Lee Vining Hydroelectric Project

FERC No. 1388

Welcome!

Operations Model TWG Meeting

May 18, 2023

Welcome and Land Acknowledgment

SCE would like to take a moment and recognize that the Lee Vining Project is located on the Mono Lake Kutzadikaa Tribes' traditional lands, which they have stewarded for generations.

Safety Moment

Welcome and Introductions: Lee Vining Relicensing Team

SCE Team

Matthew Woodhall
Project Manager

Martin Ostendorf
Senior Manager

Audry Williams
Cultural Resources Manager

Seth Carr
Operations Manager

Lyle Laven
Production Manager

Consultant Team

Shannon Luoma
Project Manager

Finlay Anderson
Technical Advisor

Kelly Larimer
Project Director

Carissa Shoemaker
TWG Coordinator

Heather Neff
Aquatics Lead

Bret Hoffman
Operations Model Lead

Isha Deo
Resource Optimization Analysis Lead

Meeting Agenda

- Safety moment, welcome and introductions
- Meeting objectives
- Study Plan Goals and Objectives
- Schematic of Mass Balance Model
- Constraints / Rules
- Intra-day model / Hydro Optimization
- Schedule, next steps, action items
- Final questions

Meeting Objectives

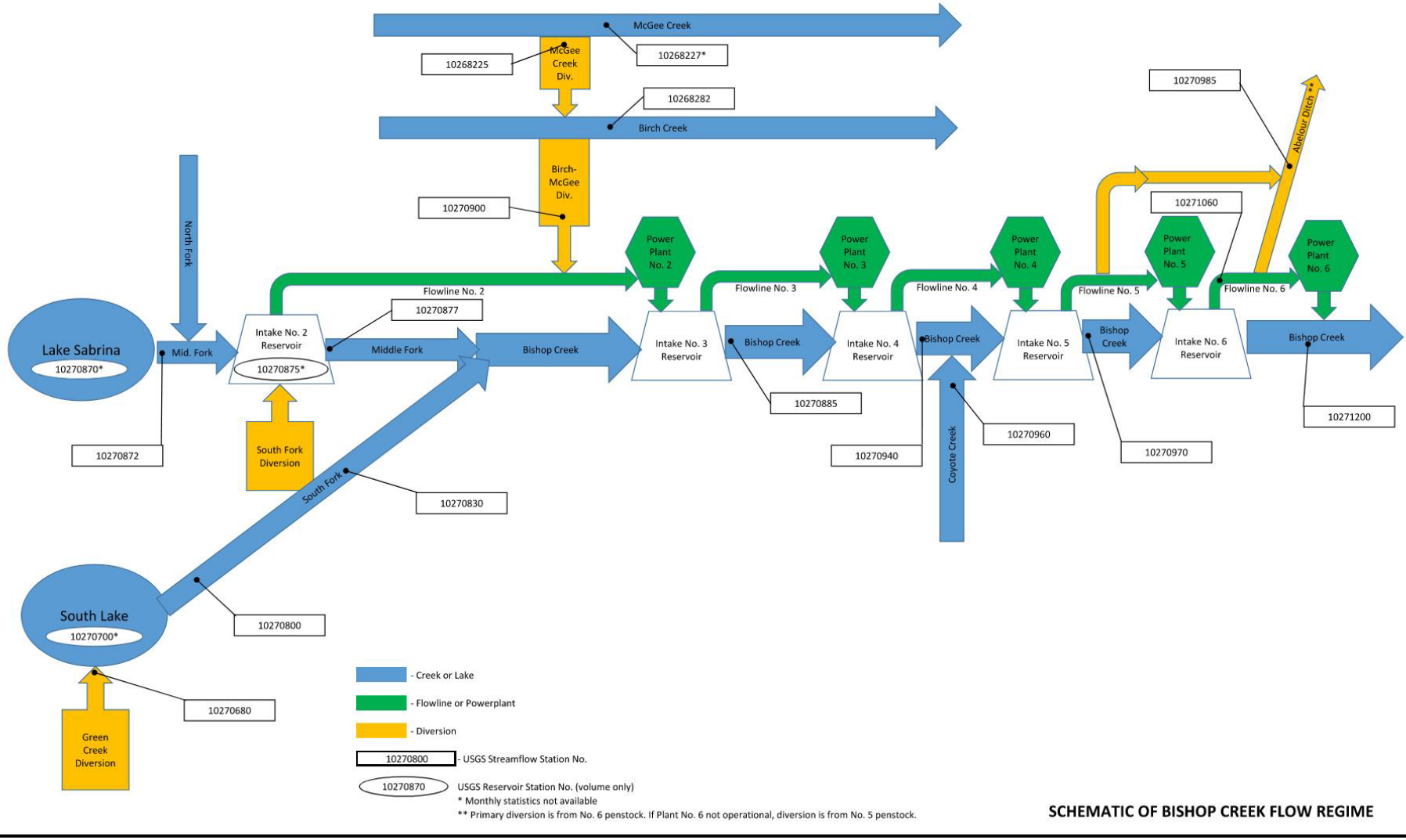
- Information sharing of operations model
  - Status and direction
- Discuss how model will be used

