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From: JP Robinette [JRobinette@BrwnCald.com]
Sent: 12/4/2019 2:51:40 PM
To: Alicia Forsythe [aforsythe@sitesproject.org]; John Spranza (john.spranza@hdrinc.com) [john.spranza@hdrinc.com]
CC: Heydinger, Erin [Erin.Heydinger@hdrinc.com]
Subject: Cindy Kao, Santa Clara Conversation after December Workshop

Ali and John,

That was a great conversation with Cindy Kao yesterday… Thanks for including me. Please find a summary of my notes below. I am cc'ing Erin as we have started discussing how to track participant requests and follow up on them (see below clipping from the Org Assessment, specifically the communications/trust section of the report):

i. Staff need to build more trust with each Board members. One on one meetings are important and information requests need to be documented, actions generated and tracked and regular reporting back to the Board member.

Here is a summary of what I heard in the meeting with Cindy. Please let me know if I have missed or mischaracterized anything. Erin, let's talk soon about setting up a database to track items like this.

Information needed for next funding decision, by March meetings:

1. Operations Plan – Including SWP and CVO
2. Project Description (of the "physical" project)
3. Range of yield expected with the permitting discussions
4. A more robust approach to participation – Shares versus Acre Feet.
5. Document the risks and unknowns

Other Actions:

1. A meeting with Ali, Garth, and Nina would be beneficial. Cindy will coordinate this meeting.
2. We need to start showing what the losses in the delta do to deliveries for SOD participants. Cindy will use 24-30% loss in her calculations. I have added this as a possible change to the repayment tool in our tracking log.

Information and commentary:

1. The Santa Clara board is very savvy when it comes to permitting. Their experience on Anderson generates a lot of questions around Sites' permitting.
2. Cindy offered to help with the ops plan development
3. Cindy offered to help in conversations with Reclamation and will reach out to Thad directly to engage.
4. Cindy was very interested in the amount of water the state receives for their investment. We showed her where to find this information in the repayment tool.
5. Generally, she says she does not understand the acre feet approach to project participation. She has presented to the board in terms of % of total project participation. In her view, the project is not over-subscribed or under-subscribed with this approach. It was discussed that her approach is more or less in line with the storage policy. More work is needed to understand how this approach scales.

Thanks,

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Value Planning Study

Purpose

Process for developing the initial alternative plans and the final selection of the recommended plan

The planning process for the Sites Project includes the following key steps:

1. Establish planning objectives and constraints
2. Identify acceptable project management measures/facilities
3. Establish appraisal level screening criteria
4. Formulate and complete an appraisal level evaluation of initial alternatives
5. Screening and identification of tentatively recommended plan(s)
6. Prepare draft and final value planning report
7. Refinement and feasibility level evaluation of tentatively recommended plan(s)
8. Screening and selection of recommended plan
9. Prepare draft and final feasibility study report and EIR/EIS

Planning Objectives and Constraints

Primary and secondary planning objectives were developed for the Sites Value Planning Study (SVPS).   to support the development and evaluation of the SVPS alternatives. The primary objectives are considered essential to developing a viable project, and the alternatives must meet all of the primary objectives to some degree to advance in the evaluation process. The development of new storage also provides an opportunity to provide other, secondary benefits. After developing alternatives to meet the primary objectives, the resulting opportunities to achieve the secondary benefits were evaluated.

Planning Objectives

The primary and secondary planning objectives for the SVPS are based on the identified problems, needs, and opportunities discussed in Chapter 2. These planning objectives incorporate state, and Authority specific goals.

The primary objectives for the SVPS studies are:

1. Improve water supply, water supply reliability, and water quality
2. Provide Incremental Level 4 water supply for refuges
3. Improve the survival of anadromous fish
4. Enhance the Delta ecosystem

The SVPS alternatives are formulated to achieve these primary objectives, and evaluated to assess their effectiveness in achieving these objectives.

The secondary objectives are:

1. Provide hydropower generation on release
2. Provide opportunities for recreation
3. Provide flood-damage reduction

The SVPS alternatives are not formulated to maximize the secondary objectives, but opportunities to achieve them were included in the alternatives and evaluated to the extent that they are available. Problems, needs, and opportunities and the corresponding objectives are identified in Table 1.

Table 1. Planning Constraints

The scope of the SVPS process is limited by the following constraints:

Offstream Storage: By definition—and consistent with the CALFED ROD—the NODOS feasibility studies are focused on offstream storage locations. The creation of reservoirs that would interrupt major watercourses and impede the migration of fish is not the subject of this investigation.

Laws, Regulations, and Policies: Laws, regulations, and policies that must be considered include, but are not limited to, NEPA, the Fish and Wildlife Coordination Act, the Clean Air Act, the Clean Water Act (CWA), the National Historic Preservation Act (NHPA), the ESA, the California ESA, CEQA, and the CVPIA. The CVPIA of 1992 (P.L. 102-575) influences water supply deliveries, river flows, and related environmental conditions.

*Pump Back Storage:*The Project facilities are not to include provisions for pump back storage hydropower generation.

Current Participants: The Project facilities are to be limited to those that directly benefit the current participants.

Federal Participation: The Bureau of Reclamation role will be limited to that of a cooperating partner, no financial involvement.

Others???

Table 1[SEQ Table * ARABIC \s 1]. Summary of Problems, Needs, Opportunities, and Planning Objectives

Problems	Needs	Opportunities	Planning Objectives
Water supply and water supply reliability			
Water supply reliability for municipal and industrial, and agriculture has decreased appreciably, resulting in loss of system resiliency.	Need improved water supply reliability to meet current and future challenges associated with increasing population, agriculture production, environmental needs, and climate change.	The project provides an additional water source of high quality that could improve: • Agricultural water supply reliability (SWP water contractors, and local agricultural water districts) • M&I water supply reliability (CVP water contractors, SWP water contractors, and local agencies)	Primary 1. Improve water supply, and water supply reliability
Incremental Level 4 water supply for refuges			
Delivering reliable Incremental Level 4 water supplies annually to refuges as required by the CVPIA.	Need reliable water supplies to provide for optimum habitat management on the refuges.	NODOS provides an additional water source that can be cooperatively operated with the CVP/SWP system and used for consistent delivery of Incremental Level 4 water to the refuges.	Primary 2. Provide Incremental Level 4 water supply for the refuges
Survivability of anadromous fish			
Populations of anadromous and endemic fish species in the Sacramento Valley river system are declining due to warmer water temperatures and low flows.	Need additional cold water and increased flows for anadromous fish migration, spawning, and rearing.	NODOS provides an additional water source that could be cooperatively operated with the CVP and SWP systems to provide water to help stabilize river flows in the fall, and facilitate the release of additional cold water (from Shasta and Oroville Reservoirs) to benefit Sacramento River anadromous fish and other aquatic species.	Primary 3. Improve the survival of anadromous fish and other aquatic species
Delta ecosystem enhancement			
There is insufficient food to sustain Delta smelt, even in years with high precipitation and runoff.	Water is needed to convey biomass for food production from the toe-drain of the Yolo Bypass into the Delta.	The NODOS project provides a dedicated source of water to transport biomass for food to portions of the Delta frequented by Delta smelt.	Primary 4. Enhance the Delta ecosystem.
Hydropower generation			
Demands for power in the state are expected to increase as population, industry, and associated infrastructure growth occurs in the future.	Need new power sources that can meet California's stringent GHG regulations.	Sites provides new hydropower to help offset the pumping costs associated with the project	Secondary 1. Provide hydropower generation on release.

Problems	Needs	Opportunities	Planning Objectives
Recreation			
Demands for flat-water, river, and land-based recreation are expected to increase as population increases.	Need additional recreation areas to meet the region's increased demands.	NODOS provides a new reservoir with recreation areas that could help meet current and future demands.	Secondary 2. Provide opportunities for recreation.
Flood-damage reduction			
Flooding occurs in the Colusa Basin watershed between October and April.	Need to capture or attenuate the sudden surges associated with flooding in the watershed.	NODOS provides a new reservoir that could capture and attenuate flood flows, thereby providing flood-damage reduction to the community of Maxwell and the Colusa Basin Drain.	Secondary 3. Provide flood-damage reduction

CVP = Central Valley Project
CVPIA = Central Valley Project Improvement Act
GHG = greenhouse gas
NODOS = north-of-the-Delta offstream storage
SWP = State Water Project

Planning Constraints

The scope of the SVPS process is limited by the following constraints:

Offstream Storage: By definition—and consistent with the CALFED ROD—the NODOS feasibility studies are focused on offstream storage locations. The creation of reservoirs that would interrupt major watercourses and impede the migration of fish is not the subject of this investigation.

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Others???

Identification and Evaluation of Measures to Address Primary Planning Objectives

Numerous management measures have been identified to address each of the primary planning objectives. [REF _Ref1563847 \h] identifies the measures that best address the primary and secondary planning objectives. Measures carried forward best address the objectives for the Sites Project, given the consideration of planning constraints and criteria.

Table 2. Retained Management Measures to Address Primary Planning Objectives

Objectives	Management Measures
Improve water supply and water supply reliability	Develop measures for offstream storage
	Transfer water between water users and source shift (i.e., use groundwater in lieu of surface water and vice versa to better manage water resources)
	Improve flows by integrating a new offstream storage facility into system operations
Provide Incremental Level 4 water supply for refuges	Reduce year-to-year variability in acquired water supply from willing sellers by developing NODOS measures
Improve the survival of anadromous fish	Improve water quality (temperature) by conserving water at existing reservoirs upstream of critical fish habitat and provide additional flows to support fish migration
Enhance the Delta Ecosystem	Use NODOS to provide water to the Yolo Bypass toe-drain to convey biomass into the Delta to promote a more robust food web for Delta smelt and other species
Provide hydropower generation	Incorporate hydropower upon release
Provide flood-damage reduction	Provide local flood-damage reduction benefits
Provide opportunities for recreation	Provide flat-water recreation benefits

Appraisal Level Decision Support Framework

A multi-criteria evaluation framework was established to value the merits of each alternative in meeting objectives within constraints. Results of the multi-criteria evaluation will be used by decision makers to inform selection of a preferred alternative. The proposed framework follows techniques presented in the "Trade-Off Analysis Planning and Procedures Guidebook," USACE; IWR 2002. The multi-criteria decision framework and results are detailed below.

The process established to conduct the multi-criteria decision analysis included the following steps:

1. Establish the main decision support criteria, sub-criteria that support the main criteria, and the associated metrics and weights.
2. Evaluate the sub-criteria to establish the metrics for the main criteria:
   a. Determine the metric value assigned to each sub-criteria.
   b. Normalize the transformed metrics by presenting them as a percent of the maximum value.
   c. Weight the criteria by percent to reflect their importance relative to one another.
   d. Develop a weighted product matrix that will present the weight assigned to each criterion and the product of the weight times the normalized metric for each alternative.
   e. Sum the weighted products to determine the total value assigned to the main criteria.

3. Evaluate the main criteria to determine the alternative(s) with the highest total weighted product, which will indicate the alternative(s) that most successfully meet(s) the planning objectives:
    a. Normalize the transformed metrics by presenting them as a percent of the maximum value.
    b. Weight the criteria by percent to reflect their importance relative to one another.
    c. Develop a weighted product matrix that will present the weight assigned to each criterion and the product of the weight times the normalized metric for each alternative.
    d. Sum the weighted products to determine the total value assigned to the main criteria.

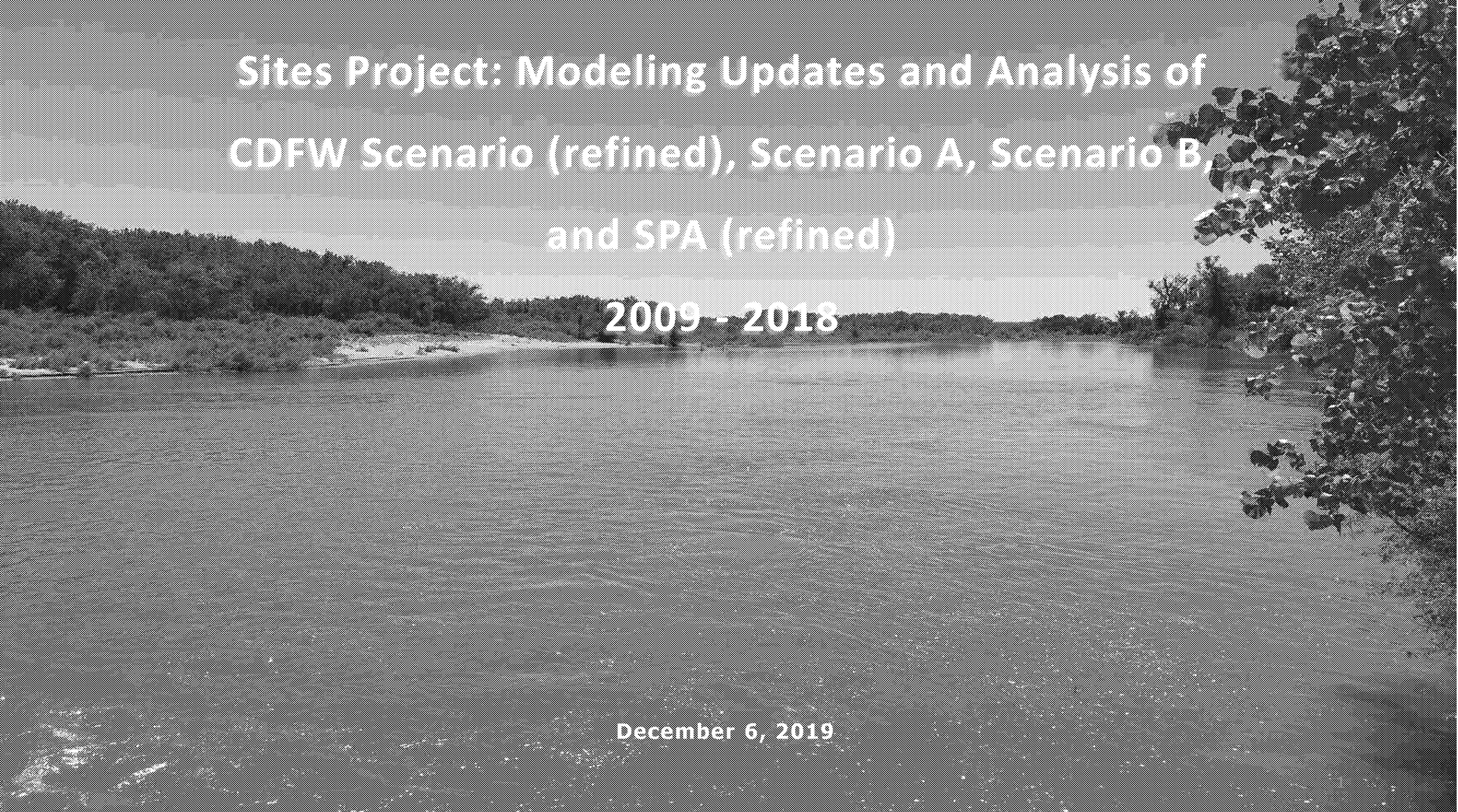
Main criteria and sub-criteria were developed for use in differentiating and choosing among the alternatives. The criteria were weighted by percent, reflecting their importance relative to one another with respect to their contributions towards meeting the objectives, and any other attributes that are important to the entities involved. The criteria, metrics, and weightings are presented in Table 3.

Table [SEQ Table * ARABIC]. Multi-criteria Decision Criteria, Metrics, and Weighting

MAIN CRITERIA	SUB-CRITERIA	METRICS	WEIGHTING (percent)
IMPROVE WATER SUPPLY and RELIABILITY		Contribution towards participant and refuge water supply objectives based on the sum of the weighted products of the sub-criteria metrics.	20
	Deliveries for north of Delta participants	The degree to which the system meets current participant prescriptions at Holthouse (current subscription is ______AF) 0 = Does not meet subscription 3 = Meets or exceeds subscription	30
	Deliveries for south of Delta participants	The degree to which the system meets current participant prescriptions at Holthouse (current subscription is ______AF) 0 = Does not meet design capacity 3 = Meets or exceeds subscriptions	30
	Ability to provide consistent delivery of level 4 water for the refuges:	The degree to which operations can be integrated 0 = low degree 3 = moderate degree	30

MAIN CRITERIA	SUB-CRITERIA	METRICS	WEIGHTING (percent)
IMPROVE ECOSYSTEM		Contribution towards anadromous and Delta Smelt objectives based on the sum of the weighted products of the sub-criteria metrics.	20
	Ability to cooperatively operate with CVP/SWP systems to improve anadromous fish survival:	The degree to which operations can be integrated 0 = low degree 3 = moderate degree	50
	Ability to provide source of water to transport biomass in support of Delta Smelt	The degree to which operations can be integrated 0 = low degree 3 = moderate degree	50
PERMITABILITY		The degree to which the alternative is permittable by federal, state, and local agencies based on the sum of the weighted products of the sub-criteria metrics.	5
	Permit difficulty and timing	The degree of difficulty and time required 0 = high degree 3 = low degree	70
	Likely need for recirculation	The likely need for recirculation 0 = high 3 = low	30
LOCAL ACCEPTABILITY		The degree to which the alternative is acceptable to local entities	5
	Real Estate	The degree to which the alternative negatively impacts real estate : 0 = high 3 = Low	30

MAIN CRITERIA	SUB-CRITERIA	METRICS	WEIGHTING (percent)
	Compatibility	The degree to which the alternative is compatible with operations and land use 0 = high 3 = Low	30
COSTS		**Cost effectiveness of alternative based on the sum of the weighted products of the sub-criteria metrics.**	**40**
	Construction Costs	Estimated construction	75
	Operation and Maintenance Costs	Estimated annual O&M costs	25



Sites Project: Modeling Updates and Analysis of CDFW Scenario (refined), Scenario A, Scenario B, and SPA (refined)

2009 - 2018

December 6, 2019

Agenda

- Current modeling status
- Modeling updates subsequent to last CDFW meeting (November 4^{th})
- Preliminary CalSim II results of Scenarios A and B
- Preliminary Daily model results of Scenarios A and B
- Sensitivity analysis with CalSim II
- Context for diversion to fill and delivery results
- Context for future analysis

Sites Modeling Updates

- Development of 4 scenarios:
  - CDFW (refined)
  - Scenario A
  - Scenario B
  - SPA (refined)
- Refinement to Fremont Weir protection logic
- Integration of Pulse and Post-Pulse operation criteria at Freeport (based on WaterFix) for Scenarios A & B
- GCC maintenance window = 2 weeks (last week of January & first week of February)
- Coordinated refinement of daily and monthly modeling approaches

Definitions of Scenarios A & B

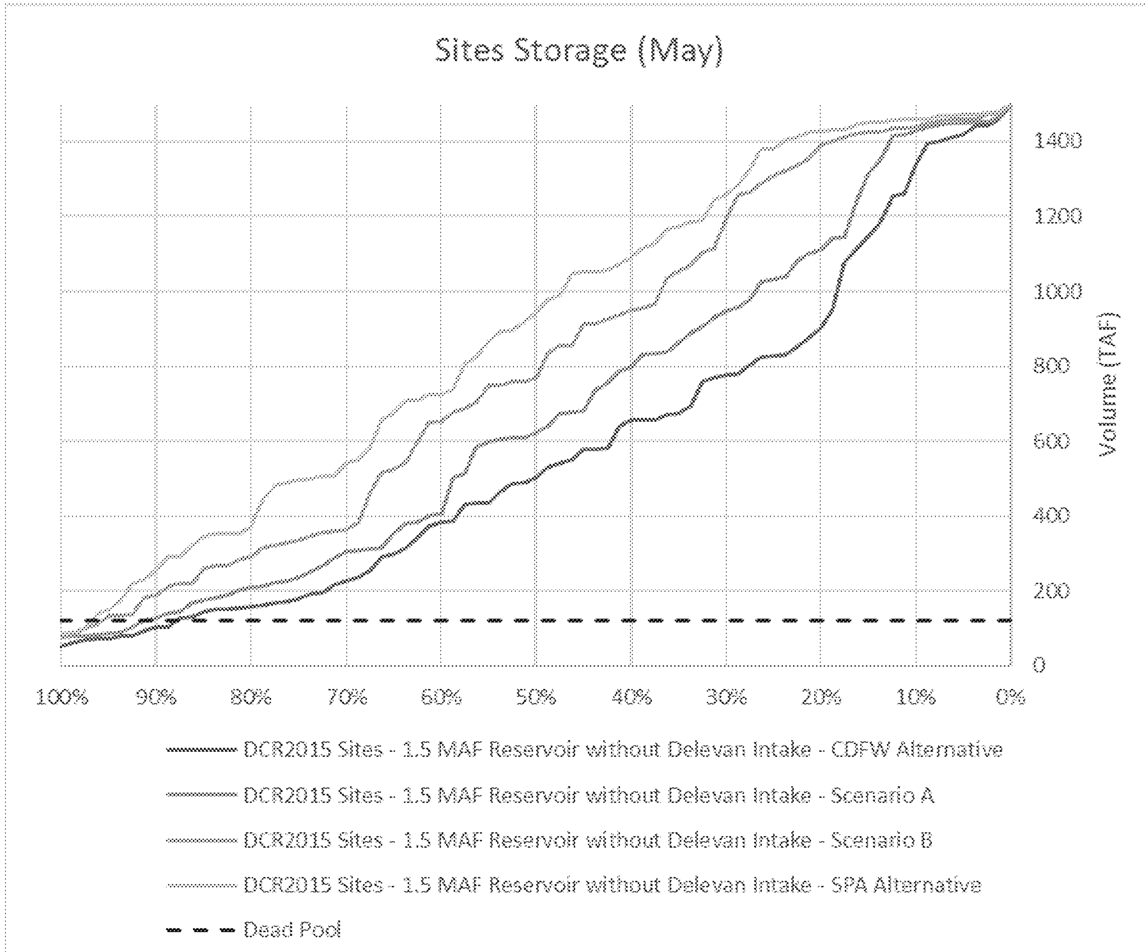
- For Scenario A
  - Wilkins Slough bypass = 8,000 cfs year-round
  - Fremont Weir notch buffer of 1% for minimal impact
  - Strict interpretation of how WaterFix ITP criteria would apply to Sites fills, as proposed by CDFW (effects analysis is not available)
- For Scenario B
  - Wilkins Slough bypass = 8,000 cfs April-May
  - Fremont Weir notch buffer of 5%
  - Relaxed interpretation of WaterFix criteria, for which some mitigation may be required (to be determined by an effects analysis)

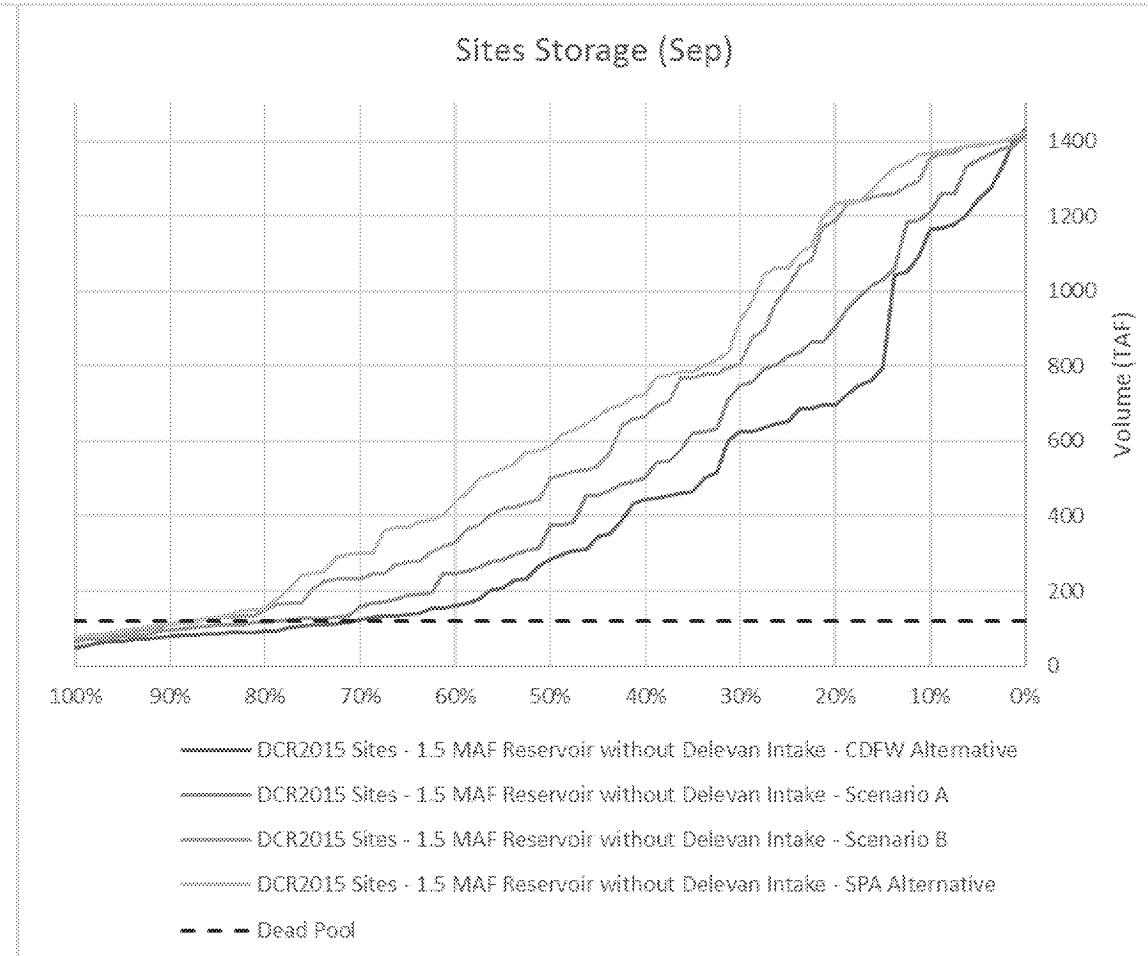
Preliminary CalSim II Results

PRELIMINARY – DRAFT – FOR INTERNAL USE ONLY

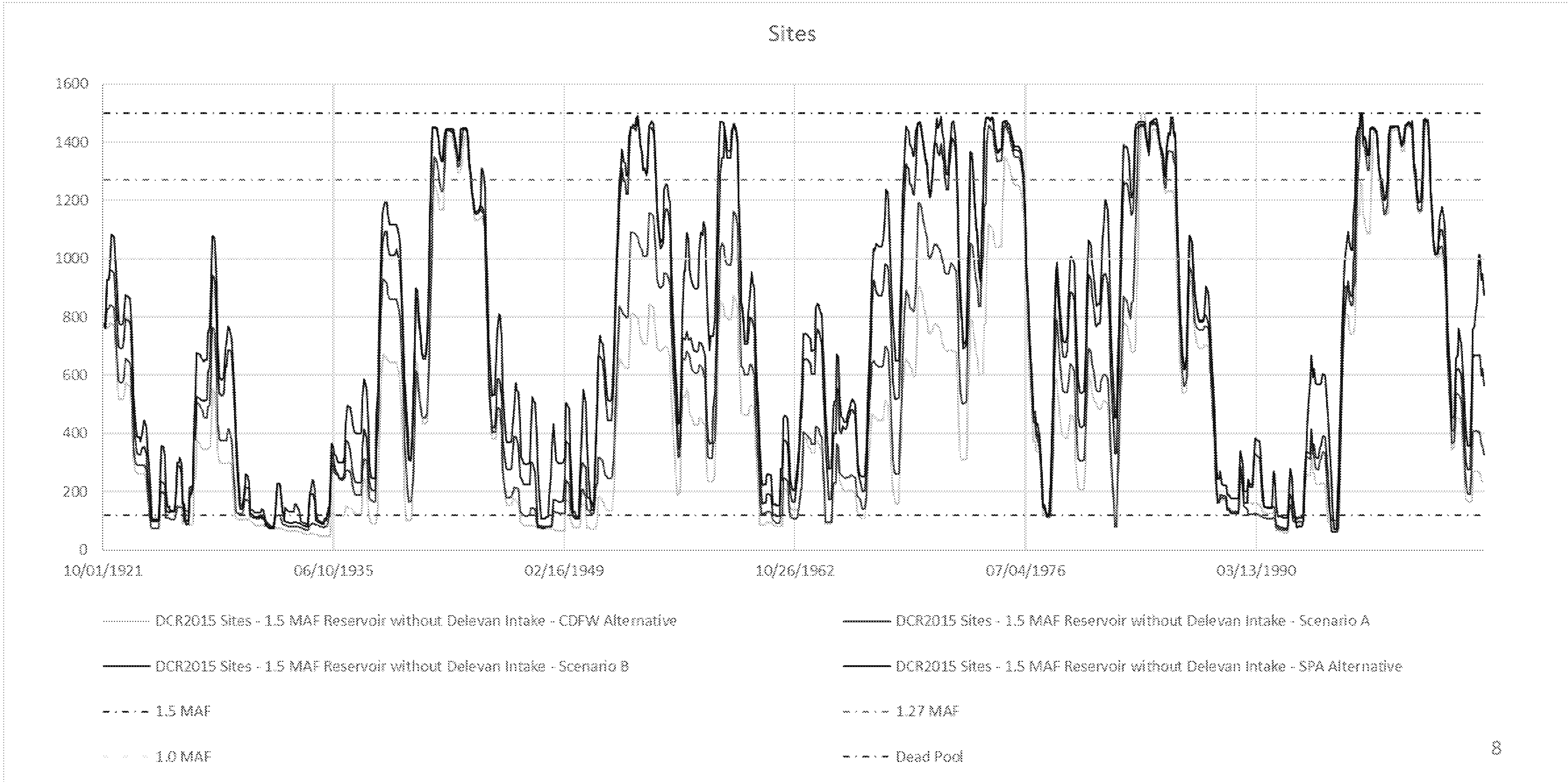
Criteria	CDFW Operations Scenario - refined	Scenario A		Scenario B		SPA Operations Scenario - refined
Reservoir Size	1.5 MAF	1.5 MAF		1.5 MAF		1.5 MAF
GCC Maintenance Window	2 weeks (Jan/Feb)	2 weeks (Jan/Feb)		2 weeks (Jan/Feb)		2 weeks (Jan/Feb)
Delevan Intake	Not included; 2-pipe outlet-only facility	Not included; 2-pipe outlet-only facility		Not included; 2-pipe outlet-only facility		Not included; 2-pipe outlet-only facility
Wilkins Slough Bypass Flow	10,000 cfs; no diversions at Red Bluff or Hamilton City Sept through December	8,000 cfs		8,000 cfs April/May; all other times, 5,000 cfs		8,000 cfs April/May; all other times, 5,000 cfs; Scaled diversion at Red Bluff and Hamilton City
Fremont Weir Notch	Prioritize the Fremont Weir Notch, Yolo Bypass preferred alternative, flow over weir within 1%	Prioritize the Fremont Weir Notch, Yolo Bypass preferred alternative, flow over weir within 1%		Prioritize the Fremont Weir Notch, Yolo Bypass preferred alternative, flow over weir within 5%		Prioritize the Fremont Weir Notch, Yolo Bypass preferred alternative, flow over weir within 5%
Flows into the Sutter Bypass System[1]	No restriction due to flow over Moulton, Colusa, and Tisdale Weirs	No restriction due to flow over Moulton, Colusa, and Tisdale Weirs		No restriction due to flow over Moulton, Colusa, and Tisdale Weirs		No restriction due to flow over Moulton, Colusa, and Tisdale Weirs
Freeport Bypass Flow	35,000 cfs between January and May (applied on a moving 7-day average)	Modeled WaterFix Criteria[2] (applied on a daily basis) Pulse & Post-Pulse Protection (applied on a moving 7-day average) Pulse = Oct-Mar (35,000 cfs offramp) Post-Pulse (3 levels) = Oct-Jun Level 1 starts Oct 1st		Modeled WaterFix Criteria[2] (applied on a daily basis) Post-Pulse Protection (applied on a moving 7-day average) Post-Pulse (3 levels) = Jan-Mar Level 2 starts Jan 1st Level 1 is initiated by the pulse trigger		Maintain Delta Water Quality[3]
Net Delta Outflow Index (NDOI) Prior to Project Diversions	44,500 cfs between March 1st and May 31st	44,500 cfs between March 1st and May 31st		44,500 cfs between March 1st and May 31st		None
Potential Range of Diversions to Fill Sites (Average) [4]	(Modeled) 177 TAF	Lower (Estimate) 189 TAF	Upper (Modeled) 209 TAF	Lower (Estimate) 242 TAF	Upper (Modeled) 272 TAF	(Modeled) 313 TAF
Potential Range of Deliveries at Holthouse (Average / Dry & Critical Years)	(Modeled) 166 TAF (A) 236 TAF (D)	Lower (Estimate) 175 TAF (A) XXX TAF (D)	Upper (Modeled) 194 TAF (A) 274 TAF (D)	Lower (Estimate) 225 TAF (A) XXX TAF (D)	Upper (Modeled) 253 TAF (A) 351 TAF (D)	(Modeled) 292 TAF (A) 406 TAF (D)

