Difference	22.9%	11.4%	8.7%	41.7%	70.1%	47.4%	46.0%	3.2%	-1.2%	0.8%	-4.9%	3.9%	-1.0%

Table 19. CVP Exports (C_CAA003_CVP + C_DMC000) for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Annual (TAF)	Average Monthly (TAF)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Existing Conditions (2020)													
No Project (NP)	2,540	219	244	230	208	208	180	151	195	199	230	225	249
With Proposed Project (PP)	2,589	216	249	232	208	214	192	156	205	207	240	225	245
Difference (PP-NP)	50	-2	4	1	0	6	11	5	10	8	10	0	-4
% Difference	2.0%	-1.0%	1.8%	0.6%	0.2%	2.8%	6.4%	3.4%	5.2%	4.0%	4.2%	0.0%	-1.6%
2040 CT													
No Project (NP)	1,948	167	228	221	206	187	156	117	138	87	93	147	201
With Proposed Project (PP)	1,962	167	229	227	204	187	162	118	141	86	95	146	200
Difference (PP-NP)	14	0	1	6	-2	0	6	0	3	-1	2	-1	-1
% Difference	0.7%	-0.3%	0.3%	2.8%	-1.2%	0.0%	3.9%	0.4%	2.3%	-0.6%	2.2%	-0.5%	-0.3%
2070 Median with 1.8 ft Sea Level Rise (Run 1)													
No Project (NP)	1,589	115	184	193	210	179	137	92	101	72	76	94	136
With Proposed Project (PP)	1,604	116	186	195	212	187	141	94	104	71	72	89	136
Difference (PP-NP)	15	1	1	2	3	8	3	2	3	0	-4	-5	0
% Difference	0.9%	0.8%	0.6%	1.1%	1.3%	4.3%	2.5%	2.6%	3.0%	-0.4%	-5.0%	-5.2%	0.0%
2070 Median with 3.5 ft Sea Level Rise (Run 3)													
No Project (NP)	1,549	88	181	175	207	186	148	91	91	67	89	96	129
With Proposed Project (PP)	1,556	87	183	176	207	190	152	91	95	68	87	92	129
Difference (PP-NP)	8	0	2	1	-1	3	3	1	4	1	-2	-4	-1
% Difference	0.5%	-0.3%	1.1%	0.8%	-0.3%	1.8%	2.2%	0.6%	4.7%	0.8%	-2.3%	-4.5%	-0.4%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)													
No Project (NP)	1,573	87	184	173	207	192	150	94	109	76	83	88	128
With Proposed Project (PP)	1,590	89	182	173	207	198	158	95	117	76	84	85	127
Difference (PP-NP)	17	1	-2	-1	0	6	8	1	7	0	1	-3	-1
% Difference	1.1%	1.5%	-1.3%	-0.5%	0.1%	3.4%	5.1%	0.6%	6.8%	-0.6%	0.8%	-3.3%	-0.4%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)													
No Project (NP)	1,545	82	183	171	207	188	149	92	92	68	89	95	128
With Proposed Project (PP)	1,547	85	180	168	207	191	154	92	93	68	89	92	127
Difference (PP-NP)	2	2	-4	-4	0	3	4	1	1	0	0	-2	0
% Difference	0.1%	3.0%	-2.0%	-2.1%	-0.2%	1.8%	2.9%	0.5%	1.4%	0.0%	0.1%	-2.5%	-0.1%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)													
No Project (NP)	1,527	91	192	184	207	183	140	89	109	75	75	69	112
With Proposed Project (PP)	1,542	84	192	186	205	184	149	94	114	76	78	66	113
Difference (PP-NP)	15	-7	0	1	-2	1	10	5	6	2	3	-3	1
% Difference	1.0%	-7.5%	-0.1%	0.8%	-1.2%	0.4%	7.1%	5.8%	5.1%	2.3%	3.9%	-5.0%	0.9%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)													
No Project (NP)	1,512	87	192	181	206	183	141	89	110	74	70	68	111
With Proposed Project (PP)	1,526	82	186	184	203	183	153	95	113	75	74	65	111
Difference (PP-NP)	13	-4	-6	3	-4	0	12	6	4	2	3	-3	0
% Difference	0.9%	-4.8%	-2.9%	1.7%	-1.7%	0.1%	8.6%	7.1%	3.4%	2.1%	4.8%	-5.1%	-0.4%
2070 Median with 1.8 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)													
No Project (NP)	1,553	115	189	204	205	173	130	92	118	75	69	68	117
With Proposed Project (PP)	1,573	115	189	203	206	177	136	95	122	75	70	66	117
Difference (PP-NP)	19	0	1	0	1	4	7	3	4	0	1	-2	0
% Difference	1.2%	0.0%	0.3%	-0.1%	0.7%	2.3%	5.0%	2.8%	3.8%	0.4%	1.5%	-2.4%	0.2%

Table 20. North Delta Diversion (NDD) Exports (D_SAC041_ISF001) for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Annual (TAF)	Average Monthly (TAF)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Existing Conditions (2020)													
No Project (NP)	0	0	0	0	0	0	0	0	0	0	0	0	0
With Proposed Project (PP)	747	20	54	87	140	123	133	19	32	45	55	9	30
Difference (PP-NP)	747	20	54	87	140	123	133	19	32	45	55	9	30
% Difference													
2040 CT													
No Project (NP)	0	0	0	0	0	0	0	0	0	0	0	0	0
With Proposed Project (PP)	623	22	58	106	147	112	127	15	14	4	1	1	16
Difference (PP-NP)	623	22	58	106	147	112	127	15	14	4	1	1	16
% Difference													
2070 Median with 1.8 ft Sea Level Rise (Run 1)													
No Project (NP)	0	0	0	0	0	0	0	0	0	0	0	0	0
With Proposed Project (PP)	490	5	23	79	150	115	107	7	4	1	0	0	0
Difference (PP-NP)	490	5	23	79	150	115	107	7	4	1	0	0	0
% Difference													
2070 Median with 3.5 ft Sea Level Rise (Run 3)													
No Project (NP)	0	0	0	0	0	0	0	0	0	0	0	0	0
With Proposed Project (PP)	499	12	21	79	148	115	112	6	4	2	0	0	1
Difference (PP-NP)	499	12	21	79	148	115	112	6	4	2	0	0	1
% Difference													
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)													
No Project (NP)	0	0	0	0	0	0	0	0	0	0	0	0	0
With Proposed Project (PP)	518	15	18	81	148	121	113	8	10	2	1	0	2
Difference (PP-NP)	518	15	18	81	148	121	113	8	10	2	1	0	2
% Difference													
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)													
No Project (NP)	0	0	0	0	0	0	0	0	0	0	0	0	0
With Proposed Project (PP)	505	12	19	79	148	116	115	7	4	2	0	0	1
Difference (PP-NP)	505	12	19	79	149	116	115	7	4	2	0	0	1
% Difference													
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)													
No Project (NP)	0	0	0	0	0	0	0	0	0	0	0	0	0
With Proposed Project (PP)	523	15	23	84	146	118	116	9	10	2	0	0	1
Difference (PP-NP)	523	15	23	84	146	118	116	9	10	2	0	0	1
% Difference													
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)													
No Project (NP)	0	0	0	0	0	0	0	0	0	0	0	0	0
With Proposed Project (PP)	539	15	20	84	149	123	120	14	10	2	0	0	2
Difference (PP-NP)	539	15	20	84	149	123	120	14	10	2	0	0	2
% Difference													
2070 Median with 1.8 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)													
No Project (NP)	0	0	0	0	0	0	0	0	0	0	0	0	0
With Proposed Project (PP)	518	6	21	84	150	117	118	12	7	2	0	0	0
Difference (PP-NP)	512	7	20	90	151	111	112	11	7	1	0	0	0
% Difference													

4.2.4 Delta Salinity

Tables 21 to 24 summarize changes in simulated Delta salinity, measured as electrical conductivity (EC), at the following compliance locations for with project and without project scenarios:

- Emmaton salinity (EM_EC_Month)
- Jersey Point salinity (JP_EC_Month)
- Rock Slough salinity (RS_EC_Month)
- Collinsville salinity (CO_EC_Month)

