CDFW - Sites 60 day Evaluation Initial Meeting Agenda

Sites Reservoir Project

Date: *May 30, 2019* **Location:** *Jacobs Office: 2485 Natomas Park Drive, Suite 600*

Time: 8:30 am - 10;30

Purpose: Initiate discussions of the Sites Project Operations components for the 60-day evaluation process. Review existing information, discuss future information needs, establish technical meeting schedule

Invitees:

~~Kristal Davis Fadtke~~ CDFW
Rob Thomson, Sites Authority
Kevin Spesert, Sites Authority
Mike Dietl, Reclamation
Ken Kundargi- CDFW
Lenny Grimaldo, ICF
~~Marin Greenwood~~, ICF
Jim Lecky, ICF
Duane Linander- CDFW
~~Filipe~~ Felipe La Luz - CDFW
Chris Fitzer, ESA Associates
Rob Tull, Jacobs
John Spranza, HDR

Agenda:

Discussion Topic	Topic Leader	Est Time
1. Introductions and Purpose a. Schedule b. Governance	~~Kristal Davis Fadtke~~ Rob Thomson	10 min
2. Sites Project Overview a. Location/Facilities	Rob Thomson	10 min
3. Operations: Hydrology and Modeling a. Past modeling b. Initial modeling results c. Other???	Rob Tull	30 min
4. Simulation Results a. Near Field b. Far-field c. Floodplain d. Life Cycle Modeling e. Delta and Longfin smelt f. Others????	Jim Lecky Lenny Grimaldo	45 min
5. Available tools a. CalSim2 Updates b. USRDOM Daily Model c. HEC5Q – American, Feather, Sacramento Riv d. USBR Monthly Temp and early life-stage	Rob Tull, Jim Lecky, Lenny Grimaldo~~, Marin Greenwood~~	60 min

Commented [LLF1]: None of the topics under Item 4 were discussed.

e. DSM2 HYDRO, Qual, PTM
f. SALMOD
g. Henderson et al.
h. OBAN/IOS
i. Sites Reservoir CE-QUAL-W2
j. Sites Project Operations Viewer

6. Next steps for 60 day schedule — Group discussion

General Meeting Notes

Initial Presentations

- R Thomson presented agenda, purpose, anticipated topics, location, and results slides.
- R Tull presented modeling and sample year hydrology slides plus intro slides on Operations viewer..

~~CDFW~~ Discussion Topics

- When writing the ITP for CWF, CDFW analyzed r~~R~~ecent years (2003-2012, 2014) of actual measured data (hydrologic and fish) ~~has been~~which was used in conjunction with Russ Perry's survival model to set initial operation conditions and then inform operations and pulse protection accordingly.
  - NMFS contracted with Russ Perry to~~for~~ model through-D~~d~~elta survival ~~modeling~~ for the purpose of incorporating his reach specific survival model into potential North Delta Diversions (NDD) operations. T~~t~~he results highlighted periods of time when Level 1 diversions would result in an impact of more than 5% survival. This overlayed with actual fish emigration timing informed by Knights Landing catch data and a bypass threshold identified by Perry's work indicated when additional protections for emigrating winter-run Chinook salmon would be needed and other times when flows in the Sacramento River were at a level that routing and survival would not be significantly impacted by additional diversions. ~~that there were more impacts using real time data when compared to other models.~~
  - CDFW used this method on the salmon side to identify a reasonable threshold above which north of delta diversion could happen with acceptable impacts to salmonid survival.
  - Revisions ~~of this threshold~~ to the operations of the NDD would then be made using up-front agreed upon adaptive management to rebalance future permitting and operations that would also include some assured amount of water that could be diverted.
- CDFW informed the group when developing and writing the CWF ITP, a condition of the ITP was that draft study plans would be reviewed by the Collaborative Adaptive Management Team (CAMT) and sent to a larger group for approval. The intent of this was so that parties would agree on a path forward prior to implementing studies versus studies being implemented and discussion on the science taking place afterwards. ~~Management would like to use a prescribed science based process that operator and permittees agree to up-front to avoid later legal challenges.~~
  - Allows for an Agreement that is a bit more open on the front knowing that there would be a prescribed science based process to refine/adaptively manage.
- Sites ITP will have to have adaptive management involved and that this 60 day process can narrow the level of uncertainty in the project's operational effect to a reasonable level that can then be reported out to Governor's Office and then carried forward to reach the 2081.
- For upcoming~~longer~~ discussions, CDFW highlighted the need to take an ecosystem wide approach as operations upstream have ramifications throughout tributaries and the Delta. there are a lot of splits in the permitting decision process; by upstream and downstream, by species and run, and by agency (CDFW, NMFS, USFWS).Ken would like to minimize that. Did not get done with ROC, would like to see it.