Sites Reservoir Storage

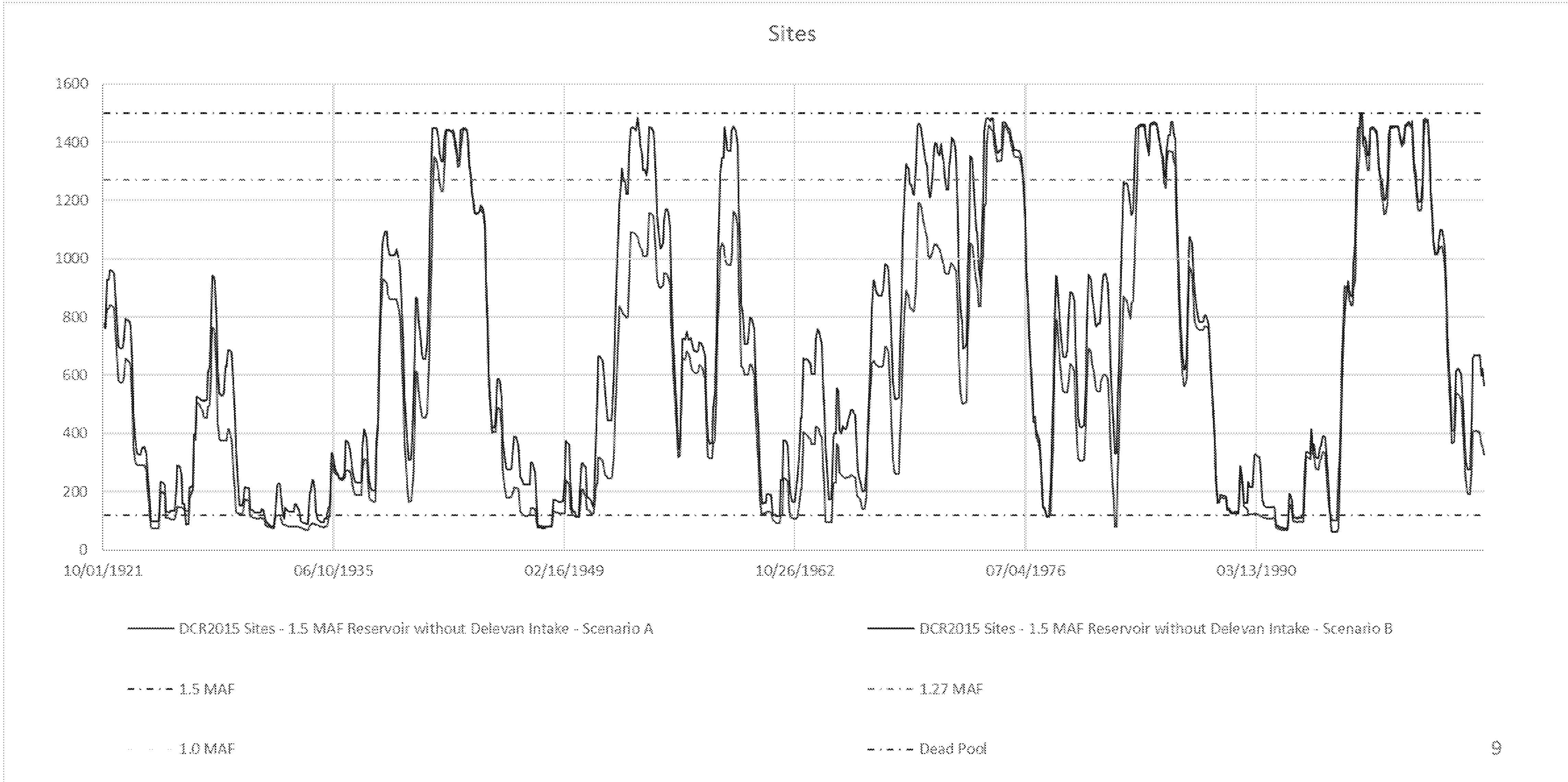




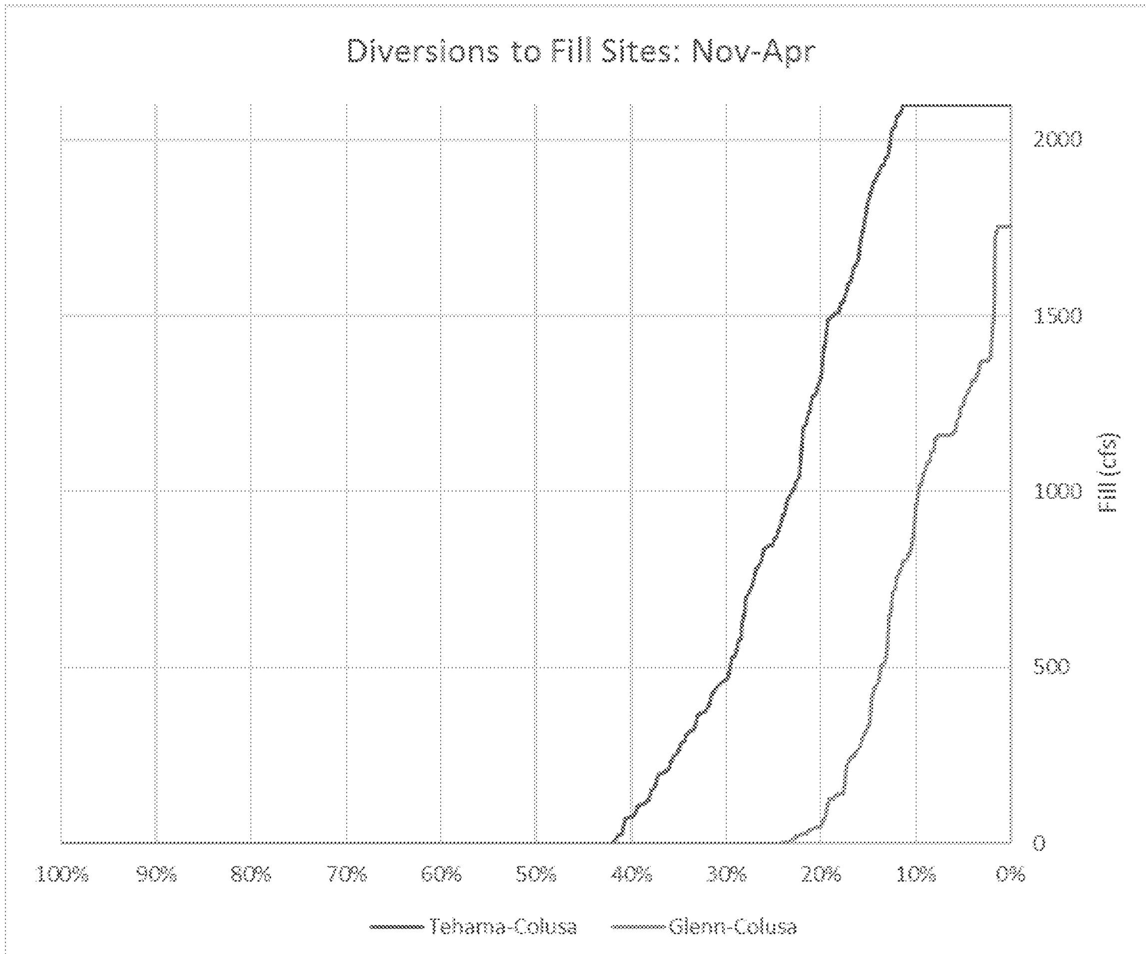
Sites Reservoir Storage

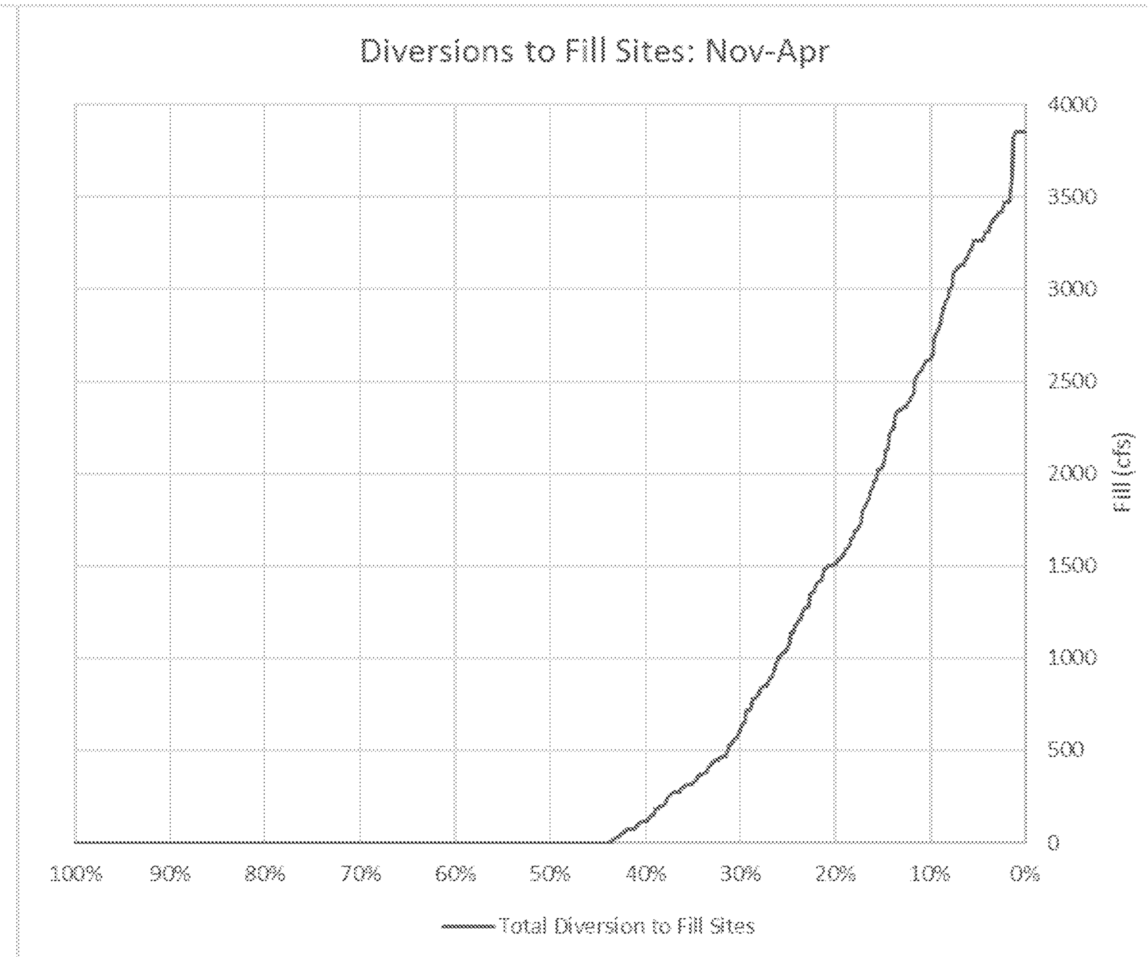


Sites Reservoir Storage

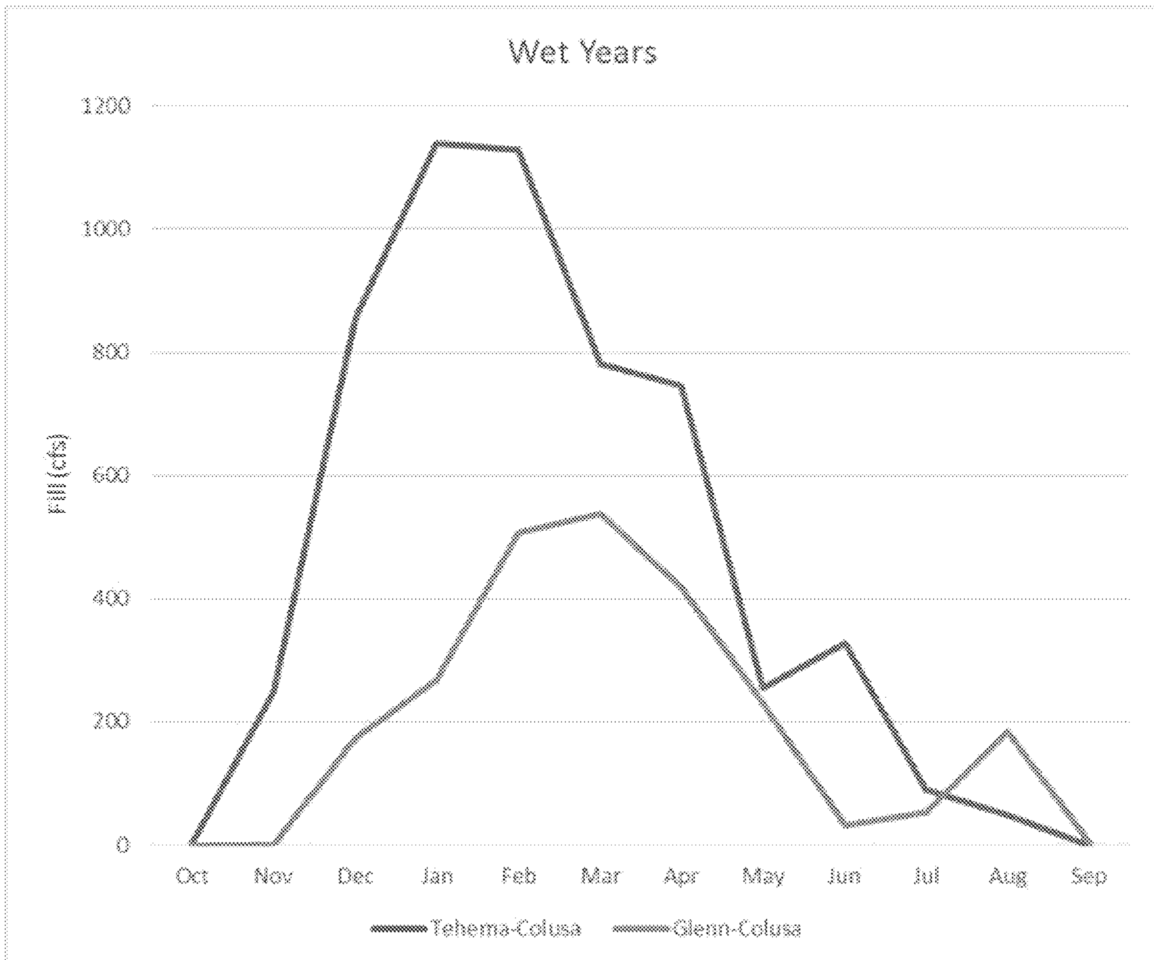


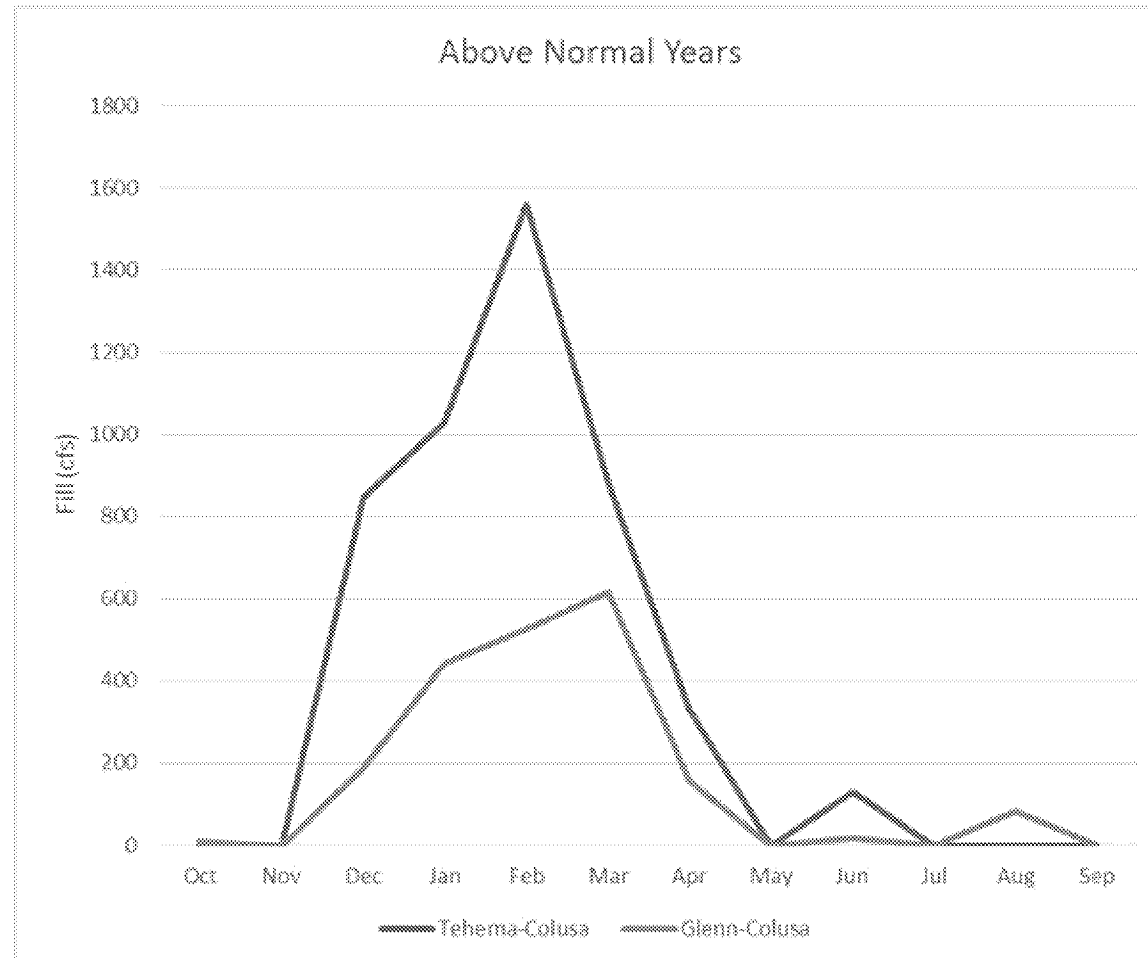
Diversions to Fill Sites – Scenario B



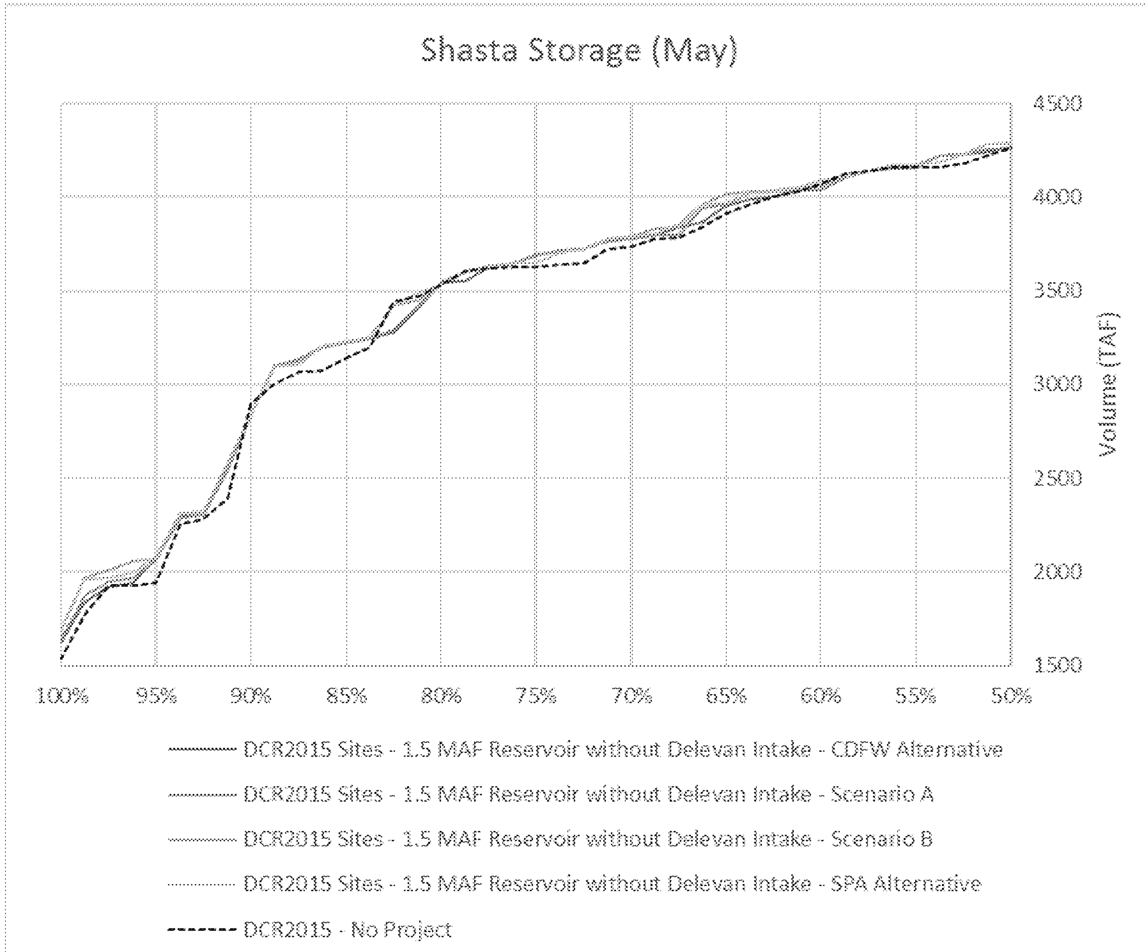


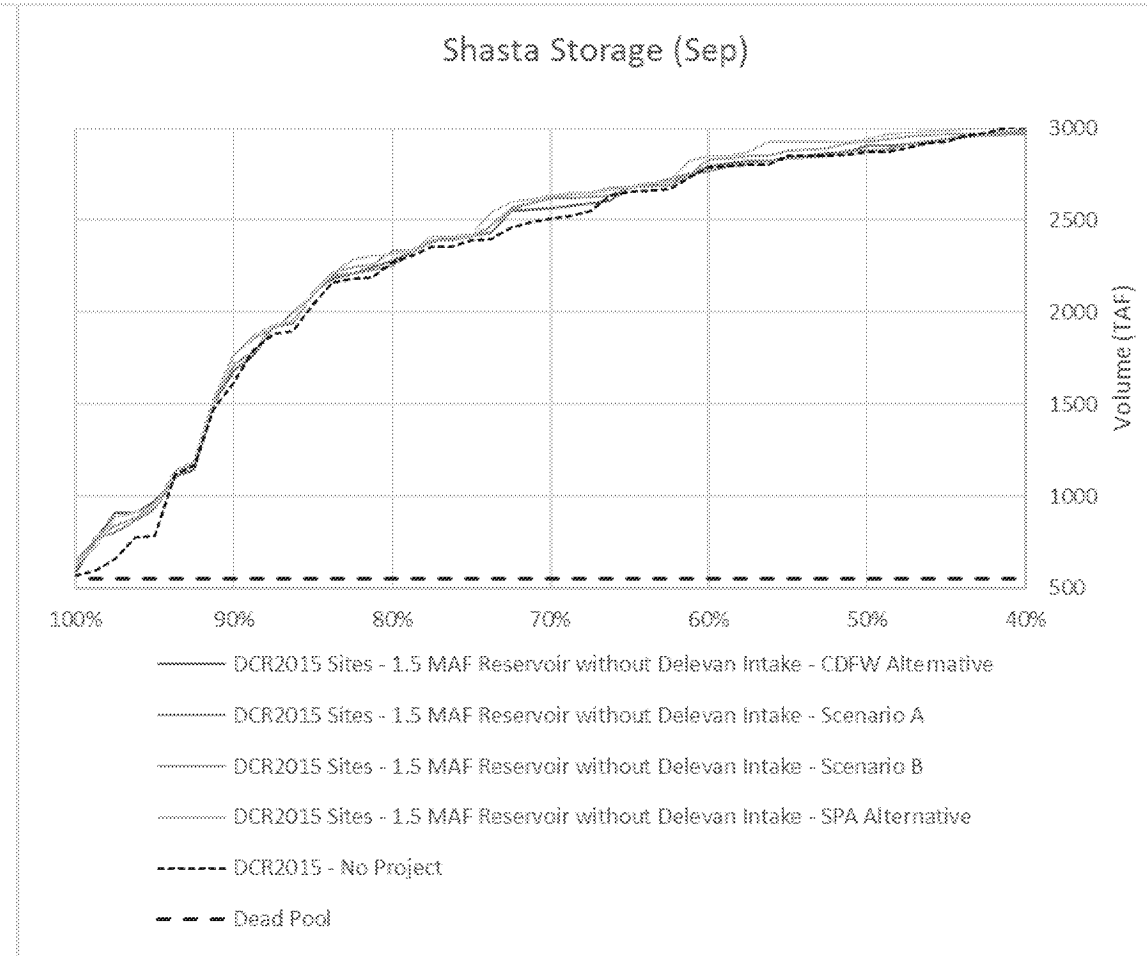
Diversions to Fill Sites – Scenario B





Shasta Storage





Daily Modeling

Daily Model

- A daily modeling tool has been developed to evaluate and test diversion criteria in a real-time operations context
- Used to supplement CalSim II
  - Represents the effects of operations criteria on a daily-timestep
  - Allows for relative comparisons between monthly and daily approaches
  - Identifies potential refinements to CalSim II modeling
  - Provides results for more recent years (2009-2018)

Differences Between CalSim II & Daily Model

- Different simulation period
  - CalSim II = 1922 – 2003
  - Daily Model = 2009 – 2018
    - Daily model includes a drier period than does CalSim II

% of WYTs	CalSim II	Daily Model
Wet	32%	20%
Above Normal	15%	0%
Below Normal	17%	40%
Dry	22%	20%
Critical	15%	20%

- CalSim II provides a continuous simulation over the full 82-year period; the Daily Model simulates each year as a separate event and only provides estimated fill volumes (does not include release operations)
- Different approaches are sometimes necessary to simulate monthly conditions vs daily conditions
- Implementing operation criteria on a daily time-step tends to be more conservative

Diversions to Sites – Daily Modeling Results

PRELIMINARY – DRAFT – FOR INTERNAL USE ONLY

		Total Diversion to Fill Sites (TAF)			
WY	**WYT**	**CDFW (Refined)**	**Scenario A**	**Scenario B**	**SPA (Refined)**
2009	D	6	8	39	78
2010	BN	10	14	45	97
2011	W	324	433	528	563
2012	BN	0	0	68	140
2013	D	1	30	108	83
2014	C	0	0	0	1
2015	C	0	2	24	31
2016	BN	105	126	172	203
2017	W	763	860	921	914
2018	BN	23	59	94	92
Annual Avg	**NA**	**123**	**153**	**200**	**220**

*Diversion of 3,900 cfs for one day equals 7.7 TAF

Sensitivity Analysis (CalSim II)

Preliminary Sensitivity Results – DRAFT – FOR INTERNAL USE ONLY

Sites Reservoir Fill (TAF)							
Long-term Average							
Capacity (TAF)	CDFW Alternative	Scenario A	Scenario B	Scenario B - Fremont Notch 9%	Scenario B - No Freeport Bypass	Scenario B - No NDOI	SPA Alternative
1.5	177	209	272	284	285	306	313
1.3	167	197	260				303
1.0	151	177	225				
Deliveries at Holthouse (TAF)							
Long-term Average							
Capacity (TAF)	CDFW Alternative	Scenario A	Scenario B	Scenario B - Fremont Notch 9%	Scnenario B - No Freeport Bypass	Scenario B - No NDOI	SPA Alternative
1.5	166	194	253	264	266	286	292
1.3	157	185	243				284
1.0	139	163	207				
Dry and Critical Years							
Capacity (TAF)	CDFW Alternative	Scenario A	Scenario B	Scenario B - Fremont Notch 9%	Scnenario B - No Freeport Bypass	Scenario B - No NDOI	SPA Alternative
1.5	236	274	351	361	374	396	406
1.3	209	244	317				378
1.0	189	223	280				

Context for Diversion to Fill and Delivery Results

- For Scenario A
  - Upper range estimates were based upon the model results using strict interpretation WaterFix criteria agreed to by CDFW (effects analysis not available)
  - Lower range estimates were set 30 TAF below the upper range model results because of uncertainty related to:
    - River flow routing/timing and magnitude of change
    - Real-time operational controls and decisions
- For Scenario B
  - Upper range estimates were based upon relaxed interpretation of WaterFix criteria, for which some mitigation may be required (to be determined by an effects analysis)
  - Lower range estimates were set similarly to Scenario A
- Concerns for effects analysis
  - Quantification of effects in bypasses, along the river, and the Delta
  - Definition of NDOI criteria and/or other per SWP ITP

Context for Future Analysis

- CVP and SWP integration
  - CVP exchange
- Value planning process
- Rebalancing of member and ecosystem benefits
- Baseline regulatory
- Hydrologic climate conditions
- Real-time operations
- Project specific regulatory
- Tool and method development

File Provided Natively

File Provided Natively

To: Board of Supervisors

From: Supervisor Steve Madrone

Agenda Section: Initiated by Board Member

SUBJECT:
Letters Regarding Sites Reservoir Project

RECOMMENDATION(S):
That the Board of Supervisors:
1. Receive public input on potential impacts from the Sites Reservoir Project on Humboldt County's Trinity River interests.
2. Authorize the Chair of the Board to sign the two (2) attached letters.