Table 21. Emmaton Salinity (EM_EC_Month) for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average (UMHOS /CM)	Average Monthly (UMHOS/CM)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Exiting Conditions (2020)													
No Project (NP)	798	1,569	1,598	1,045	540	302	235	268	344	516	661	1,111	1,390
With Proposed Project (PP)	839	1,645	1,699	1,093	589	323	242	271	344	516	707	1,153	1,484
Difference (PP-NP)	41	76	102	48	49	20	7	3	1	0	46	42	94
% Difference	4.5%	4.9%	6.4%	4.6%	9.0%	6.7%	3.0%	1.2%	0.2%	0.1%	7.0%	3.7%	6.8%
2040 CT													
No Project (NP)	1,003	2,060	1,856	1,222	604	299	238	262	382	639	972	1,540	1,963
With Proposed Project (PP)	1,034	2,102	1,976	1,266	663	323	250	269	385	638	975	1,539	2,018
Difference (PP-NP)	30	41	120	44	59	24	11	7	3	-1	3	-1	55
% Difference	3.4%	2.0%	6.5%	3.6%	9.8%	8.0%	4.8%	2.5%	0.7%	-0.2%	0.3%	0.0%	2.8%
2070 Median with 1.8 ft Sea Level Rise (Run 1)													
No Project (NP)	833	1,494	1,572	1,113	501	290	249	354	502	755	853	1,061	1,256
With Proposed Project (PP)	843	1,499	1,605	1,145	531	296	259	358	504	759	861	1,058	1,237
Difference (PP-NP)	9	5	34	32	30	6	10	4	2	4	8	-3	-19
% Difference	1.6%	0.3%	2.1%	2.9%	6.0%	2.1%	4.0%	1.1%	0.4%	0.5%	1.0%	-0.3%	-1.5%
2070 Median with 3.5 ft Sea Level Rise (Run 3)													
No Project (NP)	985	1,724	1,862	1,312	544	324	310	406	567	776	981	1,343	1,666
With Proposed Project (PP)	989	1,707	1,888	1,339	558	337	306	410	569	777	985	1,329	1,662
Difference (PP-NP)	4	-17	26	26	14	12	-5	4	2	2	4	-14	-5
% Difference	0.7%	-1.0%	1.4%	2.0%	2.6%	3.8%	-1.5%	0.9%	0.4%	0.2%	0.4%	-1.1%	-0.3%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)													
No Project (NP)	1,032	1,637	1,793	1,260	543	350	321	460	688	1,071	1,077	1,445	1,736
With Proposed Project (PP)	1,045	1,660	1,834	1,273	560	358	327	469	690	1,091	1,065	1,422	1,790
Difference (PP-NP)	13	23	41	13	17	8	6	9	2	20	-12	-23	54
% Difference	1.4%	1.4%	2.3%	1.0%	3.2%	2.4%	2.0%	1.9%	0.3%	1.9%	-1.1%	-1.6%	3.1%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)													
No Project (NP)	986	1,693	1,866	1,316	561	330	304	407	569	784	991	1,342	1,663
With Proposed Project (PP)	998	1,736	1,913	1,329	582	351	312	411	571	795	995	1,327	1,656
Difference (PP-NP)	13	43	47	13	21	22	8	4	2	11	5	-15	-7
% Difference	1.7%	2.5%	2.5%	1.0%	3.7%	6.6%	2.6%	1.0%	0.3%	1.4%	0.5%	-1.1%	-0.4%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)													
No Project (NP)	1,016	1,703	1,730	1,196	528	358	314	446	682	1,057	1,024	1,429	1,722
With Proposed Project (PP)	1,024	1,620	1,804	1,286	554	355	305	435	668	1,065	1,055	1,415	1,720
Difference (PP-NP)	8	-84	74	90	26	-3	-9	-10	-14	9	31	-14	-2
% Difference	0.6%	-4.9%	4.3%	7.5%	4.9%	-0.9%	-2.7%	-2.3%	-2.1%	0.8%	3.1%	-1.0%	-0.1%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)													
No Project (NP)	1,013	1,627	1,762	1,249	534	344	306	402	650	1,061	1,087	1,428	1,709
With Proposed Project (PP)	1,023	1,675	1,785	1,264	556	365	294	415	651	1,051	1,086	1,437	1,693
Difference (PP-NP)	10	48	23	15	22	22	-12	13	1	-10	-1	9	-16
% Difference	1.2%	3.0%	1.3%	1.2%	4.2%	6.3%	-3.8%	3.1%	0.1%	-0.9%	-0.1%	0.6%	-0.9%
2070 Median with 1.8 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)													
No Project (NP)	907	1,500	1,486	1,075	477	286	257	359	559	947	1,151	1,431	1,354
With Proposed Project (PP)	913	1,511	1,498	1,086	504	289	257	363	561	951	1,158	1,429	1,345
Difference (PP-NP)	6	11	12	12	27	3	1	4	2	4	7	-2	-8
% Difference	0.9%	0.7%	0.8%	1.1%	5.6%	0.9%	0.3%	1.2%	0.3%	0.5%	0.6%	-0.1%	-0.6%

Table 22. Jersey Point Salinity (JP_EC_Month) for Existing, 2040 CT and Various 2070 Scenarios

Scenario	Average (UMHOS/ CM)	Average Monthly (UMHOS/CM)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Exiting Conditions (2020)													
No Project (NP)	703	1,136	1,269	1,154	703	401	274	258	284	333	594	891	1,142
With Proposed Project (PP)	719	1,168	1,320	1,173	734	426	281	261	285	335	586	917	1,138
Difference (PP-NP)	15	32	51	19	31	25	7	3	1	2	-7	26	-4
% Difference	2.1%	2.8%	4.0%	1.7%	4.4%	6.3%	2.5%	1.1%	0.4%	0.7%	-1.3%	2.9%	-0.4%
2040 CT													
No Project (NP)	657	1,145	1,247	1,118	670	351	247	234	262	323	507	755	1,022
With Proposed Project (PP)	674	1,192	1,297	1,154	715	374	255	238	265	323	500	754	1,023
Difference (PP-NP)	17	47	50	36	45	23	8	4	2	0	-8	-1	1
% Difference	2.4%	4.1%	4.0%	3.2%	6.6%	6.4%	3.3%	1.5%	0.9%	-0.1%	-1.5%	-0.1%	0.1%
2070 Median with 1.8 ft Sea Level Rise (Run 1)													
No Project (NP)	533	856	1,145	972	494	299	235	252	311	354	382	423	677
With Proposed Project (PP)	538	860	1,146	985	514	309	240	254	311	354	379	424	681
Difference (PP-NP)	5	5	1	12	20	10	5	2	0	0	-4	1	4
% Difference	1.0%	0.5%	0.1%	1.3%	4.0%	3.3%	2.0%	0.7%	0.1%	0.1%	-0.9%	0.2%	0.7%
2070 Median with 3.5 ft Sea Level Rise (Run 3)													
No Project (NP)	620	1,103	1,190	864	456	316	259	269	314	367	458	606	1,239
With Proposed Project (PP)	621	1,101	1,176	892	464	325	259	267	314	364	449	602	1,239
Difference (PP-NP)	1	-2	-14	28	9	9	0	-2	1	-3	-9	-4	-1
% Difference	0.2%	-0.2%	-1.2%	3.3%	1.9%	2.9%	-0.1%	-0.7%	0.2%	-0.9%	-2.0%	-0.6%	0.0%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)													
No Project (NP)	656	1,126	1,254	863	468	322	265	279	341	443	518	707	1,289
With Proposed Project (PP)	662	1,162	1,272	876	464	325	267	281	343	446	496	696	1,320
Difference (PP-NP)	6	35	18	13	-4	2	2	2	1	3	-22	-11	30
% Difference	0.4%	3.1%	1.4%	1.5%	-0.9%	0.7%	0.7%	0.7%	0.4%	0.7%	-4.3%	-1.6%	2.4%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)													
No Project (NP)	623	1,084	1,198	873	466	325	257	269	315	363	453	609	1,266
With Proposed Project (PP)	629	1,121	1,206	873	473	333	262	270	314	358	443	605	1,286
Difference (PP-NP)	6	37	9	0	7	8	4	1	-1	-5	-10	-4	20
% Difference	0.6%	3.4%	0.7%	0.0%	1.6%	2.5%	1.7%	0.4%	-0.3%	-1.4%	-2.1%	-0.7%	1.6%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)													
No Project (NP)	647	1,181	1,255	855	466	317	263	273	336	441	478	679	1,220
With Proposed Project (PP)	645	1,099	1,254	905	477	320	260	270	331	436	486	677	1,230
Difference (PP-NP)	-2	-82	-1	50	11	3	-3	-4	-5	-5	8	-2	10
% Difference	-0.1%	-6.9%	-0.1%	5.9%	2.3%	1.1%	-1.1%	-1.3%	-1.5%	-1.2%	1.6%	-0.3%	0.8%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)													
No Project (NP)	640	1,124	1,215	874	464	310	258	265	322	428	492	671	1,263
With Proposed Project (PP)	637	1,167	1,148	873	470	318	258	262	323	420	479	681	1,243
Difference (PP-NP)	-4	43	-67	-1	6	8	0	-2	1	-9	-13	10	-19
% Difference	-0.3%	3.8%	-5.5%	-0.1%	1.3%	2.7%	-0.1%	-0.9%	0.3%	-2.0%	-2.7%	1.5%	-1.5%
2070 Median with 1.8 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)													
No Project (NP)	552	862	1,093	927	484	297	239	250	320	388	476	560	726
With Proposed Project (PP)	556	875	1,102	928	502	301	240	251	321	388	474	560	727
Difference (PP-NP)	4	14	8	0	18	4	1	1	1	1	-2	0	1
% Difference	0.7%	1.6%	0.7%	0.0%	3.7%	1.3%	0.2%	0.5%	0.4%	0.1%	-0.4%	0.0%	0.2%