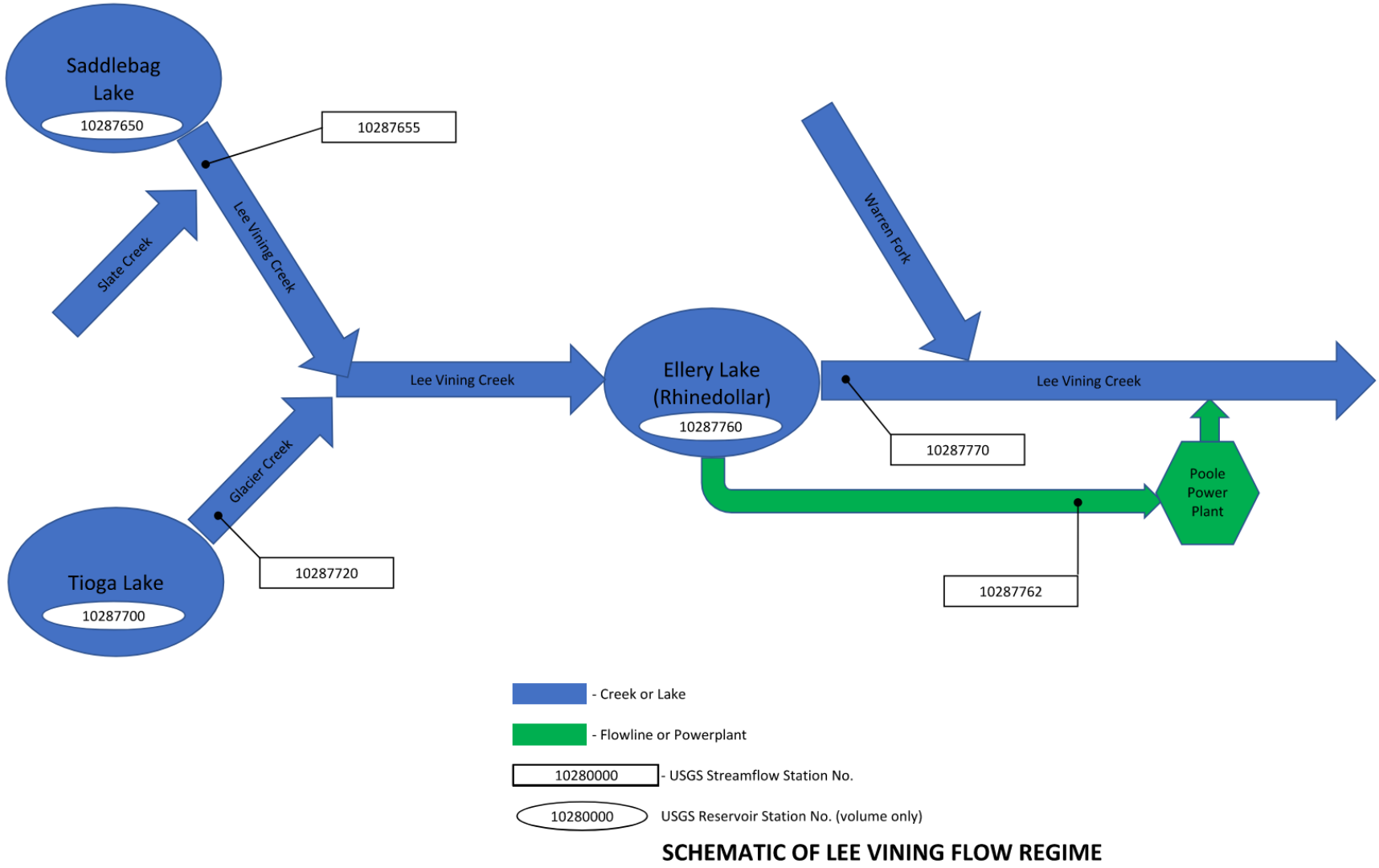
Operations Model

Operations Model (AQ-5)