Commented [LD2]: This analysis used flows from CDEC data from Wilkins Slough (WLK) and Freeport (FPT) and catch data from the Knights Landing rotary screw trap program.

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Commented [LD3]: The basis of this comment was focused around a discussion about the original intent of ROC, how it turned into a three-track process, and how teams were separated by tributaries and the Delta. The intent of this discussion was to highlight that actions at one sight have effects throughout the system as a whole and we need to keep that in mind when analyzing data for the permit application.

- Like to look at whole ecosystem to the extent feasible which would be preferred to previous/recent doctrine

- Ken would like to see Henderson's model applied to below diversions
- CDFW would be looking for a specific adaptive management framework, some specifics of what we are trying to do by when (year), what study questions need to be answered, operational decisions that would be made, assurances that it will be carried out, other…?
  - Needs to inform funding as well.
  - The larger group requests an idea of what additional information will be needed to reduce uncertainty enough to push through adaptive management.

~~Sites Team Discussion/Questions~~

- Mike D: Federal government needs to hear the State acknowledge that the project has ecosystem benefits to anadromous fish (as included in the Sites WSIP application and appeal) to assure proposed federal funding.
- Lenny G: What other specific information does CDFW need to reduce that uncertainty in the Adaptive Management Program?
  - Where can Sites help develop new science to inform fisheries?
  - CDFW stated they will need some time to think about this and get back to the group.
- Lenny G: Requested CDFW input on what data sources they would like us to use and what the definition of best available science is: Specific papers, life cycle models, and other specific science to use in the preparation of the ITP. The goal being to narrow the gap in interpretation of science in the next 60 days.
  - CDFW stated they will need some time to think about this and get back to the group.
- Rob T: If CDFW provides years they would like to see modeled, Sites will provide the information available for those years (and similar years in CalSim2) and walkthrough a run of those years with CDFW.
  - CDFW stated they will need some time to think about this and get back to the group.
- Rob T: How does this coordination process occur for terrestrial species in the ITP?
  - Ken: Would not occur in these meetings, which would focus on operations.

Next Steps

- CDFW will get back with what they would like to address in follow-up meetings.
  - Need to loop in structure (regions) and clear with Kristal.
- Look for regular blocks of time to be available.
  - Wednesdays seem likely.
  - Wed June 5, 2019 12:00 – 2:30 next meeting
- Sites to send 2018 Henderson paper around.
- CDFW to provide desired model years for next workshop.
- CDFW to provide contact for terrestrial discussions.

Future Meeting Structure:

- Better understanding of tools (daily model) and a look under the hood of the model runs
- Model Meeting
  - Next week: Daily model discussion
  - Following Week: Henderson paper Henderson paper meeting with Marin focusing on the effects below diversions. What is the plan to evaluate instream survival? Where are we going to go with the paper's findings related to Sites
  - OBAN-Potential to run model scenarios with different bypass flows

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- Outflow and Downstream

CDFW Information Requests:

1. Assumptions in CalSim; in detail
2. Daily Model discussion; in detail. And possibly a focused session on that model with CDFW hydrologists.
3. Send hydrology presentation slides to CDFW (and ESA).
4. Send Henderson paper.