Table 23. Rock Slough Salinity (RS_EC_Month) for Existing, 2040 CT and Various 2070 Scenarios

Scenario	Average (UMHOS/ CM)	Average Monthly (UMHOS/CM)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Exiting Conditions (2020)													
No Project (NP)	418	533	580	648	525	382	313	303	291	266	296	391	493
With Proposed Project (PP)	429	547	615	672	539	403	322	310	293	266	295	398	494
Difference (PP-NP)	11	14	35	23	14	20	9	7	2	0	-1	7	1
% Difference	2.3%	2.6%	6.0%	3.6%	2.8%	5.3%	2.8%	2.4%	0.6%	0.0%	-0.4%	1.9%	0.2%
2040 CT													
No Project (NP)	412	559	586	607	508	371	309	309	312	282	293	361	451
With Proposed Project (PP)	424	583	623	634	529	388	317	316	313	282	293	360	453
Difference (PP-NP)	12	24	37	27	21	17	9	6	1	0	-1	-1	2
% Difference	2.4%	4.3%	6.3%	4.4%	4.2%	4.5%	2.8%	2.1%	0.2%	0.0%	-0.2%	-0.4%	0.4%
2070 Median with 1.8 ft Sea Level Rise (Run 1)													
No Project (NP)	461	636	624	579	469	400	373	389	453	410	337	360	506
With Proposed Project (PP)	465	633	628	593	476	406	378	398	450	410	341	363	502
Difference (PP-NP)	3	-3	4	14	7	6	5	9	-3	0	4	2	-4
% Difference	0.8%	-0.4%	0.7%	2.4%	1.5%	1.4%	1.3%	2.2%	-0.6%	-0.1%	1.2%	0.7%	-0.8%
2070 Median with 3.5 ft Sea Level Rise (Run 3)													
No Project (NP)	526	755	657	765	540	392	375	399	444	399	426	537	620
With Proposed Project (PP)	527	757	655	763	552	396	379	399	450	402	428	527	614
Difference (PP-NP)	1	2	-2	-1	13	4	4	0	6	3	2	-10	-6
% Difference	0.3%	0.2%	-0.3%	-0.2%	2.3%	1.0%	1.1%	0.0%	1.3%	0.7%	0.6%	-1.8%	-1.0%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)													
No Project (NP)	547	770	639	752	536	385	367	399	445	441	496	616	723
With Proposed Project (PP)	556	794	687	768	539	390	370	403	452	445	501	595	729
Difference (PP-NP)	9	25	48	16	2	5	4	4	8	4	5	-20	5
% Difference	1.5%	3.2%	7.4%	2.1%	0.5%	1.4%	1.1%	1.1%	1.7%	0.9%	1.0%	-3.3%	0.7%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)													
No Project (NP)	526	756	629	767	540	395	373	399	446	407	437	537	630
With Proposed Project (PP)	537	783	695	777	544	402	378	401	452	418	443	523	625
Difference (PP-NP)	11	27	66	10	3	6	5	2	7	12	7	-14	-5
% Difference	1.8%	3.6%	10.5%	1.3%	0.6%	1.6%	1.3%	0.6%	1.5%	2.9%	1.5%	-2.6%	-0.7%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)													
No Project (NP)	546	766	680	719	513	385	366	397	447	441	474	624	744
With Proposed Project (PP)	553	744	639	787	556	410	370	395	450	445	483	615	743
Difference (PP-NP)	7	-22	-41	68	43	25	4	-3	3	5	9	-9	-1
% Difference	1.5%	-2.9%	-6.1%	9.5%	8.4%	6.4%	1.1%	-0.7%	0.6%	1.0%	1.9%	-1.4%	-0.2%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)													
No Project (NP)	552	778	667	760	518	384	363	394	437	448	504	626	743
With Proposed Project (PP)	558	786	683	744	550	412	373	391	447	450	505	623	736
Difference (PP-NP)	6	8	16	-16	33	28	9	-3	9	3	1	-3	-7
% Difference	1.5%	1.0%	2.4%	-2.1%	6.3%	7.3%	2.5%	-0.9%	2.1%	0.6%	0.2%	-0.6%	-0.9%
2070 Median with 1.8 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)													
No Project (NP)	473	636	613	566	469	396	365	393	438	436	378	429	563
With Proposed Project (PP)	480	637	620	575	476	406	381	407	442	440	381	430	561
Difference (PP-NP)	6	1	8	10	7	11	16	13	3	3	3	2	-2
% Difference	1.5%	0.2%	1.3%	1.8%	1.6%	2.7%	4.4%	3.4%	0.7%	0.7%	0.8%	0.4%	-0.3%

Table 24. Collinsville Salinity (CO_EC_Month) for Existing, 2040 CT and Various 2070 Scenarios

