From: Ann Newton[anewton@katzandassociates.com]
Sent: Mon 8/1/2022 1:16:40 PM (UTC-07:00)
To: Kevin Spesert[kspesert@sitesproject.org]; Jerry Brown[jbrown@sitesproject.org]
Cc: Sara M. Katz[skatz@katzandassociates.com]; Sarah Rossetto[srossetto@katzandassociates.com]; Sharon Han[shan@katzandassociates.com]
Subject: FW: PublicCEO News for August 1: Palm Springs appoints Teresa Gallavan as interim city manager

Per my last email – Sites op-ed included in today's newsletter.

K&A
KATZ&ASSOCIATES

Ann Newton
Director, Los Angeles
d: 310.774.7639
San Diego · Los Angeles · San Francisco

From: PublicCEO Newsletter <daily@publicceo.com>
Sent: Monday, August 1, 2022 10:04 AM
To: Ann Newton <anewton@katzandassociates.com>
Subject: PublicCEO News for August 1: Palm Springs appoints Teresa Gallavan as interim city manager
Importance: Low

The City of Americ looking for a direc

The ideal candidate wi collaborative and seek relationships across de fully understand their r

Population: 20,256
Salary: $118,602 - $1
Deadline: August 12

Hello Ann,

In this edition:

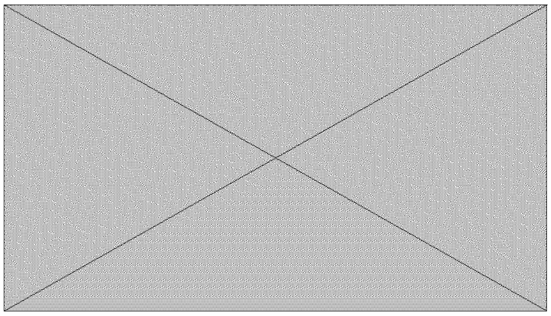
- The City of Palm Springs appoints Teresa Gallavan as interim city manager.

- The City of American Canyon is hiring a director of finance.
- Sacramento City Council Member Jeff Harris offers an analysis of California's needs for the Sites Reservoir to combat the water shortage.
- The City of Tracy is looking for en economic development manager.

Read More

Read these headlines and more in today's newsletter.

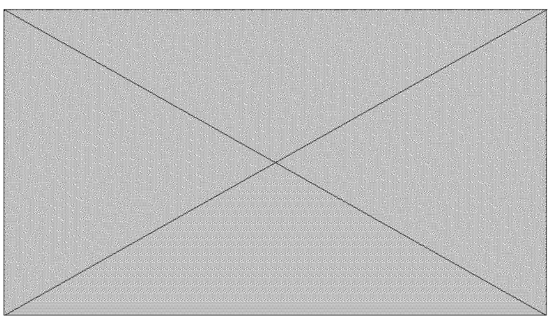
Highlights



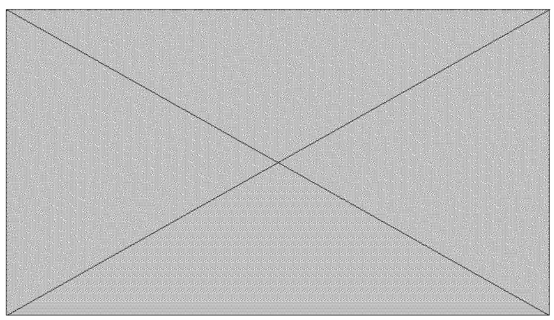
Palm Springs City Council appoints Teresa Gallavan to serve as interim city manager

Assistant City Manager Teresa Gallavan will serve as interim city manager starting September 16, taking over for Justin Clifton, who announced his resignation on July 18.

Read More



Op-Ed: California needs Sites Reservoir



The City of Tracy is hiring an economic development manager

Sacramento City Council Member Jeff Harris discusses the benefits of the Site Reservoir project and the positive impacts it will have on California.

Read More

The ideal candidate is will have an established track record in recruitment of new businesses, sports tourism, developer and sales tax agreements.

Population: 91,462
Salary: $115,943 - $140,930
Deadline: August 29

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In Other News

California Supreme Court rejects Manhattan Beach short-term rental ban

Calexico to rebid New River improvement project

Carlsbad officials frustrated with SDG&E over service center relocation

El Centro appoints interim police chief

Elk Grove rejects Old Town affordable housing project

Garbage rates set to rise starting this Monday for Jackson residents

Health experts weigh in at West Hollywood monkeypox town hall

League of Women Voters sues City of Cupertino over lobbyist disclosure rule

Long Beach Health Department to begin distribution of infant formula in partnership with LA County

Palmdale to consider resolution to not enforce mask mandates

Palm Springs basic income pilot gets $500,000 more in divided council vote

San Diego infrastructure projects could be faster and cheaper with proposed reforms

Santa Barbara expresses confidence despite Stage 2 water shortage alert

Stockton City Council approves pilot program to send crisis intervention team to some police calls

Vacaville mayor announces he is not seeking re-election

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Report 21: Charley Wilson & Jim Leach

Southern California Water Coalition Charley Wilson and Santa Margarita Water District's Jim Leach sit down with PublicCEO's Ryder Todd Smith to talk about:

- Ingraining **water conservation** into everyday life
- Collaborating to address **climate change**'s effect on water
- Investing in long term **water management**

-

Looking for the next step in your career? See who's hiring.