Goals/Objectives for Operations Model Study Plan

- Develop a robust Operations Model (Model) to assist SCE and stakeholders in understanding how Project operations interact with Lee Vining hydrology
- Accurately model the systems inflows, outflows, and operational constraints
- Align model with needs of other relicensing studies and information needs
- Develop procedures to configure model for alternative operational scenarios and document results
- Determine effective operating limits the Poole Powerhouse to accurately represent installed and dependable capacity for licensing documents


McGee Creek
10268225
McGee Creek Div.
10268227*
10268282
Birch Creek
Birch-McGee Div.
10270900
10270985
Abelour Ditch **
10271060
North Fork
Power Plant No. 2
Power Plant No. 3
Power Plant No. 4
Power Plant No. 5
Power Plant No. 6
Flowline No. 2
Flowline No. 3
Flowline No. 4
Flowline No. 5
Flowline No. 6
10270877
Lake Sabrina
10270870*
Mid. Fork
Intake No. 2 Reservoir
10270875*
Middle Fork
Bishop Creek
Intake No. 3 Reservoir
Intake No. 4 Reservoir
Intake No. 5 Reservoir
Intake No. 6 Reservoir
10270872
South Fork Diversion
10270885
10270940
10270960
10270970
10271200
Coyote Creek
South Fork
10270830
South Lake
10270700*
10270800
10270680
Green Creek Diversion
- Creek or Lake
- Flowline or Powerplant
- Diversion
10270800 - USGS Streamflow Station No.
10270870 USGS Reservoir Station No. (volume only)
* Monthly statistics not available
** Primary diversion is from No. 6 penstock. If Plant No. 6 not operational, diversion is from No. 5 penstock.
SCHEMATIC OF BISHOP CREEK FLOW REGIME



SCHEMATIC OF LEE VINING FLOW REGIME

Methods

Represent Characteristics, Variables of System

- Physical Constraints
  - Stage/Storage Curves, Spillways, Penstock/Poole Powerhouse
  - Extent of Models
- Hydrologic Input
  - Data Sources: Streamflow Gages, Snow Courses, Other?
  - Limitations: Temporal Resolution, Period of Record
- Release Influences/Impacts
  - Separated Into Intraday for Pulse Operations and Daily to Examine Resource Allocation on Seasonal/Annual Basis

Methods (continued)

Represent System Operational Rules/Targets

- SCE Obligations
  - Resource Allocation (Daily Model)
  - Sales Agreement (Annual Model)
  - Grid System Response & Stability (Intraday Model)
- FERC License (Daily Model)
  - Minimum Flows, Reservoir Targets
  - Seasonality, Year Type, Prioritization
- Alternative Scenarios

Baseline Conditions and Constraints

- SCE Operational Requirements
  - Draw Reservoirs Within % of Empty (Yearly)
- FERC Current License Requirements
  - 30 cfs Below Poole PH
  - 2 cfs (Seasonal) Below Tioga
  - 14/9/6 cfs (Year Dependent) Below Saddlebag
  - Limit Daily Fluctuations Below Saddlebag (Seasonal)
  - Tioga Lake Within 2/6 Feet Full (Year Dependent, Seasonal)
  - Ellery Lake Within 2 Feet Full (Seasonal)