Scenario	Average (UMHOS /CM)	Average Monthly (UMHOS/CM)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Exiting Conditions (2020)													
No Project (NP)	3,322	6,069	6,299	4,364	2,285	1,077	667	935	1,359	2,292	3,509	5,220	5,788
With Proposed Project (PP)	3,469	6,280	6,581	4,513	2,506	1,223	741	966	1,371	2,327	3,734	5,383	5,999
Difference (PP-NP)	147	211	282	149	222	146	74	31	12	35	225	164	211
% Difference	5.4%	3.5%	4.5%	3.4%	9.7%	13.6%	11.1%	3.3%	0.9%	1.5%	6.4%	3.1%	3.6%
2040 CT													
No Project (NP)	3,969	7,286	7,262	4,925	2,534	1,022	667	925	1,616	2,961	4,715	6,522	7,194
With Proposed Project (PP)	4,078	7,420	7,514	5,143	2,771	1,189	772	996	1,641	2,949	4,715	6,543	7,283
Difference (PP-NP)	109	135	252	219	237	167	105	71	24	-12	0	22	89
% Difference	5.1%	1.9%	3.5%	4.4%	9.3%	16.3%	15.7%	7.7%	1.5%	-0.4%	0.0%	0.3%	1.2%
2070 Median with 1.8 ft Sea Level Rise (Run 1)													
No Project (NP)	3,224	5,751	6,597	4,269	1,887	862	696	1,260	1,973	2,846	3,285	4,117	5,142
With Proposed Project (PP)	3,268	5,781	6,627	4,396	2,021	932	806	1,305	1,982	2,844	3,285	4,103	5,137
Difference (PP-NP)	45	30	30	127	135	70	110	45	8	-2	1	-13	-5
% Difference	3.2%	0.5%	0.5%	3.0%	7.1%	8.1%	15.8%	3.6%	0.4%	-0.1%	0.0%	-0.3%	-0.1%
2070 Median with 3.5 ft Sea Level Rise (Run 3)													
No Project (NP)	3,788	5,861	7,352	4,568	2,186	1,076	937	1,441	2,258	3,362	4,704	5,797	5,916
With Proposed Project (PP)	3,820	5,819	7,438	4,699	2,285	1,151	970	1,468	2,273	3,372	4,702	5,771	5,898
Difference (PP-NP)	32	-42	86	131	99	75	33	28	15	10	-3	-26	-17
% Difference	1.7%	-0.7%	1.2%	2.9%	4.6%	7.0%	3.5%	1.9%	0.7%	0.3%	-0.1%	-0.4%	-0.3%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)													
No Project (NP)	3,940	5,658	7,210	4,636	2,170	1,143	996	1,648	2,608	4,112	5,027	6,007	6,062
With Proposed Project (PP)	3,976	5,662	7,278	4,657	2,254	1,207	1,063	1,686	2,640	4,144	4,985	5,972	6,162
Difference (PP-NP)	36	4	67	22	84	64	67	38	32	32	-42	-36	100
% Difference	1.8%	0.1%	0.9%	0.5%	3.8%	5.6%	6.7%	2.3%	1.2%	0.8%	-0.8%	-0.6%	1.7%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)													
No Project (NP)	3,798	5,801	7,376	4,600	2,227	1,093	924	1,443	2,268	3,377	4,720	5,815	5,926
With Proposed Project (PP)	3,854	5,848	7,598	4,724	2,329	1,189	985	1,477	2,279	3,395	4,713	5,790	5,921
Difference (PP-NP)	57	48	222	124	102	96	60	34	12	18	-7	-24	-6
% Difference	2.4%	0.8%	3.0%	2.7%	4.6%	8.8%	6.5%	2.4%	0.5%	0.5%	-0.2%	-0.4%	-0.1%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)													
No Project (NP)	3,893	5,672	7,165	4,544	2,079	1,140	966	1,585	2,575	4,069	4,908	5,987	6,025
With Proposed Project (PP)	3,929	5,542	7,206	4,853	2,200	1,181	982	1,599	2,572	4,078	4,966	5,963	6,001
Difference (PP-NP)	36	-130	41	309	121	41	15	14	-3	9	58	-24	-24
% Difference	1.5%	-2.3%	0.6%	6.8%	5.8%	3.6%	1.6%	0.9%	-0.1%	0.2%	1.2%	-0.4%	-0.4%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)													
No Project (NP)	3,889	5,556	7,216	4,607	2,104	1,105	945	1,503	2,510	4,080	5,030	5,994	6,018
With Proposed Project (PP)	3,926	5,586	7,309	4,728	2,197	1,185	953	1,547	2,540	4,051	5,014	6,016	5,992
Difference (PP-NP)	37	30	93	121	93	80	8	44	29	-30	-16	22	-26
% Difference	1.7%	0.5%	1.3%	2.6%	4.4%	7.2%	0.9%	2.9%	1.2%	-0.7%	-0.3%	0.4%	-0.4%
2070 Median with 1.8 ft Sea Level Rise and Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)													
No Project (NP)	3,378	5,783	6,430	4,121	1,773	849	742	1,330	2,196	3,400	3,881	4,651	5,386
With Proposed Project (PP)	3,413	5,832	6,477	4,184	1,886	884	804	1,368	2,212	3,402	3,882	4,648	5,379
Difference (PP-NP)	35	49	47	63	114	36	62	38	16	2	1	-3	-6
% Difference	2.1%	0.8%	0.7%	1.5%	6.4%	4.2%	8.4%	2.9%	0.7%	0.1%	0.0%	-0.1%	-0.1%

4.2.5 Reservoir Storage

Tables 25 to 28 show the exceedance values for simulated end-of-September storage for Shasta, Trinity, Folsom, and Oroville reservoirs for with project and without project scenarios. Tables 29 to 32 show the exceedance values for simulated end-of-May storage for Shasta, Trinity, Folsom, and Oroville reservoirs.

Table 25. Oroville End-of-September Storage Exceedance for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Storage (TAF)	Percent At or Above (TAF)									
		10	20	30	40	50	60	70	80	90	100
Existing Conditions											
No Project (NP)	1,964	3,162	2,427	2,227	2,056	1,852	1,670	1,594	1,486	1,272	317
With Proposed Project (PP)	1,983	3,162	2,478	2,236	2,058	1,940	1,732	1,594	1,503	1,303	285
Difference (PP-NP)	19	0	52	10	2	88	62	0	17	31	-32
% Difference	0.9%	0.0%	2.1%	0.4%	0.1%	4.7%	3.7%	0.0%	1.1%	2.5%	-10.0%
2040 CT											
No Project (NP)	1,673	2,325	2,079	1,990	1,825	1,679	1,595	1,477	1,358	915	157
With Proposed Project (PP)	1,686	2,307	2,111	2,018	1,849	1,650	1,595	1,521	1,356	945	203
Difference (PP-NP)	13	-18	32	28	24	-29	0	44	-2	30	46
% Difference	0.8%	-0.8%	1.5%	1.4%	1.3%	-1.7%	0.0%	3.0%	-0.2%	3.3%	29.3%
2070 Median with 1.8 ft Sea Level Rise (Run 1)											
No Project (NP)	1,463	2,227	1,935	1,788	1,674	1,565	1,402	1,278	1,059	578	28
With Proposed Project (PP)	1,474	2,233	1,968	1,831	1,651	1,559	1,446	1,266	1,054	610	28
Difference (PP-NP)	10	6	32	43	-23	-6	44	-12	-4	33	0
% Difference	0.7%	0.3%	1.7%	2.4%	-1.4%	-0.4%	3.2%	-1.0%	-0.4%	5.6%	0.0%
2070 Median with 3.5 ft Sea Level Rise (Run 3)											
No Project (NP)	1,406	2,200	1,858	1,786	1,601	1,550	1,365	1,172	959	523	28
With Proposed Project (PP)	1,413	2,210	1,900	1,732	1,597	1,560	1,440	1,182	982	522	28
Difference (PP-NP)	7	10	41	-53	-4	10	75	10	22	-1	0
% Difference	0.5%	0.4%	2.2%	-3.0%	-0.3%	0.6%	5.5%	0.8%	2.3%	-0.1%	0.0%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)											
No Project (NP)	1,500	2,220	1,987	1,842	1,687	1,594	1,472	1,297	1,111	563	28
With Proposed Project (PP)	1,497	2,217	2,008	1,852	1,664	1,572	1,500	1,335	1,132	538	2
Difference (PP-NP)	-3	-2	20	10	-22	-22	28	38	21	-26	-27
% Difference	-0.2%	-0.1%	1.0%	0.5%	-1.3%	-1.4%	1.9%	2.9%	1.9%	-4.5%	-93.8%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)											
No Project (NP)	1,460	2,200	1,900	1,788	1,668	1,580	1,475	1,278	1,105	545	28
With Proposed Project (PP)	1,486	2,217	1,942	1,828	1,640	1,594	1,541	1,302	1,089	544	28
Difference (PP-NP)	26	16	41	40	-28	14	65	24	-16	0	0
% Difference	1.8%	0.7%	2.2%	2.3%	-1.7%	0.9%	4.4%	1.9%	-1.5%	-0.1%	0.0%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)											
No Project (NP)	1,655	2,243	2,019	1,892	1,762	1,674	1,594	1,510	1,390	1,008	30
With Proposed Project (PP)	1,650	2,243	2,026	1,914	1,725	1,635	1,592	1,511	1,361	1,090	30
Difference (PP-NP)	-5	0	7	22	-37	-39	-2	1	-29	82	0
% Difference	-0.3%	0.0%	0.3%	1.2%	-2.1%	-2.4%	-0.1%	0.1%	-2.1%	8.1%	0.0%
2070 Median with 3.5 ft Sea Level Rise, Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)											
No Project (NP)	1,724	2,266	2,073	1,920	1,836	1,720	1,654	1,594	1,511	1,197	29
With Proposed Project (PP)	1,726	2,281	2,102	1,985	1,833	1,722	1,642	1,586	1,512	1,193	0
Difference (PP-NP)	2	15	29	65	-3	1	-12	-8	1	-4	-29
% Difference	0.1%	0.6%	1.4%	3.4%	-0.1%	0.1%	-0.7%	-0.5%	0.1%	-0.4%	-100.0%
2070 Median with 1.8 ft Sea Level Rise, Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)											
No Project (NP)	1,831	2,428	2,219	2,044	1,921	1,864	1,728	1,645	1,594	1,378	30
With Proposed Project (PP)	1,828	2,424	2,220	2,042	1,950	1,827	1,707	1,629	1,593	1,370	32
Difference (PP-NP)	-3	-4	1	-2	29	-36	-22	-15	0	-8	3
% Difference	-0.2%	-0.2%	0.1%	-0.1%	1.5%	-2.0%	-1.3%	-0.9%	0.0%	-0.6%	9.4%