- **Human Resources Director**, Spokane Valley Fire Department, City of Walnut Creek, City of Santa Cruz, City of Hayward
- **Economic Development Manager**, City of Tracy
- **Finance Manager**, City of Coachella, City of San Leandro
- **City Clerk/Assistant to the City Manager**, City of Willows
- **Assistant County Administrator**, County of Marin
- **Town Administrator**, Town of Fort Jones
- **Senior Planner**, City of San Clemente
- **Human Resources Deputy Director**, City of Hayward
- **Senior Personnel Analyst**, City of Huntington Beach
- **Communication and Public Information Officer**, City of Palmdale
- **Chief Sustainability Officer**, County of San Diego
- **Executive Director**, Central Contra Costa Solid Waste Authority
- **Records Program Coordinator**, West County Wastewater
- **Community Development & Services Director**, City of Willows
- **Revenue and Tax Administrator**, City of Oakland
- **Director of Public Works**, City of Cupertino, City of Palm Springs
- **Assistant City Attorney**, City of Brentwood
- **Finance Director**, City of Fountain Valley
- **Trainer**, Regional Government Services

- **City Attorney**, City of Stockton
- **Confidential Legal Secretary**, County of San Diego
- **Deputy City Manager**, City of Rialto
- **Deputy Finance Director**, City of Napa
- **Executive Director**, Imperial County Transportation Committee
- **Public Works Director**, City of Lynwood, City of Lincoln
- **Executive Officer**, County of San Joaquin
- **Assistant County Counsel**, County of San Diego
- **General Manager/Chief Executive Officer**, East Valley Water District, Pasadena Water and Power
- **Assistant City Manager**, City of Hollister, City of Palm Desert
- **City Manager**, City of Calimesa, City of Daly City, City of Gustine, City of Emeryville, City of Rohnert Park
- **Community Development Director**, City of Gonzales, City of Cudahy, City of Pacific Grove
- **Senior Management Analyst**, City of San Juan Capistrano
- **Planning Manager**, City of Rolling Hills Estates, City of Los Altos
- **Deputy Director of Public Works**, City of Rancho Palos Verdes
- **Police Chief**, City of Glendale
- **Executive Officer/ Clerk of Court**, Superior Court of California, County of Los Angeles

-

Attention Public Officials

-

Add PublicCEO to your Media List

We love hearing news straight from the source. You have a standing invite to reach out with news you'd like us to share about your agency. In fact, add ***Daily@PublicCEO.com*** *to your media list!*

Submit an Op-Ed

Opine on an idea or share your insights in an op-ed *that we'll feature in this daily newsletter and on our* ***website****.*

-

Spread the News:

PublicCEO.com

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From: Jerry Brown [jbrown@sitesproject.org]
Sent: 8/2/2022 2:19:44 PM
To: Alicia Forsythe [aforsythe@sitesproject.org]; Laurie Warner Herson [laurie.warner.herson@phenixenv.com]; Spranza, John [john.spranza@hdrinc.com]; Heydinger, Erin [erin.heydinger@hdrinc.com]
Subject: August EIR/EIS Update

When preparing this month's update to the Boards on the EIR/EIS please consider including the following in the report and the presentation:

1. Identify the major comment areas (not necessarily commentors) and things we've already done and plan to do to adjust the project to address the concerns (e.g. adjust the diversion criteria, extraordinary water availability analysis, water right special terms, etc)
2. Drill down on the subject of "environmental feasibility". This was the topic area that got the most attention at the Dec 2021 CWC meeting. We need to get the Board prepared for and build a strong understanding of the basis for the decisions they will be asked to make. CEQA Section 15093 is very clear about this point and I want to make sure we hear from the board early about anything they anticipate they will need to complete their action.
3. Communicate the schedule to reach the Final. Include any outreach that is planned prior to the decision date.

From: Kevin Spesert [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=DEF2E3FB8FBE4310BB65B7A20F658C0F-KSPESERT000]
Sent: 8/2/2022 2:49:38 PM
To: Jerry Brown [jbrown@sitesproject.org]
Subject: RE: Landowner Meetings
Attachments: TABLE_Project_Mailing_List_20220715.xlsx; Colusa_Basin_Drain_Selection.JPG; Dunnigan_Pipeline_West_Selection.JPG; Footprint & Roads.png; Knights_Landing_Ridge_Cut_Selection.JPG

One other note...

Due to the potential road way improvements on Road 68/69, Delevan Road, and McDermott Road...we may have some additional ROW acquisition that will be required for wider turn clearance at intersections and possible strip acquisitions for roadway widening...this is why we included the landowners along those roads...

For the CBD...we included that parcels along the CBD...upstream of where we enter the drain to County Line Road as this is were Sites water has the potential to back up and impact those parcels...Lewis had recommend that we include these as affected landowners...