Sites Project: Topic Area Update Meeting

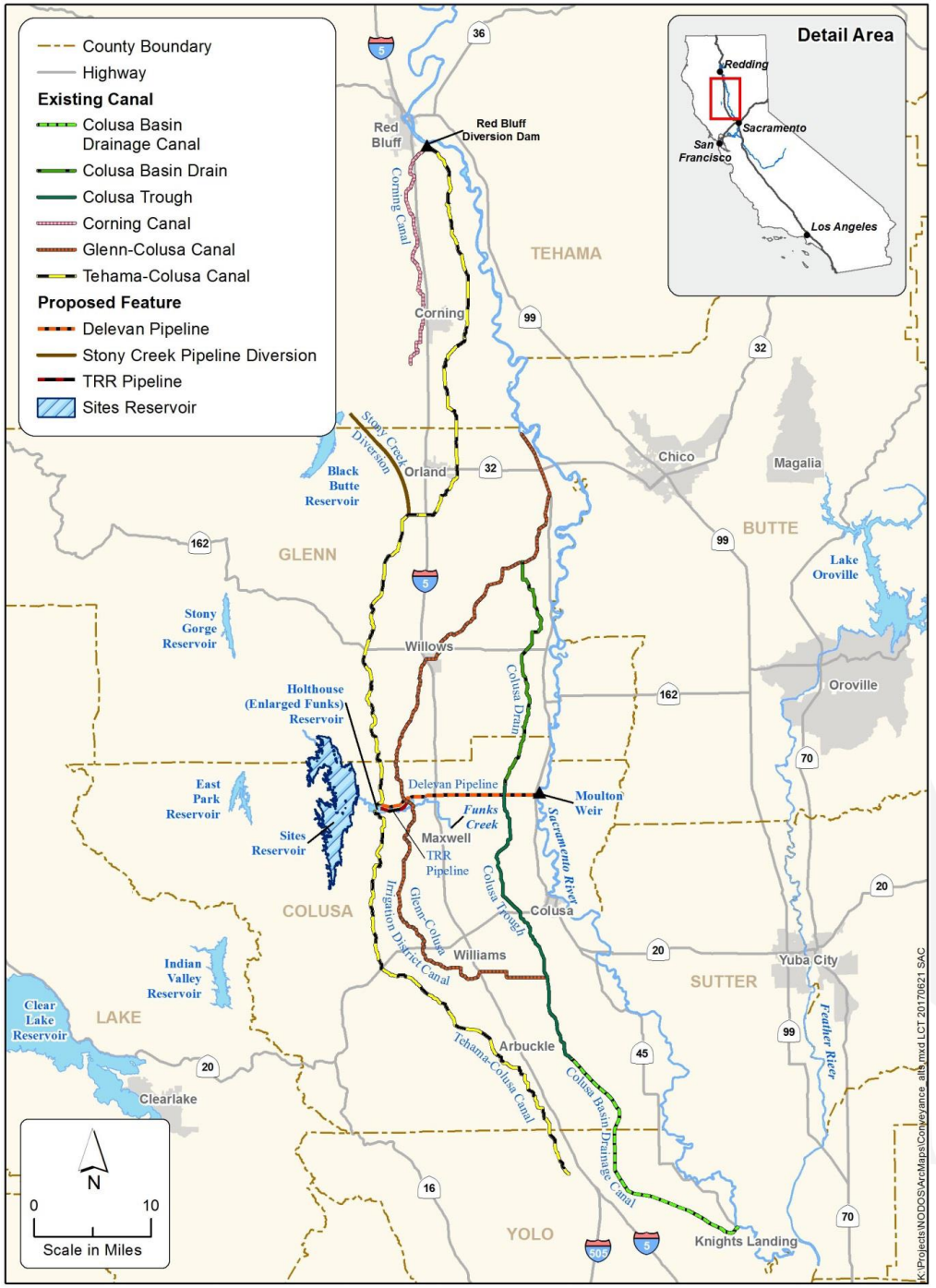
California Department of Fish and Wildlife

