CDFW - Sites Project Topic Area Update Agenda

Sites Reservoir Project

Date: *March 21, 2019* **Location:** *ICF Office*

Time: 1-4 PM

Purpose: 1) Update CDFW staff on Sites Project, 2) Develop understanding on the approach to permitting

Invitees:

Jim Watson, Rob Thomson - Sites Authority	Lenny Grimaldo, ICF	Ian Boyd, CDFW
John Spranza, HDR	Marin Greenwood, ICF	Jason Roberts, CDFW
Monique Briard, ICF	Jonathan Williams, CDFW	Kenneth Kundargi, CDFW
Jim Lecky, ICF	Brycen Swart, CDFW	Matt Johnson, CDFW
Ellen Berryman, ICF	Paige Uttley, CDFW	Mike Healey, CDFW
	Colin Purdy, CDFW	

Agenda:

Discussion Topic	Topic Leader
1. Sites Overview/update a. Location/Facilities b. Project Purposes, Schedule	Jim Watson
2. Operations Simulations a. Proposed operations b. Past modeling and anticipated modeling plans c. Downstream Habitat modeling d. Fish Screen Study	Rob Thomson
3. ESA/CESA a. Consultation Approach b. State-listed terrestrial species c. Analysis Approach d. Biological Assessment plus State Only listed species	Jim Lecky/ Ellen Berryman
4. Effects to Anadromous fish a. Near Field b. Far-field c. Life Cycle Modeling	Marin Greenwood
5. Effects to Delta Smelt and Longfin Smelt	Lenny Grimaldo
6. Next steps	Group discussion

Sites Project: Topic Area Update Meeting

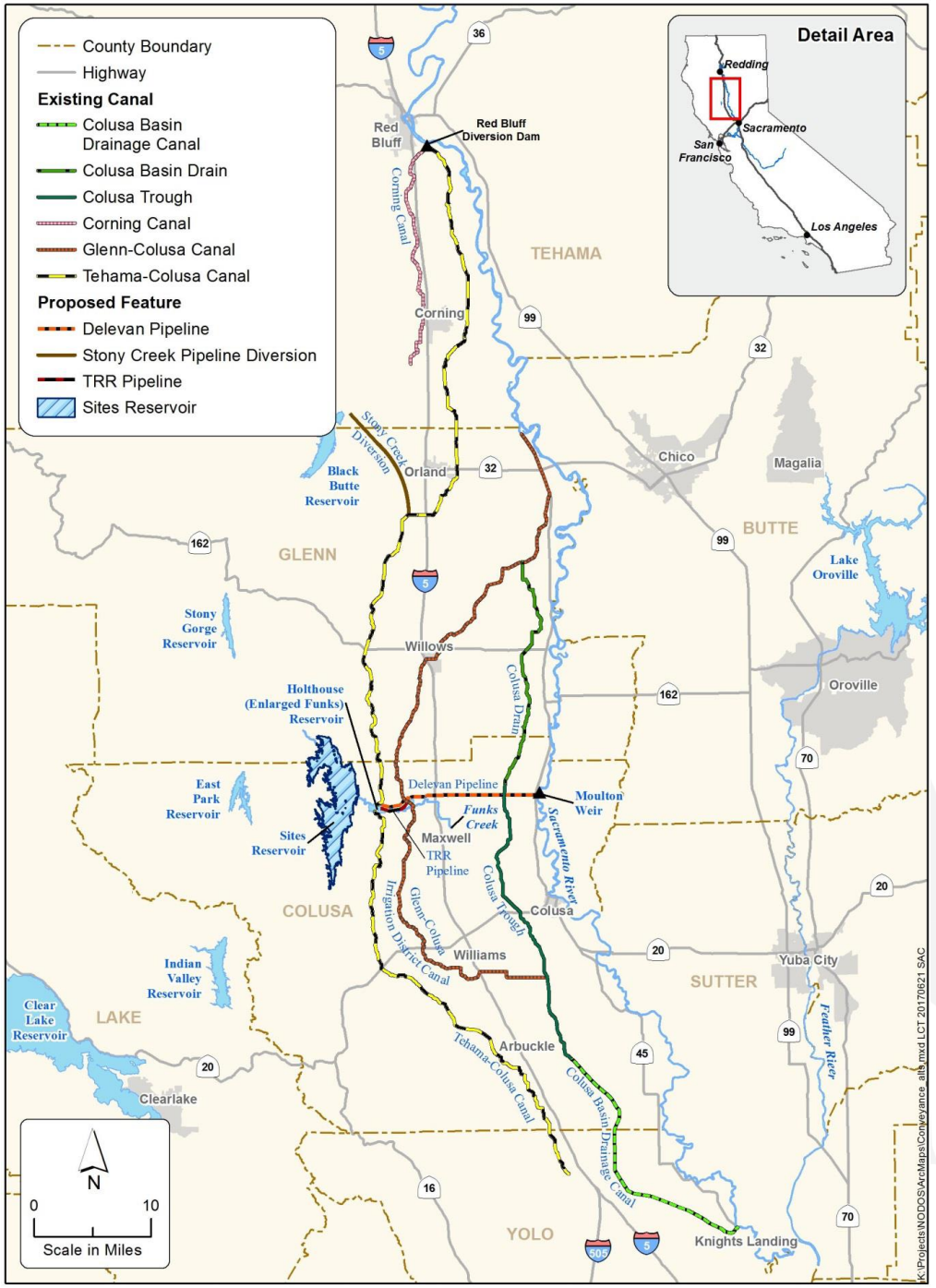
California Department of Fish and Wildlife