For the Ridge Cut...we included the parcels the length of the Ridge Cut from Knights Landing to the Bypass as we will have Sites water flowing thru this area and could affect some of these landowners.

I have attached the mailing list...this is the raw version that includes all of the duplicate parcels/landowners...before the mailing went out, this list was reformatted and the duplicated owners/addresses were removed...

I have also included a few graphics that show the parcels that are listed in the mailing list.

From: Kevin Spesert <kspesert@sitesproject.org>
Sent: Tuesday, August 2, 2022 2:09 PM
To: Jerry Brown <jbrown@sitesproject.org>
Subject: Re: Landowner Meetings

1 - The post cards went out to landowners who own parcels associated with project facilities (footprint, pipelines, roads, etc.) we also included parcels along Road 68/69, Delevan Road and McDermott Road due to the planned roadway improvements along those roads to support construction traffic...we also included landowners along the CBD (from County Line Road to Knights Landing based on recommendations from Lewis/Bill) and the Ridge Cut....it is the same mailing list that we used for the Landowners meeting last year...we are also planning on a second mailer to go to the same list at the end of this week...

2 - we discussed holding landowner meetings at the 6/7 Legislative/Outreach Committee meeting which was the same meeting we discussed for formation of the Comminty/Tribal groups (landowner meetings were not agendized but were included in the discussion)...I also reported on the scheduling for the meetings at the Joint AB/RC Meeting on 6/17 during the Committe Reports potion of the Agenda...I also talked about them this past AB meeting during the LMC report portion of the agenda (Fritz made a commment to encourage participants to attend those meeting so that they can hear first hand what landowners are saying)

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Tuesday, August 2, 2022 1:43 PM
To: Kevin Spesert <kspesert@sitesproject.org>
Subject: Landowner Meetings

Can you confirm:

1. We only sent the postcards to landowners where we need to acquire property rights.
2. The meetings and reports where we communicated to participants that this outreach was occurring.

Thanks

File Provided Natively

From: Alicia Forsythe [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A6CDF06A7E904B65BAA21702A82AD329-AFORSYTHE]
Sent: 8/3/2022 8:21:49 AM
To: Spranza, John [John.Spranza@hdrinc.com]
Subject: RE: NGO distribution list

I think so. It's a huge list, but I think its time to get back out to the larger group and just make sure we are reaching out to them. Looking to make more touch points so if we get the "you didn't contact us" we have more in our files where we did reach out. Maybe provide some context for the larger group when you send the email out – just to say that we've made some changes to the diversion criteria and wanted to open up the distribution list again for those that may be interested in a discussion on these changes.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, August 2, 2022 2:49 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>
Subject: RE: NGO distribution list

Just to confirm, you want me to include all of these folks?

John Spranza

D 916.679.8858 M 818.640.2487

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, August 2, 2022 9:59 AM
To: Spranza, John <john.spranza@hdrinc.com>
Subject: NGO distribution list

Its in this folder: NGO Small Groups

Called NGO – emails (002).docx.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Spranza, John [John.Spranza@hdrinc.com]
Sent: 8/3/2022 8:37:17 AM
To: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: RE: NGO distribution list

Okay, thanks for confirming. I jus saw that list and had to check.

John Spranza

D 916.679.8858 M 818.640.2487

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Wednesday, August 3, 2022 8:22 AM
To: Spranza, John <john.spranza@hdrinc.com>
Subject: RE: NGO distribution list

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---

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, August 2, 2022 2:49 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>
Subject: RE: NGO distribution list

Just to confirm, you want me to include all of these folks?

John Spranza

D 916.679.8858 M 818.640.2487

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, August 2, 2022 9:59 AM

To: Spranza, John <john.spranza@hdrinc.com>
Subject: NGO distribution list

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Its in this folder: NGO Small Groups

Called NGO – emails (002).docx.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Spranza, John [John.Spranza@hdrinc.com]
Sent: 8/3/2022 10:30:55 AM
To: Peters, Jeff [Jeff.Peters@icf.com]; Hassrick, Jason [Jason.Hassrick@icf.com]
CC: Angela Bezzone [bezzone@mbkengineers.com]; Lecky, Jim [Jim.Lecky@icf.com]; Alicia Forsythe [aforsythe@sitesproject.org]
Subject: RE: Stone and Funks gauge/measurement locations

Jeff,
Sorry it took me a while to get back to you on this, I wanted to wait until I had the aquatic study plan as well. I think your approach makes sense and I will check with our real estate group to see what, if any access we can get to these sites.

John Spranza

D 916.679.8858 M 818.640.2487

From: Peters, Jeff <Jeff.Peters@icf.com>
Sent: Wednesday, July 13, 2022 6:43 PM
To: Spranza, John <John.Spranza@hdrinc.com>; Hassrick, Jason <Jason.Hassrick@icf.com>
Cc: Angela Bezzone <bezzone@mbkengineers.com>; Lecky, Jim <Jim.Lecky@icf.com>
Subject: RE: Stone and Funks gauge/measurement locations

Hi all,

See attached files for potential locations. The Word document shows all the locations together on Google Earth imagery, and the .kmz file has the individual locations if people would like to take a closer look. Note that the purple locations on the Word document are our study reaches for the technical studies we will be performing, as eluded to below.