SOURCE OF FUNDING:
N/A

DISCUSSION:
The Sites Reservoir Project is a proposed off-stream storage facility located in Glenn and Colusa counties, approximately ten (10) miles west of the town of Maxwell (Attachment 1). The facility would include an approximately one point eight (1.8) million acre-feet water storage reservoir with associated dams, diversion structures, pipelines, electrical generating facilities, overhead powerlines, roads, and bridges. The reservoir would be filled through the diversion of winter flows from the Sacramento River at two (2) existing diversion sites with existing canals and a proposed new diversion structure and pipeline. The facility would be owned and operated by the Sites Project Authority, a joint powers authority formed by several irrigation districts. Funding for construction is proposed from the Water Supply Investment Program of Proposition 1, passed in 2014. The facility is intended to be integrated with the Federal Central Valley Project and State Water Project systems.

The Trinity River Division of the Central Valley Project diverts water stored in Trinity Lake into the Sacramento River through the Clear Creek tunnel and Whiskeytown Lake. Humboldt County has a vested interest in the Central Valley Project because the county holds a water contract with the Bureau of Reclamation for annual releases of not less than fifty thousand (50,000) acre-feet from Trinity Lake into the Trinity River. The Trinity River flows through Humboldt County for approximately thirty-one (31) river miles before discharging to the Klamath River at Weitchpec. The Trinity River is the largest tributary to the Klamath River, which flows through Humboldt County for approximately sixty (60) river miles before discharging to the ocean in Del Norte County. The Trinity River Basin provides habitat for anadromous fish species and constitutes an important resource for commercial, recreational, and tribal fisheries.

On January 9, 2018, your Board approved a letter (Attachment 2) to the Sites Project Authority commenting on the Draft Environmental Impact Report/Environmental Impact Statement ("Draft EIR/EIS") and requesting assurance that construction and operation of the Sites Reservoir Project will result in no additional demands for diversions of Trinity River water to the Sacramento Basin. On January 15, 2018, the Chair of the Sites Project Authority issued a letter (Attachment 3) to the Chair of the Board of Supervisors stating that the Sites Project has never planned or proposed to divert water that was released by the Bureau of Reclamation and conveyed to the Sacramento River watershed. The letter stated that the Sites Project Authority commits to the construction and operations that will result in no additional demand for diversions from the Trinity River to the Sacramento River basin. However, a technical report (Attachment 4) prepared by Kamman Hydrology & Engineering ("Kamman") on behalf of the Pacific Coast Federation of Fishermen's Association and Save California Salmon identified potentially significant impacts impacting the Trinity River. In addition, the surface water modeling for the Draft EIR/EIS did not include an accounting of Humboldt County's water contract with the Bureau of Reclamation, nor did it include the anticipated flow releases described in the Bureau of Reclamation's Long-Term Plan to Protect Adult Salmon in the Lower Klamath River.

The proposed letter No. 1 (Attachment 5) requests that the Sites Project Authority commit to a term and condition in their water rights application or alternatively, a Memorandum of Understanding that would provide a binding commitment to avoid adverse impacts to the Trinity River. The proposed letter No. 2 (Attachment 6) requests that the Sites Project Authority and Bureau of Reclamation revise and recirculate the Draft EIR/EIS due to the new information presented in the January 2019 Kamman report.

FINANCIAL IMPACT:
The proposed action will have no financial impact, so it will not impact the General Fund.

STRATEGIC FRAMEWORK:
This action supports your Board's Strategic Framework by advancing local interests in natural resource discussions.

OTHER AGENCY INVOLVEMENT:
Sites Project Authority, Bureau of Reclamation

ALTERNATIVES TO STAFF RECOMMENDATIONS:
Board discretion

ATTACHMENTS:
1 Maps
2 January 9, 2018 letter from the Humboldt County Board of Supervisors
3 January 15, 2018 letter from the Sites Project Authority
4 January 21, 2019 Kamman report
5 Proposed letter No. 1 to the Sites Project Authority
6 Proposed letter No. 2 to the Sites Project Authority and Bureau of Reclamation

PREVIOUS ACTION/REFERRAL:
Board Order No.: C-6
Meeting of: January 9, 2018
File No.: N/A

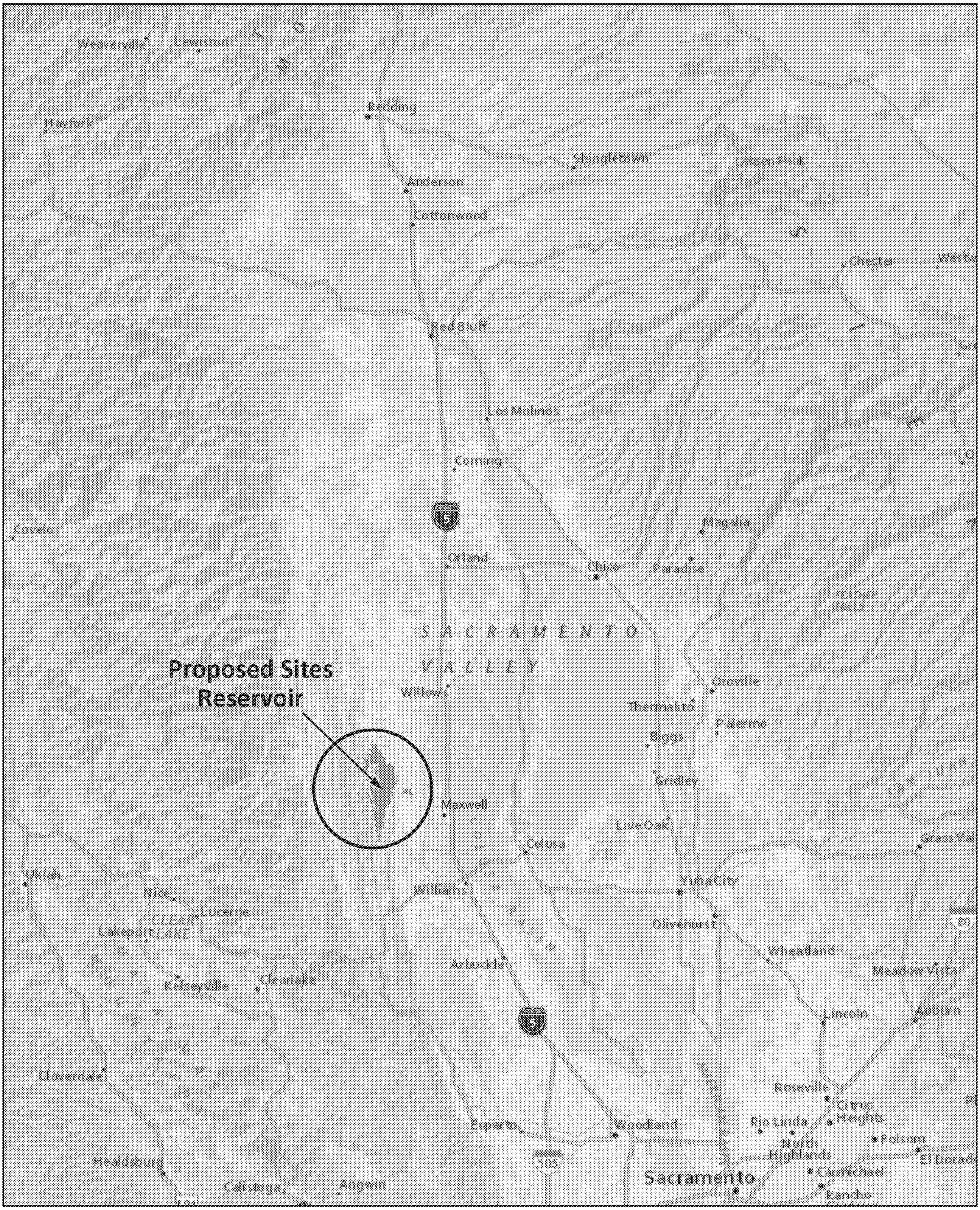


FIGURE 1-1
Proposed Sites Reservoir
Project Location
Sites Reservoir Project EIR/EIS

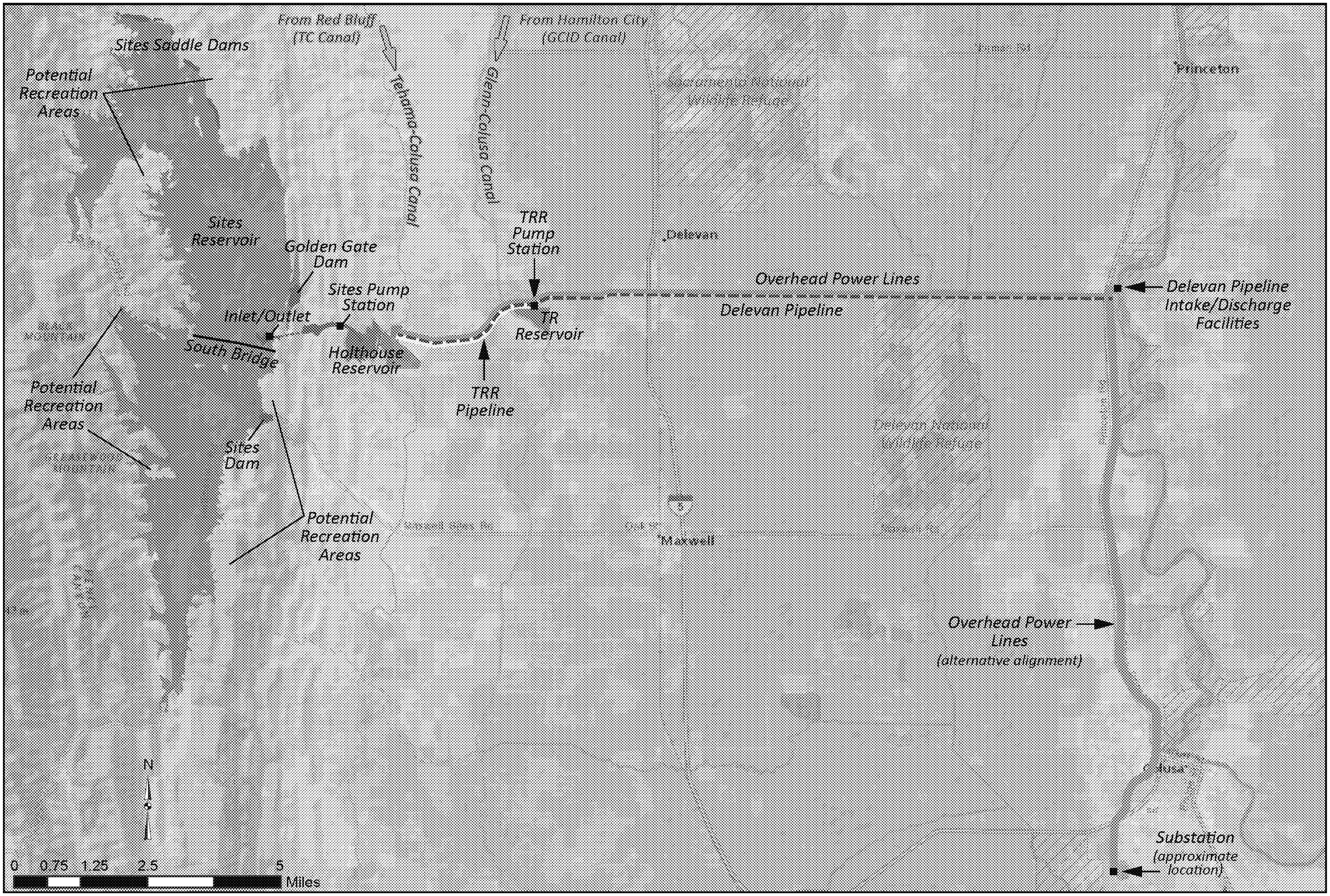


FIGURE 1-2
Proposed Sites Reservoir Project Facilities
Sites Reservoir Project EIR/EIS

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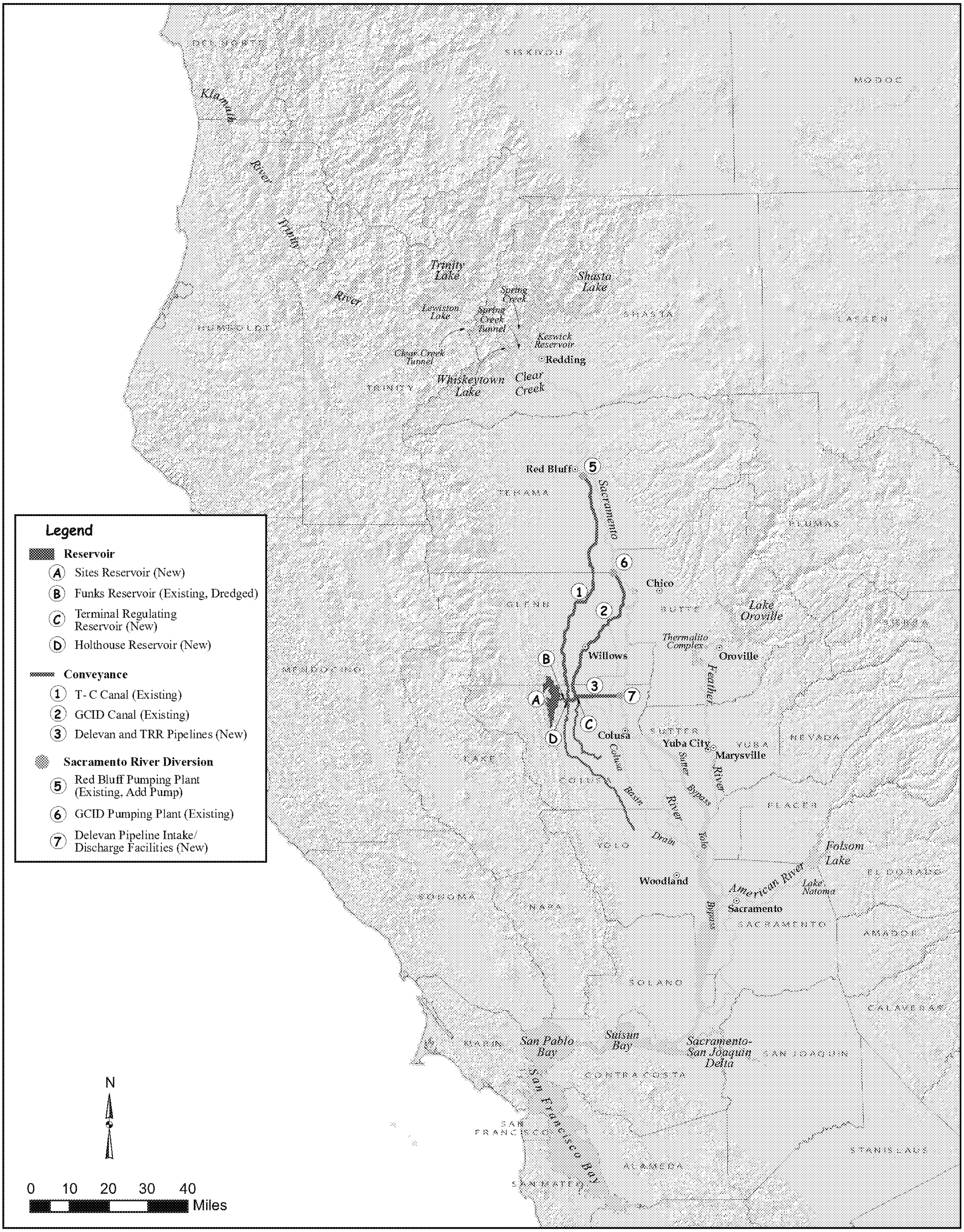

FIGURE 1-5
Secondary Study Area
Sites Reservoir Project EIR/EIS

SL0118171100RDD SPJPA_Fig1-5_208_V1.ai dash 03/23/17

BOARD OF SUPERVISORS
COUNTY OF HUMBOLDT
825 5TH STREET, ROOM 111
EUREKA, CALIFORNIA 95501   PHONE: (707) 476-2390

January 9, 2018

Janet Barbieri
Sites Project Authority
P.O. Box 517
Maxwell, CA 95955
Sent via e-mail: EIR-EIS-Comments@SitesProject.org

Subject: Comments on Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the Proposed Sites Reservoir Project

Dear Ms. Barbieri:

The Humboldt County Board of Supervisors requests assurance that construction and operation of the Sites Reservoir Project will result in no additional demands for diversions of Trinity River water to the Sacramento Basin. We also request assurance that the Sites Project Authority and the Bureau of Reclamation will work with Humboldt County and other Trinity River stakeholders to identify opportunities to reduce out-of-basin transfers of Trinity River water as part of the coordinated operations of the Central Valley Project and the future Sites Reservoir Project. Humboldt County can support the proposed Sites Reservoir Project only if these assurances can be provided and are robust and binding.

Humboldt County's primary interests are protecting the commercial, recreational, and tribal fisheries that are dependent on fish produced in the Klamath-Trinity River system. Construction of the Trinity River Division of the Central Valley Project in the 1960s caused major adverse impacts to Trinity River fisheries by diverting up to 90% of the Trinity River flows. Diversions were reduced to approximately 50% after passage of the Trinity River Record of Decision (ROD) in 2000. However, populations of salmon, steelhead, and other fish and wildlife remain far below the recovery objectives. In order to achieve restoration of fish populations and alleviate the impacts on our fishing and tribal communities, the minimum annual flow volumes in the 2000 Trinity River ROD must be maintained, and retention of additional Trinity River water for in-basin needs will likely be required.

Humboldt County executed a contract with the Bureau of Reclamation in 1959 for not less than 50,000 acre-feet of water to be made available annually from the Trinity River Division of the Central Valley Project for the beneficial use of Humboldt County and other downstream users. Humboldt County's first-priority right to water from Trinity Reservoir, prior to out-of-basin transfers to the Sacramento River, was reaffirmed in the December 23, 2014 memorandum issued by the Office of the Solicitor for the U.S. Department of the Interior. In 2015 and 2016, the Bureau of Reclamation utilized Humboldt County's contract water to implement flow augmentation releases to reduce the risk of a fish disease outbreak affecting the fall run of Chinook salmon in the Lower Klamath River. In 2017, the Bureau of Reclamation adopted a Long-term Plan to Protect Adult Salmon in the Lower Klamath River which identified Humboldt County's contract water as the primary water source for fall flow augmentation releases when needed. Humboldt County continues to work with the Bureau of Reclamation and other stakeholders on fully utilizing the County's contract water for Trinity River needs.

Concerns have been raised that construction of the Sites Reservoir Project could result in increased demands for export of Trinity River water into the Sacramento River basin. However, we also see opportunity for operation of the Sites Reservoir Project to strategically manage and store water during high-flow periods that could reduce demands for Trinity River water in the Central Valley. The Humboldt County Board of Supervisors requests assurances that the proposed Sites Reservoir Project will not negatively impact flows, water quality, or fishery needs in the Klamath-Trinity River system.

We appreciate the Sites Project Authority's recognition of Humboldt County's interests and request a formal response clarifying how the EIR/EIS for the proposed Sites Reservoir Project addresses Humboldt County's concerns.

The staff contact on this matter is Hank Seemann (hseemann@co.humboldt.ca.us) in our Department of Public Works.

Sincerely,

Ryan Sundberg, Chair
Humboldt County Board of Supervisors

Sites

January 15, 2108

Subject: Humboldt County's Comments on the Proposed Sites Reservoir Project

Dear Mr. Sundberg:

Thank you for letter of January 9, 2018 regarding the Sites Project Environmental Impact Report/Environmental Impact Statement (EIR/EIS). We are in receipt of your EIR/EIS comment letter and will formally respond to your comments as part of the Final EIR/EIS.

In regard to relationship of the Sites Project and your goals of achieving net ecosystem and water quality conditions in the Trinity River downstream of Lewiston Dam, the Sites Project has never planned or proposed to divert water that was released by Reclamation and conveyed to the Sacramento River watershed. Such water is covered by existing water rights and would not be available for diversion by the Sites Project. Hence, the Sites Project Authority commits to the construction and operations that will result in no additional demands for diversions from the Trinity River to the Sacramento River basin.

Sincerely,

Fritz Durst

Fritz Durst, Chair
Sites Project Authority

Cc: David Murillo, Regional Director, Mid-Pacific Region, Bureau of Reclamation

P.O. Box 517
Maxwell, CA 95955
530.438.2309

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11 Valencia Avenue, San Rafael, CA 94901
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Facsimile: (415) 680-1538
Email: greg@KHE-Inc.com

January 21, 2019

Mr. Noah Oppenheim, Pacific Coast Federation of Fishermen's Association (PCFFA)
Mr. Thomas Stokely, Save California Salmon

Subject: Review of Draft Environmental Impact Report/Statement
Sites Reservoir Project

Dear Mr. Oppenheim and Mr. Stokely:

I have reviewed the Draft Environmental Impact Report/Draft Environmental Impact Statement (DEIR/S) for the Sites Reservoir (Sites) Project located in Glenn and Colusa Counties, California. The focus of my review was to evaluate if the Sites Project and associated Trinity River Division (TRD) of the Central Valley Project (CVP) operations would potentially impact the hydrology and water quality of the Trinity River. I am familiar with how TRD operations affect water temperatures as I have completed numerous water temperature modeling studies related to alternative operations of Trinity and Lewiston reservoirs with a focus on effects on downstream temperatures in the Trinity River. These studies were completed from 1997 through 2004. A copy of my resume is attached.

The DEIR/S indicates that the project poses less than significant impacts on the water quality to the Trinity River downstream of Trinity and Lewiston reservoirs. However, based on my review and analysis of the DEIR/S and other available information, I have identified a number of notable deficiencies in the water quality assessment that fail to identify and correctly analyze revised water operation impacts on Trinity River water quality (temperature) and, in turn, biological resources. Therefore, it is my opinion that the information presented in the DEIR/S is inadequate in evaluating potential adverse impacts to the water quality of the Trinity River. Nor does it propose mitigation measures for reasonably foreseeable adverse impacts to water quality and aquatic resources of the Trinity River. A discussion of the identified deficiencies is provided below.

1. Foreseeable Impacts to Trinity River Associated with Sites Project Operations
Based on my knowledge and experience in analyzing water temperature conditions of the TRD of the CVP, it is my opinion that the revised TRD water operations associated with the Sites Project will lead to increased water temperatures in Lewiston Reservoir and releases to the Trinity River. Any increase in the temperature of water released to the Trinity River would degrade water quality conditions and increase the potential for violations of North Coast Basin Plan[1] water quality (temperature) objectives as well at the water temperature objectives

[1] "Water Quality Control Plan for the North Coast Region" Footnote 5, Table 3-1, page 3-8.00: Accessed at http://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/083105-bp/04_water_quality_objectives.pdf

established under the Trinity River Record of Decision (USDOI 2000) to protect outmigrating juvenile salmonids[2].

I reached this conclusion through analysis of water resources system modeling results provided in Appendix 6B of the DEIR/S. Tables 1 through 3 are taken from Appendix 6B and present Trinity Reservoir storage, Trinity River flow and Clear Creek Tunnel diversion modeling results for both the Sites Project No Action Alternative and Alternative D under a variety of water year types. Table 1 presents a comparison of end of month (EOM) storage in Trinity Reservoir. The DEIR/S suggests incorrectly that the small differences between the No Action Alternative and Alternative D are not significant per the following statement (page 6-36).

> *The CALSIM II model monthly simulation of real-time daily (or even hourly) operation of the CVP and SWP results in several limitations in use of the CALSIM II model results. The model results must be used in a comparative manner to reduce the effects of use of monthly assumptions and other assumptions that are indicative of real-time operations, but do not specifically match real-time observations. Given the CALSIM II model uses a monthly time step, incremental flow and storage changes of 5 percent or less are generally considered within the standard range of uncertainty associated with model processing, and as such flow changes of 5 percent or less were considered to be similar to Existing Conditions/No Project/No Action flow levels in the comparative analyses using CALSIM II conducted in this EIR/EIS.*

Table 2 presents the monthly average releases to the Trinity River from Lewiston Reservoir. Apart from the 8.9% decline during December of Wet years, 8.6% to 31.2% decline in flows during February and March of Above Average water year-types, and the 24.2% drop during February of the Below Average water year-type, there are no reductions in flow under Alternative D that are considered significant in the DEIR/S.

Table 3 presents the changes in flow through the Clear Creek Tunnel, which represent diversions from Lewiston Reservoir (via the Carr power plant) to the Sacramento River and potentially Sites Reservoir. A general pattern seen in the these data is a shift in operations under the Project Alternative that increase the rate of diversions through the winter months (December-March) and reduce diversion rates through the summer/fall months (July-November) during dry and critically dry year types. I assume this change in operations is intended to provide more water to the Sacramento River during the winter to enhance

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Daily Average Not to Exceed	Period	River Reach
60°F	July 1- Sept 15	Lewiston to Douglas City Bridge
56°F	Sept 15-Oct 1	Lewiston to Douglas City Bridge
56°F	Oct 1- Dec 31	Lewiston to North Fork Confluence

[2] Trinity River Outmigrant Juvenile Salmonid objectives at Weitchpec (Trinity River Flow Evaluation (USFWS and HVT 1999) accessed athttp://www.trrp.net/library/document/?id=226

Normal, Wet and Extremely Wet	April 1-May 22	<13.0 C (<55.4 F)
	May 23-June 4	<15.0 C (<59.0 F)
	June 5-July 9	<17.0 C (<62.6 F)
Dry and Critically Dry	April 1-May 22	<15.0 C (<59.0 F)
	May 23-June 4	<17.0 C (<62.6 F)
	June 5-July 9	<20.0 C (<68.0 F)

the opportunity for diversion to Sites Reservoir. However, this change in operations would have a significant negative effect on the water temperatures in Lewiston Reservoir as well as the temperature of releases to the Trinity River.