Table 26. Shasta End-of-September Storage Exceedance for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Storage (TAF)	Percent At or Above (TAF)									
		10	20	30	40	50	60	70	80	90	100
Existing Conditions											
No Project (NP)	2,827	3,400	3,400	3,400	3,247	3,025	2,848	2,709	2,572	1,757	550
With Proposed Project (PP)	2,837	3,400	3,400	3,400	3,248	3,038	2,861	2,703	2,567	1,726	579
Difference (PP-NP)	10	0	0	0	1	12	13	-6	-5	-31	29
% Difference	0.4%	0.0%	0.0%	0.0%	0.0%	0.4%	0.5%	-0.2%	-0.2%	-1.8%	5.2%
2040 CT											
No Project (NP)	2,715	3,400	3,387	3,199	3,014	2,900	2,793	2,652	2,246	1,686	684
With Proposed Project (PP)	2,737	3,400	3,380	3,195	2,996	2,886	2,803	2,689	2,312	1,676	758
Difference (PP-NP)	23	0	-8	-4	-18	-14	10	38	67	-10	73
% Difference	0.8%	0.0%	-0.2%	-0.1%	-0.6%	-0.5%	0.3%	1.4%	3.0%	-0.6%	10.7%
2070 Median with 1.8 ft Sea Level Rise (Run 1)											
No Project (NP)	2,212	3,262	2,932	2,710	2,459	2,332	2,220	2,050	1,692	550	550
With Proposed Project (PP)	2,226	3,262	2,936	2,710	2,471	2,356	2,243	2,071	1,660	550	550
Difference (PP-NP)	14	0	4	0	12	25	24	21	-32	0	0
% Difference	0.6%	0.0%	0.1%	0.0%	0.5%	1.1%	1.1%	1.0%	-1.9%	0.0%	0.0%
2070 Median with 3.5 ft Sea Level Rise (Run 3)											
No Project (NP)	2,091	3,224	2,877	2,545	2,294	2,221	2,048	1,890	1,551	550	214
With Proposed Project (PP)	2,096	3,236	2,870	2,527	2,308	2,228	2,066	1,915	1,527	550	205
Difference (PP-NP)	5	12	-7	-17	14	7	18	25	-24	0	-9
% Difference	0.3%	0.4%	-0.2%	-0.7%	0.6%	0.3%	0.9%	1.3%	-1.6%	0.0%	-4.1%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)											
No Project (NP)	2,240	3,223	2,949	2,777	2,533	2,359	2,273	2,059	1,793	550	524
With Proposed Project (PP)	2,239	3,228	2,911	2,764	2,498	2,373	2,297	2,032	1,760	550	550
Difference (PP-NP)	-1	5	-38	-13	-35	14	24	-27	-33	0	26
% Difference	0.0%	0.2%	-1.3%	-0.5%	-1.4%	0.6%	1.1%	-1.3%	-1.9%	0.0%	4.9%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)											
No Project (NP)	2,092	3,221	2,877	2,543	2,303	2,220	2,051	1,887	1,552	550	232
With Proposed Project (PP)	2,097	3,235	2,871	2,556	2,299	2,228	2,065	1,905	1,529	550	194
Difference (PP-NP)	5	14	-6	13	-4	9	15	18	-23	0	-38
% Difference	0.2%	0.4%	-0.2%	0.5%	-0.2%	0.4%	0.7%	1.0%	-1.5%	0.0%	-16.4%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)											
No Project (NP)	2,481	3,384	3,156	3,013	2,808	2,667	2,519	2,358	2,069	932	550
With Proposed Project (PP)	2,474	3,396	3,147	2,985	2,800	2,651	2,515	2,354	2,059	837	550
Difference (PP-NP)	-6	12	-9	-28	-8	-16	-4	-4	-10	-94	0
% Difference	-0.3%	0.3%	-0.3%	-0.9%	-0.3%	-0.6%	-0.1%	-0.2%	-0.5%	-10.1%	0.0%
2070 Median with 3.5 ft Sea Level Rise, Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)											
No Project (NP)	2,487	3,400	3,156	3,013	2,835	2,668	2,504	2,368	2,067	785	550
With Proposed Project (PP)	2,483	3,396	3,168	3,007	2,806	2,663	2,494	2,374	2,060	844	550
Difference (PP-NP)	-4	-3	13	-6	-29	-5	-10	6	-8	59	0
% Difference	-0.2%	-0.1%	0.4%	-0.2%	-1.0%	-0.2%	-0.4%	0.2%	-0.4%	7.5%	0.0%
2070 Median with 1.8 ft Sea Level Rise, Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)											
No Project (NP)	2,598	3,400	3,200	3,072	2,937	2,792	2,629	2,498	2,182	1,366	550
With Proposed Project (PP)	2,597	3,381	3,200	3,074	2,938	2,776	2,628	2,496	2,179	1,352	550
Difference (PP-NP)	-1	-19	0	2	2	-16	-1	-3	-2	-13	0
% Difference	0.0%	-0.6%	0.0%	0.1%	0.1%	-0.6%	0.0%	-0.1%	-0.1%	-1.0%	0.0%

Table 27. Trinity End-of-September Storage Exceedance for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Storage (TAF)	Percent At or Above (TAF)									
		10	20	30	40	50	60	70	80	90	100
Existing Conditions											
No Project (NP)	1,438	1,975	1,975	1,773	1,668	1,554	1,385	1,274	1,025	656	240
With Proposed Project (PP)	1,443	1,975	1,975	1,804	1,661	1,558	1,404	1,274	1,004	662	240
Difference (PP-NP)	5	0	0	31	-7	4	19	0	-21	6	0
% Difference	0.3%	0.0%	0.0%	1.8%	-0.4%	0.3%	1.4%	0.0%	-2.1%	1.0%	0.0%
2040 CT											
No Project (NP)	1,321	1,936	1,652	1,595	1,452	1,365	1,273	1,125	1,015	670	328
With Proposed Project (PP)	1,329	1,927	1,662	1,599	1,461	1,363	1,288	1,123	1,025	678	402
Difference (PP-NP)	8	-8	10	4	9	-3	15	-2	10	8	74
% Difference	0.6%	-0.4%	0.6%	0.3%	0.6%	-0.2%	1.2%	-0.2%	1.0%	1.2%	22.7%
2070 Median with 1.8 ft Sea Level Rise (Run 1)											
No Project (NP)	1,065	1,714	1,481	1,331	1,198	1,090	1,010	848	745	314	19
With Proposed Project (PP)	1,071	1,713	1,503	1,330	1,195	1,087	1,022	890	772	325	19
Difference (PP-NP)	7	-1	22	-1	-3	-3	12	42	26	11	0
% Difference	0.6%	-0.1%	1.5%	0.0%	-0.2%	-0.3%	1.2%	4.9%	3.5%	3.4%	0.0%
2070 Median with 3.5 ft Sea Level Rise (Run 3)											
No Project (NP)	1,003	1,637	1,409	1,261	1,109	1,024	906	795	667	240	106
With Proposed Project (PP)	1,002	1,637	1,383	1,262	1,141	1,022	922	791	695	240	52
Difference (PP-NP)	0	0	-26	1	32	-2	16	-4	28	0	-54
% Difference	0.0%	0.0%	-1.8%	0.1%	2.9%	-0.2%	1.7%	-0.5%	4.2%	0.0%	-51.1%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)											
No Project (NP)	1,073	1,680	1,488	1,371	1,243	1,090	1,010	872	786	240	47
With Proposed Project (PP)	1,070	1,680	1,473	1,371	1,232	1,089	1,019	872	788	240	19
Difference (PP-NP)	-4	0	-15	0	-11	-2	9	0	3	0	-28
% Difference	-0.4%	0.0%	-1.0%	0.0%	-0.9%	-0.2%	0.9%	0.0%	0.4%	0.0%	-59.3%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)											
No Project (NP)	1,006	1,637	1,390	1,267	1,139	1,026	912	792	698	240	176
With Proposed Project (PP)	1,006	1,637	1,373	1,254	1,141	1,023	917	783	698	240	120
Difference (PP-NP)	0	0	-17	-13	1	-3	6	-9	0	0	-56
% Difference	0.0%	0.0%	-1.2%	-1.0%	0.1%	-0.3%	0.6%	-1.1%	0.1%	0.0%	-31.6%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)											
No Project (NP)	1,165	1,743	1,517	1,418	1,295	1,182	1,129	1,022	913	428	240
With Proposed Project (PP)	1,164	1,758	1,517	1,402	1,295	1,212	1,127	1,020	914	450	96
Difference (PP-NP)	-1	15	0	-17	0	30	-1	-1	1	22	-144
% Difference	-0.1%	0.9%	0.0%	-1.2%	0.0%	2.6%	-0.1%	-0.1%	0.1%	5.1%	-60.1%
2070 Median with 3.5 ft Sea Level Rise, Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)											
No Project (NP)	1,170	1,758	1,517	1,419	1,297	1,212	1,131	1,028	912	459	240
With Proposed Project (PP)	1,169	1,758	1,517	1,414	1,275	1,195	1,133	1,027	934	472	182
Difference (PP-NP)	-1	0	0	-4	-22	-18	2	-1	22	13	-58
% Difference	-0.1%	0.0%	0.0%	-0.3%	-1.7%	-1.4%	0.2%	-0.1%	2.4%	2.9%	-24.1%
2070 Median with 1.8 ft Sea Level Rise, Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)											
No Project (NP)	1,212	1,790	1,533	1,456	1,328	1,254	1,193	1,101	966	546	240
With Proposed Project (PP)	1,211	1,790	1,533	1,457	1,316	1,258	1,193	1,085	966	532	240
Difference (PP-NP)	-1	0	0	0	-12	4	0	-16	0	-15	0
% Difference	-0.1%	0.0%	0.0%	0.0%	-0.9%	0.4%	0.0%	-1.5%	0.0%	-2.7%	0.0%