ICF will be installing temporary staff gages and water surface loggers next winter/spring, and we will be collecting data at these locations until the dams are constructed. So we should get a pretty robust data set by the time all is said and done. The idea behind this strategy is to develop stage-discharge relationships on both Funks and Stone Corral Creeks to get a better handle on real-time hydrology in order to inform the baseline hydrologic conditions. This data, together with the various technical studies we will be performing (fish/bioassessment/hydrogeomorphic studies), will provide us with a solid baseline understanding of both of these creeks.

Note that ICF has no plans to install anything permanent at this time. But is sounds like MBK will be taking the lead on this.

In order to keep this simple (and to be able to perform work in one day), you will see that I have chosen a total of 4 sites – 2 on each creek. On each creek I have identified a foothill and a valley location for our staff gages/loggers. These locations might be good options for MBK's permanent gage locations as well.

As a sidenote, there used to be a gage on Stone Corral Creek and USGS has 27 years of discharge measurements 1958 through 1985. However, this gage was located near the community of Sites which will be inundated – so that location is not an option. I chose these locations based on access and position within the watershed.

DISCLAIMER – THESE ARE TENTATIVE LOCATIONS AND WE STILL HAVE NOT SECURED ACCESS/PERMISSION TO ENTER.

I am looking forward to collaborating with all of you.

Let me know if you have any questions.

Jeff ("JP")

Jeff Peters, M.A.
Geomorphologist and Restoration Specialist
ICF (formerly Jones & Stokes)
980 9th Street, Suite 1200
Sacramento, CA 95814
O: 916-737-3000 / D: 916-231-9603 / M: 916-752-0984
Jeff.Peters@icf.com

Please note that I will be in the field the weeks of 7/11 and 7/18 and then on vacation the weeks of 7/25 and 8/1.

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Monday, July 11, 2022 1:47 PM
To: Hassrick, Jason <Jason.Hassrick@icf.com>; Peters, Jeff <Jeff.Peters@icf.com>
Cc: Angela Bezzone <bezzone@mbkengineers.com>; Lecky, Jim <Jim.Lecky@icf.com>
Subject: RE: Stone and Funks gauge/measurement locations

Thanks Jason and Jeff.

John Spranza

D 916.679.8858 M 818.640.2487

From: Hassrick, Jason <Jason.Hassrick@icf.com>
Sent: Monday, July 11, 2022 1:37 PM
To: Spranza, John <John.Spranza@hdrinc.com>; Peters, Jeff <Jeff.Peters@icf.com>
Cc: Angela Bezzone <bezzone@mbkengineers.com>; Lecky, Jim <Jim.Lecky@icf.com>
Subject: Re: Stone and Funks gauge/measurement locations

Hey John,

So I was able to touch base with Jeff before he headed back into the field. We were planning on starting with some stream pressure transducers (HOBO loggers) at two locations per creek (upstream and downstream). Jeff will send out a figure and a description of those locations in the next couple of days.

Jason

JASON HASSRICK | ICF | jason.hassrick@icf.com **| +1.530.312.3275 mobile**
ICF Fish and Aquatic Science Team

From: Hassrick, Jason <Jason.Hassrick@icf.com>
Date: Monday, July 11, 2022 at 1:14 PM
To: John Spranza <John.Spranza@hdrinc.com>, Peters, Jeff <Jeff.Peters@icf.com>
Cc: Angela Bezzone <bezzone@mbkengineers.com>, Lecky, Jim <Jim.Lecky@icf.com>
Subject: Re: Stone and Funks gauge/measurement locations

Hi John,

Adding Jeff Peters to this in case he has something we can respond to directly before we share the study plan.

JASON HASSRICK | **ICF** | jason.hassrick@icf.com | **+1.530.312.3275 mobile**
ICF Fish and Aquatic Science Team

From: Spranza, John <John.Spranza@hdrinc.com>
Date: Tuesday, July 5, 2022 at 12:04 PM
To: Lecky, Jim <Jim.Lecky@icf.com>, Hassrick, Jason <Jason.Hassrick@icf.com>
Cc: Angela Bezzone <bezzone@mbkengineers.com>
Subject: Stone and Funks gauge/measurement locations

Jim and Jason,
Following up on an action item from our call last week, do you have the proposed locations where you want to gauge the creeks available for MBK to review
Thanks,
John

John Spranza, MS, CCN
Senior Ecologist / Regulatory Specialist

HDR
2379 Gateway Oaks Drive, Suite 200
Sacramento, CA 95833
D 916.679.8858 M 818.640.2487
john.spranza@hdrinc.com

hdrinc.com/follow-us
hdrinc.com/follow-us

From: Jeff Peters [jptelemark@yahoo.com]
Sent: 8/3/2022 10:55:13 AM
To: Spranza, John [john.spranza@hdrinc.com]
CC: Hassrick, Jason [Jason.Hassrick@icf.com]; Angela Bezzone [bezzone@mbkengineers.com]; Lecky, Jim [Jim.Lecky@icf.com]; Alicia Forsythe [aforsythe@sitesproject.org]
Subject: Re: Stone and Funks gauge/measurement locations

Thanks John.