Table 4 was developed in order to compare the total average flow through Lewiston Reservoir under the Sites Project No Action Alternative and Alternative D operations. The total flow through Lewiston Reservoir was computed by summing the average monthly flow values of releases to the Trinity River (Table 1) and flow through Clear Creek Tunnel (Table 3).

Due to its geometry and operations of the TRD, water temperatures in Lewiston Reservoir are highly variable. During the summer when there are relatively low and constant releases to the Trinity River and Carr power plant diversions are at capacity, the rate of flow through Lewiston Reservoir is sufficient to displace its entire volume in about 2.5 days and water temperatures remain relatively cool (Brown et al., 1992)[3]. On the other hand, when the Carr power plant is not operating, flow through Lewiston Reservoir stagnates and thermal stratification develops within days, typically leading to the warming of summer surface waters to between 60 and 70 F (15.6 and 21.1 C) (Ibid).

Modeling that I have completed suggests that total flow rates through Lewiston Reservoir (i.e. the sum of Carr power plant diversions and river releases) should be between approximately 800 cubic feet per second (cfs) during the late summer/early fall months of normal year-types and up to 1900 cfs during the summer/fall months of critically dry year-types in order to comply with downstream temperature objectives (Kamman, 1999a)[4]. The maximum late summer/early fall daily releases for releases to the Trinity River under the Trinity ROD range from 300 to 450 cfs. Thus, Carr power plan diversions (i.e., flow through Clear Creek Tunnel) would need to be maintained between 1450 and 1600 cfs to meet summer/early fall temperature needs during normal and critically dry years, respectively.

Based on this this information, it can be inferred that any decrease on total flow through Lewiston Reservoir during the summer/fall period would lead to increased temperatures in water released to the Trinity River as well as that diverted via the Carr power plant and Clear Creek Tunnel. Comparison of total flow rates through Lewiston Reservoir for Alternative D (Table 4) indicates significant reductions during most summer/fall months of the representative dry and critically dry year-types. Most notable are the reductions in flow and likely reservoir heating during the month of October, where flow through Lewiston Reservoir is reduced by 165% and 56% during dry and critically dry year-types, respectively, a time when meeting downstream temperature objectives is already compromised (Kamman, 1999b)[5].

Evaluation of average monthly temperature results for releases to the Trinity River presented in Appendix 7E (River Temperature Modeling) of the DEIR/S do not corroborate the anticipated increase in Lewiston Reservoir temperatures. Table 5 presents the DEIR/S temperature modeling results and

[3] Brown, R., Yates, G., and Field, J. (1992) "Temperature Modeling of Lewiston Lake with the BETTER two-dimensional reservoir flow mixing and heat exchange model." *Rep.*, Department of Transportation and Planning, Trinity County, Weaverville, CA.

[4] Kamman, G.R., 1999a, Temperature Analysis of Proposed Trinity River Fish and Wildlife Restoration Flow Alternatives using the BETTER Model: Prepared for: Trinity County Planning Department, June, 80p.

[5] Kamman, G.R., 1999b, Addendum to Temperature Analysis of Proposed Trinity River Fish and Wildlife Restoration Flow Alternatives using the BETTER Model: Cumulative Effects. Prepared for: Trinity County Planning Department, September, 7p.

suggests (contrary to the discussion above) that water temperatures in Lewiston Reservoir (i.e., temperature of releases to Trinity River) would decrease as total flow through the reservoir decreases. In fact, the temperature decreases are most pronounced during some dry and critically dry months of greatest reduction in flow rates through Lewiston Reservoir, when water temperatures would be increasing. This leads me to call into question the validity of the temperature model analysis of TRD operations presented in the DEIR/S.

More important is that the proposed change in TRD operations by the Sites Project directly conflicts with and reverses intended operations stipulated in the Secretary of Interior's 2000 Record of Decision (ROD) for the Trinity River Mainstem Fishery Restoration project. As you are aware, the modeling and temperature analysis work I completed for Trinity County back in the late 1990's contributed significantly to development of the instream flow and Carr power plant and Clear Creek Tunnel diversion schedules for the Trinity Preferred Alternative in order to better meet downstream temperature objectives. This work was accomplished through lengthy and focused analyses and meetings with project stakeholders and resulted in final preferred alternative operations with increased late summer CVP diversions to the Sacramento River. Acknowledging that even the river releases and temperatures from Lewiston Reservoir associated with the Preferred Alternative may not satisfy downstream temperature objectives, the Trinity Project ROD stipulates the following (page 20): "*Under the Preferred Alternative, the TRD would be operated to release additional water to the Trinity River, and the timing of exports to the Central Valley would be shifted to later in the summer to help meet Trinity River instream temperature requirements*". By proposing to reduce late summer CVP diversions to the Sacramento River, the Sites Project creates a foreseeable potential impact on Trinity River water quality by reversing the very operations associated with the Trinity River ROD that are intended to satisfy downstream water temperatures objectives and protect instream beneficial uses, particularly for salmon and steelhead.

This potential shift in TRD operations is concerning due to the fact that there are frequent exceedances of water temperature objectives under the current TRD ROD operations and flows. Recent studies completed by the U.S. Fish and Wildlife Service[6] provide data on how the TRD operations and ROD flows comply with downstream Basin Plan and Restoration Project temperature objectives. Appendix A from David and Goodman (2017), presented below, summarizes the exceedances to the Basin Plan (DGC and NFH locations) and Trinity River Restoration Project (TRWEI location) temperature objectives for the period 2001 through 2016.

[6] David, A.T. and Goodman, D.H., 2017, Performance of water temperature management on the Klamath and Trinity Rivers, 2016. U.S. Fish and Wildlife Service, Arcata Fisheries Technical Report TR 2017-29, November, 72p; and
Polos, J. 2016. Adult salmon water temperature targets. Trinity River Restoration Program Performance Measure. Trinity River Restoration Program.

Appendix A. Number of days exceeding numeric water temperature objectives for the three specified locations on the Trinity River, 2001-2016. DGC = Trinity at Douglas City; NFH = Trinity above the North Fork Trinity; TRWE1 = Trinity above the Klamath.

	Objective locations			Forecast water year	Actual water year
Year	DGC	NFH	TRWE1	type	type
2001	--	--	33[a]	Dry	Dry
2002	0	--	54	Normal	Normal
2003	11	--	34	Wet	Wet
2004	0	--	43	Wet	Wet
2005	--	1	21[b]	Normal	Wet
2006	6	0	18	Ex. Wet	Ex. Wet
2007	3	0	19	Dry	Dry
2008	1	4	0	Normal	Dry
2009	31	2	21	Dry	Dry
2010	6	7	10	Normal	Wet
2011	0	0	7	Wet	Wet
2012	0	1	25	Normal	Normal
2013	0	0	26	Dry	Dry
2014	18	15	53	Crit. Dry	Crit. Dry
2015	--	18	65	Dry	Dry
2016	14	3	52	Wet	Wet

[a] Data unavailable prior to 5/3 for TRWE1 in 2001. We assumed mean daily temperatures did not reach or exceed 15.0 C before this date.
[b] Data unavailable prior to 4/4 for TRWE1 in 2005. We assumed mean daily temperatures did not reach or exceed 13.0 C before this date.

These exceedances occur during all water year types, but with highest frequency during dry and critically dry year types. Of note in this Appendix are the high number of exceedances during the wet water year 2016. As reported by David and Goodman, the exceedances during 2016 are, in part, due to depletion of the cool water pool (carry-over storage) during the preceding 3-year drought period (2013-2015).

2. Foreseeable Impacts to Trinity River Associated with Trinity Lake Carryover Storage
Ordinarily in late summer, water temperatures in Trinity Reservoir are well stratified, displaying a layer of warm water above a deeper pool of much colder water. During this time, releases from Trinity Reservoir to Lewiston Reservoir occur through a submerged powerhouse outlet. If the reservoir is drawn down to a relatively low level, the upper warm layer may intersect the powerhouse outlet, releasing warm water to Lewiston Reservoir. In turn, these warm temperatures are propagated through Lewiston Reservoir to the Trinity River. As presented below, a number of studies have been completed to quantify the minimum October 1st carryover storage volume that is needed to protect against the introduction of warm summer water releases during various water year types and droughts.

In 1998, Trinity County retained KHE to evaluate how an intense multi-year drought would affect carryover storage in Trinity Reservoir (Kamman, 1998)[7]. The study approach included an

[7] Kamman, G.R., 1998, Carryover Storage Analysis – Simulated (1928-1934) period. Prepared for: Trinity County Planning Department, May 22, 3p

interannual accounting of Trinity Reservoir storage during a series of representative water year-types similar to those experienced during the 1928-1934 drought.[8] Water releases from Trinity Lake were based on the water year type for Trinity Division operations[9] under the ROD Flows. A series of interannual Trinity Reservoir water budgets were developed with initial carryover storage volumes ranging from 750- to 2000-TAF.

Study results (Kamman, 1998) indicate that under CVP operations to meet ROD Flows, there is a net annual increase in Trinity Reservoir storage during normal (1928) year-types, but decrease during dry (-17.5 TAF) and critically dry (-341 TAF) year-types. Thus, when starting with 750 TAF of storage, Trinity Reservoir storage would have dropped below 200 TAF after the third year of the drought, primarily driven by storage reductions experienced during critically dry years. Study results also indicate that a starting storage volume of 1250 TAF is required to maintain a minimum carryover storage of 600 TAF through the drought. However, modeling results (Kamman, 1999a and 1999b) indicate that even 600 TAF of carryover storage does not fully achieve compliance with temperature objectives during dry and critically dry year types. This study suggests that a minimum carryover storage volume of between 1250- and 1500-TAF during the first year of drought is likely required in order to provide the necessary water release temperatures to the Trinity River to meet downstream temperature objectives during subsequent years.

In addition to the work cited above, I am aware of other studies focused on identifying the minimum Trinity Reservoir carryover storage to provide the necessary cold water releases to satisfy river temperature objectives. In their 1992 testimony to the State Water Board, Finnerty and Hecht (1992)[10] concluded that Trinity Reservoir carryover storage of 900 TAF or slightly more may be needed to meet downstream temperature objectives during 90% of all years. Their conclusion was based on analysis of hydrology, reservoir operations and temperatures for 1991, a single critically dry year-type. The second study, completed by Deas in 1998[11] on behalf of Trinity County, included water temperature simulations of Trinity Reservoir using the Water Temperature Simulation Model (WTSM). Deas evaluated temperature compliance under 1990 dry year-type conditions assuming initial reservoir storage volumes of 750-, 1250- and 1500-TAF. Model simulation results indicated elevated water temperatures at the powerhouse intake elevation for the 750 TAF carryover storage scenario and minimal to no temperature concerns at initial carryover storage volumes of 1250- and 1500-TAF, respectively. Deas' findings of elevated temperatures associated with 750 TAF of carryover storage are corroborated in the 2012 report by Reclamation[12], which found that a September 30 carryover storage requirement of less than 750 TAF is "problematic" in meeting state and federal Trinity River temperature objectives

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[8] The interannual water budget accounting started in 1928, a normal water year type.

[9] It is likely that CVP operations would change during drought periods. However, we did not have the knowledge or expertise to define such changes. Thus, the analysis used operations consistent with the earlier PROSIM simulations.

[10] Hecht, B. and Finnerty, A.A., 1992, Testimony to the State Water Resources Control Board regarding Carryover Storage in Trinity and Lewiston Reservoirs to Protect Public-interest Resources. State Water Resources Control Board Water Right Phase of the Bay-Delta Estuary Proceedings, June 26, 7p.

[11] Deas, M.L., 1998, Trinity Reservoir Carryover Analysis. Prepared for: Trinity County Planning Department, Natural Resources Division, August, 26p.

[12] U.S. Department of Interior, Bureau of Reclamation, 2012, Trinity Reservoir Carryover Storage Cold Water Pool Sensitivity Analysis – Technical Service Center (TSC) Technical Memorandum No. 86-68220-12-06. August 20, 7p.

protective of the fishery.

The Sites Project water operation and temperature analyses assume a minimum Trinity Reservoir carryover storage volume of 600TAF. The study findings presented above indicate that initial October 1 carryover storage volumes of 600- and 750-TAF are not sufficient to satisfy Trinity River temperature objectives for a single dry/critically dry water year-type, let alone multi-year droughts. Thus, it is reasonable to foresee that current implementation of the ROD Flows without sufficient carryover storage will not achieve Trinity River temperature objectives during critically dry year-types. Modeling results indicate that critically dry water year-types deplete reservoir carryover storage volumes at much higher rates than occurs during dry years. Whether dealing with dry or critically dry year-types, reservoir storage has no chance of being replenished during multi-year droughts under the current and proposed Sites Project CVP operations.

As determined by Finnerty and Hecht, a minimum baseline carryover storage volume of 900 TAF is required to meet Basin Plan temperature objectives on the Trinity River during a single dry year. Studies by Deas and Kamman suggest this baseline carryover storage volume is likely higher for critically dry year-types. Significantly higher carryover storage volumes over the baseline value are required to preserve the necessary reservoir cool water pool during multi-year drought periods, in order to achieve temperature objectives. Modeling studies suggest first year drought carryover storage volumes of around 1750 TAF are sufficient to maintain adequate carryover storage to meet temperature objectives during multi-year droughts. Thus, a single minimum carryover storage volume cannot be developed without revising CVP operations that focus on preserving Trinity Reservoir carryover storage, most likely by reducing water that is diverted out of the Trinity River basin.

The Sites Project DEIR/S presents the results of their modeling analyses as monthly average values of flow, storage and water temperature for multiple years within designated water-year type classifications. This presentation masks the impacts from a single extreme dry year as well as repeated impacts associated with a continuous multi-year drought. These are the periods of greatest concern and potential damage to aquatic resources, but they are not identified or described in the DEIR/S. Prior to 2016, the USGS[13] developed a water temperature model that accurately simulates daily mean water temperature along the course of the Trinity River, from Lewiston Dam to the Klamath River confluence. This model would be a more appropriate tool to evaluate how changes in TRD water operations associated with the Sites Project would satisfy water temperature objectives in the Trinity River.

3. Inaccurate Existing (Baseline) TRD Water Operations

The water operations analysis for Sites Project EIR/S did not include an analysis considering use of Humboldt County's 50 thousand acre feet (TAF) water contract included as a provision of the Trinity River Division Act. The following is an excerpt from the Statutory Authority Appendix contained in the DEIS for the Long-Term Plan to Protect Adult Salmon in the Lower Klamath River (Lower Klamath LTP)[14] describing Humboldt County's 50 TAF water contract.

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[13] Jones, E.C., Perry, R.W., Risley, J.C., Som, N.A. and Hetrick, N.J., 2016, Construction, calibration and validcation of the RBM10 water temperature model for the Trinity River, Northern California. U.S. Department of Interior, U.S. Geological Survey, Open-File Report 2016-1056, prepared in cooperation with the U.S. Fish and Wildlife Service and the Bureau of Reclamation, 56p.

[14] U.S. Department of Interior, Bureau of Reclamation, 2016, Long-Term Plan to Protect Adult Salmon in the Lower Klamath River, Humboldt County, California Draft Environmental Impact Statement, October.

Construction of the Trinity River Division (TRD) of the Central Valley Project (CVP) was authorized by the Act of August 12, 1955 (Public Law 84-386) (TRD Act). In section 2 of the 1955 TRD Act, Congress directed that the operation of the TRD should be integrated and coordinated with the operation of the CVP, subject to two conditions set forth as distinct Provisos in section 2 of that Act. The first of these two Provisos states that the Secretary of the Interior is authorized and directed to "adopt appropriate measures to insure the preservation and propagation of fish and wildlife" including certain minimum flows in the Trinity River deemed at the time as necessary to maintain the fishery. The second Proviso directs that not less than 50,000 acre-feet of water shall be released and made available to Humboldt County and other downstream users[15]*.*

The recently released Solicitor's Opinion, M-37030, concludes that each of the two Provisos in section 2 of the TRD Act are "separate and independent limitations on the TRD's integration with, and thus diversion of water to, the CVP" and that the two Provisos may "require separate releases of water as requested by Humboldt County and potentially other downstream users pursuant to Proviso 2 and a 1959 Contract between the U.S. Department of the Interior, Bureau of Reclamation (Reclamation) and Humboldt County."[16] *M- Opinion 37030 at 2. Formal 18 opinions of the Solicitor are binding on the Department of the Interior and its bureaus.*

Chapter 6 and Appendix 6A of the Sites Project DEIR/S state that the project water operations modeling analyses adhered to 2000 Trinity River ROD releases to the Trinity River downstream of Lewiston Reservoir to meet instream flow requirements. The DEIR/S states, "The total volume of water released to the Trinity River ranges from approximately 368,600 AF in critically dry years to 815,000 AF in extremely wet years, depending on the annual water-year type (hydrology) determined as of April 1st (DOI, 2000). Table 6-2 shows the annual volumes, peak flows, and peak flow duration by water type." Table 6-2 from the DEIR/S is presented below. However, there is no mention of Humboldt County's 50 TAF annual water contract being integrated into the DEIR/S water resources system modeling and analysis. It is not possible to compare total annual modeled Trinity River releases from the DEIR/S (Table 2, attached) to the annual Trinity River ROD flow volumes (Table 6.2 below) as they represent different water year type classification schemes[17]. The USFWS report by David and Goodman (2017) indicates how the Humboldt County 50 TAF water contract has been especially important for flow augmentation during dry years to meet flow and temperature targets in the lower Klamath River to reduce the probability of an adult fish kill. The omission of the Humboldt County 50 TAF contract in the DEIR/S analyses could have significant effects on the water quality conditions and potential impacts

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[15] Reclamation's water permits from the State of California includes the following condition:
"Permittee shall release sufficient water from Trinity and/or Lewiston Reservoirs into the Trinity River so that not less than an annual quantity of 50,000 acre-feet will be available for the beneficial use of Humboldt County and other downstream users." Condition 9

[16] The 1959 water delivery contract between Reclamation and Humboldt County includes the following:
"The United States agrees to release sufficient water from Trinity and/or Lewiston Reservoirs into the Trinity River so that not less than an annual quantity of 50,000 acre-feet will be available for the beneficial use of Humboldt County and other downstream users."
Contract, Article 8.

[17] The water year types included in the Trinity ROD are probability-based and classified by ranges of annual upper Trinity River Basin water year runoff. This classification is different from the water year types presented in all other tables in Appendix 6B of the DEIR/S, which are based on the historical record of WY1922 through WY2003 and defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 2000).

to both the Trinity and Sacramento Rivers. Therefore, the DEIR/S should be considered incomplete in the analysis of the effects of the Site Project operations on the Trinity River.

Table 6-2
Trinity River Record of Decision
Annual Flow Volumes and Peak Flows

Water Year Type	Volume (AF)	Peak Flow (cfs)	Peak Flow Duration (days)
Extremely Wet	815,000	11,000	5
Wet	701,000	8,500	5
Normal	647,000	6,000	5
Dry	453,000	4,500	5
Critically Dry	369,000	1,500	36

Notes:
cfs = cubic feet per second
Source: DOI, 2000.

4. Incomplete Cumulative Impact Assessment
In addition to the omission of the Humboldt County 50 TAF water delivery contract on the Trinity River, the Sites Project DEIR/S fails to consider and incorporate the Lower Klamath LTP operations into the water resources system modeling analyses. Under CEQA, a cumulative impact assessment must consider development projects within the cumulative study area, which includes past projects, projects under construction and approved, and pending projects that are anticipated to be either under construction or operational by the time of the completion of the proposed project. The Sites DEIR/S states the following (pg. 6A-2, Appendix 6A).

> *The Existing Conditions/No Project/No Action Condition simulation was developed assuming Year 2030 level of development and regulatory conditions. The Existing Conditions/No Project/No Action Condition assumptions include existing facilities and ongoing programs that existed as of March 2017 (publication of the Notice of Preparation) that could affect or could be affected by implementation of the alternatives. The Existing Conditions/No Project/No Action Condition assumptions and the models do not include any restoration actions or additional conveyance over the current conditions.*

Although the ROD for the Lower Klamath LTP[18] wasn't signed until April 2017, it was certainly a well-known and defined pending project and should have been incorporated into the baseline condition of the water resource system modeling analysis. Tables 6 through 8 provide average monthly storage and flow values for the TRD under the Lower Klamath LTP. Comparison of the Lower Klamath LTP Alternative 1 conditions presented in Table 6 through 8 to the Sites Project No Action Alternative conditions presented in Tables 1 through 3 indicate significant differences in project operations and hydrologic conditions when including the Lower Klamath LTP in the water resource impact assessment. For example, under the Lower Klamath LTP, diversions to

[18] U.S. Department of the Interior, Bureau of Reclamation, 2017, Record of Decision for the Long Term Plan to Protect Adult Salmon in the Lower Klamath River, April, Accessed at https://www.usbr.gov/mp/nepa/includes/documentShow.php?Doc_ID=28314

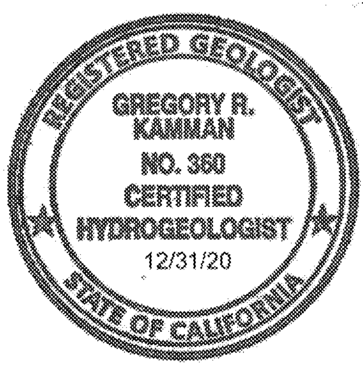
the Sacramento River are reduced by an average of 13 TAF per year, while Sites DEIR has diversions increasing, on average, by 4 TAF per year. The main reason for this difference is the August and September Trinity River release rates: as a result of flow augmentations, the Lower Klamath LTP increases average releases to Trinity River by 20% and 42% (presumably using the Humboldt County 50TAF water) above No Action flows, respectively (see Table 7). Alternative D of the Sites Project maintains a constant 450 cfs baseline ROD flow during these months for all water year types. The Lower Klamath LTP introduces significant project operations, not included in the Sites Project DEIR/S analyses, which could have significant effects on the anticipated water supply available to the project as well as impacts to temperature on the Sacramento River. Because of this omission in the impact analysis, the Sites Project DEIR/S should be considered incomplete.

Another cumulative impact that is not evaluated in the Sites Project DEIR/S is the influence of climate change on the meteorology and hydrology of northern California rivers. The water temperature modeling of Alternatives completed as part of DEIR/S analyses uses historic meteorologic and hydrologic data and do not consider the predicted warmer future temperatures in the Trinity and Klamath River basins under climate change (USBR, 2011)[19]. Warmer air temperatures under climate change will result in warmer reservoir and river water temperatures. Anticipated changes to the timing and magnitude of spring snowmelt hydrograph and associated tributary accretion (flow and water temperature) are likely to increase river water temperatures, which will reduce the attainment of water temperature objectives on the Trinity River, especially those established for outmigrant juvenile salmonids. Thus, the DEIR/S fails to evaluate the cumulative impact of climate change conditions.

Please feel free to contact me with any questions regarding the material and conclusions contained in this letter.

Sincerely,

Greg Kamman, PG, CHG
Principal Hydrologist



[19] U.S. Department of the Interior, Policy and Administration, Bureau of Reclamation, 2011, SECURE Water Act Section 9503(c) – Reclamation Climate Change and Water. April, 226p.

TABLE 1: Trinity Lake end of month storage. Source: Table SW-01-9a, Appendix 6B of Sites Project DEIR/S.

Table SW-02-9a
Trinity Lake, End of Month Elevation
Long-term Average and Average by Water Year Type

Analysis Period	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	End of Month Elevation (FEET)											
Long-term												
Full Simulation Period[1]												
No Action Alternative	2,278	2,280	2,285	2,292	2,302	2,313	2,325	2,324	2,321	2,310	2,297	2,286
Alternative D	2,281	2,283	2,288	2,294	2,304	2,314	2,325	2,325	2,322	2,310	2,298	2,287
Difference	2	3	3	2	2	1	1	1	1	1	1	1
Percent Difference[3]	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	2,322	2,323	2,325	2,324	2,337	2,347	2,357	2,359	2,358	2,350	2,342	2,332
Alternative D	2,322	2,323	2,324	2,325	2,338	2,348	2,358	2,360	2,358	2,350	2,341	2,331
Difference	-1	0	0	1	1	1	0	0	0	0	-1	-1
Percent Difference	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Above Normal (15%)												
No Action Alternative	2,305	2,305	2,307	2,298	2,313	2,329	2,341	2,342	2,340	2,331	2,321	2,309
Alternative D	2,307	2,307	2,309	2,305	2,319	2,334	2,345	2,346	2,344	2,335	2,323	2,311
Difference	2	2	2	7	6	5	4	4	4	4	2	2
Percent Difference	0.1%	0.1%	0.1%	0.3%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%	0.1%
Below Normal (17%)												
No Action Alternative	2,275	2,278	2,285	2,281	2,289	2,298	2,313	2,313	2,310	2,298	2,287	2,277
Alternative D	2,275	2,278	2,286	2,281	2,289	2,298	2,314	2,313	2,310	2,298	2,286	2,277
Difference	0	1	0	0	0	0	0	0	0	0	0	0
Percent 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%
Dry (22%)												
No Action Alternative	2,260	2,261	2,270	2,283	2,291	2,304	2,316	2,312	2,307	2,293	2,277	2,266
Alternative D	2,261	2,263	2,273	2,284	2,292	2,304	2,316	2,312	2,306	2,291	2,277	2,266
Difference	2	2	2	1	1	0	0	-1	-1	-1	0	0
Percent Difference	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%
Critical (15%)												
No Action Alternative	2,189	2,190	2,198	2,240	2,246	2,255	2,263	2,260	2,258	2,239	2,218	2,203
Alternative D	2,203	2,206	2,211	2,242	2,248	2,257	2,265	2,262	2,260	2,242	2,224	2,208
Difference	14	16	13	2	2	2	2	2	2	2	6	5
Percent Difference	0.6%	0.7%	0.6%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.3%	0.2%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

TABLE 2: Monthly flow on Trinity River below Lewiston Reservoir. Source: Table SW-04-9a, Appendix 6B of Sites Project DEIR/S.

Table SW-04-9a
Trinity River below Lewiston Reservoir, Monthly Flow
Long-term Average and Average by Water Year Type

	Monthly Flow (CFS)											
Analysis Period	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	368	360	522	655	645	575	554	3,779	2,091	923	450	450
Alternative D	373	360	498	638	621	570	561	3,779	2,091	923	450	450
Difference	5	-1	-24	-17	-24	-5	6	0	0	0	0	0
Percent Difference[3]	1.2%	-0.2%	-4.6%	-2.6%	-3.7%	-0.9%	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	373	300	852	1,412	1,026	1,096	627	4,636	3,318	1,289	450	450
Alternative D	373	300	775	1,351	1,052	1,143	647	4,636	3,318	1,289	450	450
Difference	0	0	-76	-61	26	47	20	0	0	0	0	0
Percent Difference	0.0%	0.0%	-8.9%	-4.3%	2.5%	4.3%	3.2%	0.0%	0.0%	0.0%	0.0%	0.0%
Above Normal (15%)												
No Action Alternative	373	713	621	316	831	436	469	4,462	2,488	1,048	450	450
Alternative D	373	709	621	332	760	300	469	4,462	2,488	1,048	450	450
Difference	0	-5	0	16	-72	-136	0	0	0	0	0	0
Percent Difference	0.0%	-0.7%	0.0%	5.1%	-8.6%	-31.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Below Normal (17%)												
No Action Alternative	373	300	300	300	517	319	507	3,774	1,672	869	450	450
Alternative D	373	300	300	300	392	319	507	3,774	1,672	869	450	450
Difference	0	0	0	0	-125	0	0	0	0	0	0	0
Percent Difference	0.0%	0.0%	0.0%	0.0%	-24.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dry (22%)												
No Action Alternative	373	300	300	300	300	300	529	3,216	1,251	667	450	450
Alternative D	373	300	300	300	300	300	529	3,216	1,251	667	450	450
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Percent 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%
Critical (15%)												
No Action Alternative	342	300	300	300	300	300	575	2,092	783	450	450	450
Alternative D	373	300	300	300	300	300	575	2,092	783	450	450	450
Difference	31	0	0	0	0	0	0	0	0	0	0	0
Percent Difference	9.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

TABLE 3: Monthly flow through Clear Creek Tunnel. Source: Table SW-05-9a, Appendix 6B of Sites Project DEIR/S.