Table 28. Folsom End-of-September Storage Exceedance for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Storage (TAF)	Percent At or Above (TAF)									
		10	20	30	40	50	60	70	80	90	100
Existing Conditions											
No Project (NP)	546	752	752	729	633	551	456	418	395	324	90
With Proposed Project (PP)	551	752	752	735	655	568	459	419	393	330	90
Difference (PP-NP)	5	0	0	6	22	17	4	1	-2	5	0
% Difference	0.9%	0.0%	0.0%	0.8%	3.5%	3.0%	0.8%	0.2%	-0.5%	1.6%	0.0%
2040 CT											
No Project (NP)	484	752	646	591	533	499	442	422	323	250	90
With Proposed Project (PP)	488	752	644	582	532	497	449	421	337	252	90
Difference (PP-NP)	4	0	-2	-9	-1	-1	7	-2	14	1	0
% Difference	0.8%	0.0%	-0.3%	-1.6%	-0.2%	-0.3%	1.6%	-0.4%	4.2%	0.6%	0.0%
2070 Median with 1.8 ft Sea Level Rise (Run 1)											
No Project (NP)	388	609	501	439	420	393	367	350	323	103	90
With Proposed Project (PP)	389	609	501	439	428	396	369	350	324	103	90
Difference (PP-NP)	2	0	0	0	8	3	2	0	1	0	0
% Difference	0.4%	0.0%	-0.1%	0.0%	2.0%	0.8%	0.5%	0.0%	0.4%	0.0%	0.0%
2070 Median with 3.5 ft Sea Level Rise (Run 3)											
No Project (NP)	368	599	464	425	401	376	352	325	270	90	90
With Proposed Project (PP)	368	601	460	433	402	376	358	329	271	90	90
Difference (PP-NP)	1	2	-3	8	0	0	5	3	1	0	0
% Difference	0.2%	0.4%	-0.7%	1.8%	0.0%	-0.1%	1.5%	1.1%	0.2%	0.0%	0.0%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)											
No Project (NP)	392	599	500	446	422	400	374	351	322	90	90
With Proposed Project (PP)	392	600	500	454	418	401	377	350	322	90	72
Difference (PP-NP)	1	2	0	8	-3	2	3	-1	1	0	-18
% Difference	0.2%	0.3%	0.0%	1.8%	-0.8%	0.4%	0.7%	-0.3%	0.2%	0.0%	-19.5%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)											
No Project (NP)	368	598	463	425	400	376	352	325	270	90	90
With Proposed Project (PP)	369	601	464	437	400	376	355	331	271	90	90
Difference (PP-NP)	1	3	1	12	0	0	2	5	0	0	0
% Difference	0.3%	0.5%	0.2%	2.8%	0.1%	0.0%	0.7%	1.6%	0.1%	0.0%	0.0%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)											
No Project (NP)	437	650	548	513	462	433	420	377	356	216	89
With Proposed Project (PP)	437	650	566	510	460	432	410	377	354	224	78
Difference (PP-NP)	0	0	19	-3	-3	-1	-10	0	-3	8	-11
% Difference	0.0%	0.0%	3.4%	-0.6%	-0.5%	-0.3%	-2.3%	-0.1%	-0.8%	3.6%	-12.1%
2070 Median with 3.5 ft Sea Level Rise, Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)											
No Project (NP)	441	650	559	515	465	434	411	376	355	223	90
With Proposed Project (PP)	439	650	562	506	463	433	412	378	356	232	90
Difference (PP-NP)	-2	0	3	-8	-2	-2	1	1	1	9	0
% Difference	-0.5%	0.0%	0.6%	-1.6%	-0.4%	-0.4%	0.2%	0.3%	0.4%	4.0%	0.0%
2070 Median with 1.8 ft Sea Level Rise, Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)											
No Project (NP)	466	691	603	550	499	462	433	396	372	259	90
With Proposed Project (PP)	466	694	603	549	499	463	436	397	369	260	90
Difference (PP-NP)	0	3	1	-1	0	1	3	1	-2	0	0
% Difference	0.1%	0.4%	0.1%	-0.1%	0.0%	0.2%	0.7%	0.3%	-0.6%	0.1%	0.0%