March 21, 2019

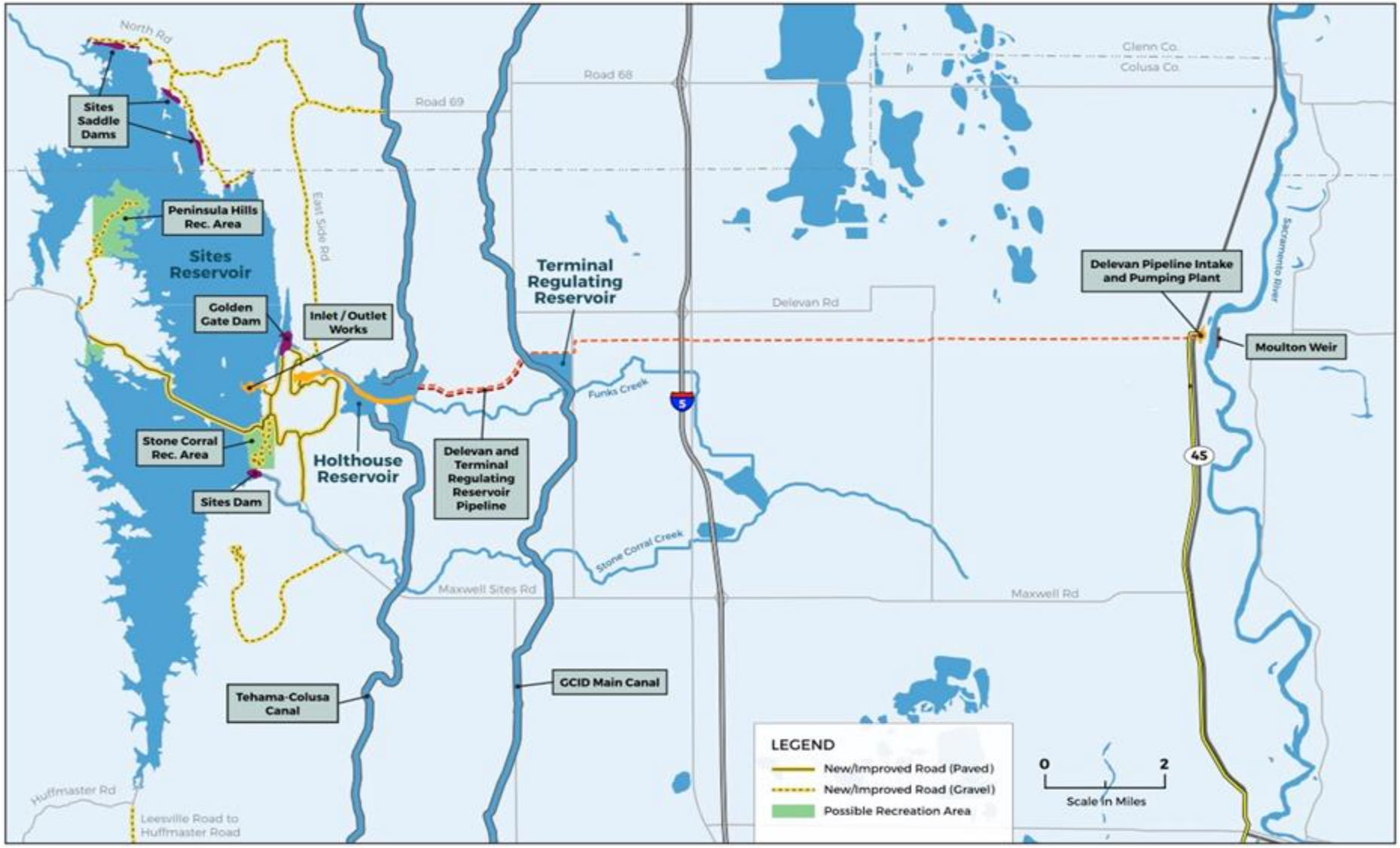
What is the Sites Project?