Table SW-05-9a
Clear Creek Tunnel, Monthly Flow
Long-term Average and Average by Water Year Type

Analysis Period	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	Monthly Flow (CFS)											
Long-term												
Full Simulation Period[1]												
No Action Alternative	1,033	344	257	420	95	269	389	168	551	1,812	1,926	1,666
Alternative D	900	261	269	460	155	341	373	163	576	1,862	1,957	1,675
Difference	-133	-83	12	40	61	71	-16	-5	25	50	30	9
Percent Difference[3]	-12.9%	-24.2%	4.7%	9.4%	64.2%	26.4%	-4.2%	-3.2%	4.6%	2.8%	1.6%	0.5%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	1,593	481	536	430	81	344	483	278	421	1,742	1,678	2,135
Alternative D	1,571	448	585	437	118	355	493	268	439	1,765	1,882	2,142
Difference	-22	-32	49	7	38	12	10	-10	18	23	204	6
Percent Difference	-1.4%	-6.7%	9.1%	1.6%		3.4%	2.0%	-3.5%	4.3%	1.3%	12.1%	0.3%
Above Normal (15%)												
No Action Alternative	964	437	304	269	58	302	588	0	167	1,417	1,875	1,958
Alternative D	1,088	340	237	269	71	468	564	21	166	1,500	2,313	1,875
Difference	124	-98	-67	0	12	166	-24	21	-1	83	438	-83
Percent Difference	12.9%	-22.4%	-22.1%	0.0%		54.9%	-4.1%		-0.5%	5.9%	23.3%	-4.3%
Below Normal (17%)												
No Action Alternative	429	186	65	295	80	384	265	61	660	1,538	1,796	1,361
Alternative D	433	68	96	334	212	406	171	61	660	1,698	1,714	1,342
Difference	4	-118	32	39	132	22	-94	0	0	161	-82	-18
Percent Difference	1.0%	-63.5%	48.6%	13.4%		5.6%	-35.3%	0.0%	0.0%	10.5%	-4.6%	-1.4%
Dry (22%)												
No Action Alternative	884	333	100	408	166	141	222	221	905	2,100	2,322	1,468
Alternative D	676	205	81	551	265	295	252	200	978	2,147	2,119	1,420
Difference	-209	-128	-20	143	99	154	29	-22	73	47	-203	-48
Percent Difference	-23.6%	-38.4%	-19.7%	35.2%	59.9%	109.4%	13.1%	-9.8%	8.1%	2.2%	-8.7%	-3.3%
Critical (15%)												
No Action Alternative	818	156	62	715	70	135	385	147	561	2,245	2,075	1,012
Alternative D	142	84	99	710	90	174	342	143	585	2,200	1,802	1,235
Difference	-676	-72	37	-5	21	39	-43	-4	25	-45	-272	222
Percent Difference	-82.6%	-46.2%		-0.8%		28.5%	-11.2%	-2.5%	4.4%	-2.0%	-13.1%	22.0%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

TABLE 4: Estimated Monthly flow through Lewiston Reservoir.

Flow through Lewiston Lake (cfs)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Full Simulation Period1												
No Action Alternative	1401	704	779	1075	740	844	943	3947	2642	2735	2376	2116
Alternative D	1273	621	767	1098	776	911	934	3942	2667	2785	2407	2125
Difference	(128)	(83)	(12)	23	36	67	(9)	(5)	25	50	31	9
Percent Difference	-9.1%	-11.8%	-1.5%	2.1%	4.9%	7.9%	-1.0%	-0.1%	0.9%	1.8%	1.3%	0.4%
Wet (32%)												
No Action Alternative	1966	781	1388	1842	1107	1440	1110	4914	3739	3031	2128	2585
Alternative D	1944	748	1360	1788	1170	1498	1140	4904	3757	3054	2332	2592
Difference	(22)	(33)	(28)	(54)	63	58	30	(10)	18	23	204	7
Percent Difference	-1.1%	-4.2%	-2.0%	-2.9%	5.7%	4.0%	2.7%	-0.2%	0.5%	0.8%	9.6%	0.3%
Above Normal (15%)												
No Action Alternative	1337	1150	925	585	889	738	1057	4462	2655	2465	2325	2408
Alternative D	1461	1049	858	601	831	768	1033	4483	2654	2548	2763	2325
Difference	124	(101)	(67)	16	(58)	30	(24)	21	(1)	83	438	(83)
Percent Difference	9.3%	-8.8%	-7.2%	2.7%	-6.5%	4.1%	-2.3%	0.5%	0.0%	3.4%	18.8%	-3.4%
Below Normal (17%)												
No Action Alternative	802	486	365	595	597	703	772	3835	2332	2407	2246	1811
Alternative D	806	368	396	634	604	725	678	3835	2332	2567	2164	1792
Difference	4	(118)	31	39	7	22	(94)	0	0	160	(82)	(19)
Percent Difference	0.5%	-24.3%	8.5%	6.6%	1.2%	3.1%	-12.2%	0.0%	0.0%	6.6%	-3.7%	-1.0%
Dry (22%)												
No Action Alternative	1257	633	400	708	466	441	751	3437	2156	2767	2772	1918
Alternative D	1049	505	381	851	565	595	781	3416	2229	2814	2569	1870
Difference	(208)	(128)	(19)	143	99	154	30	(21)	73	47	(203)	(48)
Percent Difference	-16.5%	-20.2%	-4.8%	20.2%	21.2%	34.9%	4.0%	-0.6%	3.4%	1.7%	-7.3%	-2.5%
Critical (15%)												
No Action Alternative	1160	456	362	1015	370	435	960	2239	1344	2695	2525	1462
Alternative D	515	384	399	1010	390	474	917	2235	1368	2650	2252	1685
Difference	(645)	(72)	37	(5)	20	39	(43)	(4)	24	(45)	(273)	223
Percent Difference	-55.6%	-15.8%	10.2%	-0.5%	5.4%	9.0%	-4.5%	-0.2%	1.8%	-1.7%	-10.8%	15.3%

TABLE 5: Monthly temperatures of Trinity River below Lewiston Dam. Source: Table SQ-33-9a, Appendix 7E of Sites Project DEIR/S.

Table SQ-33-9a
Trinity River below Lewiston Dam, Monthly Temperature
Long-term Average and Average by Water Year Type

Analysis Period	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	Monthly Temperature (DEG-F)											
Long-term												
Full Simulation Period[1]												
No Action Alternative	49.4	44.7	40.0	39.4	42.7	47.0	50.2	46.6	50.9	51.3	51.7	50.7
Alternative D	49.3	44.6	39.9	39.5	42.7	46.9	50.3	46.6	50.8	51.1	51.3	50.7
Difference	-0.1	-0.1	-0.1	0.2	0.0	-0.2	0.1	0.0	-0.1	-0.2	-0.4	0.1
Percent Difference[3]	-0.2%	-0.2%	-0.2%	0.4%	0.0%	-0.4%	0.2%	-0.1%	-0.2%	-0.4%	-0.7%	0.1%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	47.0	44.6	41.5	40.6	43.0	45.9	49.1	45.8	48.3	50.8	51.6	48.6
Alternative D	47.0	44.6	41.3	40.5	43.0	45.8	49.1	45.8	48.3	50.7	50.9	48.8
Difference	0.1	0.0	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	-0.2	-0.7	0.2
Percent Difference	0.1%	0.1%	-0.3%	-0.2%	-0.1%	-0.3%	-0.1%	0.0%	0.0%	-0.3%	-1.4%	0.4%
Above Normal (15%)												
No Action Alternative	48.2	43.3	40.2	38.6	42.6	47.3	49.9	45.9	50.6	51.6	50.9	48.8
Alternative D	47.7	43.2	39.8	38.6	42.6	47.2	50.0	45.9	50.5	51.2	49.6	49.4
Difference	-0.5	-0.1	-0.4	0.1	0.0	-0.1	0.1	-0.1	-0.1	-0.4	-1.3	0.6
Percent Difference	-1.1%	-0.2%	-1.1%	0.3%	0.0%	-0.2%	0.2%	-0.2%	-0.2%	-0.8%	-2.5%	1.3%
Below Normal (17%)												
No Action Alternative	50.2	44.7	39.0	38.7	41.9	46.8	51.1	46.4	51.3	52.0	52.0	51.3
Alternative D	50.2	44.7	39.1	38.9	41.9	46.7	51.6	46.5	51.3	51.6	52.2	51.5
Difference	0.0	0.0	0.2	0.1	0.0	-0.2	0.5	0.0	0.0	-0.3	0.1	0.2
Percent Difference	-0.1%	0.1%	0.4%	0.3%	0.0%	-0.4%	1.0%	0.1%	0.0%	-0.6%	0.3%	0.4%
Dry (22%)												
No Action Alternative	49.5	45.0	39.6	38.4	42.4	47.9	51.4	46.7	51.9	50.7	50.1	50.3
Alternative D	49.7	44.7	39.4	39.0	42.4	47.6	51.1	46.6	51.7	50.5	50.5	50.4
Difference	0.2	-0.2	-0.2	0.6	0.0	-0.4	-0.2	-0.1	-0.2	-0.3	0.4	0.1
Percent Difference	0.4%	-0.5%	-0.4%	1.5%	0.1%	-0.8%	-0.4%	-0.2%	-0.5%	-0.5%	0.8%	0.2%
Critical (15%)												
No Action Alternative	54.5	45.7	38.2	39.4	43.1	48.0	50.2	49.3	55.5	52.5	54.4	56.6
Alternative D	53.8	45.5	38.4	39.7	43.2	47.8	50.4	49.2	55.3	52.6	53.9	55.6
Difference	-0.7	-0.2	0.1	0.2	0.1	-0.2	0.2	-0.1	-0.2	0.1	-0.5	-1.0
Percent Difference	-1.3%	-0.5%	0.3%	0.6%	0.2%	-0.3%	0.4%	-0.2%	-0.3%	0.2%	-0.9%	-1.8%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

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TABLE 6: Monthly Trinity Lake Storage. Source: Table 4-1, Lower Klamath LTP DEIS.

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action (TAF)												
Extremely Wet	1,197	1,258	1,399	1,618	1,839	1,998	2,208	2,300	2,236	2,105	1,993	1,850
Wet	1,373	1,393	1,507	1,621	1,806	1,952	2,114	2,090	2,018	1,896	1,752	1,606
Normal	1,322	1,324	1,346	1,415	1,529	1,669	1,843	1,773	1,689	1,534	1,386	1,276
Dry	1,096	1,089	1,113	1,127	1,189	1,292	1,403	1,361	1,302	1,159	1,005	901
Critically Dry	1,051	1,016	1,014	988	1,012	1,068	1,087	1,048	985	836	676	598
Average All Years	1,233	1,242	1,306	1,385	1,511	1,637	1,779	1,755	1,686	1,548	1,403	1,283
Alternative 1 (TAF)												
Extremely Wet	1,170	1,236	1,377	1,597	1,821	1,981	2,191	2,285	2,221	2,090	1,979	1,839
Wet	1,362	1,382	1,497	1,613	1,798	1,946	2,107	2,083	2,011	1,890	1,743	1,595
Normal	1,319	1,321	1,343	1,415	1,528	1,669	1,842	1,772	1,689	1,536	1,387	1,266
Dry	1,092	1,085	1,109	1,123	1,184	1,288	1,399	1,357	1,298	1,148	992	881
Critically Dry	1,044	1,007	1,005	979	1,004	1,058	1,078	1,039	976	848	677	576
Average All Years	1,224	1,233	1,298	1,377	1,504	1,631	1,772	1,749	1,680	1,544	1,396	1,269
No Action compared to Alternative 1 (TAF)												
Extremely Wet	-27	-22	-22	-21	-17	-17	-17	-15	-15	-15	-15	-11
Wet	-11	-11	-10	-9	-8	-7	-7	-7	-6	-6	-8	-11
Normal	-3	-2	-3	0	0	0	0	0	0	3	1	-10
Dry	-4	-4	-4	-4	-4	-4	-4	-4	-4	-11	-13	-20
Critically Dry	-7	-9	-9	-9	-8	-9	-9	-9	-9	11	1	-22
Average All Years	-9	-9	-9	-8	-7	-6	-6	-6	-6	-5	-8	-14
No Action compared to Alternative 1 (%)												
Extremely Wet	-2%	-2%	-2%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%
Wet	-1%	-1%	-1%	-1%	0%	0%	0%	0%	0%	0%	0%	-1%
Normal	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-1%
Dry	0%	0%	0%	0%	0%	0%	0%	0%	0%	-1%	-1%	-2%
Critically Dry	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	1%	0%	-4%
Average All Years	-1%	-1%	-1%	-1%	0%	0%	0%	0%	0%	0%	-1%	-1%

Key:
TAF = thousand acre-feet

TABLE 7: Monthly flow on Trinity River below Lewiston Reservoir. Source: Table 4-3, Lower Klamath LTP DEIS.

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action (cfs)												
Extremely Wet	373	796	930	1,264	1,525	2,458	1,042	4,570	4,626	1,241	450	450
Wet	373	300	1,023	1,175	915	510	481	4,687	2,862	1,102	450	450
Normal	373	300	300	300	385	302	477	4,189	2,120	1,102	450	450
Dry	337	286	300	300	300	300	543	2,848	847	481	450	450
Critically Dry	368	267	300	300	300	300	600	1,498	783	450	450	400
Average All Years	363	359	605	696	668	654	584	3,753	2,210	890	450	445
Alternative 1 (cfs)												
Extremely Wet	373	719	930	1,248	1,455	2,458	1,042	4,570	4,626	1,241	460	477
Wet	373	300	1,024	1,151	910	505	481	4,687	2,862	1,102	503	533
Normal	373	300	300	300	358	302	477	4,189	2,120	1,102	506	632
Dry	337	286	300	300	300	300	543	2,848	847	481	574	725
Critically Dry	332	267	300	300	300	300	600	1,498	783	450	699	861
Average All Years	359	349	605	687	652	652	584	3,753	2,210	890	538	630
No Action compared to Alternative 1 (cfs)												
Extremely Wet	0	-77	0	-16	-69	0	0	0	0	0	10	27
Wet	0	0	1	-24	-5	-5	0	0	0	0	53	83
Normal	0	0	0	0	-27	0	0	0	0	0	56	182
Dry	0	0	0	0	0	0	0	0	0	0	124	275
Critically Dry	-37	0	0	0	0	0	0	0	0	0	249	461
Average All Years	-4	-10	0	-8	-16	-2	0	0	0	0	88	185
No Action compared to Alternative 1 (%)												
Extremely Wet	0%	-10%	0%	-1%	-5%	0%	0%	0%	0%	0%	2%	6%
Wet	0%	0%	0%	-2%	-1%	-1%	0%	0%	0%	0%	12%	18%
Normal	0%	0%	0%	0%	-7%	0%	0%	0%	0%	0%	13%	40%
Dry	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	61%
Critically Dry	-10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	55%	115%
Average All Years	-1%	-3%	0%	-1%	-2%	0%	0%	0%	0%	0%	20%	42%

Key:
% = percent
cfs = cubic feet per second

TABLE 8: Monthly flow on Trinity River Diversion to Sacramento River at Lewiston Reservoir. Source: Table 4-3, Lower Klamath LTP DEIS.

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action (cfs)												
Extremely Wet	827	233	235	410	7	329	278	498	407	1,836	1,526	2,079
Wet	945	541	376	482	97	322	591	0	290	1,190	1,952	2,065
Normal	792	355	193	418	243	396	228	0	472	1,553	1,991	1,471
Dry	712	418	166	385	134	153	229	247	1,011	1,973	2,098	1,358
Critically Dry	598	609	132	748	168	157	426	378	736	2,028	2,178	949
Average All Years	802	439	241	464	131	276	367	172	575	1,640	1,965	1,648
Alternative 1 (cfs)												
Extremely Wet	766	234	233	410	7	329	278	465	407	1,836	1,513	1,984
Wet	904	551	355	482	100	303	586	0	290	1,181	1,937	2,025
Normal	767	344	196	378	270	396	228	0	469	1,510	1,957	1,471
Dry	636	415	162	387	134	152	229	247	1,008	2,092	2,009	1,196
Critically Dry	521	642	132	753	143	177	426	373	736	1,701	2,092	880
Average All Years	748	443	234	457	134	272	366	167	573	1,623	1,920	1,573
No Action compared to Alternative 1 (cfs)												
Extremely Wet	-61	1	-2	0	0	0	0	-33	0	0	-13	-95
Wet	-42	10	-21	0	3	-20	-5	0	0	-9	-14	-41
Normal	-25	-10	4	-40	27	0	0	0	-3	-43	-34	0
Dry	-75	-3	-4	2	0	-1	0	0	-3	119	-89	-163
Critically Dry	-77	32	0	5	-25	20	0	-4	0	-327	-86	-69
Average All Years	-53	4	-7	-7	3	-4	-2	-5	-2	-18	-45	-74
No Action compared to Alternative 1 (%)												
Extremely Wet	-7%	0%	-1%	0%	0%	0%	0%	-7%	0%	0%	-1%	-5%
Wet	-4%	2%	-6%	0%	3%	-6%	-1%	0%	0%	-1%	-1%	-2%
Normal	-3%	-3%	2%	-10%	11%	0%	0%	0%	-1%	-3%	-2%	0%
Dry	-11%	-1%	-3%	1%	0%	0%	0%	0%	0%	6%	-4%	-12%
Critically Dry	-13%	5%	0%	1%	-15%	13%	0%	-1%	0%	-16%	-4%	-7%
Average All Years	-7%	1%	-3%	-1%	3%	-1%	0%	-3%	0%	-1%	-2%	-5%

Key:
% = percent
cfs = cubic feet per second

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EDUCATION	1989	M.S. Geology - Sedimentology and Hydrogeology Miami University, Oxford, OH
	1985	A.B. Geology Miami University, Oxford, OH
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PROFESSIONAL HISTORY	1997 - Present	Principal Hydrologist/Vice President Kamman Hydrology & Engineering, Inc. San Rafael, CA
	1994 - 1997	Senior Hydrologist/Vice President Balance Hydrologics, Inc., Berkeley, CA
	1991 - 1994	Project Geologist/Hydrogeologist Geomatrix Consultants, Inc., San Francisco, CA
	1989 - 1991	Senior Staff Geologist/Hydrogeologist Environ International Corporation, Princeton, NJ
	1986 - 1989	Instructor and Research/Teaching Assistant Miami University, Oxford, OH

SKILLS AND EXPERIENCE

As a Principal Hydrologist with over 25 of technical and consulting experience in the fields of geology, hydrology, and hydrogeology, Mr. Kamman routinely manages projects in the areas of surface- and ground-water hydrology, stream and wetland habitat restoration, water supply, water quality assessments, water resources management, and geomorphology. Areas of expertise include: stream and wetland habitat restoration; characterizing and modeling basin-scale hydrologic and geologic processes; assessing hydraulic and geomorphic responses to land-use changes in watersheds and causes of stream channel instability; evaluating surface- and ground-water resources and their interaction; and designing and implementing field investigations characterizing surface and subsurface conditions; and stream and wetland habitat restoration feasibility assessments and design. In addition, Mr. Kamman commonly works on projects that revolve around sensitive fishery, wetland, wildlife and/or riparian habitat enhancement. Thus, Mr. Kamman is accustomed to working within a multi-disciplined team and maintains close collaborative relationships with biologists, engineers, planners, architects, lawyers, and resource and regulatory agency staff. Mr. Kamman is a prime or contributing author to over 80 technical publications and reports in the discipline of hydrology – the majority pertaining to ecological restoration. Mr. Kamman routinely teaches courses on stream and wetland restoration through U.C. Berkeley Extension and San Francisco State University's Romberg Tiburon Center.

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1.0 TECHNICAL REPORTS

Kamman, G.K., Fiori, R., and Kamman, R.Z., 2017, Lagunitas Creek Salmonid Habitat Enhancement Project, anchoring and bank stabilization concerns at LDRJ Sites #4 and #5. Prepared for: Marin Municipal Water District, September 25, 23p.

Kamman G.R. and Hayes, C., 2017, Annual geomorphic monitoring (WY2017) rock cascade-pool structure, Green Gulch landslide repair project, Marin County. Prepared for: Green Gulch Farm/San Francisco Zen Center, August 31, 57 p.

Kamman, G.R., 2017, Results of Flood Assessment for Proposed Mason Street Culverts, Quartermaster Reach Wetland Restoration Project, The Presidio of San Francisco, California. Prepared for: The Presidio Trust, May, 37p.

Kamman, G.R., 2017, Mountain Lake Water Budget, The Presidio of San Francisco. Prepared for: The Presidio Trust, May, 56p.

Kamman, G.R., 2017, Preliminary Flood Inundation Analysis and Restoration Opportunities, Butte Creek Site, Colusa County, CA. Prepared for: WRA, February 17, 10p.

Kamman G.R. and Hayes, C., 2016, Annual geomorphic monitoring (WY2016) rock cascade-pool structure, Green Gulch landslide repair project, Marin County. Prepared for: Green Gulch Farm/San Francisco Zen Center, July 1, 53 p.

Kamman, G.R., 2016, Novato Creek Hydrologic Monitoring, Water Year 2016 Summary. Prepared for: Marin County Department of Public Works, June 7, 19p.

Kamman, G.R., 2016, Hydraulic Design and Feasibility Assessment Report: Eel River Estuary and Centerville Slough Enhancement Project, Humboldt County, CA. Prepared for: California Trout and California Department of Fish and Wildlife, June, 277p.

Kamman, G.R., 2016, Hydrologic Analysis Results: Proposal to Change Operations of the Crane Prairie, Wickiup, and Crescent Lake Dams and Reservoirs as related to harm to Oregon spotted frog. Prepared for: Earthjustice Northwest Office, Seattle, February 5, 18p.

Kamman, G.R., 2015, Characterization of Groundwater Conditions, Stanislaus County, California. Prepared for: Law Offices of Thomas N. Lippe APC, San Francisco, CA, November, 67p.

Kamman, G.R., 2015, Assessment of Groundwater Conditions, 2031 North Avenue Residence, Napa, California. Prepared for: Michael Lee, Napa, CA, November, 9, 7p.

Kamman, R.Z., Hayes, C., Kamman, G.R., Avocet Research Associates, Carbiener, M., Holland, E., and Baye, P., 2015, Draft McInnis Marsh Restoration Project: Feasibility Study and Alternatives Analysis McInnis Marsh, Marin County, CA. Prepared for: Marin County Parks and The California Coastal Conservancy, September 5, 66p.

Kamman, G.R., 2015, Draft Eel River Coastal Plain Dunes Assessment and Restoration Feasibility Analysis, Humboldt County, CA. Prepared for: GHD, June, 124p.

Kamman, G.R., 2015, Draft Basis of Design Report for Southern Eel River Delta Wetland Restoration and Enhancement Project. Prepared for: Trout Unlimited and California Coastal Conservancy, May, 66p.

Kamman, R.Z., Hayes, C. and Kamman G.K., 2015, Draft Hydrologic Assessment: Lawson's Land, Dillon Beach, CA. Prepared for: Lawson's Landing Inc. pursuant to The California Coastal Commission Coastal Development Permit, Special Condition 4.1.2.d, January, May, 38p.

Kamman G.R. and Hayes, C., 2015, Annual geomorphic monitoring (WY2015) rock cascade-pool structure, Green Gulch landslide repair project, Marin County. Prepared for: Green Gulch Farm/San Francisco Zen Center, March 2, 45 p.

Kamman, G.R., 2014, Groundwater assessment, Page Mill Road Office Complex, 1450/1454 Page Mill Road, Palo Alto, CA. Prepared for Stanford University Real Estate Operations, November 3, 8p.

Kamman, G.R., 2014, 100% Basis of design report, Lagunitas Creek salmonid winter habitat enhancement project. Prepared in association with: Fiori Geosciences, Prepared for: Marin Municipal Water District, September, 212p.

Kamman, G.R., 2014, Draft Lower Miller Creek channel maintenance and flood study: pre-design report. Prepared in association with: Demgen Aquatic Biology and Miller Pacific Engineering Group, Prepared for: Las Gallinas Valley Sanitary District, July, 142p.

Kamman, R.Z, WRECO, Kamman, G.R., 2014, Hydraulic assessment of existing conditions, Novato Creek Watershed Project. Prepared in association with: WRECO, Prepared for: County of Marin, Department of Public Works, June, 198p.

Kamman, R.Z. and Kamman G.K., 2013, Annual geomorphic monitoring report for Water Year 2013, Vineyard Creek Channel Enhancement Project. Prepared for Marin County Department of Public Works, Flood Control and Water Conservation District, May, 69p.

Kamman, G.R., 2014, Groundwater assessment, Upper California Avenue Site, 1451, 1501 and 1601 S. California Avenue, Palo Alto, CA. Prepared for Stanford University Real Estate Operations, April 10, 5p.

Kamman, G.R. and Lapine, S.L., 2014, Hydrologic sufficiency analysis, Rheem Creek Mitigation Bank, Richmond, CA. Prepared for: Olberding Environmental, Inc., on behalf of: Contra Costa Water District, April, 19p.

Kamman, G.R., 2013, Groundwater assessment, 1400 Page Mill Road, Palo Alto, CA. Prepared for Stanford University Real Estate Operations, September 3, 6p.

Kamman, G.R., 2013, Lagunitas Creek salmonid winter habitat enhancement assessment report. Prepared in association with: Fiori Geosciences and Dr. Bill Trush, Prepared for: Marin Municipal Water District, June, 124p.

Kamman, R.Z. and Kamman G.K., 2013, Annual geomorphic monitoring report for Water Year 2012, Vineyard Creek Channel Enhancement Project. Prepared for Marin County Department of Public Works, Flood Control and Water Conservation District, February, 83p.

Kamman, G.R. and Lapine, S.L., 2013, Hydrologic sufficiency analysis, Suisun Creek Preserve, Solano County, CA. Prepared for: Grizzly Bay, LLC, April, 12p.

Kamman, G.R. and Lapine, S.L., 2013, Hydrologic feasibility assessment, Suisun Creek Preserve, Solano County, CA. Prepared for: Grizzly Bay, LLC, March, 12p.

Kamman, G.R., 2012, Basis of design report, Home and G Ranch wetlands, Point Reyes National Seashore, Marin County, CA. Prepared for: Architectural Resources Group, Inc., on behalf of Point Reyes National Seashore, December, 136p.

Kamman, G.R., 2012, Groundwater assessment, 1701 Page Mill Road, Palo Alto, CA. Prepared for Stanford University Real Estate Operations, August 16, 5p.

Kamman, G.R. and Lapine, S.L., 2012, Hydrologic sufficiency analysis, Collier Creek Mitigation Bank, Livermore Area of Alameda and Contra Costa Counties, CA. Prepared for: Olberding Environmental, Inc., August, 28p.

Kamman, R.Z. and Kamman G.K., 2012, Annual geomorphic monitoring report for Water Year 2011, Vineyard Creek Channel Enhancement Project. Prepared for Marin County Department of Public Works, Flood Control and Water Conservation District, February, 46p.

Kamman, G.R. and Lapine, S., 2012, Erosion control assessment in support of trail planning at Mori Point, Pacifica, CA. Prepared for Golden Gate Parks Conservancy, February, 57p.

Kamman, G.R., 2011, Mana Plain Wetland Area Hydraulic Model Report, Kauai, Hawaii. Prepared for: Mana Plain Wetland Restoration Partnership, September 10, 87p.

Kamman, G.R., Kamman, R.Z., Lapine, S., and Higgins, S., 2011, Draft Basis of Design Report, Volume I, Salt River Ecosystem Restoration Project, Riverside Ranch Tidal Marsh Restoration and Preliminary Salt River Channel Design. Prepared for: Humboldt County RCD, June.

Kamman, G.R., 2011, Chapter 3.1: Hydrology and Water Quality and Chapter 3.2: Geology and Soils, in: Grassetti Environmental Consulting, California State Coastal Conservancy, and Kamman Hydrology & Engineering, Inc., 2011, Final Environmental Impact Report: Salt River Ecosystem Restoration Project (SCH# SD2007-05-6). Prepared for Humboldt County RCD, February, 744p.

Kamman, G.R., Higgins, S. and Lapine, S., 2011, 2nd DRAFT Restoration Feasibility and Conceptual Design Report, Third Valley Creek and Chicken Ranch Beach, Inverness, California. Prepared for: Tomales Bay Watershed Council, with contributions from May & Associates, Inc., Avocet Research Associates, and Anthropological Studies Center of Sonoma State University, April 20, 199p.

Kamman, R.Z., Kamman G.K., and Higgins, S., 2011, Annual geomorphic monitoring report for Water Year 2010, Vineyard Creek Channel Enhancement Project. Prepared for Marin County Department of Public Works, Flood Control and Water Conservation District, February, 47p.

Kamman, G.R. and Lapine, S., 2010, Nyhan Creek Trail Segment Assessment, Southern Marin County, California. Prepared for Golden Gate National Parks Conservancy, December 31, 23p.

Kamman, G.R., 2010, Chapter 3.1: Water Resources. In: The Presidio Trust (eds.), 2010. *The Quartermaster Reach Environmental Assessment, September 21, pp. 11-25.*

Kamman, G.R. and Higgins, S., 2010, Hydrologic and Water Quality Investigation, Lower Pitkin Marsh, Sonoma County, California. Prepared for Sonoma Land Trust, August 25, 69p.

Kamman, G.R., 2010. Subsurface Investigation & Conceptual Wetland Enhancement at North fort Scott Wetland Mitigation Site, The Presidio of San Francisco, California. Prepared for The Presidio Trust, August 6, 43p.

Kamman, G.R. and Lapine, S., 2010, Yreka Creek Hydrologic and Hydraulic Analysis Report, Siskiyou County, California. Prepared for WRA, Inc. and the City of Yreka, Department of Public Works, July 29, 32p.