March 21, 2019

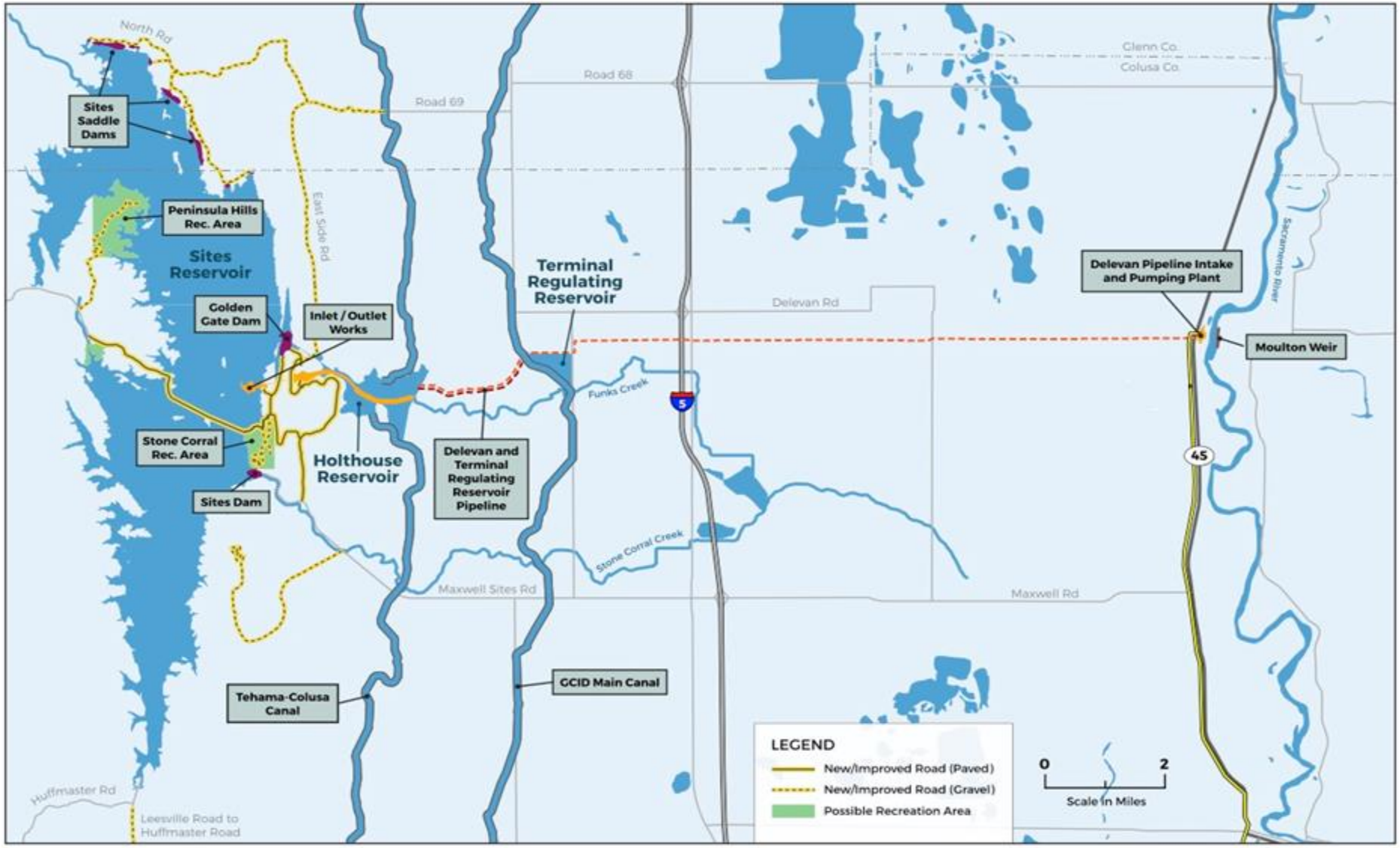
What is the Sites Project?

- 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



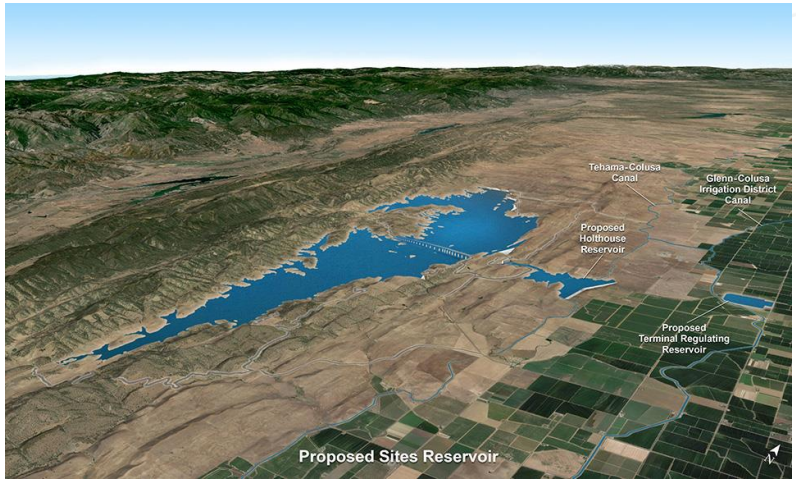
Project Objectives

Primary:

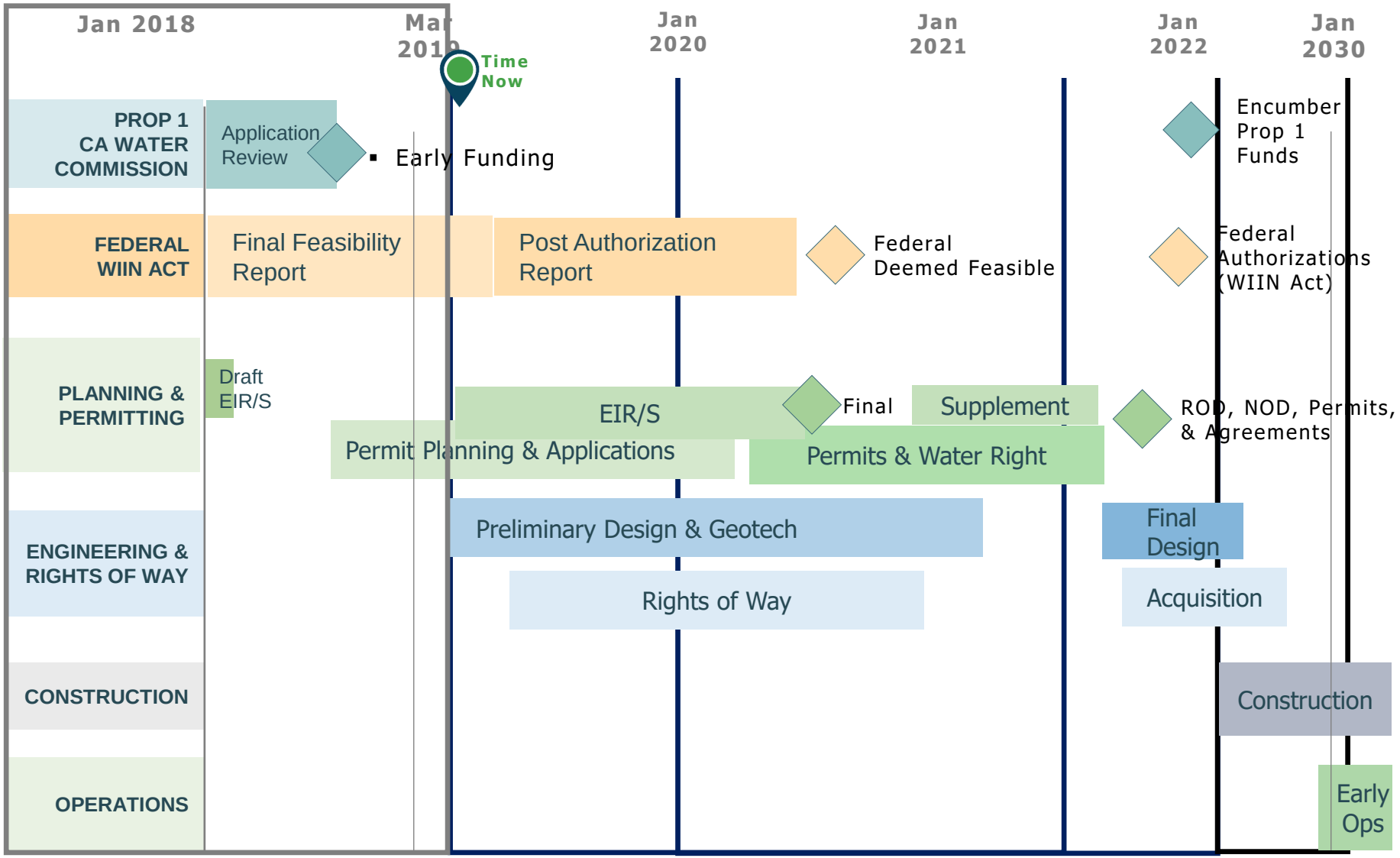
- Water Supply and Water Supply Reliability
- Anadromous Fish Net Improvements
- Operational Flexibility
- Pelagic Estuarine Fish Net Improvements
- Wildlife Refuge Supply