- New large reservoir, regulating forebays, pipeline and Sacramento River diversion
  - Fourteen miles long, 1.82 MAF storage
  - Two 300'+ earthen dams, 9 saddle dams
  - Two forebay regulating reservoirs connecting to existing irrigation canals
  - 14 miles of twin barrel, 12' diameter pipelines and two pump/generation
  - New 2,000 cfs diversion/pumping facility
- Sustainable Surface Water Infrastructure Improvement
  - Benefits endangered species and refuges
  - Increases water supply in drier years
  - Reduce regional floods
  - Increases recreation
  - Is more effective with Climate Change
- Proposed by a local joint-powers authority. Participants throughout CA, Reclamation, State

Regional Map



Project Facilities



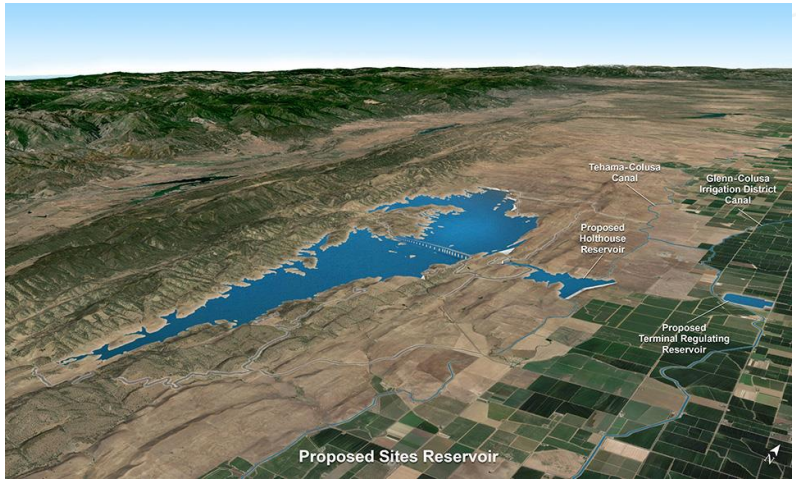
Project Objectives

Primary:

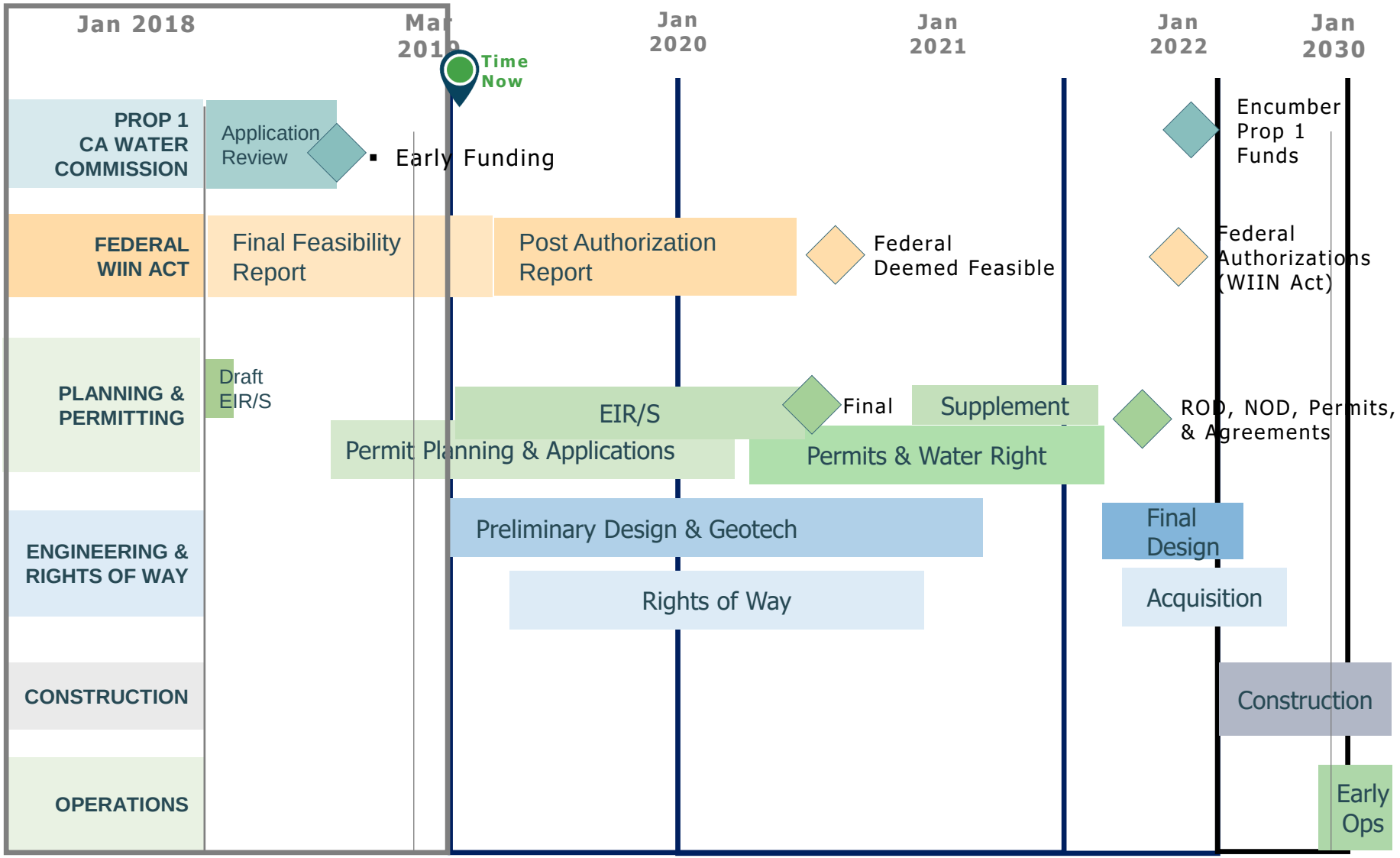
- Water Supply and Water Supply Reliability
- Anadromous Fish Net Improvements
- Operational Flexibility
- Pelagic Estuarine Fish Net Improvements
- Wildlife Refuge Supply

Secondary:

- Hydropower
- Recreation
- Flood Damage Reduction



Preliminary Design/Permitting Schedule



Previous Analyses

- Draft ER/EIS
  - CalSim II (2010 DCR)
  - DSM2, Upstream Water Temperature
  - SALMOD, IOS
  - Delivery assumptions vary for alternatives
- CWC WSIP Applications and Appeal
  - CalSim II (2015) provided by DWR
  - Unique Climate Change Assumptions
  - DSM2, Upstream Water Temperature
  - OBAN, SALMOD
  - Delivery assumptions based on Alternative D