Kamman, G.R. and Higgins, S., 2010, Western Stege Marsh Restoration Project, Year 5 Hydrologic Monitoring Report. Prepared for Tetra Tech EM Inc. and University of California, Berkeley, July 14, 76p.

Higgins, S. and Kamman, G.R., 2010, Watershed-based assessment of hydrologic and geomorphic conditions in Cache Creek through Capay Valley, Yolo County, CA. Prepared for Yolo County RCD, May 19, 85p.

Kamman, G.R. and Lapine, S., 2010, Seasonal Crossing Structure Concept Design. Prepared for: George Salvaggio (WRA, Inc.) and Jeannette Hook (City of Yreka), May 4, 7p.

Kamman, G.R., 2010, Banducci Reservoir Disposal Site Design, Muir Beach Project. Prepared for Carolyn Shoulders (GGNRA, NPS) and Sharon Farrell (GGNPC), April 5, 4p.

Kamman, G.R., 2010, Letter Report Regarding Feasibility to Divert Water from Arroyo Valle Seasonal Wetland Enhancement Design Concepts Shadow Cliffs Regional Recreation Area, Livermore, CA. Prepared for Anne Rivoire, Park Planner, East Bay Regional Park District. January 14, 13p.

Kamman, G.R., 2010, Hydrology Report, Temescal Creek Bridge Crossing, St. John's Episcopal Church, Oakland, CA. Prepared for: Wolfe Mason Associates/Design Community & Environment, January, 53p.

Kamman, R.Z., Kamman G.K., and Higgins, S., 2009, Annual geomorphic monitoring report for Water Year 2009, Vineyard Creek Channel Enhancement Project. Prepared for Marin County Department of Public Works, Flood Control and Water Conservation District, December 18, 33p.

Kamman, G.R. and Lapine, S., 2009, Break-Away Bridge Options and Limitations. Prepared for George Salvaggio (WRA, Inc.) and Jeannette Hook (City of Yreka), December 7, 7p.

Higgins, S. and Kamman, G.R., 2009, Annual geomorphic monitoring of San Francisquito Creek channel, Sand Hill Road Bridge and former golf cart crossing, Stanford University, Santa Clara County, CA. Prepared for Stanford University, Facilities Operations - Utilities Division, December 1, 13p.

Kamman, G.R., (ed.), 2009, Phase 2 Technical Report, Sycamore Grove Recovery Program, Sycamore Grove Park, Livermore, CA. Prepared for Livermore Area Recreation and Park District and Zone 7 Water Agency, Contributing Authors: HortScience, Inc., Kamman Hydrology & Engineering, Inc., Lone Pine Research and National Forest Genetic Electrophoresis Laboratory, December, 129p.

Kamman, G.R., 2009, Sharp Park Conceptual Restoration Alternatives Report Review. Prepared for: Sharon Farrell (Golden Gate Parks Conservancy), Daphne Hatch (Golden Gate National Recreation Area), Phil Ginsburg (S.F. Recreation Park Commission), November 18, 3p.

Kamman, G.R. and Higgins, S., 2009. Fitzgerald Marine Reserve Trail Improvement: Hydrologic and Hydraulic Analysis, San Mateo County, California. Prepared for WRA, Inc., November, 22p.

Kamman, G.R., 2009, Opportunities and Constraints for Ecological Restoration Shadow Cliffs Regional Recreation Area. Prepared for: George Salvaggio (WRA) to Anne Rivoire, EBRPD, September 23, 13p.

Higgins, S. and Kamman, G.R., 2009, Preliminary Hydrologic Assessment Report for the Borba Dairy Farms Conservation and Wetland Mitigation Bank Merced County, California. Prepared for WRA, Inc., September 14, 40p.

Kamman, R.Z., Higgins, S. and Kamman, G., 2009, Olema Marsh Restoration: Salinity Impact Assessment Report. Prepared for: Point Reyes National Seashore Association and National Park Service, September, 58p.

Kamman, G.R. and Higgins, S., 2009, Western Stege Marsh Restoration Project, Year 4 Hydrologic Monitoring Report. Prepared for Tetra Tech EM Inc. and University of California, Berkeley, June 30, 37p.

Kamman, G.R. and Williams, T., 2009, Hydrologic monitoring results and implication on modification to Middle Pond, Mori Point. Prepared for Golden Gate Parks Conservancy, May 28, 8p.

Kamman, G.R. and Lapine, S., 2009, Yreka Creek Floodplain Enhancement Assessment. Prepared for: George Salvaggio (WRA, Inc.) and Jeannette Hook (City of Yreka), May 27, 10p.

Kamman, G.R. and Higgins, S., 2009. Preliminary Findings of a Geomorphic Assessment in Support of Erosion Control Planning and Design; Phleger Estate, San Mateo County, California. Prepared for Golden Gate National Parks Conservancy and Golden Gate National Recreation Area, NPS, April 28, 6p.

Kamman, G.R. and Higgins, S., 2009, Report for the Hydrologic Assessment and Ecological Enhancement Feasibility Study, Laguna Salada Wetland System, Pacifica, California. Prepared for: Tetra Tech Inc., San Francisco, March 30, 45p.

Kamman, G.R., 2009, Annual geomorphic monitoring of San Francisquito Creek channel, Sand Hill Road Bridge and former golf cart crossing, Stanford University, Santa Clara County, CA. Prepared for Stanford University, Facilities Operations - Utilities Division, February 18, 62p.

Kamman, G.K. and Higgins, S., 2008, Annual hydrologic/geomorphic monitoring, Vaquero Farms wetlands mitigation, Vineyards at Marsh Creek (Blackhawk 4)/EDAW Project No. 07015005.01. Prepared for EDAW Natural Resources (Sacramento), December 19, 20p.

Lapine, S. and Kamman, G.R., 2008. Hydrologic and Hydraulic Analysis, Saenger Property. Prepared for Paul Saenger, December 7, 5p.

Lapine, S. and Kamman, G.R., 2008, Lower West Creek drainage improvement assessment. Prepared for Marin County Department of Public Works, Flood Control, November 5, 4p.

Kamman, G.R., 2008. Memorandum from KHE to Mark Frey; Subject: NIKE Swale/Landfill 8 Shallow Subsurface Investigation. November 3.

Kamman, G.R., 2008, Reduced Flooding Pressure Resulting from Proposed Greenway Project. Prepared for Jeannette Hook (City of Yreka), August 26, 11p.

Kamman, G.R., 2008, Technical Assistance in Development of Year 3 Monitoring Report. Prepared for: Jason Brodersen, P.G., Program Manager, Tetra Tech EM Inc., August 20, 11p.

Kamman, R., Kamman, G.R., Higgins, S., and May, L, 2008, Summary of Headland Institute (HI) Stream Corridor Enhancement Design Components. Prepared for: The Headlands Institute Restoration Design Team, May 28, 36p.

Kamman, R., Kamman, G.R., Higgins, S., and May, L, 2008, Summary of Site Conditions for the Headland Institute (HI) Stream Corridor and Watershed. Prepared for: The Headlands Institute Restoration Design Team, May 5, 37p.

Kamman, G.R., 2008, Annual geomorphic monitoring of San Francisquito Creek channel, Sand Hill Road Bridge and former golf cart crossing, Stanford University, Santa Clara County, CA. Prepared for Olberding Environmental Inc., January 30, 37p.

Kamman, G.K. and Higgins, S., 2007, Annual hydrologic/geomorphic monitoring, Vaquero Farms wetlands mitigation, Vineyards at Marsh Creek (Blackhawk 4)/EDAW Project No. 07015005.01. Prepared for EDAW Natural Resources (Sacramento), December 17, 17p.

Kamman, G.R., 2007, Independent Model Review for Klamath Settlement Negotiations Klamath Independent Review Project (KIRP). Prepared for Erica Terrence and Anna Schulz, Northcoast Environmental Center, November 9, 19p.

Kamman, G.R., and Higgins, S., 2007, Results of subsurface investigation: Dragon Fly Creek. Prepared for The Presidio Trust, November 9, 12p.

Kamman, G.R., 2007, Chapter 3: Alternatives and Chapter 4.3: Water Resources, in: The Presidio Trust, 2007, Environmental Assessment for Tennessee Hollow Upper Watershed Revitalization Project, August, 149p.

Kamman, G.R., 2007, Mori Point trail planning and restoration project, wetland pond final designs. Prepared for Golden Gate Parks Conservancy, July 23, 34p.

Kamman, G.R., 2007, Chapter 2: Hydrological Considerations in: Nautilus Environmental (eds.), Brown & Caldwell, Foothill Associates, KHE, and Stoecker Ecological, 2007, Feasibility Study on the Reuse of Ojai Valley Sanitary District Effluent - DRAFT Final Facilities Planning Report, prepared for City of Buenaventura, Public Works Department, July 10, 148p.

Kamman, G.R., 2007, Mori Point wetland ponds - preliminary designs. Prepared for Golden Gate Parks Conservancy, June 19, 6p.

Kamman, G.R., and Higgins, S., 2007. Santa Clara River Estuary water budget and salinity assessment. Prepared for Nautilus Environmental LLC and The City of Buenaventura, April 30, 11p.

Kamman, G.R. and Kamman R.Z., 2007, Feasibility and design report of Bear Valley Creek watershed enhancement and fishery restoration project. Prepared for Point Reyes National Seashore Association and National Park Service, March, 325p.

Kamman, G.R., Kamman R.Z., and Beahan, C., 2007, Design report for lower Redwood Creek floodplain and salmonid habitat restoration at the Banducci site, Golden Gate National Recreation Area, Marin County, CA. Prepared for Golden Gate Parks Conservancy and National Park Service, February 28, 105p.

Kamman, G.R., 2007, Pilarcitos Creek Bank Stabilization Project, Pilarcitos Creek, San Mateo County, California. Prepared for TRC-Essex, January 22, 8p.

Kamman, G.R., 2007, Annual geomorphic monitoring of San Francisquito Creek channel, Sand Hill Road Bridge and former golf cart crossing, Stanford University, Santa Clara County, CA. Prepared for Olberding Environmental Inc., January 2, 29p.

Kamman, G.R. and Beahan, C., 2006, Annual geomorphic monitoring of Arroyo Mocho channel - WY2006, Wente Street Bridge, Livermore, CA. Prepared for Sycamore Associates, LLC, December 14, 13p.

Kamman, G.K. and Higgins, S., 2007, Hydraulic analysis for final design, Vaquero Farms Wetland Mitigation Project. Prepared for Sycamore Associates, LLC, July 11, 8p.

Kamman, G.R. and Lapine, S., 2006, West Creek drainage improvement assessment, Tiburon, CA. Prepared for Marin County Department of Public Works, Flood Control and Water Conservation District, July, 44p.

Kamman G.K. and Kamman, R.Z., 2006, Larkspur Creek bank stabilization, floodplain expansion and riparian revegetation project, Schaefer Parcel (Lark Creek Inn - parcel no. 021-104-34. Prepared for Department of Public Works, City of Larkspur, CA, June 1, 11p.

Kamman, G.R., 2006. Hydrologic Feasibility Assessment Report for the Tennessee Hollow Watershed Project, The Presidio of San Francisco. Prepared for: The Presidio Trust, with assistance from Colby Groundwater Consulting, May, 52p.

Kamman, G.R., 2006. Piezometer installation and monitoring Fill Site 6A, The Presidio of San Francisco. Prepared for The Presidio Trust, April 14, 20p.

Kamman, G.R., and Kamman, R.Z., 2006, Data Synthesis and Hydrodynamic Model Development Feasibility Report, Pescadero Lagoon, San Mateo County, California. Technical letter report prepared for California Coastal Commission, April 13, 18p.

Kamman, G.R., 2006, Leona Mines Closure - Conceptual Creek Design. Prepared for Peters & Ross, February 5, 15p.

Kamman, G.R. and Rios, T., 2005, Annual geomorphic monitoring of San Francisquito Creek channel, Sand Hill Road Bridge and former golf cart crossing, Stanford University, Santa Clara County, CA. Prepared for Olberding Environmental Inc., December 12, 20p.

Kamman, G.R., 2005, Preliminary hydrologic assessment, Mori Point Trail Planning and Restoration Project. Prepared for Golden Gate Parks Conservancy, October 14, 8p.

Kamman, G.R. and Rios, T., 2005, Annual geomorphic monitoring of Arroyo Mocho channel, Wente Street Bridge, Livermore, CA. Prepared for Sycamore Associates, LLC, November 11, 11p.

Kamman, G.R., 2005, Hydrology and water quality assessment report, Coastal Trail planning at Land's End, San Francisco, CA. Prepared for Golden Gate Parks Conservancy, August, 24p.

Kamman, G.R., 2005, Technical letter report - groundwater impact assessment, January 2005 Settlement Agreement, Lundy Hydroelectric Project (FERC No. 1390). Prepared for Lundy Mutual Water Company, May 6, 9p.

Kamman, G.R., Gragg, J., and Kamman R.Z., 2005. Hydrology & Coastal Lagoon Assessment: Environmental Study of the Santa Clara River Estuary. Prepared for Nautilus Environmental LLC and The City of Buenaventura, March, 52p.

Kamman, G.R. and Rios, T., 2005. Fiscalini Bank Stabilization Hydraulic Analysis and Preliminary Design Evaluation Report. Prepared for The California Coastal Conservancy and Greenspace-The Cambria Land Trust, February, 27p.

Kamman, G.R. and Rios, T., 2004, Survey and Hydraulic Analysis of St. Johns Property Project, Temescal Creek, Oakland, CA. Prepared for: Wolfe Mason Associates/Design Community & Environment, December 27, 13p.

Kamman, G.R. and Kamman R.Z., 2004, Gallinas Creek Restoration Feasibility Study and Conceptual Design Report, Marin County, California. Prepared for: San Pablo Bay Watershed Restoration Program Partners (US Army Corps of Engineers, San Francisco District and California Coastal Conservancy), in cooperation with: The Friends of Gallinas Creek., The Bay Institute, and Marin County Stormwater Pollution Prevention Program, December, 47p.

Kamman, G.R. and Rios, T., 2004. Hydrologic Feasibility Analysis for the Tolay Lake Ranch Property, Sonoma County, California. Prepared for: Sonoma County Agricultural Preservation & Open Space District, December, 96p.

Kamman, G.R. and Rios, T., 2004, Annual geomorphic monitoring of Arroyo Mocho channel, Wente Street Bridge, Livermore, CA. Prepared for Sycamore Associates, LLC, November 17, 10p.

Ecorp Consulting, Inc. and Kamman Hydrology & Engineering, Inc., 2004, Draft Gualala Estuary and Lower River Enhancement Plan: Results of 2002 and 2003 Physical and Biological Surveys. Prepared for: Sotoyome Resource Conservation District and California Coastal Conservancy, June 10.

Kamman, G.R., 2003, Annual geomorphic monitoring of Arroyo Mocho channel, Wente Street Bridge, Livermore, CA. Prepared for Sycamore Associates, LLC, December 23, 10p.

Kamman, G.R., 2003, Hydrologic Analyses - Technical Letter Report, Reach B-2 Pond, Sycamore Grove Park, Livermore, CA. Prepared for Livermore Area Recreation and Parks Department, December 4, 13p.

Kamman, G.R., 2003, Hydrologic assessment of wetland mitigation and monitoring plan, Metcalf Road Property, San Jose, CA. Prepared for: Sycamore Associates, LLC, November 21, 21p.

Kamman R.Z. and Kamman, G.R., 2003, Review of flood hazard analysis for Easkoot Creek Project, Stinson Beach, CA. Prepared for Golden Gate National Recreation Area, National Park Service, September 10, 1p.

Kamman, G.R., 2003, Redwood Creek levee analysis, Lower Redwood Creek, Orick, CA. Prepared for Humboldt County Department of Public Works, July 28, 15p.

Kamman, G.R., 2003. 3rd iteration of preliminary grading plan for Fill Site 6, Tennessee Hollow Riparian Corridor Restoration Project, The Presidio of San Francisco. Prepared for The Presidio Trust, March 25, 10p.

Kamman, G.R., 2003. Draft Interim Hydrologic Monitoring Report for the Tennessee Hollow Riparian Corridor Restoration Project, the Presidio of San Francisco. Prepared for The Presidio Trust, March, 110p.

Kamman, G.R. and McBain & Trush, Inc., 2002, Chapter 4: Shallow Groundwater Hydrology. In: McBain & Trush, Inc. (eds.), 2002. *San Joaquin River Restoration Study Background Report*, prepared for Friant Water Users Authority, Lindsay, CA, and Natural Resources Defense Council, San Francisco, CA, December,

Kamman, G.R., 2002. Conceptual Watershed Model and proposed surface- and ground-water monitoring program for the Tennessee Hollow Riparian Corridor Restoration Project, The Presidio of San Francisco. Prepared for The Presidio Trust, July, 77p.

Kamman, G.R., 2002. Hydraulic Assessment of Proposed Channel Modifications: Iron Horse Trail Concord, CA. Prepared for: The East Bay Regional Park District, January 2002, 12p.

Kamman, G.R. and Kamman, R.Z., 2001, Final revised tidal marsh designs, Cargill-Eden Landing Ecological Preserve, Hayward, CA. Prepared for: East Bay Regional Park District, September 7, 4p., with plates.

Kamman, G.R., Kamman, R.Z., and Granholm, S., 2001, Final conceptual seasonal wetland design, Damon Slough Mitigation Site, Oakland, CA. Prepared for: Port of Oakland, June 14, 37p.

Kamman, G.K., 2001, Salt Panne/Snowy Plover Management Area, Eden Landing Ecological Reserve Restoration and Management Plan, Hayward, CA. Prepared for: East Bay Regional Park District, April 18, 5p.

Kamman, G.R. and Kamman, R.Z., 2001, Hydrologic evaluation of final design for the Bay Point Regional Shoreline wetland restoration plan, Bay Point, CA. Prepared for: LSA and East Bay Regional Park District, April, 33p.

Kamman, G.R., 2001. Draft Comments: 100-year flood estimate on Upper Trinity River. Prepared for Trinity County Planning Department, February 9, 8p.

Kamman, R.Z. and Kamman, G.K., 2000, Tidal exchange analysis of tidal channel geometry, Cargill-Eden Landing Ecological Preserve, Hayward, CA. Prepared for: East Bay Regional Park District and Far West Restoration Engineering, November 1, 11p.

Kamman, G.R., 2000, Preliminary hydrologic sufficiency analysis for proposed California tiger salamander (CTS) pond, Bosley Property, Livermore, CA. Prepared for: Sycamore Associates, LLC, May 24, 7p.

Kamman, G.R. and Kamman, R.Z., 2000, Hydrologic analysis for the Bay Point Regional Shoreline wetland restoration plan, Bay Point, CA. Prepared for: LSA and East Bay Regional Park District, March, 47p.

Kamman, G.R., 2000, Hydrologic analyses for creek restoration design: Heather Farms Project Site, Walnut Creek, CA. Prepared for: Sycamore Associates, LLC, January, 33p.

Kamman, G.R., 2000, Hydrologic Analysis, Conway Ranch Water Rights, Mill Creek, Mono County, CA. Prepared for: Don Mooney Esq., January 28, 21p.

Kamman, G.R., 1999, Flood damage assessment of proposed Trinity River fish and wildlife restoration flow alternatives. Prepared for: Trinity County Planning Department, September, 19p.

Kamman, G.R., and Stokely, T., 1999, Trinity Dam auxiliary oputlet releases. Prepared for: Trinity County Planning Department, Agreement No. TFG 94-04, September 24, 4p.

Kamman, G.R., 1999, Addendum to Temperature analysis of proposed Trinity River fish and wildlife restoration flow alternatives using the BETTER model: cumulative effects analyses. Prepared for: Trinity County Planning Department, Agreement No. TFG 94-04, September, 7p.

Kamman, G.R., 1999, Temperature analysis of proposed Trinity River fish and wildlife restoration flow alternatives using the BETTER model. Prepared for: Trinity County Planning Department, Agreement No. TFG 94-04, June, 31p.

Kamman, G.R., 1999, Stormwater runoff hydrology and channel stability report: The Ranch on Silver Creek Project, San Jose, CA. Prepared for: Sycamore Associates, LLC, May, 21p + appendices.

Kamman, G.R., 1999, Baseline water quality and hydrology investigation: The Ranch on Silver Creek Project, San Jose, CA. Prepared for: Sycamore Associates, LLC, May, 28p.

Kamman, G.R., 1999, Slope stabilization at Wallabi Ct., Las Trampas Creek, Lafayette, CA. Prepared for: Sycamore Associates, LLC, April 5, 8p.

Kamman, G.R., 1999, Draft report on causation 1997 West Walker River flood damage to Mt. Gate Lodge, Mono County, CA. Prepared for: Lou deBottari, January 18, 16p.

Kamman, G.R., 1998, Hydrologic and hydraulic review of Temescal Creek Bridge repairs, 145 Duncan Way, Oakland, CA. Prepared for: Vince Aitro, December 31, 10p.

Kamman, G.R., 1998, Final summary of site visits and recommendations for bank stabilization, San Ramon Creek, South San Ramon Creek and associated tributaries, San Ramon, CA. Prepared for: City of San Ramon, Engineering, September 23, 12p.

Kamman, G.R., 1998, Hydrologic sufficiency and design considerations for proposed mitigation wetlands, Crystyl Ranch Drive, Contra Costa County, CA. Prepared for: Sycamore Associates, LLC, June, 19p.

Kamman, G.R., 1998, Carryover storage analysis, simulated (1928-1934) drought period. Prepared for Trinity County Planning Department, Agreement No. TFG 97-04, May 22, 1p.

Kamman, G.R., 1998, Draft carryover storage analysis results, maximized auxiliary bypass releases. Prepared for Trinity County Planning Department, Agreement No. TFG 97-04, May 21, 1p.

Kamman, G.R., 1998, Carryover storage analysis results, Maximum Flow, Flo Study, and No Action Alternatives. Prepared for Trinity County Planning Department, Agreement No. TFG 97-04, May 19, 3p.

Kamman, G.R., 1998, Carryover storage analysis results, Flow Study and No Action Alternatives. Prepared for Trinity County Planning Department, Agreement No. TFG 97-04, May 14, 3p.

Kamman, G.R., 1998, Carryover storage analysis results, Flow Study and No Action Alternatives. Prepared for Trinity County Planning Department, Agreement No. TFG 97-04, May 14, 3p.

Kamman, G.R. and Kamman, R.Z., 1997, Hamilton Base Realignment and Closure Wetland Conversion Alternative: Landfill 26 Groundwater Assessment. Prepared on behalf of PWA, Ltd. for IT Corporation and San Francisco District Corps of Engineers, October, 16p.

Kamman, G.R., 1997, Small community flood information study report for five Salinas River communities, Tembladero Slough study area. Prepared for: Phillip Williams & Associates, Ltd., on behalf of San Francisco District Corps of Engineers, September 30, 51p.

Kamman, G.R., 1997, Hydraulic estimates for San Ramon Creek bank stabilization, Crow Canyon Gardens, San Ramon. Prepared for: ENGEO and Sycamore Associates, LLC, September, 5p.

Kamman, G.R., 1997, Natural vs. regulated flow and temperature conditions on the Upper Eel River, California – Lake Pillsbury to Outlet Creek. Prepared for: California Trout, August 23, 103p.

Kamman, G.R., 1997, Theoretical temperature modeling – Upper Klamath Lake Area, Oregon. Prepared for: Phillip Williams & Associates, Ltd., March 10, 18p.

Kamman, G.R. and Hecht, B., 1997, Hydrology and Water Supplies at the Marin Coast Ranch, Marin County, California. Prepared for The Brenner Group, San Rafael, CA, March, 33p.

Kamman, G.R., 1996, Flow of the Mojave River for Water Year 1995, Victorville Narrows, California. Prepared for James C. Hanson Engineers, Sacramento, California, June, 9p.

Hanson, K.L., Coopersmith, K.J., Angell, M.M., Crampton, T.A., Wood, T.F., Kamman, G.R., Baldwin, F., Peregoy, W., and McVicar, T., 1996, Evaluation of the Capability of Inferred Faults in the Vicinity of Building 371, Rocky Flats Environmental Technology Site, Colorado.

Kamman, G.R., 1996, Progress Report: Flow of the Mojave River for Water Year 1995, Victorville Narrows, California. Prepared for: James C. Hanson Engineers, Sacramento, California, June.

Kamman, G.R., Hecht, B., and Owens, J., 1996, Hydrologic Assessment: Seminary Creek Restoration Project - 1996. Prepared for East Bay Asian Local Development Corporation, Oakland, California, June, 5p.

Kamman, G.R. and Hecht, B., 1996, Assessment of Fishway Effects on Water Production from the Los

Trancos Diversion, Stanford University, California. Prepared for Stanford University, May, 21p.

Kamman, G.R. and Hecht, B., 1996, Results of Baseline Hydrologic Investigation and Modifications to Recharge Mitigation Measures, Proposed Harbor View Development, Bodega Bay, California. Prepared for Redwood Development, Santa Rosa, California, May, 19p.

Kamman, G.R., Hecht, B., and Owens, J., 1996. Webb Ranch Bridge Hydrology Assessment. Prepared for Stanford Land Company, Menlo Park, California, April, 13p.

Hecht, B. and Kamman, G.R., 1996, Initial Assessment of Pre- and Post-Klamath Project Hydrology of the Klamath River and Impacts of the Project on In-stream Flows and Fishery Habitat. Prepared on behalf of The Yurok Tribe, March, 39p.

Kamman, G.R. and Hecht, B., 1996, Report of Hydrologic Investigation Results, Proposed Veterans Home Golf Course, Yountville, California. Prepared for Reynolds and Brown, Concord, California, January, 11p.

Kamman, G.R., 1995, Changes in Surface Water Salinity as a Function of Natural Wet and Dry Cycles - Santa Ynez River Basin. Prepared for the City of Santa Barbara, Santa Barbara, California, December, 8p.

Kamman, G.R. and Hecht, B., 1995, Daily and Peak Flow Records Measured at the San Geronimo Creek Gage during WY 1995. Prepared for: Marin Municipal Water District, Corte Madera, California, October.

Kamman, G.R., 1995, Daily and Peak Flow Records Measured at the San Geronimo Creek Gage during WY 1994. Prepared for: Marin Municipal Water District, Corte Madera, California, September.

Kamman, G.R. and Hecht, B., 1995, Interim Ground Water Monitoring Program: Sisquoc Plant and Vicinity, Santa Barbara County, California. Prepared for: SP Milling Company, Oxnard, California, July.

Kamman, G.R. and Hecht, B., 1995, Results of Hydrologic Investigation, Highland Ranch, Sonoma County, California. Prepared for: Robert Yahng, Baker and McKenzie, San Francisco, California, June, 8p.

Kamman, G.R., and Ramirez, T., 1994, Evaluation of Gravel Retainment Structures and Placement of Salmon Spawning Gravel in the Merced River below the Crocker-Huffman Dam. Prepared for Center for Environmental Design Research, University of California, Berkeley, California, May, 14p.

Kamman, G.R. and Hecht, B., 1995, Assessment of Fishway Effects on Water Production from the Los Trancos Diversion, Stanford University, California. Prepared for: Stanford University, May.

Kamman, G.R. and Johnson, K.A., 1994, Phase II Site Investigation Results, 1515 Industrial Way, Belmont, California. Prepared for: General Instrument Corporation, Parsippany, New Jersey, November.

Kamman, G.R. and Zemo, D.A., 1994, Ground Water Investigation Work Plan, Clark's Home and Garden, Hayward, California," prepared for: Mr. Chester Clark, Grants Pass, Oregon, April.

Kamman, G.R. and Graf, T., 1994, Results of Site Investigation, Quan's Automotive Service, Oakland, California. Prepared for: Alameda County Health Care Services Agency, Oakland, California, March.

Kamman, G.R., Rowles, L.D. and Bice, N.T., 1994, Addendum to Phase V Investigation Report, 234 East Main Street and Vicinity, Ontario, California. Prepared for: General Electric Company, San Francisco, California, February.

Kamman, G.R. and Goodin, S.E., 1994, Proposal for Underground Tank Site Remediation Testing and Management Services. Prepared for: California Fairs Financing Authority, Sacramento, California.

Kamman, G.R., Zemo, D.T., Bice, N.T., and Rafferty, M.T., 1993, Results of Phase I Activities and Phase II Work Plan for On-Site Soil Remediation, Former McKesson Facility, Santa Fe Springs, California. Prepared for: McKesson Corporation, San Francisco, California, November.

Kamman, G.R. and Goodin, S.E., 1993, Soil Investigation for Proposed Freeway Alignment, Parcels A, B, and C, Oakland Post Office, Oakland, California. Prepared for: California Department of Transportation, Oakland, California, September.

Kamman, G.R., Zemo, D.T., and Bice, N.T., 1993, Phase I On-Site Soil Remediation Work Plan, Former McKesson Facility, Santa Fe Springs, California. Prepared for: McKesson Corporation, San Francisco, California, June 1993 (with D.A. Zemo and N.T. Bice).

Kamman, G.R. and Rowles, L.D., 1994, Quarterly Ground Water Monitoring Reports, 234 East Main Street and Vicinity, Ontario, California. Prepared for: General Electric Company, San Francisco, California, March.