Table 29. Oroville End-of-May Storage Exceedance for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Storage (TAF)	Percent At or Above (TAF)									
		10	20	30	40	50	60	70	80	90	100
Existing Conditions											
No Project (NP)	3,007	3,538	3,538	3,538	3,506	3,361	3,034	2,751	2,506	1,931	977
With Proposed Project (PP)	3,015	3,538	3,538	3,538	3,483	3,375	3,016	2,797	2,480	1,953	944
Difference (PP-NP)	8	0	0	0	-22	14	-18	46	-26	22	-33
% Difference	0.3%	0.0%	0.0%	0.0%	-0.6%	0.4%	-0.6%	1.7%	-1.0%	1.1%	-3.3%
2040 CT											
No Project (NP)	2,870	3,538	3,538	3,352	3,235	3,100	2,988	2,590	2,276	1,753	765
With Proposed Project (PP)	2,874	3,538	3,538	3,358	3,251	3,096	2,979	2,534	2,284	1,754	823
Difference (PP-NP)	5	0	0	7	16	-4	-9	-56	8	1	57
% Difference	0.2%	0.0%	0.0%	0.2%	0.5%	-0.1%	-0.3%	-2.2%	0.4%	0.0%	7.5%
2070 Median with 1.8 ft Sea Level Rise (Run 1)											
No Project (NP)	2,649	3,538	3,362	3,173	3,071	2,926	2,729	2,317	2,091	1,587	46
With Proposed Project (PP)	2,661	3,538	3,363	3,173	3,078	2,912	2,737	2,328	2,058	1,564	71
Difference (PP-NP)	11	0	1	0	7	-14	8	11	-33	-23	25
% Difference	0.4%	0.0%	0.0%	0.0%	0.2%	-0.5%	0.3%	0.5%	-1.6%	-1.4%	55.4%
2070 Median with 3.5 ft Sea Level Rise (Run 3)											
No Project (NP)	2,580	3,492	3,330	3,112	2,994	2,839	2,697	2,172	1,890	1,505	30
With Proposed Project (PP)	2,587	3,505	3,329	3,108	2,995	2,891	2,698	2,182	1,986	1,505	30
Difference (PP-NP)	7	13	-1	-4	1	52	1	10	96	0	0
% Difference	0.3%	0.4%	0.0%	-0.1%	0.0%	1.8%	0.0%	0.4%	5.1%	0.0%	0.0%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)											
No Project (NP)	2,705	3,538	3,379	3,267	3,108	3,027	2,792	2,295	2,174	1,593	30
With Proposed Project (PP)	2,688	3,538	3,379	3,237	3,107	2,973	2,725	2,322	2,163	1,593	30
Difference (PP-NP)	-16	0	0	-30	-1	-54	-67	27	-11	0	0
% Difference	-0.6%	0.0%	0.0%	-0.9%	0.0%	-1.8%	-2.4%	1.2%	-0.5%	0.0%	0.0%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)											
No Project (NP)	2,618	3,492	3,330	3,155	3,033	2,940	2,697	2,211	1,982	1,520	52
With Proposed Project (PP)	2,627	3,505	3,368	3,154	3,041	2,909	2,698	2,240	2,028	1,509	63
Difference (PP-NP)	9	13	38	-2	8	-31	1	30	46	-11	11
% Difference	0.3%	0.4%	1.1%	-0.1%	0.3%	-1.1%	0.0%	1.3%	2.3%	-0.7%	21.1%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)											
No Project (NP)	2,830	3,538	3,396	3,313	3,138	3,064	2,913	2,518	2,332	1,846	608
With Proposed Project (PP)	2,816	3,538	3,390	3,281	3,138	3,056	2,901	2,512	2,306	1,886	524
Difference (PP-NP)	-14	0	-6	-32	0	-8	-12	-7	-26	40	-84
% Difference	-0.5%	0.0%	-0.2%	-1.0%	0.0%	-0.3%	-0.4%	-0.3%	-1.1%	2.1%	-13.9%
2070 Median with 3.5 ft Sea Level Rise, Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)											
No Project (NP)	2,862	3,538	3,415	3,313	3,165	3,098	2,926	2,699	2,386	1,935	504
With Proposed Project (PP)	2,855	3,538	3,395	3,281	3,142	3,066	2,901	2,653	2,388	1,936	465
Difference (PP-NP)	-7	0	-20	-32	-23	-32	-25	-46	2	1	-39
% Difference	-0.2%	0.0%	-0.6%	-1.0%	-0.7%	-1.0%	-0.8%	-1.7%	0.1%	0.1%	-7.7%
2070 Median with 1.8 ft Sea Level Rise, Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)											
No Project (NP)	2,935	3,538	3,415	3,330	3,203	3,128	2,976	2,865	2,568	2,113	711
With Proposed Project (PP)	2,924	3,538	3,415	3,303	3,196	3,106	2,976	2,786	2,564	2,057	722
Difference (PP-NP)	-11	0	0	-27	-7	-21	0	-80	-3	-56	10
% Difference	-0.4%	0.0%	0.0%	-0.8%	-0.2%	-0.7%	0.0%	-2.8%	-0.1%	-2.6%	1.5%

Table 30. Shasta End-of-May Storage Exceedance for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Storage (TAF)	Percent At or Above (TAF)									
		10	20	30	40	50	60	70	80	90	100
Existing Conditions											
No Project (NP)	4,051	4,552	4,552	4,552	4,487	4,429	4,217	4,024	3,849	2,498	1,690
With Proposed Project (PP)	4,053	4,552	4,552	4,552	4,487	4,412	4,199	4,021	3,834	2,509	1,857
Difference (PP-NP)	2	0	0	0	0	-16	-17	-3	-15	10	167
% Difference	0.1%	0.0%	0.0%	0.0%	0.0%	-0.4%	-0.4%	-0.1%	-0.4%	0.4%	9.9%
2040 CT											
No Project (NP)	3,939	4,552	4,552	4,371	4,239	4,174	4,051	3,852	3,623	2,844	2,039
With Proposed Project (PP)	3,961	4,552	4,552	4,377	4,243	4,197	4,083	3,893	3,628	2,853	2,179
Difference (PP-NP)	22	0	0	6	4	23	32	41	5	9	139
% Difference	0.6%	0.0%	0.0%	0.1%	0.1%	0.6%	0.8%	1.1%	0.1%	0.3%	6.8%
2070 Median with 1.8 ft Sea Level Rise (Run 1)											
No Project (NP)	3,474	4,552	4,284	4,053	3,901	3,808	3,554	3,425	3,052	1,599	550
With Proposed Project (PP)	3,483	4,552	4,280	4,046	3,891	3,787	3,604	3,450	3,052	1,590	550
Difference (PP-NP)	9	0	-4	-7	-10	-20	50	25	0	-9	0
% Difference	0.3%	0.0%	-0.1%	-0.2%	-0.3%	-0.5%	1.4%	0.7%	0.0%	-0.5%	0.0%
2070 Median with 3.5 ft Sea Level Rise (Run 3)											
No Project (NP)	3,371	4,552	4,237	3,960	3,822	3,667	3,471	3,306	2,782	1,436	550
With Proposed Project (PP)	3,378	4,552	4,237	3,960	3,822	3,679	3,484	3,311	2,784	1,438	550
Difference (PP-NP)	6	0	0	0	0	12	13	5	2	2	0
% Difference	0.2%	0.0%	0.0%	0.0%	0.0%	0.3%	0.4%	0.2%	0.1%	0.2%	0.0%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)											
No Project (NP)	3,505	4,552	4,355	4,108	3,960	3,754	3,614	3,468	3,020	1,731	550
With Proposed Project (PP)	3,504	4,552	4,365	4,109	3,970	3,791	3,613	3,467	3,012	1,755	550
Difference (PP-NP)	-1	0	10	2	10	37	-1	-1	-8	23	0
% Difference	0.0%	0.0%	0.2%	0.0%	0.3%	1.0%	0.0%	0.0%	-0.3%	1.3%	0.0%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)											
No Project (NP)	3,377	4,552	4,237	3,959	3,822	3,670	3,468	3,304	2,795	1,438	550
With Proposed Project (PP)	3,381	4,552	4,237	3,959	3,831	3,687	3,479	3,308	2,798	1,438	550
Difference (PP-NP)	4	0	0	0	9	17	11	4	3	0	0
% Difference	0.1%	0.0%	0.0%	0.0%	0.2%	0.5%	0.3%	0.1%	0.1%	0.0%	0.0%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)											
No Project (NP)	3,634	4,552	4,381	4,159	3,996	3,875	3,778	3,525	3,243	1,928	1,007
With Proposed Project (PP)	3,629	4,552	4,381	4,151	3,996	3,870	3,785	3,525	3,215	1,951	913
Difference (PP-NP)	-5	0	0	-8	0	-5	6	0	-27	23	-93
% Difference	-0.1%	0.0%	0.0%	-0.2%	0.0%	-0.1%	0.2%	0.0%	-0.8%	1.2%	-9.3%
2070 Median with 3.5 ft Sea Level Rise, Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)											
No Project (NP)	3,638	4,552	4,381	4,143	3,999	3,875	3,785	3,525	3,254	1,929	1,007
With Proposed Project (PP)	3,634	4,552	4,381	4,146	3,997	3,874	3,787	3,526	3,224	1,952	976
Difference (PP-NP)	-4	0	0	3	-2	0	2	0	-29	24	-31
% Difference	-0.1%	0.0%	0.0%	0.1%	-0.1%	0.0%	0.1%	0.0%	-0.9%	1.2%	-3.1%
2070 Median with 1.8 ft Sea Level Rise, Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)											
No Project (NP)	3,718	4,552	4,381	4,145	4,049	3,952	3,877	3,611	3,378	2,256	1,007
With Proposed Project (PP)	3,717	4,552	4,381	4,145	4,048	3,950	3,877	3,611	3,378	2,233	1,007
Difference (PP-NP)	-1	0	0	1	-2	-2	0	0	0	-23	0
% Difference	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-1.0%	0.0%