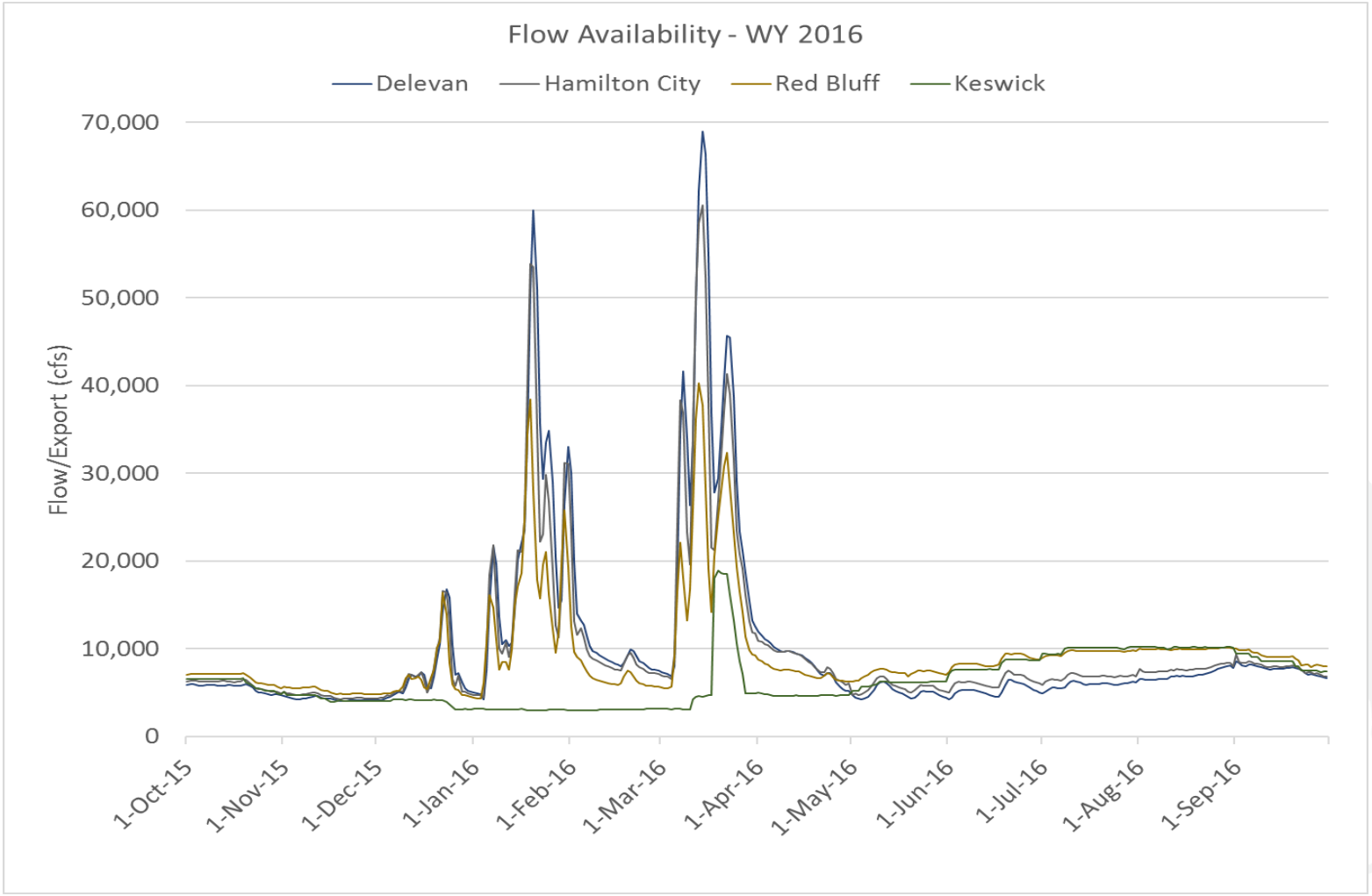
Example Analyses Since DEIR and WSIP

- Sacramento Riverine Habitat Estimation
  - Based on flood inundation – habitat mapping. Red Bluff to Knights Landing
  - Nature Conservancy Habitat types
  - HEC-RAS and GIS computation
- Hydraulic-limited river diversion limitations
  - Stairstep limits to diversions based on SacRiver stage - flow
  - Considers screen-pump limits at each location
  - Reduces lower-flow diversions
- CalSim II merged model adding optional analysis of:
  - CA Water Fix with variable diversion rates
  - Freemont Weir notch
  - Various climate change assumptions

Daily Sacramento River Operations Modeling

- Provide information and help develop further understanding of the interaction of the proposed Sites Reservoir Project over a wide range of potential flow conditions in the Sacramento River.
- Assess potential ecosystem benefits of coordinated Sites operations
- Simulates daily flow conditions in the Sacramento River from Shasta Lake to Knights Landing
- Uses available historical gage records and reservoir operations records for period 1964 – 2018

Flow Hydrograph Example



Planned Analysis Tools

- CalSim II – merged model with existing
- USRDOM – expanded calibration and analysis to May 2018
- Sacramento River HEC5Q model
- American River HEC5Q Model
- USBR Monthly Temperature Model
- USBR early life stage mortality models
- SALMOD
- OBAN
- IOS
- DPM
- DSM2 HYDRO, DSM2 QUAL, DSM2 PTM
- Power models including LTGen, SWP Power and NODOS Power model
- Economics Models including LCPSIM/CWEST, SWAP, LCRBQM and OMWEM
- HEC-RAS for water surface change – habitat variation
- CE-QUAL – W2 for Reservoir Water Quality

Fish Screen Study Plan

Prepare a draft plan of study for evaluation of diversions to Sites Reservoir and potential impacts to fish survival associated with intake facility operations at the Red Bluff Pumping Plant, Hamilton City, and the proposed Delevan Intake.

- Perform literature review
- Identify information to establish biological baselines
- Identify information to support permitting and development of performance criteria
- Identify information to inform facility design