Kamman, G.R., Rowles, L.D., Foote, G.R., and Bice, N.T., 1993, Phase V Investigation Report, 234 East Main Street and Vicinity, Ontario, California. Prepared for: General Electric Company, San Francisco, California, January.

Kamman, G.R., Warner, S.D., and Goodin, S.E., 1992, Environmental Site Assessment Report, 215 Leo Avenue, San Jose, California. Prepared for: Redtree Properties, San Francisco, California, December.

Kamman, G.R. and Hall, N.T., 1992, Paleoseismic Investigations of the San Andreas Fault on the San Francisco Peninsula," NEHRP proposal to US Geological Survey, May.

Kamman, G.R., McDonald, S. and North, R., 1990, Presentation of Phase III Sampling Results and Partial Soil Cleanup Plan and Additional Ground Water Investigation for Paulsboro Packaging, Inc., ECRA Case No. 86826. Prepared for: Paulsboro Packaging, Inc., Paulsboro, New Jersey, December.

Kamman, G.R. and Fusillo, T., 1990, Addendum Report on the Results of Environmental Sampling at Tax Blocks S-6: Lots 90, 92, and 93, West Windsor, New Jersey, Prepared for: Matrix Development Group, Inc., Cranbury, New Jersey, June.

Kamman, G.R. and Stone, B., 1990, Results Report and Phase II Sampling Plan for the Courier-News, Bridgewater, New Jersey, ECRA Case No. 90029. Prepared for: The Courier News, Bridgewater, New Jersey, May.

Kamman, G.R. and Fusillo, T., 1990, Results of Soil, Sediment, and Ground Water Sampling at Tax Block S-6: Lots 90, 92, and 93 in West Windsor, New Jersey. Prepared for: Matrix Development Group, Inc., Cranbury, New Jersey, April.

Kamman, G.R. and Fusillo, T. 1989, Proposed Sampling Plan for University Square Associates Property, West Windsor Township, Mercer County. Prepared for: Matrix Development Group, Inc., Cranbury, New Jersey, December.

Kamman, G.R., 1989, Clay diagenesis of the Monterey Formation and relationship to burial history: Point Arena and Salinas Basins, California. M.S. thesis, Miami University, Oxford, OH, April, 147p.

2.0 DECLARATIONS, DEPOSITIONS & CEQA REVIEW COMMENTS

Kamman, G.R., 2017, Review of Sonoma Agenda Item Summary Report for Appeal Hearing, Knights Bridge Winery, PRMD file #: UPE 13-0046, 17134 Spencer Lane, Calistoga, CA. Prepared for: Maacama Watershed Alliance (MWA) and Friends of Spencer Lane, August 21, 30p.

Kamman, G.R., 2017, Review Comments: PAD and SD1, FERC Relicensing of Potter Valley Project (PVP). Professional declaration prepared for: Friends of Eel River, July 31, 8p.

Kamman, G.R., 2017, Review of Revised Draft EIR (RDEIR) Davidon/Scott Ranch GPA, Rezoning, and Vesting Tentative Map Project, Petaluma, California. Prepared for: Shute, Mihaly & Weinberger LLP, June 12, 11p.

Kamman, G.R., 2017, Review Comments, Draft Environmental Impact Report, Fish Habitat Flow and Water Rights Project. Professional declaration prepared for: Friends of Eel River, March 8, 18p.

Kamman, G.R., 2016, Review of Draft General Waste Discharge Requirements for Vineyard Dischargers in the Napa River and Sonoma Creek Watersheds. Prepared for: Law Offices of Thomas N. Lippe APC, December 12, 4p.

Kamman, G.R., 2016, Review of County Appeal Hearing Video from November 22, 2016, Walt Ranch Erosion Control Plan (P11-00205-ECPA), Walt Ranch Project, Napa, CA. Professional Declaration Prepared for: Law Offices of Thomas N. Lippe APC, November 28, 3 p.

Kamman, G.R., 2016, Review of Final EIR, Walt Ranch Erosion Control Plan (P11-00205-ECPA), Walt Ranch Project, Napa, CA. Professional Declaration Prepared for: Law Offices of Thomas N. Lippe APC, November 20, 15 p.

Kamman, G.R., 2016, Effect of Vineyard Drainage Elements on Modeled Peak Runoff, Walt Ranch Erosion Control Plan (P11-00205-ECPA), Walt Ranch Project, Napa, CA. Professional Declaration Prepared for: Law Offices of Thomas N. Lippe APC, November 17, 8 p.

Kamman, G.R., 2016, Review of Revised Mitigated Negative Declaration Knights Bridge Winery, PRMD file #: UPE 13-0046, 17134 Spencer Lane, Calistoga, CA. Prepared for: Maacama Watershed Alliance (MWA) and Friends of Spencer Lane, October 27, 50p.

Kamman, G.R., 2016, Review of Middle Green Valley Specific Plan Project, Second Revised Recirculated Draft Environmental Impact Report, Solano County, CA, Sch# 2009062048. Professional Declaration Prepared for: Law Offices of Amber Kemble, October 25, 3p.

Kamman, G.R., 2016, Review of Initial Study and Negative Declaration Mountain Peak Winery: Use Permit #P13-00320-UP, 3265 Soda Canyon Road, Napa, CA 94558 (APN: 032-500-033). Prepared for: The Soda Canyon Group, October 11, 15p.

Kamman, G.R., 2016, Hydrologic and Water Quality Issues Associated with Proposed Golden Bridges School Project at 203 Cotter Street, San Francisco, CA. Prepared for: Neighbors of Cotter Street, September 19, 15p.

Kamman, G.R., 2016, Review of Mitigated Negative Declaration Knights Bridge Winery, PRMD file #: UPE 13-0046, 17134 Spencer Lane, Calistoga, CA. Prepared for: Maacama Watershed Alliance (MWA) and Friends of Spencer Lane, September 16, 6p.

Kamman, G.R., 2016, Review of Draft EIR for General Waste Discharge Requirements for Vineyard Dischargers in the Napa River and Sonoma Creek Watersheds. Prepared for: Law Offices of Thomas N. Lippe APC, September 14, 81p.

Kamman, G.R., 2016, Landslide Hazard Assessment, Walt Ranch Erosion Control Plan (P11-00205-ECPA), Walt Ranch Project, Napa, CA. Professional Declaration Prepared for: Law Offices of Thomas N. Lippe APC, August 26, 45 p.

Kamman, G.R., 2016, Review of Approved Erosion Control Plan (P14-00069-ECPA), Kongsgaard Wine LLC – Atlas Peak Vineyard Conversion, Napa, CA. Professional Declaration Prepared for: Law Offices of Thomas N. Lippe APC, March 14, 8p.

Kamman, G.R., 2016, Second Declaration of Greg Kamman Plaintiff's Joint Motion for Preliminary Injunction, Prepared for Center for Biological Diversity (Plaintiff) v. U.S. Bureau of Reclamation, Case No. 6:16-cv-00035-TC (Recovery for Oregon Spotted Frog, Upper Deschutes Basin, Oregon) , March 11, 11p.

Kamman, G.R., 2016, Declaration of Greg Kamman Plaintiff's Joint Motion for Preliminary Injunction, Prepared for Center for Biological Diversity (Plaintiff) v. U.S. Bureau of Reclamation, Case No. 6:16-cv-00035-TC (Recovery for Oregon Spotted Frog, Upper Deschutes Basin, Oregon) , February 4, 8p.

Kamman, G.R., 2016, Review of Final, Recirculated and Draft Environmental Impact Reports, Corte Madera Inn Rebuild Project, Marin County, California. Prepared for: Community Venture Partners, February 4, 9p.

Kamman, G.R., 2016, Review of Response to Public Comments by Richard C. Slade & Associates LLC, Mountain Peak Winery: Use Permit #P13-00320, 3265 Soda Canyon Road, Napa, CA 94558 (APN: 032-500-033). Prepared for: The Soda Canyon Group, January 30, 298p.

Kamman, G.R., 2015, Review of Timber Harvest Plan (THP) 1-15-042 SON (Gualala Redwoods Inc. "Dogwood" THP). Professional Declaration Prepared for: Law Offices of Paul Carrol and Friends of the Gualala River, December 24, 4p.

Kamman, G.R., 2015, Declaration of Greg Kamman in Opposition to Affirmative Defense Regarding Mootness, Prepared for Paul Carroll, Attorney at Law and Center for Biological Diversity (Petitioners) v. County of Sonoma, Agricultural Commissioner of Sonoma County and (Respondents) Ohlson Ranch, September 9, 10p.

Kamman, G.R., 2015, Review of Timber Harvest Plan (THP) 1-15-042 SON (Gualala Redwoods Inc. "Dogwood" THP) and THP 1-15-033 SON (Gualala Redwoods Inc. "Apple" THP). Professional Declaration Prepared for: Law Offices of Paul Carrol and Friends of the Gualala River, August 6, 8p.

Kamman, G.R., 2015, Sharp Park Project Impacts to Laguna Salada. Prepared for National Parks Conservation Association and Wild Equity Institute, April 14, 1p.

Kamman, G.R., 2014, Review of Draft EIR, Walt Ranch Project, Napa, CA. Professional Declaration Prepared for: Lippe Gaffney Wagner LLP, November 20, 15 p.

Kamman, G.R., 2014, Review of Technical Reports Sonoma County Discretionary Development Permit Application #UPE 13-00046, Proposed Knights Bridge Winery, 18260 Hwy 128, Calistoga, CA 94515. Professional Declaration Prepared for: Maacama Watershed Alliance, October 27, 4p.

Kamman, G.R., 2014, Review of Middle Green Valley Specific Plan Project, Revised Recirculated Draft Environmental Impact Report, Solano County, CA, Sch# 2009062048. Professional Declaration Prepared for: Law Offices of Amber Kemble, August 11, 11p.

Kamman, G.R., 2014, Top of Bank Review, Finger Avenue Planned Development Project, Redwood City, CA. Professional Declaration Prepared for: Friends of Cordilleras Creek, July 14, 10 p.

Kamman, G.R., 2014, Hydrologic Technical Review of 1360 Big Rock Road Project St. Helena, California. Professional Declaration Prepared for: Lippe, Gaffney Wagner LLP, June 14, 5p.

Kamman, G.R., 2014, Review of IS/MND Kongsgaard Wine LLC – Atlas Peak Vineyard Conversion Agricultural Erosion Control Plan #P14-00069. Professional Declaration Prepared for: Law Offices of Thomas N. Lippe, APC, May 14, 9 p.

Kamman, G.R., 2013, Review of Middle Green Valley Specific Plan Project, Solano County, CA, Recirculated Draft EIR, Sch.# 2009062048. Professional Declaration Prepared for: Law Offices of Amber Kemble, October 10, 6p.

Kamman, G.R., 2013, Flow trend analysis, Williamson and Sprague River Basins. Prepared for: Yurok Tribe, July 22, 8p.

Kamman, G.R., 2014, Addendum to Hydrologic Technical Review of 1360 Big Rock Project, St. Helena, California.. Professional Declaration Prepared for: Lippe Gaffney Wagner, LLP, June 17, 2p.

Kamman, G.R., 2014, Hydrologic Technical Review of 1360 Big Rock Project, St. Helena, California. Professional Declaration Prepared for: Lippe Gaffney Wagner, LLP, June 14, 5 p.

Kamman, G.R., 2013, Proposed hydraulic analysis and design recommendations – landslide stabilization – creek cascade design element, Green Gulch Zen Center, Muir Beach, CA. Prepared for Green Gulch Zen Center, April 25, 4p.

Kamman, G.R., 2012, Deposition of Gregory Richard Kamman, R.G., C.H.G., Schaefer vs. City of Larkspur, CA, Superior Court of the State on California, County of Marin. August 23, 2012.

Kamman, G.R., 2012, Technical review comments to Biological Assessment, Sharp Park Safety, Infrastructure Improvement and Habitat Enhancement Project. Prepared for Wild Equity Institute, August 3, 11p.

Kamman, G.R., 2012, Proposed Hardy-based Environmental Water Allocation (EWA) Input for WRIMS Model Simulation, Klamath River Basin. Prepared for: Yurok Tribe, July 20, 5p.

Kamman, G.R., 2012, Review of Draft EIR, Hunter Subdivision Project, St. Helena, CA. Professional Declaration Prepared for: Law Offices of Thomas Lippe, July 10, 11p.

Kamman, G.R., 2012, Review of groundwater conditions and modeling report by S.S. Papadopulos & Associates, Inc., Scott Valley, California. Prepared for: Yurok Tribe, 4p.

Kamman, G.R., 2012, Review of Mitigated Negative Declaration, Ratna Ling Buddhist Retreat Master Plan, File No. PLP08-0021. Professional Declaration Prepared for: Law Offices of Paul Carrol and Friends of the Gualala River, April 4, 5p.

Kamman, G.R., 2011, Supplemental Declaration of Greg Kamman regarding Laguna Salada, Wild Equity Institute v. City and County of San Francisco, et al., Case No.: 3:11-CV-00958 SI, United States District Court, Northern District of California, San Francisco Division. Prepared for Wild Equity Institute, November 4, 50p.

Kamman, G.R., 2011, Declaration of Greg Kamman regarding Laguna Salada, Wild Equity Institute v. City and County of San Francisco, et al., Case No.: 3:11-CV-00958 SI, United States District Court, Northern District of California, San Francisco Division. Prepared for Wild Equity Institute, September 23, 7p.

Kamman, G.R., 2011, Preliminary Review of BBPUD Bay Flat Road Well Installation Project. Prepared for: Law Offices of Rose Zoia, July 10, 16p.

Kamman, G.R., 2010, Review of Sonoma County Water Agency NOP (issued 9/29/10) Fish Habitat Flow and Water Rights Project. Professional declaration prepared for: Friends of Eel River, November 8, 7p.

Kamman, G.R., 2009, Finger Avenue Nine-Lot Planned Development. Professional declaration prepared for Friends of Cordilleras Creek, October 26, 2p.

Kamman, G.R., 2009, Supplemental Technical Review of Henry Cornell Winery, 245 Wappo Road, Santa Rosa, CA APN 028-260-041. Prepared for Ms. Kimberly Burr, Esquire, June 1, 3p.

Kamman, G.R., 2009, San Rafael Airport Recreation Facility DEIR. Profession declaration prepared for Friends of Gallinas Creek, May 12, 3p.

Kamman, G.R., 2008, Technical Review of Henry Cornell Winery, 245 Wappo Road, Santa Rosa, CA APN 028-260-041. Prepared for Ms. Kimberly Burr, Esquire, November 12, 8p.

Kamman, G.R., 2007, Independent Model Review for Klamath Settlement Negotiations, Klamath Independent Review Project (KIRP). Prepared for Northcoast Environmental Center, November 9, 19p.

Kamman, G.R., 2007, Negative Declaration for File No. UPE04-0040, Gualala Instream. Professional declaration prepared for Friends of the Gualala River, October 21, 2p.

Kamman, G.R., 2007, Second Declaration on WRA and Balance Hydrologics, Inc. technical studies pertaining to wetland conditions at the Harbor View Development site, Bodega Bay, CA. September 20, 3p.

Kamman, G.R., 2007, Fairfax Conversion Project Environmental Impact Report (SCH# 2004082094). Professional declaration prepared for Friends of the Gualala River, July 27, 15p.

Kamman, G.R., 2007, Comments on WRA and Balance Hydrologics, Inc. technical studies pertaining to wetland conditions at the Harbor View Development site, Bodega Bay, CA. February 13, 4p.

Kamman, G.R., 2004, Evaluation of potential impacts on hydrology and water supply, THP No. 1-04-055 SON and Proposed Mitigated Negative Declaration TCP No. 04-533, Roessler/Zapar Inc. THP/Conversion, Annapolis, CA. Professional declaration prepared for Friends of the Gualala River, August 13, 11p.

Kamman, G.R., 2004, Evaluation of potential hydrologic effects, THP No. 1-04-059 SON and Proposed Mitigated Negative Declaration TCP No. 04-531, Sleepy Hollow (Martin) THP/Conversion, Annapolis, CA. Professional declaration prepared for Friends of the Gualala River, July 17, 9p.

Kamman, G.R., 2004, Robert Mondavi Properties Vineyard (Erosion Control Plan Application #99323). Professional declaration prepared for the Law Offices of Thomas N. Lippe, July 1, 5p.

Kamman, G.R., 2004, Pocket Canyon THP No. 1-020216 SON. Professional declaration prepared for Pocket Canyon Protection Group, March 8, 2p.

Kamman, G.R., 2003, Evaluation of potential hydrologic effects, Negative Declaration for THP/Vineyard Conversion, No. 1-01-171 SON, Artesa Vineyards, Annapolis, CA. Professional declaration prepared for Friends of the Gualala River, May 19, 9p.

Kamman, G.R., 1999, Review of Final Supplemental Environmental Assessment, Cirby-Linda-Dry Creek Flood Control Project. Professional declaration prepared for: Monty Hornbeck, Sunrise Office Park Owners Association; Bill Kopper/John Gabrielli, Attorneys at Law; and Sharon Cavello/Cathie Tritel, Placer Group Sierra Club, May 24, 10p.

Kamman, G.R., 1997, Review comments, Deer Creek Hills Draft EIR. Professional declaration prepared for: The Nature Conservancy, August 4, 6p.

Kamman, G.R., 1995, Variable Water Resources Available in the Area of Salinas, California. Declaration prepared for Price, Postal, and Parma, Santa Barbara, California, May, 6p.

3.0 PUBLICATIONS AND PRESENTATIONS

Kamman, G.R. and Kamman, R.Z., 2015, Landscape Scale Urban Creek Restoration in Marin County, CA - Urban Creek Restoration: Interfacing with the Community. 33rd Annual Salmonid Restoration Conference, March 11-14, Santa Rosa, CA.

Kamman, G.R., R.Z., 2015, Enhancing Channel and Floodplain Connectivity: Improving Salmonid Winter Habitat on Lagunitas Creek, Marin County, CA - Beyond the Thin Blue Line: Floodplain Processes, Habitat, and Importance to Salmonids. 33rd Annual Salmonid Restoration Conference, March 11-14, Santa Rosa, CA.

Kamman, G.R., 2012, The role of physical sciences in restoring ecosystems. November 7, Marin Science Seminar, San Rafael, CA.

King, N. and Kamman, G.R., 2012, Preferred Alternative for the Chicken Ranch Beach/Third Valley Creek Restoration Project. State of the Bay Conference 2012, Building Local Collaboration & Stewardship of the Tomales Bay Watershed. October 26, Presented by: Tomales Bay Watershed Council, Inverness Yacht Club, Inverness, CA.

King, N. and Kamman, G.R., 2010, Chicken Ranch Beach Restoration Planning by TBWC. State of the Bay Conference 2010, A Conference about Tomales Bay ant its Watershed. October 23, Presented by: Tomales Bay Watershed Council, Inverness Yacht Club, Inverness, CA.

Higgins, S. and Kamman, G.R., 2009, Historical changes in Creek, Capay Valley, CA. Poster presented at American Geophysical Union Fall Meeting 2009, Presentation No. EP21B-0602, December.

Kamman, G.R. and Higgins, S., 2009, Use of water-salinity budget models to estimate groundwater fluxes and assess future ecological conditions in hydrologically altered coastal lagoons. Coastal and Estuarine Research Federation 20th Biennial Conference, 1-5 November, Portland, OR

Bowen, M., Kamman, G.R., Kaye, R. and Keegan, T., 2007, Gualala River Estuary assessment and enhancement plan. Estuarine Research Federation, California Estuarine Research Society (CAERS) 2007 Annual Meeting, 18-20 March, Bodega Marine Lab (UC Davis), Bodega Bay, CA

Bowen, M. and Kamman, G.R., M., 2007, Salt River Estuary enhancement: enhancing the Eel River Estuary by restoring habitat and hydraulic connectivity to the Salt River. Salmonid Restoration Federation's 25th Salmonid Restoration Conference, 7-10 March, Santa Rosa, CA.

Magier, S., Baily, H., Kamman, G., and Pfeifer, D, 2005, Evaluation of ecological and hydrological conditions in the Santa Clara River Estuary with respect to discharge of treated effluent. In: Abstracts with Programs, The Society of Environmental Toxicology and Chemistry North America 26th Annual Meeting, 13-17 November, Baltimore Convention Center, Baltimore, Maryland.

Baily, H., Magier, S., Kamman, G., and Pfeifer, D, 2005, Evaluation of impacts and benefits associated with discharge of treated effluent to the Santa Clara River Estuary. In: Abstracts with Programs, The Society of Environmental Toxicology and Chemistry North America 26th Annual Meeting, 13-17 November, Baltimore Convention Center, Baltimore, Maryland.

Kamman, G.R., Kamman, R.Z., and Parsons, L., 2005, Hydrologic and Hydraulic Feasibility Assessments for Ecological Restoration: The Giacomini Wetland Restoration Project, Point Reyes National Seashore, CA. *In:* Abstracts with Programs, The Geological Society of America, 101st Annual

Cordilleran Section Meeting, Vol.37, No. 4, p. 104, Fairmont Hotel, April 29-May1, 2005, San Jose, CA.

Kamman, G.R., 2001. Modeling and its Role in the Klamath Basin – Lewiston Reservoir Modeling. Klamath Basin Fish & Water Management Symposium, Humboldt State University, Arcata, CA, May 22-25.

Kamman, G.R., 1998, Surface and ground water hydrology of the Salmon Creek watershed, Sonoma County, CA. Salmon Creek Watershed Day, May 30, Occidental, CA.

Kamman, G.R., 1998. The Use of Temperature Models in the Evaluation and Refinement of Proposed Trinity River Restoration Act Flow Alternatives. ASCE Wetlands Engineering and River Restoration Conference Proceedings, Denver, Colorado (March 22-23, 1998).

Hecht, B., and Kamman, G.R., 1997, Historical Changes in Seasonal Flows of the Klamath River Affecting Anadromous Fish Habitat. In: Abstracts with Programs Klamath Basin Restoration and Management Conference, March 1997, Yreka, California.

Hanson, K.L, Coppersmith, K.J., Angell, M., Crampton, T.A., Wood, T.F., Kamman, G., Badwan, F., Peregoy, W., and McVicar,T., 1995, Evaluation of the capability of inferred faults in the vicinity of Building 371, Rocky Flats Environmental Technology Site, Colorado, in Proceedings of the 5th DOE Phenomena Hazards Mitigation Conference, p. 185-194, 1995.

Kamman, G.R. and Mertz, K.A., 1989, Clay Diagenesis of the Monterey Formation: Point Arena and Salinas Basins, California. *In:* Abstracts with Programs, The Geological Society of America, 85th Annual Cordilleran Section Meeting, Spokane Convention Center, May 1989, Spokane, Washington, pp.99-100.

4.0 ENGINEERING DESIGNS AND SPECIFICATIONS

Kamman G.R., Kamman R.Z., Hayes, C., Lapine, S.L. and Fiori Geoscience, 2017, Lagunitas Creek Salmonid Winter Habitat Enhancement Plans, Marin County, CA., Project Sites 1-9: – Issued for Bid. Prepared for: Marin Municipal Water District, April 17, 25 sheets.

Kamman G.R., Kamman R.Z., Hayes, C., 2017, Mana Plain Wetland Restoration Plan, Mana, Kauai, Hawaii. Prepared for: State of Hawaii, Board of Land and Natural Resources, April 15, 18 sheets.

Kamman G.R., Kamman R.Z., and Hayes, C., 2017, Home Ranch Pond #2 and #9 Design, Point Reyes National Seashore. Prepared for: Jacobs Engineering, February 3, 5 sheets.

Kamman G.R. and Kamman R.Z., 2015, Plans for Construction of Conlon Avenue Parking Lot – 90% Design. Prepared for: Golden Gate National Recreation Area, Muir Woods National Monument, December 3, 10 sheets.

Kamman G.R. and Kamman R.Z., 2015, Plans for Construction of Conlon Avenue Parking Lot – 90% Design. Prepared for: Golden Gate National Recreation Area, Muir Woods National Monument, December 3, 10 sheets.

Kamman G.R. and Kamman R.Z., 2014, Plans for construction of Lower Miller Creek Channel Maintenance Project – 30% Design. Prepared for: Las Gallinas Valley Sanitary District, November, 11 sheets.

Kamman G.R., Lapine, S.L., and Hayes, C., 2014, Rheem Creek Wetland Restoration Design. Prepared for: Olberding Environmental, Inc., October 22, 1 sheet.

Kamman G.R., Kamman R.Z. and Lapine, S.L., 2014, East Arm Mountain Lake Wetland Restoration Plan, The Presidio of San Francisco, CA. Prepared for: The Presidio Trust, June 30, 11 sheets.

Kamman, G.R., 2014, John West Fork Fish Passage Repair Project. Prepared for: Point Reyes National Seashore, June, 6p.

Kamman G.R., Kamman R.Z., Lapine, S.L. and Oberkamper Associates Civil Engineers, Inc., 2014, YMCA Reach of Tennessee Hollow Creek Wetland Restoration Construction Documents, The Presidio of San Francisco, CA. Prepared for: The Presidio Trust, April, 15 sheets.

Kamman G.R., Kamman R.Z., and Oberkamper Associates Civil Engineers, Inc., 2014, Technical Specifications for YMCA Reach of Tennessee Hollow Creek Wetland Restoration, The Presidio of San Francisco, CA. Prepared for: The Presidio Trust, April, 133p.

Kamman G.R., and Kamman R.Z., 2014, Technical Specifications for East Arm Mountain Lake Wetland Restoration, The Presidio of San Francisco, CA. Prepared for: The Presidio Trust, March, 127p.

Kamman G.R., Kamman R.Z., Lapine, S.L., Oberkamper Associates Civil Engineers, Inc., and Roth LaMotte Landscape Architecture, 2014, MacArthur Meadow Wetland Restoration Plan, The Presidio of San Francisco, CA – 30% Design. Prepared for: The Presidio Trust, March 10, 12 sheets.

Kamman G.R., 2013, Suisun Creek Preserved Mitigation Wetland, Solano County, CA. Prepared for: Las Gallinas Valley Sanitary District, November, 11 sheets.

Kamman G.R., Kamman R.Z. and Lapine, S.L., 2013, Cayatano Creek Preserve Mitigation Wetland, Livermore Area, Alameda and Contra Costa Counties, CA – 50% Design. Prepared for: Grizzly Bay LLC., July 16, 2 sheets.

Miller Pacific Engineering Group and Kamman, G.R., 2013, Landslide stabilization retaining wall and rip-rap cascade, Green Gulch Zen Center, Muir Beach, CA. Prepared for: Green Gulch Zen Center, July, 8 sheets.

Kamman G.R., Kamman R.Z. and Lapine, S.L., 2013, Kellogg Creek and Deer Valley East Restoration Project, Contra Costa County, CA. Prepared for: Contra Costa Water District, June, 15 sheets.

Kamman G.R. and Kamman R.Z., 2013, Technical Specifications for Kellogg Creek and Deer Valley East Restoration Project, Contra Costa County, CA. Prepared for: Contra Costa Water District, June, 91p.

Kamman, G.R., 2012, John West Fork Repair Project, Point Reyes National Seashore, CA. Prepared for: National Park Service, December, 5 sheets.

Kamman G.R. and Lapine, S.L., 2012, Home Ranch Pond #9 Design, Point Reyes National Seashore, CA. Prepared for: Point Reyes National Seashore., October 24, 3 sheets.

Kamman G.R. and Lapine, S.L., 2012, G Ranch Wetland Swale near Abbott's Lagoon, Point Reyes National Seashore, CA. Prepared for: Point Reyes National Seashore., October 3, 3 sheets.

Kamman G.R. and Lapine, S.L., 2012, Eagle Ridge Preserve Property Wetland Design, Livermore Area, Contra Costa and Alameda Counties, CA. Prepared for: Olberding Environmental, Inc., August 31, 2 sheets.

Kamman G.R., 2012, Bear Valley Trail Upper Culvert Replacement and Bank Repair, Point Reyes National Seashore, CA. Prepared for: Point Reyes National Seashore, April, 8 sheets.

Kamman R.Z., Kamman G.R., and Lapine, S., 2012, Salt River Ecosystem Restoration Project, Riverside Ranch Tidal Marsh Restoration Plans, Phase 1 Construction. Prepared for Humboldt County RCD, April, 24 sheets.

Kamman R.Z., Kamman G.R., and Lapine, S., 2012, Technical Specifications for the Salt River Ecosystem Restoration Project, Phase 1 Construction, Riverside Ranch and Salt River Restoration Plans. Prepared for Humboldt County RCD, February, 163p.

Kamman, G.R., Kamman, R.Z., Higgins, S. and Lapine, S., 2010, Las Gallinas Valley Sanitary District (LGVSD) - Miller Creek Sanitary Sewer Easement Restoration (100% construction drawings), San Rafael, California. Prepared for LGVSD, September 1, 8 sheets.

Kamman, G.R., Kamman, R.Z., Higgins, S. and Lapine, S., 2010, Technical Specifications for Las Gallinas Valley Sanitary District (LGVSD) - Miller Creek Sanitary Sewer Easement Restoration, San Rafael, California. Prepared for LGVSD, September 1, 70p.