Please note that we will be requesting access to some other field sites as well for the bioassessment, geomorphology, and fish studies (as identified in the Aquatic Study Plan). I'm on vacation right now without a computer but Jason or somebody else from ICF can share the map showing these locations with you.

Might as well start working on access for all of the field site locations now...

Jeff

On Aug 3, 2022, at 10:31 AM, Spranza, John <John.Spranza@hdrinc.com> wrote:

Jeff,
Sorry it took me a while to get back to you on this, I wanted to wait until I had the aquatic study plan as well. I think your approach makes sense and I will check with our real estate group to see what, if any access we can get to these sites.

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D 916.679.8858 M 818.640.2487

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ICF Fish and Aquatic Science Team

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Cc: Angela Bezzone <bezzone@mbkengineers.com>
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John

John Spranza, MS, CCN
Senior Ecologist / Regulatory Specialist

HDR

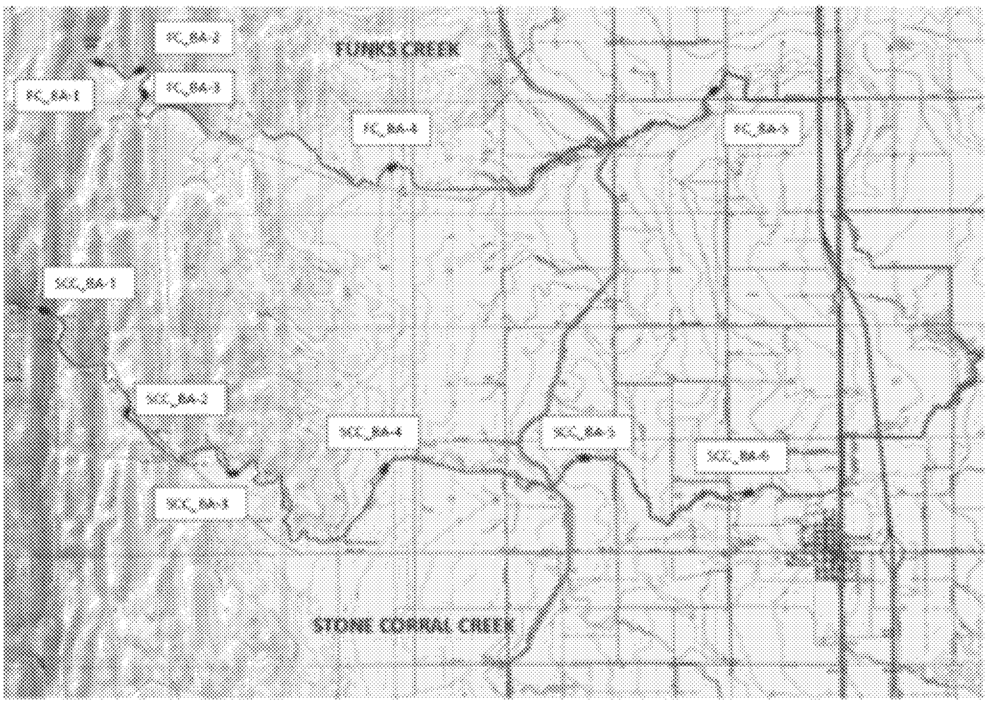
2379 Gateway Oaks Drive, Suite 200
Sacramento, CA 95833
D 916.679.8858 M 818.640.2487
john.spranza@hdrinc.com

hdrinc.com/follow-us
hdrinc.com/follow-us

From: Hassrick, Jason [Jason.Hassrick@icf.com]
Sent: 8/3/2022 2:25:12 PM
To: Spranza, John [john.spranza@hdrinc.com]; Conner McDonald [conner@cmdwest.com]
CC: Alicia Forsythe [aforsythe@sitesproject.org]; Peters, Jeff [Jeff.Peters@icf.com]
Subject: Re: Stone and Funks gauge/measurement locations

Hi John and Connor,

Please note that there are additional sites identified for the bioassessment, fish, and geomorphology field site locations in the associated sections of the study plan.



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Date: Wednesday, August 3, 2022 at 10:33 AM
To: Conner McDonald <conner@cmdwest.com>
Cc: Alicia Forsythe <aforsythe@sitesproject.org>, Hassrick, Jason <Jason.Hassrick@icf.com>, Peters, Jeff <Jeff.Peters@icf.com>
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D 916.679.8858 M 818.640.2487

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Sites Governance Discussions

Purpose:

The Governance workgroup is charged with providing advice and input to the Reservoir Committee and Authority Board in their evaluation of project governance changes that may be necessary as the Project progresses through future phases of work.

Intent:

The following Governance Principles represent the general parameters under which the AB and RC expects the Ad Hoc will work to conform any governance approaches to the current governance structure, or to bring forward alternative approaches for discussion and direction at joint meetings of the AB and RC.