Table 31. Trinity End-of-May Storage Exceedance for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Storage (TAF)	Percent At or Above (TAF)									
		10	20	30	40	50	60	70	80	90	100
Existing Conditions											
No Project (NP)	1,867	2,396	2,308	2,212	2,131	2,008	1,877	1,722	1,485	1,083	655
With Proposed Project (PP)	1,871	2,396	2,308	2,212	2,134	2,001	1,855	1,729	1,508	1,058	720
Difference (PP-NP)	4	0	0	0	3	-7	-22	7	24	-25	65
% Difference	0.2%	0.0%	0.0%	0.0%	0.2%	-0.3%	-1.2%	0.4%	1.6%	-2.3%	10.0%
2040 CT											
No Project (NP)	1,809	2,305	2,153	2,070	2,003	1,909	1,822	1,684	1,494	1,022	847
With Proposed Project (PP)	1,817	2,305	2,151	2,083	2,003	1,923	1,820	1,718	1,525	1,019	859
Difference (PP-NP)	8	0	-2	14	0	14	-1	34	30	-3	12
% Difference	0.4%	0.0%	-0.1%	0.7%	0.0%	0.7%	-0.1%	2.0%	2.0%	-0.3%	1.4%
2070 Median with 1.8 ft Sea Level Rise (Run 1)											
No Project (NP)	1,627	2,188	2,072	1,992	1,915	1,733	1,607	1,463	1,256	737	240
With Proposed Project (PP)	1,632	2,188	2,072	1,992	1,904	1,746	1,611	1,488	1,272	718	240
Difference (PP-NP)	5	0	0	0	-11	13	5	24	16	-18	0
% Difference	0.3%	0.0%	0.0%	0.0%	-0.6%	0.8%	0.3%	1.7%	1.2%	-2.5%	0.0%
2070 Median with 3.5 ft Sea Level Rise (Run 3)											
No Project (NP)	1,576	2,161	2,072	1,927	1,864	1,668	1,535	1,415	1,132	708	240
With Proposed Project (PP)	1,573	2,161	2,072	1,927	1,862	1,685	1,527	1,411	1,138	706	240
Difference (PP-NP)	-3	0	0	0	-2	17	-9	-5	6	-1	0
% Difference	-0.2%	0.0%	0.0%	0.0%	-0.1%	1.0%	-0.6%	-0.3%	0.5%	-0.2%	0.0%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)											
No Project (NP)	1,627	2,188	2,072	2,002	1,916	1,734	1,571	1,474	1,221	709	240
With Proposed Project (PP)	1,624	2,188	2,072	1,992	1,916	1,738	1,575	1,457	1,210	709	240
Difference (PP-NP)	-3	0	0	-10	0	3	4	-18	-11	0	0
% Difference	-0.2%	0.0%	0.0%	-0.5%	0.0%	0.2%	0.2%	-1.2%	-0.9%	0.0%	0.0%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)											
No Project (NP)	1,578	2,161	2,072	1,927	1,864	1,694	1,528	1,413	1,182	707	240
With Proposed Project (PP)	1,578	2,161	2,072	1,926	1,849	1,699	1,539	1,411	1,166	708	240
Difference (PP-NP)	0	0	0	-1	-15	5	11	-2	-16	1	0
% Difference	0.0%	0.0%	0.0%	0.0%	-0.8%	0.3%	0.7%	-0.1%	-1.3%	0.2%	0.0%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)											
No Project (NP)	1,700	2,188	2,131	2,037	1,944	1,827	1,667	1,553	1,403	830	561
With Proposed Project (PP)	1,697	2,188	2,142	2,030	1,944	1,828	1,656	1,546	1,399	836	561
Difference (PP-NP)	-3	0	11	-7	0	0	-11	-7	-4	7	0
% Difference	-0.2%	0.0%	0.5%	-0.3%	0.0%	0.0%	-0.7%	-0.4%	-0.3%	0.8%	0.0%
2070 Median with 3.5 ft Sea Level Rise, Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)											
No Project (NP)	1,703	2,197	2,142	2,037	1,944	1,827	1,670	1,566	1,405	830	561
With Proposed Project (PP)	1,700	2,188	2,142	2,030	1,944	1,828	1,667	1,555	1,405	837	561
Difference (PP-NP)	-2	-9	0	-7	0	0	-3	-11	0	7	0
% Difference	-0.1%	-0.4%	0.0%	-0.3%	0.0%	0.0%	-0.2%	-0.7%	0.0%	0.8%	0.0%
2070 Median with 1.8 ft Sea Level Rise, Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)											
No Project (NP)	1,735	2,197	2,142	2,037	1,963	1,913	1,720	1,616	1,474	944	561
With Proposed Project (PP)	1,734	2,197	2,142	2,035	1,963	1,916	1,716	1,617	1,471	944	561
Difference (PP-NP)	-1	0	0	-2	-1	3	-4	1	-2	0	0
% Difference	-0.1%	0.0%	0.0%	-0.1%	0.0%	0.2%	-0.2%	0.1%	-0.2%	0.0%	0.0%

Table 32. Folsom End-of-May Storage Exceedance for Existing, 2040 CT, and Various 2070 Scenarios

Scenario	Average Storage (TAF)	Percent At or Above (TAF)									
		10	20	30	40	50	60	70	80	90	100
Existing Conditions											
No Project (NP)	839	967	967	967	967	967	967	822	683	494	211
With Proposed Project (PP)	838	967	967	967	967	967	967	825	681	473	197
Difference (PP-NP)	0	0	0	0	0	0	0	3	-2	-21	-14
% Difference	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	-0.3%	-4.3%	-6.7%
2040 CT											
No Project (NP)	808	967	967	967	967	940	861	735	658	425	232
With Proposed Project (PP)	813	967	967	967	967	940	882	779	666	431	232
Difference (PP-NP)	5	0	0	0	0	0	21	44	8	6	0
% Difference	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	2.5%	6.0%	1.2%	1.4%	-0.2%
2070 Median with 1.8 ft Sea Level Rise (Run 1)											
No Project (NP)	765	967	967	967	926	882	791	674	591	378	90
With Proposed Project (PP)	769	967	967	967	926	883	793	688	617	378	90
Difference (PP-NP)	3	0	0	0	0	1	2	14	26	0	0
% Difference	0.4%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	2.0%	4.4%	0.0%	0.0%
2070 Median with 3.5 ft Sea Level Rise (Run 3)											
No Project (NP)	746	967	967	956	888	827	744	654	585	354	90
With Proposed Project (PP)	747	967	967	960	909	827	742	653	592	354	90
Difference (PP-NP)	1	0	0	4	21	0	-3	-1	6	1	0
% Difference	0.2%	0.0%	0.0%	0.4%	2.4%	0.0%	-0.4%	-0.2%	1.1%	0.2%	0.0%
2070 Median with 3.5 ft Sea Level Rise with Drought Year Regulatory Actions (Run 6)											
No Project (NP)	781	967	967	967	967	948	815	700	613	378	90
With Proposed Project (PP)	780	967	967	967	967	939	827	712	614	367	90
Difference (PP-NP)	0	0	0	0	0	-9	12	13	1	-11	0
% Difference	0.0%	0.0%	0.0%	0.0%	0.0%	-0.9%	1.5%	1.8%	0.1%	-2.9%	0.0%
2070 Median with 3.5 ft Sea Level Rise with Limited Exports for Dry and Critical Years (Run 8)											
No Project (NP)	745	967	967	956	888	827	744	658	579	354	90
With Proposed Project (PP)	747	967	967	960	909	831	742	657	587	354	90
Difference (PP-NP)	2	0	0	3	21	4	-3	-1	8	0	0
% Difference	0.3%	0.0%	0.0%	0.4%	2.4%	0.5%	-0.4%	-0.1%	1.4%	0.1%	0.0%
2070 Median with 3.5 ft Sea Level Rise and Combined Water Management (Run 9)											
No Project (NP)	801	967	967	967	967	928	852	720	663	402	90
With Proposed Project (PP)	800	967	967	967	967	934	861	719	666	399	90
Difference (PP-NP)	0	0	0	0	0	6	9	-1	3	-3	0
% Difference	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	1.1%	-0.1%	0.4%	-0.8%	0.0%
2070 Median with 3.5 ft Sea Level Rise, Combined Water Management and Limited Exports for Dry and Critical Years (Run 10)											
No Project (NP)	801	967	967	967	967	935	852	719	664	400	90
With Proposed Project (PP)	801	967	967	967	967	935	862	719	667	399	90
Difference (PP-NP)	0	0	0	0	0	0	10	0	3	-1	0
% Difference	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	0.0%	0.5%	-0.3%	0.0%
2070 Median with 1.8 ft Sea Level Rise, Combined Water Management and Limited Exports for Dry and Critical Years (Run 11)											
No Project (NP)	813	967	967	967	967	966	871	758	681	449	90
With Proposed Project (PP)	813	967	967	967	967	966	861	758	682	449	90
Difference (PP-NP)	0	0	0	0	0	0	-10	0	1	0	0
% Difference	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-1.1%	0.0%	0.2%	0.0%	0.0%

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