Kamman, G.R., Kamman, R.Z. and Lapine, S., 2010. Point Reyes National Seashore, Restore Critical Dune Habitat to Protect Threatened and Endangered Species, 100% construction drawings. Prepared for: Point Reyes National Seashore Association and National Park Service, June 1, 13 sheets.

Kamman, G.R. and Lapine, S., 2010. Former Reservoir Fill Site, Restoration at Muir Beach, Golden Gate National Recreation Area (100% Construction drawings). Prepared for Golden Gate National Parks Conservancy, May 12, 2 sheets.

Kamman, G.R. and Lapine, S., 2010. Alluvial Fan Fill Site, Restoration at Muir Beach, Golden Gate National Recreation Area (100% Construction drawings). Prepared for Golden Gate National Parks Conservancy, May 12, 2 sheets.

Kamman, G.R., Kamman, R.Z. and Lapine, S., 2010. Technical Specifications, Point Reyes National Seashore, Restore Critical Dune Habitat to Protect Threatened and Endangered Species, 100% plan set. Prepared for: Point Reyes National Seashore Association and National Park Service, June 1, 132p.

Kamman G.K. and Lapine, S., 2010, Dragonfly Creek Restoration Design, in: State of California, Department of Transportation, Project plans for construction on adjacent to State Highway in the City and County of San Francisco 0.3 mile south of Route 1/101 separation, March 25, 30 sheets.

Kamman G.R. and Lapine, S.L., 2009, Project Plans for Construction on Eastern Tributary of Tennessee Hollow Creek, The Presidio of San Francisco, CA. Prepared for: The Presidio Trust, on behalf of State of California, Department of Transportation., September 23,10 sheets.

Kamman, R.Z., Kamman G.K., and Beahan, C., 2008, 100% Design Drawings, Plans for construction of Vineyard Creek Channel Enhancement Project, from end of Arbor Circle to McClay Road, Project No. 2008-006. Prepared for Marin County Department of Public Works, Flood Control and Water Conservation District Zone 1 and City of Novato, CA, June, 28 sheets.

Kamman G.K., Kamman, R.Z., and Beahan, C., 2008, Contract documents including: notice to contractors, proposals, special provisions and contract documents for Vineyard Creek Channel Enhancement Project, from end of Arbor Circle to McClay Road, Novato California. Prepared for Marin County Department of Public Works, Flood Control and Water Conservation District Zone 1, June, 144p.

Kamman G.K. and Kamman, R.Z., 2008, Giacomini Wetland Restoration Project, Phase 2 (2008) Construction Drawings. Prepared for Golden Gate National Recreation Area and Point Reyes National Seashore, May, 33 sheets.

Kamman G.K., Kamman, R.Z., and Beahan, C., 2007, Giacomini Wetland Restoration Project, Phase I (2007) Construction Drawings. Prepared for Golden Gate National Recreation Area and Point Reyes National Seashore, August, 23 sheets.

Kamman G.K., Kamman, R.Z., and Beahan, C., 2007, Technical Specifications for Giacomini Wetland Restoration Project, Phase I (2007) Construction. Prepared for Golden Gate National Recreation Area and Point Reyes National Seashore, with contributions from Winzler & Kelly, August, 185p.

Kamman G.K. and Kamman, R.Z., 2008, Technical Specifications for Giacomini Wetland Restoration Project, Phase 2 (2008) Construction. Prepared for Golden Gate National Recreation Area and Point Reyes National Seashore, May, 243p.

Kamman, G.R., Kamman R.Z., and Beahan, C., 2007, 100% Specifications, Lower Redwood Creek floodplain and salmonid habitat restoration at the Banducci site, Golden Gate National Recreation

Area, Marin County, CA. Prepared for Golden Gate Parks Conservancy and National Park Service, June 8, 46p.

Kamman, R.Z., Kamman G.K., and Beahan, C., 2007, 100% Design Drawings, Lower Redwood Creek Restoration, The Banducci Site, Golden Gate National Recreation Area, Marin County, CA. Prepared for Golden Gate Parks Conservancy and National Park Service, February 28, 7 sheets.

Kamman G.K. and Kamman, R.Z., 2006, Feasibility Study and Construction Drawings for Freshwater Marsh and High Water Wildlife Refugia on the West Pasture of the Giacomini Dairy. Prepared for Golden Gate National Recreation Area and Point Reyes National Seashore, September.

Kamman, G.R., 2002, Haypress Pond Restoration Grading Plan, Tennessee Valley, Sausalito, CA. Prepared for Golden Gate National Recreation Area, National Park Service, January 10, 15p.

5.0 ACADEMIC APPOINTMENTS

San Francisco State University, 2012 through 2014, Wetland hydrology. SFSU College of Extended Learning, Romberg Tiburon Center, CA, 2-day course, 1.6 CEU.

San Francisco State University, 2011, Introduction to wetland hydrology. Basic Wetland Delineation Training, SFSU College of Extended Learning, Romberg Tiburon Center, CA, March 28-April 1.

University of California, Berkeley Extension, 2001 through 2008, Hydrologic and geomorphic processes in stream restoration. Civil and Environmental Engineering, Certificate Program in California Water Management and Ecosystem Restoration, Berkeley, CA, 2-day course, 1.0 CEU.

San Francisco State University, 2007, Introduction to tidal wetland hydrology. SFSU College of Extended Learning, Romberg Tiburon Center, CA, May 11-12, 1.6 CEU.

City of San Jose, 2005, Hydrologic and geomorphic processes in stream restoration. City of San Jose's Environmental Services Department, Watershed Protection Division, San Jose, CA, January 26.

Miami University Geology Field Station, Dubois, WY, 1989, Instructor, Summer Session, May-July.

Miami University, Oxford, Ohio, 1985-89, Instructor and Research/Teaching Assistant (MS candidate).

BOARD OF SUPERVISORS
COUNTY OF HUMBOLDT
825 5th Street, Suite 111, Eureka, CA 95501-1153
Telephone (707) 476-2390 Fax (707) 445-7299

Fritz Durst, Chairman
Sites Project Authority
P.O. Box 517
Maxwell, CA 95955

Subject: Request to Protect Humboldt County's Trinity River Interests from Adverse Impacts caused by the Sites Reservoir Project

Dear Chairman Durst:

In a letter dated January 9, 2018, the Humboldt County Board of Supervisors expressed conditional support for the proposed Sites Reservoir Project, if robust and binding assurances are provided that:

1. Construction and operation of the Sites Reservoir Project will result in no additional demands for diversions of Trinity River water to the Sacramento Basin, and

2. The Sites Project Authority and the Bureau of Reclamation will work with Humboldt County and other Trinity River stakeholders to identify opportunities to reduce out-of-basin transfers of Trinity River water as part of the coordinated operations of the Central Valley Project and the future Sites Reservoir Project.

You replied with a letter (dated January 15, 2018) to the chair of the Board of Supervisors in which you asserted that no Trinity River water would be diverted into Sites Reservoir and therefore no additional demands on the Trinity River would occur as a result of the project. However, we find that this letter is not sufficiently robust and binding.

Subsequently, we are in receipt of the January 21, 2019 report by Kamman Engineering and Hydrology in which two significant impacts affecting the Trinity River were identified within the Sites Reservoir Project Draft Environmental Impact Report/Environmental Impact Statement ("Draft EIR/EIS") as follows:

1. The surface water modeling does not include an accounting of Humboldt County's 1959 water contract with the Bureau of Reclamation for annual releases of not less than 50,000 acre-feet of Trinity River water, nor does it include the anticipated flow releases described in the Bureau of Reclamation's Long-Term to Protect Adult Salmon in the Lower Klamath River (2017 Record of Decision), and

2. The surface water modeling identifies a significant change in the pattern of Trinity River exports to the Sacramento River from fall to spring in some water year types, thereby increasing residence time of water in Lewiston Reservoir and increasing Trinity River water temperatures. This change would likely violate North Coast Basin Plan Trinity River temperature objectives and SWRCB Water Right Order 90-05; however, the document fails to disclose the increased potential for temperature violations.

It is our understanding that Sites Project Authority representatives have stated that the temperature modeling results have limited accuracy due to the methods and assumptions; however, we are not reassured. Although your letter assured us that no harm would be caused to the Trinity River, we are concerned that the modeling results published in your Draft EIR/EIS show that the operations of the Sites Project would likely cause irreversible harm to migrating salmon and the document does not discuss alternatives or mitigations to address these impacts.

Based on the findings by Kamman Hydrology and the lack of robust and binding assurances, we specifically request that a water right term and condition be placed on the water rights application for the Sites Reservoir Project as follows:

"Trinity River water shall not be used to fill Sites Reservoir unless the Trinity River Division of the Central Valley Project is releasing water as a result of storage conditions requiring "Safety of Dams" releases beyond normal operating plans and concurrently when Shasta Reservoir is making flood control releases. Furthermore, Humboldt County's 1959 water contract with the Bureau of Reclamation, Trinity River Record of Decision (ROD) flows, and releases to implement the Bureau of Reclamation's Long-Term Plan to Project Adult Salmon in the Lower Klamath River shall not be reduced or negatively impacted in any way as a result of any Sites Reservoir decisions, modeling, operational plans, and water rights petitions."

Alternatively, we would consider entering into a Memorandum of Understanding with the Bureau of Reclamation and Sites Project Authority with clearly defined obligations and commitments to ensure that Humboldt County's 1959 water contract with the Bureau of Reclamation and our interests in the Trinity River are sufficiently protected.

We request a response by January 15, 2020, after which we will consider whether to withdraw our conditional support for the proposed Sites Reservoir Project.

Sincerely,

Rex Bohn, Chairman
Humboldt County Board of Supervisors

cc: Senator Dianne Feinstein
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Fritz Durst, Chairman
Sites Project Authority
P.O. Box 517
Maxwell, CA 95955

Ernest Conant, Regional Director
Bureau of Reclamation, Mid-Pacific Region
2800 Cottage Way
Sacramento, CA 95825

Subject: Request for Revision and Recirculation of Draft EIR/EIS for Sites Reservoir Project

Dear Chairman Durst and Regional Director Conant:

The Humboldt County Board of Supervisors requests that the Draft Environmental Impact Statement/Environmental Impact Report ("Draft EIR/EIS") for the Sites Reservoir Project be revised and recirculated prior to certification due to significant new information regarding the expected adverse environmental effects of the project's proposed operations. After the comment period on the Draft EIR/EIS ended in 2017, serious deficiencies have been identified in the document warranting revision of the impacts analysis and new or modified alternatives and/or mitigation measures. Humboldt County has a vested interest in this project because significant impacts to the Trinity River, which is partially diverted into the Sacramento River, would cause irreversible harm to Humboldt County's commercial, sport, and tribal fisheries.

Specifically, we are in receipt of the January 21, 2019 report by Kamman Engineering and Hydrology in which two significant impacts affecting the Trinity River were identified within the Sites Reservoir Project Draft EIR/EIS as follows:

1. The surface water modeling does not include an accounting of Humboldt County's 1959 water contract with the Bureau of Reclamation for annual releases of not less than 50,000 acre-feet of Trinity River water, nor does it include the anticipated flow releases described in the Bureau of Reclamation's Long-Term Plan to Protect Adult Salmon in the Lower Klamath River (2017 Record of Decision), and

2. The surface water modeling identifies a significant change in the pattern of Trinity River exports to the Sacramento River from fall to spring, thereby increasing residence time of water in Lewiston Reservoir and increasing Trinity River water temperatures. This change would likely violate North Coast Basin Plan Trinity River temperature objectives and SWRCB Water Right Order 90-05; however, the document fails to disclose the increased potential for temperature violations.

Issuing a final EIR/EIS without correcting these serious modeling problems will not meet the basic purpose and substantive legal requirement of the California Environmental Quality Act ("CEQA") to prevent significant, avoidable damage to the environment by requiring changes in projects through the use of feasible alternatives or mitigation measures (CEQA Guidelines 15002). Moreover, failure to remodel the proposed action and alternatives in a recirculated Draft EIR/EIS will not provide the public with an opportunity to review and comment on the actions, alternatives, and potential mitigation measures as required for transparency, and therefore it will not procedurally comply with CEQA Guidelines 15088.5.

An additional issue of concern that has potential adverse impacts on Humboldt County is your proposed minimum instream flows on the Sacramento River. In a letter dated January 12, 2018, to the Sites Project Authority, the California Department of Fish and Wildlife recommended a bypass flow requirement to maintain at least 13,000 cubic feet per second (cfs) past all diversion facilities, while you are proposing 3,250 cfs (Red Bluff), 4,000 CFS (Hamilton City), and 5,000 cfs (Wilkins Slough). This discrepancy greatly concerns us and we believe this issue requires at a minimum further analysis, and potentially revision of the selected alternative and mitigation measures, in a revised and recirculated Draft EIR/EIS.

The successful migration, spawning, and rearing of native wild Sacramento River salmon is critical to ensure the "harvestable surplus" of these stocks that is required for the success of Humboldt County commercial and sport fishing industries and our resource-dependent communities. If your project cannot be economically feasible without taking flows in the Sacramento River below state recommended **minimum** instream flows, we question the benefits to salmon and environmental neutrality that you have professed for your project. A revised and recirculated Draft EIR/EIS with a comparison of alternatives with various minimum instream flow volumes is required to adequately compare what it would mean to reduce the Sacramento River to such low flows.

We request a timely response from both the Sites Project Authority and the Bureau of Reclamation to the Humboldt County Board of Supervisors so we can take appropriate action to secure the public and private interests of our constituents on these important issues.

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Value Planning Study

Purpose

Process for developing the initial alternative plans and the final selection of the recommended plan

The planning process for the Sites Project includes the following key steps:

1. Establish planning objectives and constraints
2. Identify acceptable project management measures/facilities
3. Establish appraisal level screening criteria
4. Formulate and complete an appraisal level evaluation of initial alternatives
5. Screening and identification of tentatively recommended plan(s)
6. Prepare draft and final value planning report
7. Refinement and feasibility level evaluation of tentatively recommended plan(s)
8. Screening and selection of recommended plan
9. Prepare draft and final feasibility study report and EIR/EIS

Planning Objectives and Constraints

Primary and secondary planning objectives were developed for the Sites Value Planning Study (SVPS).   to support the development and evaluation of the SVPS alternatives. The primary objectives are considered essential to developing a viable project, and the alternatives must meet all of the primary objectives to some degree to advance in the evaluation process. The development of new storage also provides an opportunity to provide other, secondary benefits. After developing alternatives to meet the primary objectives, the resulting opportunities to achieve the secondary benefits were evaluated.

Planning Objectives

The primary and secondary planning objectives for the SVPS are based on the identified problems, needs, and opportunities discussed in Chapter 2. These planning objectives incorporate state, and Authority specific goals.

The primary objectives for the SVPS studies are:

1. Improve water supply, water supply reliability, and water quality
2. Provide Incremental Level 4 water supply for refuges
3. Improve the survival of anadromous fish
4. Enhance the Delta ecosystem

The SVPS alternatives are formulated to achieve these primary objectives, and evaluated to assess their effectiveness in achieving these objectives.

The secondary objectives are:

1. Provide hydropower generation on release
2. Provide opportunities for recreation
3. Provide flood-damage reduction

The SVPS alternatives are not formulated to maximize the secondary objectives, but opportunities to achieve them were included in the alternatives and evaluated to the extent that they are available. Problems, needs, and opportunities and the corresponding objectives are identified in Table 1.

Table 1. Planning Constraints

The scope of the SVPS process is limited by the following constraints:

Offstream Storage: By definition—and consistent with the CALFED ROD—the NODOS feasibility studies are focused on offstream storage locations. The creation of reservoirs that would interrupt major watercourses and impede the migration of fish is not the subject of this investigation.

Laws, Regulations, and Policies: Laws, regulations, and policies that must be considered include, but are not limited to, NEPA, the Fish and Wildlife Coordination Act, the Clean Air Act, the Clean Water Act (CWA), the National Historic Preservation Act (NHPA), the ESA, the California ESA, CEQA, and the CVPIA. The CVPIA of 1992 (P.L. 102-575) influences water supply deliveries, river flows, and related environmental conditions.

*Pump Back Storage:*The Project facilities are not to include provisions for pump back storage hydropower generation.

Current Participants: The Project facilities are to be limited to those that directly benefit the current participants.

Federal Participation: The Bureau of Reclamation role will be limited to that of a cooperating partner, no financial involvement.

Others???

Table 11. Summary of Problems, Needs, Opportunities, and Planning Objectives

Problems	Needs	Opportunities	Planning Objectives
Water supply and water supply reliability			
Water supply reliability for municipal and industrial, and agriculture has decreased appreciably, resulting in loss of system resiliency.	Need improved water supply reliability to meet current and future challenges associated with increasing population, agriculture production, environmental needs, and climate change.	The project provides an additional water source of high quality that could improve: • Agricultural water supply reliability (SWP water contractors, and local agricultural water districts) • M&I water supply reliability (CVP water contractors, SWP water contractors, and local agencies)	Primary 1. Improve water supply, and water supply reliability
Incremental Level 4 water supply for refuges			
Delivering reliable Incremental Level 4 water supplies annually to refuges as required by the CVPIA.	Need reliable water supplies to provide for optimum habitat management on the refuges.	NODOS provides an additional water source that can be cooperatively operated with the CVP/SWP system and used for consistent delivery of Incremental Level 4 water to the refuges.	Primary 2. Provide Incremental Level 4 water supply for the refuges
Survivability of anadromous fish			
Populations of anadromous and endemic fish species in the Sacramento Valley river system are declining due to warmer water temperatures and low flows.	Need additional cold water and increased flows for anadromous fish migration, spawning, and rearing.	NODOS provides an additional water source that could be cooperatively operated with the CVP and SWP systems to provide water to help stabilize river flows in the fall, and facilitate the release of additional cold water (from Shasta and Oroville Reservoirs) to benefit Sacramento River anadromous fish and other aquatic species.	Primary 3. Improve the survival of anadromous fish and other aquatic species
Delta ecosystem enhancement			
There is insufficient food to sustain Delta smelt, even in years with high precipitation and runoff.	Water is needed to convey biomass for food production from the toe-drain of the Yolo Bypass into the Delta.	The NODOS project provides a dedicated source of water to transport biomass for food to portions of the Delta frequented by Delta smelt.	Primary 4. Enhance the Delta ecosystem.
Hydropower generation			
Demands for power in the state are expected to increase as population, industry, and associated infrastructure growth occurs in the future.	Need new power sources that can meet California's stringent GHG regulations.	Sites provides new hydropower to help offset the pumping costs associated with the project	Secondary 1. Provide hydropower generation on release.

Problems	Needs	Opportunities	Planning Objectives
Recreation			
Demands for flat-water, river, and land-based recreation are expected to increase as population increases.	Need additional recreation areas to meet the region's increased demands.	NODOS provides a new reservoir with recreation areas that could help meet current and future demands.	Secondary 2. Provide opportunities for recreation.
Flood-damage reduction			
Flooding occurs in the Colusa Basin watershed between October and April.	Need to capture or attenuate the sudden surges associated with flooding in the watershed.	NODOS provides a new reservoir that could capture and attenuate flood flows, thereby providing flood-damage reduction to the community of Maxwell and the Colusa Basin Drain.	Secondary 3. Provide flood-damage reduction

CVP = Central Valley Project
CVPIA = Central Valley Project Improvement Act
GHG = greenhouse gas
NODOS = north-of-the-Delta offstream storage
SWP = State Water Project

Planning Constraints

The scope of the SVPS process is limited by the following constraints:

Offstream Storage: By definition—and consistent with the CALFED ROD—the NODOS feasibility studies are focused on offstream storage locations. The creation of reservoirs that would interrupt major watercourses and impede the migration of fish is not the subject of this investigation.

Laws, Regulations, and Policies: Laws, regulations, and policies that must be considered include, but are not limited to, NEPA, the Fish and Wildlife Coordination Act, the Clean Air Act, the Clean Water Act (CWA), the National Historic Preservation Act (NHPA), the ESA, the California ESA, CEQA, and the CVPIA. The CVPIA of 1992 (P.L. 102-575) influences water supply deliveries, river flows, and related environmental conditions.

Pump Back Storage:The Project facilities are not to include provisions for pump back storage hydropower generation.

Current Participants: The Project facilities are to be limited to those that directly benefit the current participants.

Federal Participation: The Bureau of Reclamation role will be limited to that of a cooperating partner, no financial involvement.

Others???

Identification and Evaluation of Measures to Address Primary Planning Objectives

Numerous management measures have been identified to address each of the primary planning objectives. Table 22 identifies the measures that best address the primary and secondary planning objectives. Measures carried forward best address the objectives for the Sites Project, given the consideration of planning constraints and criteria.

Table 2. Retained Management Measures to Address Primary Planning Objectives

Objectives	Management Measures
Improve water supply and water supply reliability	Develop measures for offstream storage
	Transfer water between water users and source shift (i.e., use groundwater in lieu of surface water and vice versa to better manage water resources)
	Improve flows by integrating a new offstream storage facility into system operations
Provide Incremental Level 4 water supply for refuges	Reduce year-to-year variability in acquired water supply from willing sellers by developing NODOS measures
Improve the survival of anadromous fish	Improve water quality (temperature) by conserving water at existing reservoirs upstream of critical fish habitat and provide additional flows to support fish migration
Enhance the Delta Ecosystem	Use NODOS to provide water to the Yolo Bypass toe-drain to convey biomass into the Delta to promote a more robust food web for Delta smelt and other species
Provide hydropower generation	Incorporate hydropower upon release
Provide flood-damage reduction	Provide local flood-damage reduction benefits
Provide opportunities for recreation	Provide flat-water recreation benefits

Appraisal Level Decision Support Framework

A multi-criteria evaluation framework was established to value the merits of each alternative in meeting objectives within constraints. Results of the multi-criteria evaluation will be used by decision makers to inform selection of a preferred alternative. The proposed framework follows techniques presented in the “Trade-Off Analysis Planning and Procedures Guidebook,” USACE; IWR 2002. The multi-criteria decision framework and results are detailed below.

The process established to conduct the multi-criteria decision analysis included the following steps:

1. Establish the main decision support criteria, sub-criteria that support the main criteria, and the associated metrics and weights.
2. Evaluate the sub-criteria to establish the metrics for the main criteria:
   a. Determine the metric value assigned to each sub-criteria.
   b. Normalize the transformed metrics by presenting them as a percent of the maximum value.
   c. Weight the criteria by percent to reflect their importance relative to one another.
   d. Develop a weighted product matrix that will present the weight assigned to each criterion and the product of the weight times the normalized metric for each alternative.
   e. Sum the weighted products to determine the total value assigned to the main criteria.

3. Evaluate the main criteria to determine the alternative(s) with the highest total weighted product, which will indicate the alternative(s) that most successfully meet(s) the planning objectives:
   a. Normalize the transformed metrics by presenting them as a percent of the maximum value.
   b. Weight the criteria by percent to reflect their importance relative to one another.
   c. Develop a weighted product matrix that will present the weight assigned to each criterion and the product of the weight times the normalized metric for each alternative.
   d. Sum the weighted products to determine the total value assigned to the main criteria.

Main criteria and sub-criteria were developed for use in differentiating and choosing among the alternatives. The criteria were weighted by percent, reflecting their importance relative to one another with respect to their contributions towards meeting the objectives, and any other attributes that are important to the entities involved. The criteria, metrics, and weightings are presented in Table 3.

Table 3. Multi-criteria Decision Criteria, Metrics, and Weighting

MAIN CRITERIA	SUB-CRITERIA	METRICS	WEIGHTING (percent)
IMPROVE WATER SUPPLY and RELIABILITY		Contribution towards participant and refuge water supply objectives based on the sum of the weighted products of the sub-criteria metrics.	20
	Deliveries for north of Delta participants	The degree to which the system meets current participant prescriptions at Holthouse (current subscription is ______AF) 0 = Does not meet subscription 3 = Meets or exceeds subscription	30
	Deliveries for south of Delta participants	The degree to which the system meets current participant prescriptions at Holthouse (current subscription is ______AF) 0 = Does not meet design capacity 3 = Meets or exceeds subscriptions	30
	Ability to provide consistent delivery of level 4 water for the refuges:	The degree to which operations can be integrated 0 = low degree 3 = moderate degree	30

MAIN CRITERIA	SUB-CRITERIA	METRICS	WEIGHTING (percent)
IMPROVE ECOSYSTEM		**Contribution towards anadromous and Delta Smelt objectives based on the sum of the weighted products of the sub-criteria metrics.**	**20**
	Ability to cooperatively operate with CVP/SWP systems to improve anadromous fish survival:	The degree to which operations can be integrated 0 = low degree 3 = moderate degree	50
	Ability to provide source of water to transport biomass in support of Delta Smelt	The degree to which operations can be integrated 0 = low degree 3 = moderate degree	**50**
PERMITABILITY		**The degree to which the alternative is permittable by federal, state, and local agencies based on the sum of the weighted products of the sub-criteria metrics.**	5
	Permit difficulty and timing	The degree of difficulty and time required 0 = high degree 3 = low degree	70
	Likely need for recirculation	The likely need for recirculation 0 = high 3 = low	30
LOCAL ACCEPTABILITY		**The degree to which the alternative is acceptable to local entities**	**5**
	Real Estate	The degree to which the alternative negatively impacts real estate : 0 = high 3 = Low	30

MAIN CRITERIA	SUB-CRITERIA	METRICS	WEIGHTING (percent)
	Compatibility	The degree to which the alternative is compatible with operations and land use 0 = high 3 = Low	30
COSTS		**Cost effectiveness of alternative based on the sum of the weighted products of the sub-criteria metrics.**	**40**
	Construction Costs	Estimated construction	75
	Operation and Maintenance Costs	Estimated annual O&M costs	25

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Fritz Durst, Chairman
Sites Project Authority
P.O. Box 517
Maxwell, CA 95955

Subject: Request to Protect Humboldt County's Trinity River Interests from Adverse Impacts caused by the Sites Reservoir Project

Dear Chairman Durst:

In a letter dated January 9, 2018, the Humboldt County Board of Supervisors expressed conditional support for the proposed Sites Reservoir Project, if robust and binding assurances are provided that:

1. Construction and operation of the Sites Reservoir Project will result in no additional demands for diversions of Trinity River water to the Sacramento Basin, and

2. The Sites Project Authority and the Bureau of Reclamation will work with Humboldt County and other Trinity River stakeholders to identify opportunities to reduce out-of-basin transfers of Trinity River water as part of the coordinated operations of the Central Valley Project and the future Sites Reservoir Project.

You replied with a letter (dated January 15, 2018) to the chair of the Board of Supervisors in which you asserted that no Trinity River water would be diverted into Sites Reservoir and therefore no additional demands on the Trinity River would occur as a result of the project. However, we find that this letter is not sufficiently robust and binding.

Subsequently, we are in receipt of the January 21, 2019 report by Kamman Engineering and Hydrology in which two significant impacts affecting the Trinity River were identified within the Sites Reservoir Project Draft Environmental Impact Report/Environmental Impact Statement ("Draft EIR/EIS") as follows:

1. The surface water modeling does not include an accounting of Humboldt County's 1959 water contract with the Bureau of Reclamation for annual releases of not less than 50,000 acre-feet of Trinity River water, nor does it include the anticipated flow releases described in the Bureau of Reclamation's Long-Term to Protect Adult Salmon in the Lower Klamath River (2017 Record of Decision), and

2. The surface water modeling identifies a significant change in the pattern of Trinity River exports to the Sacramento River from fall to spring in some water year types, thereby increasing residence time of water in Lewiston Reservoir and increasing Trinity River water temperatures. This change would likely violate North Coast Basin Plan Trinity River temperature objectives and SWRCB Water Right Order 90-05; however, the document fails to disclose the increased potential for temperature violations.

It is our understanding that Sites Project Authority representatives have stated that the temperature modeling results have limited accuracy due to the methods and assumptions; however, we are not reassured. Although your letter assured us that no harm would be caused to the Trinity River, we are concerned that the modeling results published in your Draft EIR/EIS show that the operations of the Sites Project would likely cause irreversible harm to migrating salmon and the document does not discuss alternatives or mitigations to address these impacts.

Based on the findings by Kamman Hydrology and the lack of robust and binding assurances, we specifically request that a water right term and condition be placed on the water rights application for the Sites Reservoir Project as follows:

"Trinity River water shall not be used to fill Sites Reservoir unless the Trinity River Division of the Central Valley Project is releasing water as a result of storage conditions requiring "Safety of Dams" releases beyond normal operating plans and concurrently when Shasta Reservoir is making flood control releases. Furthermore, Humboldt County's 1959 water contract with the Bureau of Reclamation, Trinity River Record of Decision (ROD) flows, and releases to implement the Bureau of Reclamation's Long-Term Plan to Project Adult Salmon in the Lower Klamath River shall not be reduced or negatively impacted in any way as a result of any Sites Reservoir decisions, modeling, operational plans, and water rights petitions."

Alternatively, we would consider entering into a Memorandum of Understanding with the Bureau of Reclamation and Sites Project Authority with clearly defined obligations and commitments to ensure that Humboldt County's 1959 water contract with the Bureau of Reclamation and our interests in the Trinity River are sufficiently protected.

We request a response by January 15, 2020, after which we will consider whether to withdraw our conditional support for the proposed Sites Reservoir Project.

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