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

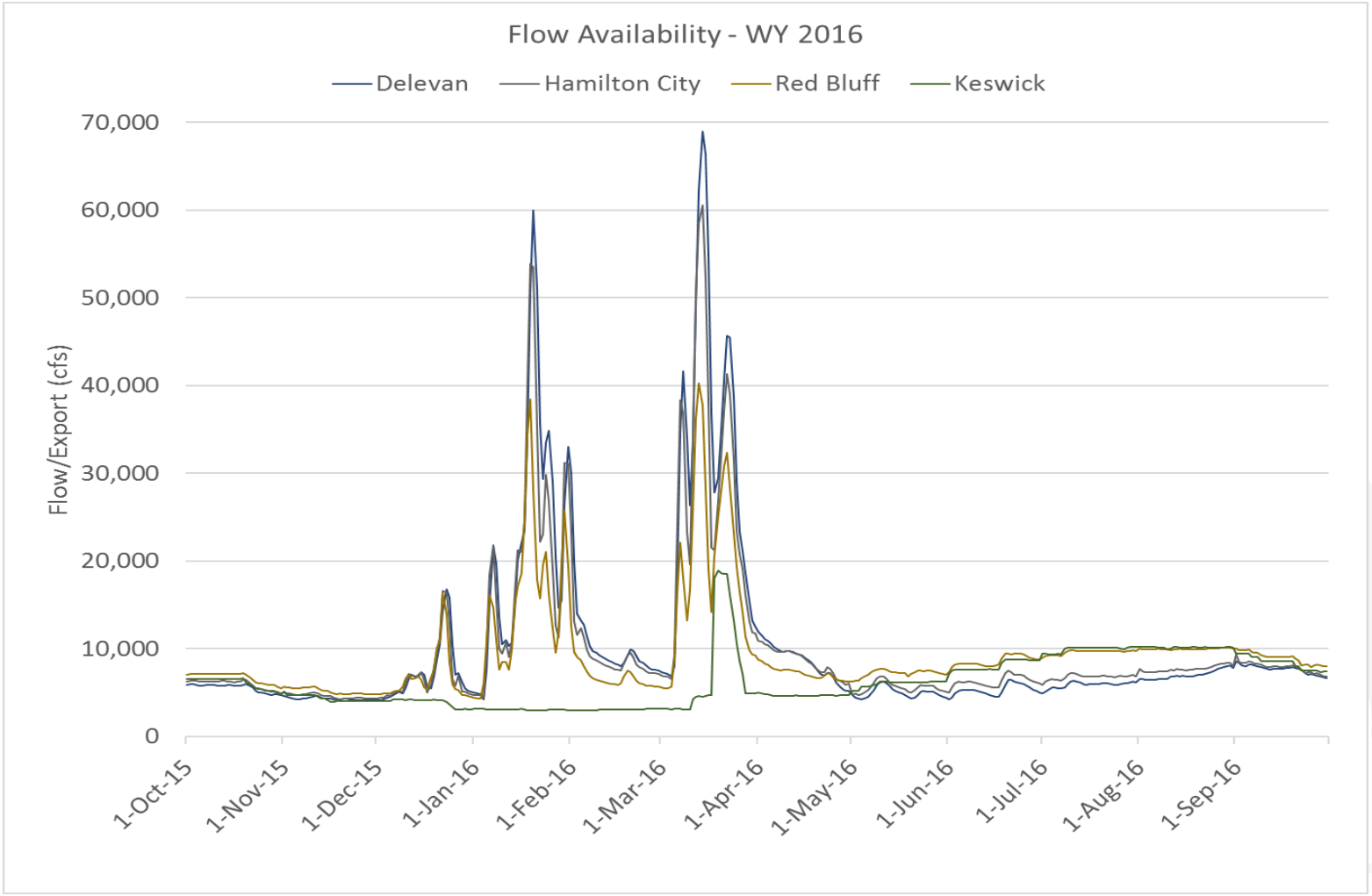
Example Analyses Since DEIR and WSIP

- 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)