- Identify pre- and post-construction monitoring and evaluation (M&E) requirements
- Identify any long-term M&E requirements

ESA Schedule:

Presidential Memo (10/19/2018)

- Encourages Commerce and Interior to work together
  - Streamline regulatory process
  - In accordance with applicable law
- Sites Project identified as major water project
- Establishes schedule
  - Joint biological assessment due to agencies in September 2019
  - Biological Opinions by February 2020

State Listed Terrestrial Species

Species	Federal Status	State Status
Foothill yellow-legged frog	No listing	Candidate, Threatened
Giant garter snake	Threatened	Threatened
Bald eagle	Delisted	Endangered
Swainson's hawk	No listing	Threatened
Bank swallow	No listing	Threatened
Western yellow-billed cuckoo	Threatened	Endangered
Tricolored blackbird	No listing	Threatened
Greater Sandhill Crane	No listing	Threatened, Fully Protected
Palmate-bracted bird's beak	Endangered	Endangered

Mapping Approach

ICF is mapping land cover through aerial photo interpretation using

- Google Earth
- National Agricultural Imagery Program (NAIP) imagery
- Topographic data obtained through LIDAR

Terrestrial Species Models

Foothill yellow-legged frog	Perennial and intermittent streams with rocky substrates (not Sacramento River), Stone Corral Creek, Funks Creek (above reservoir), Antelope Creek
Giant garter snake	(Valley floor) AQUATIC - agricultural ditches, canals, freshwater emergent wetland, managed wetland, rice . UPLAND - areas within 200 feet of aquatic habitat that include annual grassland, other ag, disturbed, barren.
Western yellow-billed cuckoo	Riparian patches at least 25 acres in size
Swainson's hawk	NESTING - Riparian, other tree stands, isolated trees (not blue oak woodland); FORAGING - Minimum of 5-acre patches. Annual grassland, seasonal wetlands, alfalfa, hay fields, field crops, row crops, managed wetlands
Tricolored blackbird	NESTING - emergent marsh, managed wetland, riparian (blackberry thickets) FORAGING - annual grassland, seasonal wetland, grain/hay crops, field crops, rice, fallow
Bald eagle	NESTING - Riparian, FORAGING - Reservoir, river