Governance Principles

The governance structure should:

1. Retain appropriate elements of fundamental governance structures and procedures. These provisions are defined in the Joint Powers Agreement (November 21, 2016), the Bylaws for Phase 2 (September 17, 2018), and Project Agreement (April 1, 2019, as amended). The relevant governance sections are excerpted and attached. Some of the key considerations include:
    - The AB's decision authority over key decisions affecting Sacramento landowners and water users, such as:
        - The minimum level of local participation in the project.
        - Lands to be acquired for the project features.
        - Water diversion and release criteria and water rights conditions where there are potential ramifications on local water use.
        - Recreation planning.
    - Consideration of critical shared facilities and the rights and needs of those owners (GCID and TCCA/Reclamation).
    - AB and RC shared decision-making on material changes as defined in the agreements listed above, such as schedule, cost, permitting, mitigation, land acquisition, and member and participant rights and duties.
2. Adapt decision making to evolving project responsibilities and the need for efficient implementation to keep project scope, schedule, and budget aligned with investor expectations.
    - Land acquisition and management.
    - Local agreements and commitments.
    - Compliance with laws, regulations, and permit requirements.
    - Compliance with contracts and agreements.
    - Cost and risk management for design and construction of a $4B+ project.
3. Consider the evolving interests of participants as the project investment expands and the local impacts and mitigation grow, including:
    - Control over decisions that affect investment costs, assignment of risks, and future liabilities.
    - Maintenance of positive local relations in the project area.
    - Federal and state participation and establishing appropriate rights in the governance of the project.
4. Ensure efficient organization and decision-making processes.

The further refinement of Sites governance will require careful attention to balancing the issues and interests of all interested and affected parties. One way to consider this balance is to understand the tension between maintaining “local control” of the water and land resources for Sacramento Valley interests and the “local control” for investors of ratepayer funds to ensure the expected benefits over the life of the project facilities. The work of the Ad Hoc Governance Committee will explore options to address this tension and maintain an efficient organizational decision process that ensures continued participation of all parties.

<Add link to Participant Portal when full agreements are posted there.>

Near-term Milestones

September Joint Meeting

- Debrief Ad Hoc workgroup progress/discussions
- Accept Working Draft Governance Principles for Ad Hoc

December Joint Meeting – Initial Concepts and Issues for Further Discussion/Development

- Board and committee structure and representation
- Delegation, material changes, and thresholds/triggers
- Meeting practices and procedures
- Management and staffing
- Other (e.g., contract terms, enforcement, dispute resolution, etc.)

<The following is a draft for review and discussion on September 2>

Anticipated Topics for Monthly Ad Hoc meetings through December.

- September
  - Governance Principles
  - Existing JPA Agreement, Bylaws, and Project Agreement
  - Discussion Priorities and Plan
- October
  - Asset Ownership and Permit Compliance
  - Governance Models/Examples
- November
  - Risk Management
  - Structure and Representation
- December
  - Initial Concepts and Issues for Discussion

From: Conner McDonald [conner@cmdwest.com]
Sent: 8/3/2022 5:02:12 PM
To: Kevin Spesert [kspesert@sitesproject.org]
Subject: FW: Stone and Funks gauge/measurement locations

Hey Kevin,

Fyi... String from John and Team regarding land access for baseline monitoring of the creeks...

Happy to discuss; or you may want to talk with Ali / John direct. I have not yet discussed with them...

-thanks!

CONNER MCDONALD – SR/WA / *Right-of-Way Services*
CMD WEST
c/ 530-750-9912 e/ CONNER@CMDWEST.COM

From: Hassrick, Jason <Jason.Hassrick@icf.com>
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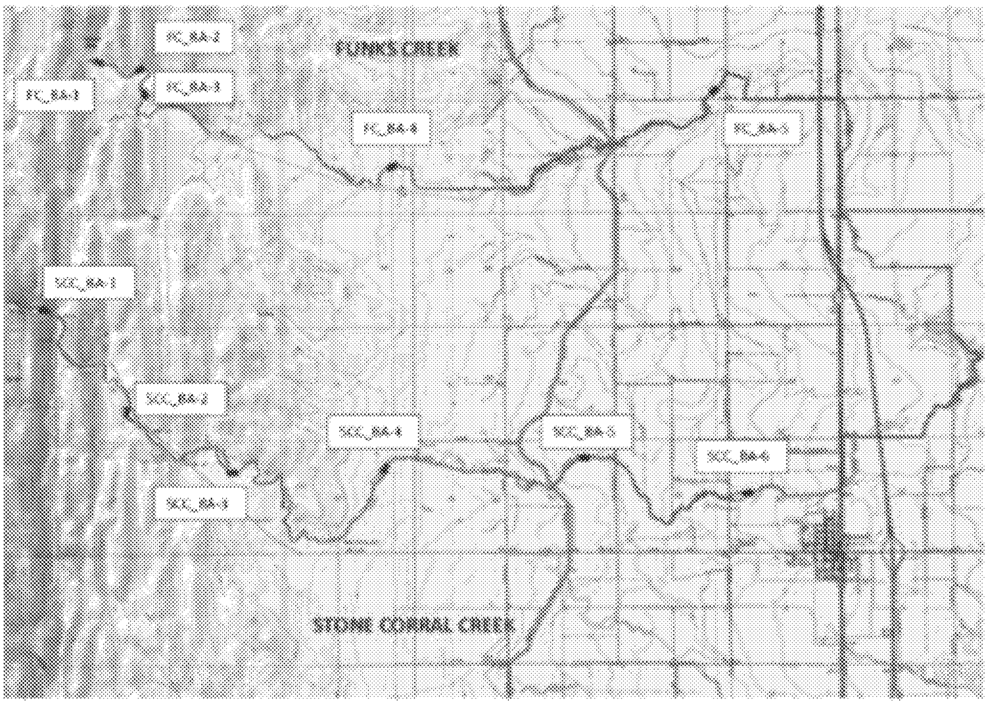