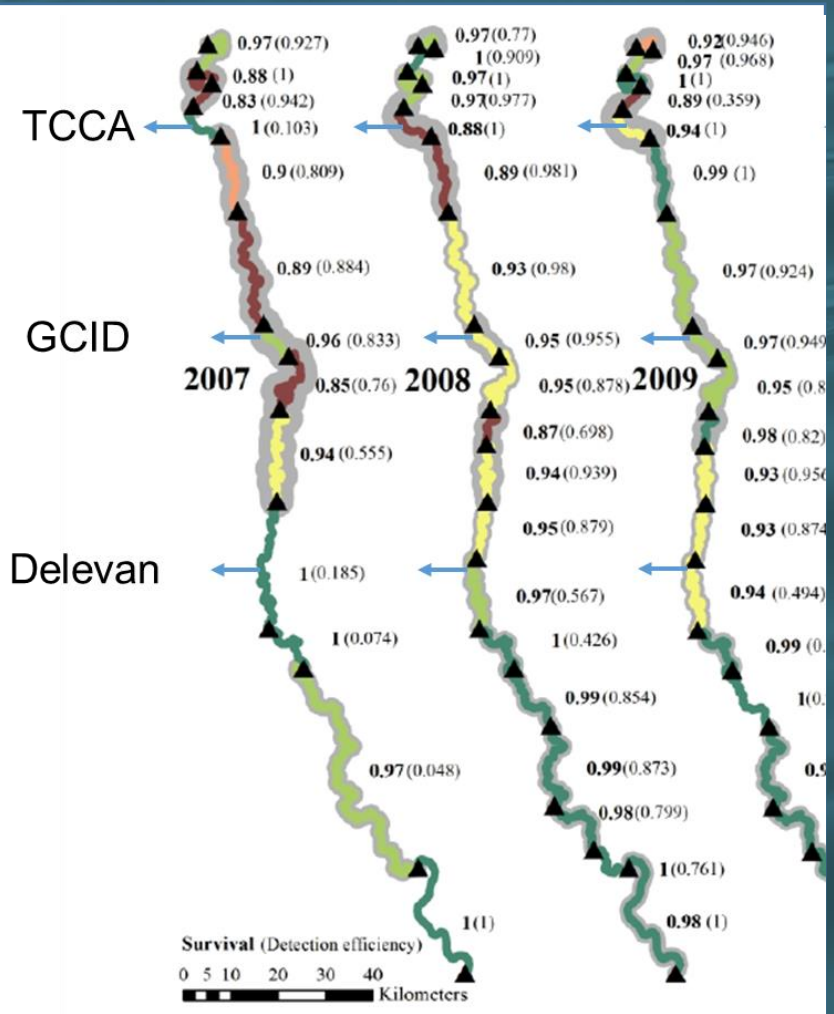
Green Sturgeon:

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

Far-Field Flow-Survival Analysis

Juvenile Chinook Salmon:

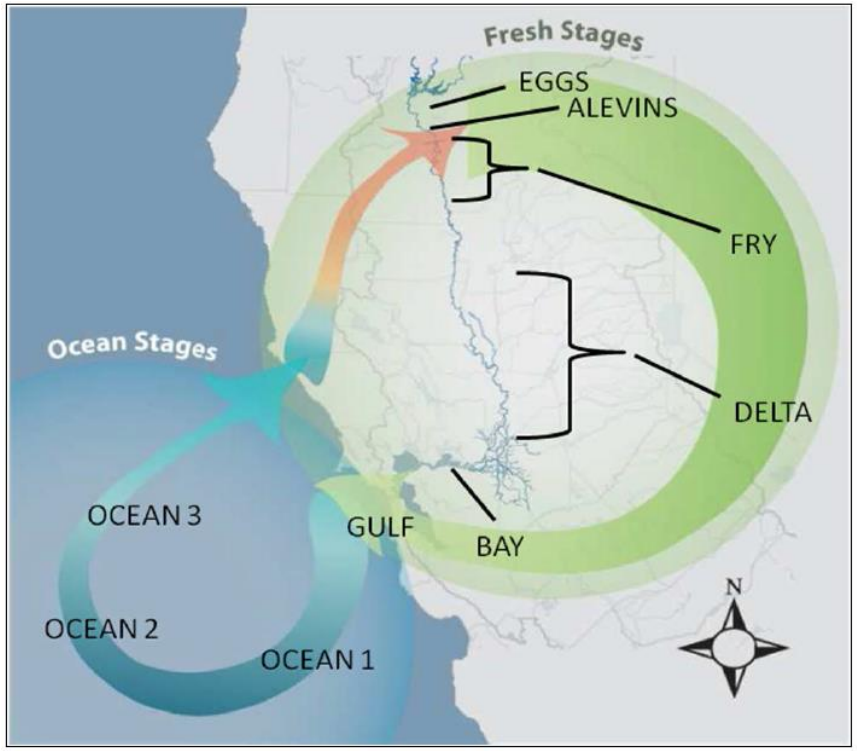
- Proposing to use model from new Henderson et al. (2018) paper
- Peer-reviewed (CJFAS)
- Multiple reaches from above Red Bluff down to Knights Landing
- Focus on Sites withdrawal period (winter/spring), daily timescale
- Incorporates flow and temperature effects
- Also includes other (non-operations)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