WSIP Process Lessons Learned

What we thought

- Sites = cold water pool management = climate resiliency = anadromous fish benefits

What we learned

- Need to revisit benefits to salmon populations
- Collaboration with regulatory agencies is essential
- Benefit of pulse flow to Yolo Bypass for delta smelt acknowledged
- Benefit to refuge water supply acknowledged

Approach to Biological Assessment

The Challenge:

- Given flexibility created by off-stream storage for management of cold water pool and flows;
- How do we build and operate the project to provide a net benefit to fishery resource?
- We would like to work with CDFW, NMFS, and USFWS to develop an approach to weigh benefits and impacts of operations
- And develop an operations plan that is expected to achieve a net benefit to the environment

Near-Field Effects Analyses

Salmonids:

- Spatial distribution (horizontal/vertical: literature review, with specific info. for water surface elevations of screens, etc.)
- Entrainment (size distribution)
- Impingement/screen contact/passage time (literature review & Swanson et al. analyses)
- Predation (literature review, incl. Vogel GCID studies)
- Stranding behind overtopped screens (high flow, based on water surface elevation)

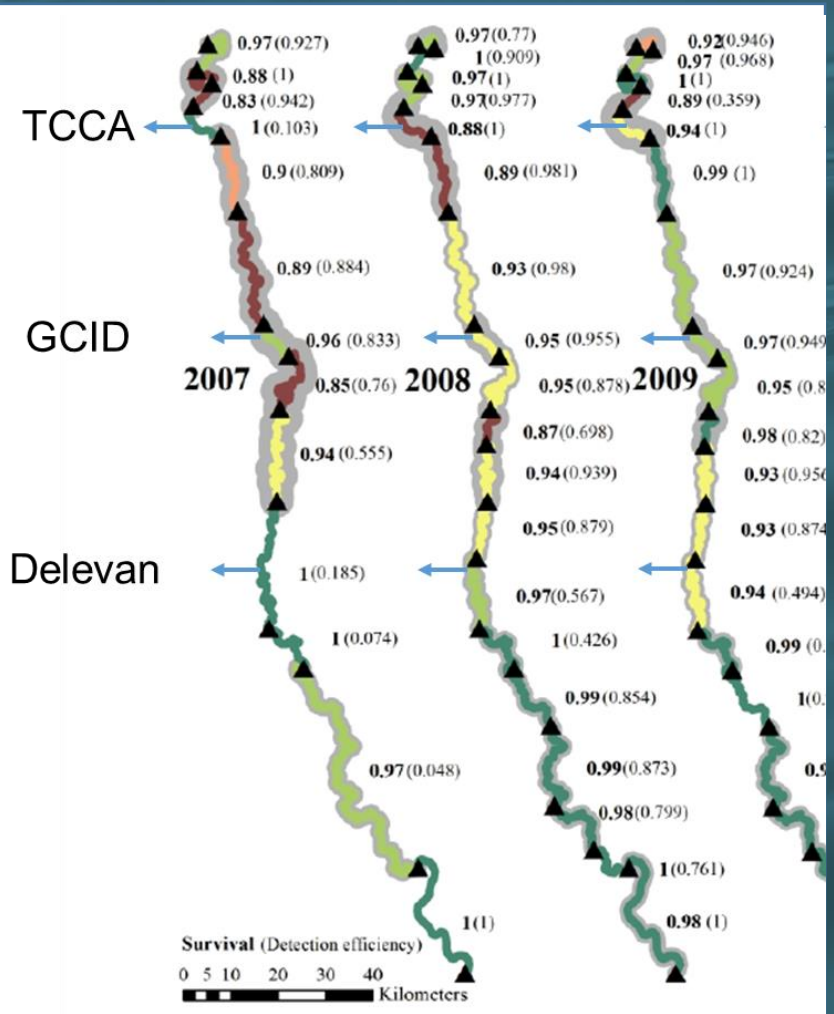
Green Sturgeon:

- Review of protective velocity criteria and timing (Verhille et al. 2014)
- Entrainment (size distribution)

Far-Field Flow-Survival Analysis

Juvenile Chinook Salmon:

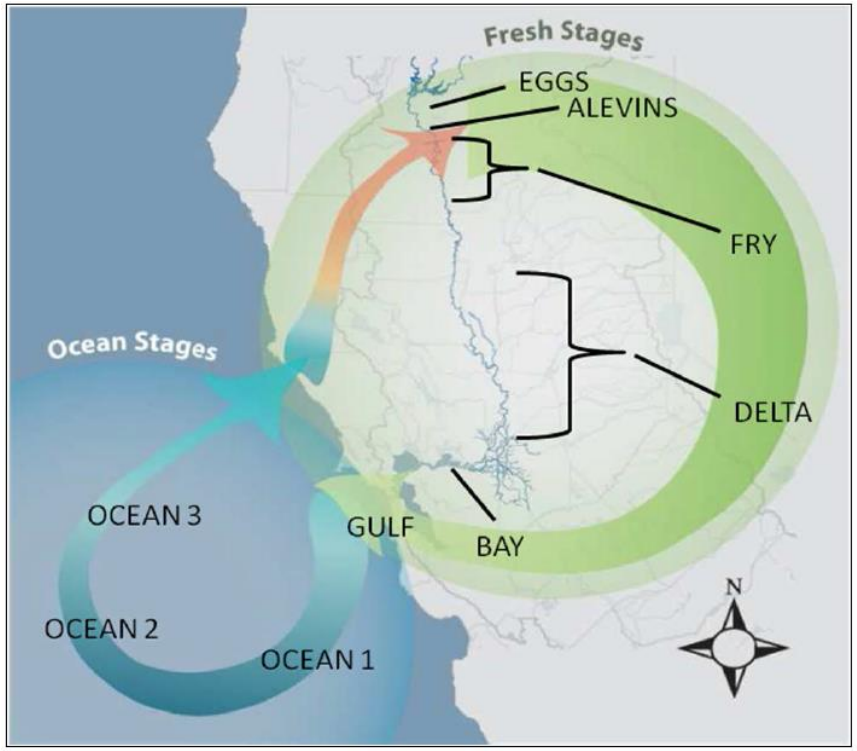
- Proposing to use model from new Henderson et al. (2018) paper
- Peer-reviewed (CJFAS)
- Multiple reaches from above Red Bluff down to Knights Landing
- Focus on Sites withdrawal period (winter/spring), daily timescale
- Incorporates flow and temperature effects
- Also includes other (non-operations) covariates
- Results will allow adjustment of other models, e.g., OBAN



Life Cycle Modeling

OBAN:

- Winter-Run Chinook Salmon
- July-Sep temp. (eggs/alevins)
- Aug-Nov flow (fry)
- Dec-Mar Yolo flow (juveniles)
- Dec-Jun exports (juveniles)
- DCC (Dec-Mar) (juveniles)
- Adjustment of Sac. R. migration survival per Henderson et al. results
- Ocean conditions not affected by project but included in model (productivity and harvest)



Effects to Delta Species

Delta Smelt

- Fall X2 habitat (Feyrer et al. 2011)
- Adult and larval entrainment (Grimaldo et al. 2009; Grimaldo et al. 2017)
- Later summer/fall flows carrying food (IEP Studies)
- Sediment entrainment by Project intakes

Longfin Smelt

- Juvenile abundance vs winter-spring outflow (Kimmerer et al. 2009
- Stock-recruit dynamics (Nobriga and Rosenfield 2016)
- Adult and juvenile entrainment (Grimaldo et al. 2009)