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Attachments: Sites Hydro Monitoring Locations_ICF_7-13-22.docx; Sites Hydro Monitoring Locations.kmz

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To: 'Hassrick, Jason' [Jason.Hassrick@icf.com]; Spranza, John [john.spranza@hdrinc.com]
CC: Alicia Forsythe [aforsythe@sitesproject.org]; 'Peters, Jeff' [Jeff.Peters@icf.com]; Kevin Spesert [kspesert@sitesproject.org]
Subject: RE: Stone and Funks gauge/measurement locations

Evening John,

Thanks for your note, and the discussion. If you could send a KMZ of the watercourse alignments; and the identified study sites, that would be helpful. I look forward to discussing this.

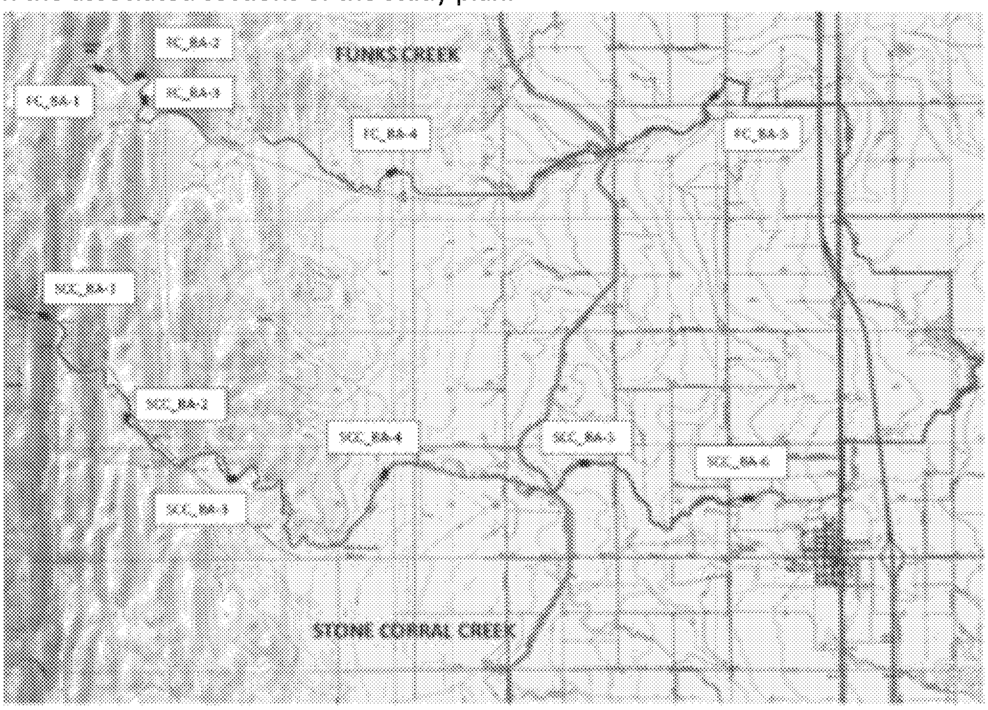
-all the best – Conner

CONNER MCDONALD – SR/WA / *Right-of-Way Services*
CMD WEST
c/ 530-750-9912 e/ CONNER@CMDWEST.COM

From: Hassrick, Jason <Jason.Hassrick@icf.com>
Sent: Wednesday, August 3, 2022 2:25 PM
To: John Spranza <John.Spranza@hdrinc.com>; Conner McDonald <conner@cmdwest.com>
Cc: Alicia Forsythe <aforsythe@sitesproject.org>; Peters, Jeff <Jeff.Peters@icf.com>
Subject: Re: Stone and Funks gauge/measurement locations

Hi John and Connor,

Please note that there are additional sites identified for the bioassessment, fish, and geomorphology field site locations in the associated sections of the study plan.



Jason

From: Spranza, John <John.Spranza@hdrinc.com>
Date: Wednesday, August 3, 2022 at 10:33 AM
To: Conner McDonald <conner@cmdwest.com>
Cc: Alicia Forsythe <aforsythe@sitesproject.org>, Hassrick, Jason <Jason.Hassrick@icf.com>, Peters, Jeff <Jeff.Peters@icf.com>
Subject: FW: Stone and Funks gauge/measurement locations

Conner,
The ICF aquatics team has identified their preferred pre-construction baseline monitoring study locations for the required Stone and Funks creek aquatic study plan. The goal is to get these established in winter of 2022/23. We included the studies and temporary gauges in the Priority 1 access surveys needs we provided to you a few weeks back, what do you think the chances are of getting access? If we can't get overland access, would there be a possibility of accessing the creek from an allowable location and then walking the channel (which is state property) to the locations?