Resource Optimization Analysis

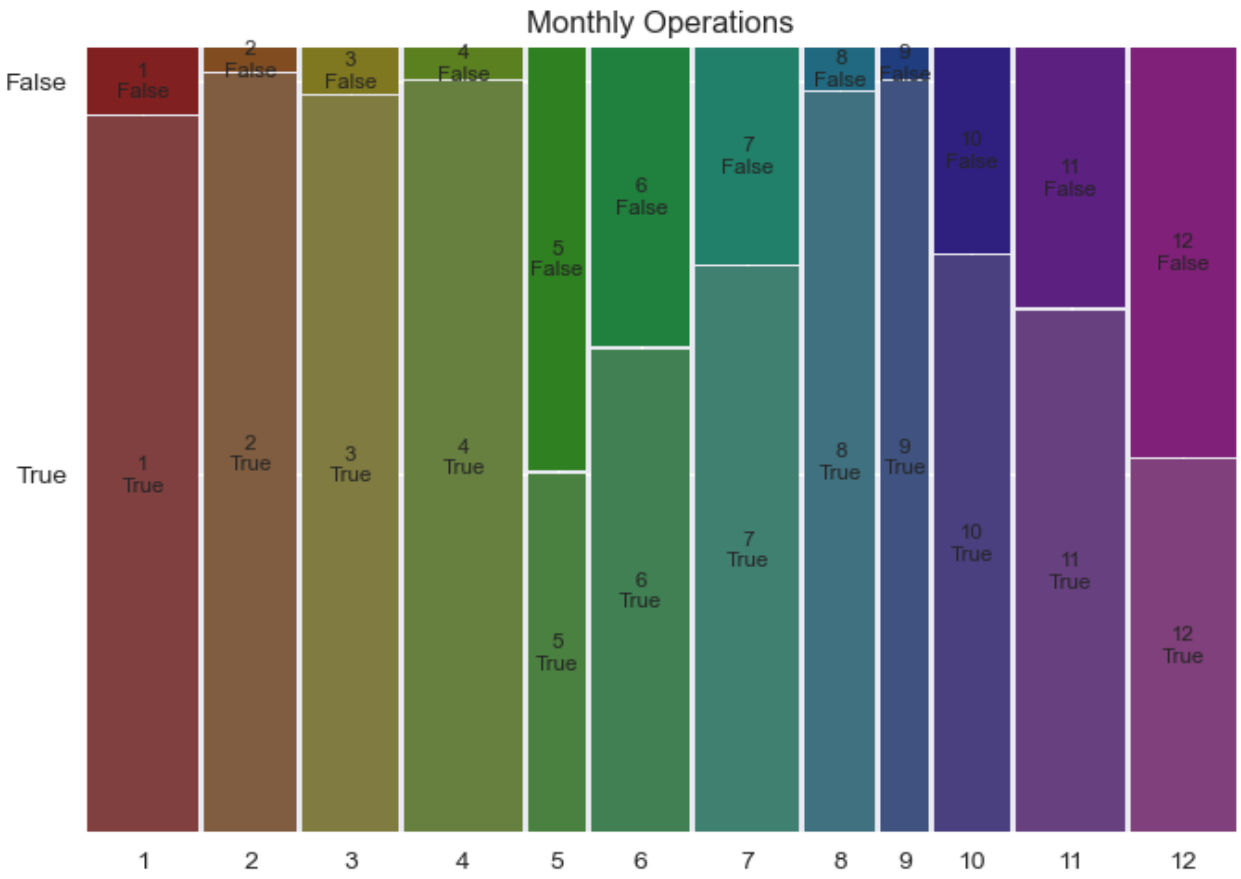
Methods

- Develop Python code to identify and analyze hydro optimization events in time series
- Available Data:
  - 15-min Poole Powerhouse + Spillway Outflow
  - LADWP gage data
  - SCADA demand data
- Moving average algorithm used to quantify peaks
  - Sharp variations from recent average flow values strongly correspond with known hydro optimization peaks
- Use statistics to characterize any differences in hydro optimization pre- and post-2015

Calibration Results

- Explicitly calibrated to capture the most flow peaks corresponding with demand peaks
  - Moving average length
  - Variation from moving average
  - Size of peak event
  - Length of peak event
- Final parameters indicate that approximately 77.5% of flow peaks correspond directly with a demand peak
  - As the exact peak timing captured varies based on duration/magnitude of peak, this value seems reasonable
  - Captures 807 hydropeaking events between Oct 2009 – Dec 2021

Likelihood of Peaking Each Month Pre- and Post-Operations Shift



Chi-Squared Test

- Indicates that there is a difference in frequency of peaks pre- and post-2016
- Operation change in 2016 did make a statistically significant difference on the frequency of peaks
- p-value << 0.05

T-Test on Peak Magnitude

- Indicates there is a difference in peak magnitude pre- and post-2016
  - Operation change in 2016 did make a statistically significant difference on the magnitude of peaks
- p-value $<<$ 0.05

Questions?

How to Stay Involved

- Check the Project website for updates/news at www.sce.com/leevining
- You can view other SCE relicensing Projects at www.sce.com/regulatory/hydro-licensing
- Sign up to receive Project-related emails through the Contact Registration Form/Project Questionnaire on the Project website
- Sign up for FERC's for e-subscription (docket number "P-1388") at www.ferc.gov
- Email Carissa Shoemaker with questions carissa.shoemaker@erm.com

Final Questions?

Thank you!