Happy to jump on a call to go through this if you'd like.
Thanks.

Pre-construction Baseline Monitoring
Pre-construction baseline monitoring would be conducted within the study area to identify, quantify, and map habitats (see Chapter 4), document aquatic species distribution and population characteristics (e.g., relative abundance, diversity), and identify triggers (e.g., decrease in relative abundance) for adaptive management actions. This monitoring establishes a baseline condition from which success criteria are measured and includes initial reconnaissance and pre-construction sampling.
The pre-construction surveys would first involve a reconnaissance survey to observe and record variables that may affect sampling efforts and establish monitoring stations. Data collection would include information about the site, habitat, and fauna that are observed during site visits. Aquatic habitat and fish species sampling would be conducted once the reconnaissance is complete and sampling stations have been established. Data would be collected via standardized electronic or paper forms by experienced biologists during assessments and sampling. Data collected as part of pre-construction efforts would be summarized into yearly reports and a final pre-construction baseline report to the Authority at the end of the 5-year survey period. Surveys would provide the information required to characterize baseline conditions of the fisheries resources, as well as threats and stressors to fish species and habitat in the pre-construction conditions. Because of the lack of data regarding fish community composition in the study areas, this Aquatic Study Plan proposes to conduct baseline fish surveys for up to 5 years prior to start of construction.

John Spranza

D 916.679.8858 M 818.640.2487

From: Peters, Jeff <Jeff.Peters@icf.com>
Sent: Wednesday, July 13, 2022 6:43 PM
To: Spranza, John <John.Spranza@hdrinc.com>; Hassrick, Jason <Jason.Hassrick@icf.com>
Cc: Angela Bezzone <bezzone@mbkengineers.com>; Lecky, Jim <Jim.Lecky@icf.com>
Subject: RE: Stone and Funks gauge/measurement locations

Hi all,

See attached files for potential locations. The Word document shows all the locations together on Google Earth imagery, and the .kmz file has the individual locations if people would like to take a closer look. Note that the purple locations on the Word document are our study reaches for the technical studies we will be performing, as eluded to below.

ICF will be installing temporary staff gages and water surface loggers next winter/spring, and we will be collecting data at these locations until the dams are constructed. So we should get a pretty robust data set by the time all is said and done. The idea behind this strategy is to develop stage-discharge relationships on both Funks and Stone Corral Creeks to get a better handle on real-time hydrology in order to inform the baseline hydrologic conditions. This data, together with the various technical studies we will be performing (fish/bioassessment/hydrogeomorphic studies), will provide us with a solid baseline understanding of both of these creeks.

Note that ICF has no plans to install anything permanent at this time. But is sounds like MBK will be taking the lead on this.

In order to keep this simple (and to be able to perform work in one day), you will see that I have chosen a total of 4 sites – 2 on each creek. On each creek I have identified a foothill and a valley location for our staff gages/loggers. These locations might be good options for MBK's permanent gage locations as well.

As a sidenote, there used to be a gage on Stone Corral Creek and USGS has 27 years of discharge measurements 1958 through 1985. However, this gage was located near the community of Sites which will be inundated – so that location is not an option. I chose these locations based on access and position within the watershed.

DISCLAIMER – THESE ARE TENTATIVE LOCATIONS AND WE STILL HAVE NOT SECURED ACCESS/PERMISSION TO ENTER.

I am looking forward to collaborating with all of you.

Let me know if you have any questions.

Jeff ("JP")

Jeff Peters, M.A.
Geomorphologist and Restoration Specialist
ICF (formerly Jones & Stokes)
980 9th Street, Suite 1200
Sacramento, CA 95814
O: 916-737-3000 / D: 916-231-9603 / M: 916-752-0984
Jeff.Peters@icf.com

ICF

Please note that I will be in the field the weeks of 7/11 and 7/18 and then on vacation the weeks of 7/25 and 8/1.

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Monday, July 11, 2022 1:47 PM
To: Hassrick, Jason <Jason.Hassrick@icf.com>; Peters, Jeff <Jeff.Peters@icf.com>
Cc: Angela Bezzone <bezzone@mbkengineers.com>; Lecky, Jim <Jim.Lecky@icf.com>
Subject: RE: Stone and Funks gauge/measurement locations

Thanks Jason and Jeff.

John Spranza

D 916.679.8858 M 818.640.2487

From: Hassrick, Jason <Jason.Hassrick@icf.com>
Sent: Monday, July 11, 2022 1:37 PM
To: Spranza, John <John.Spranza@hdrinc.com>; Peters, Jeff <Jeff.Peters@icf.com>
Cc: Angela Bezzone <bezzone@mbkengineers.com>; Lecky, Jim <Jim.Lecky@icf.com>
Subject: Re: Stone and Funks gauge/measurement locations

Hey John,

So I was able to touch base with Jeff before he headed back into the field. We were planning on starting with some stream pressure transducers (HOBO loggers) at two locations per creek (upstream and downstream). Jeff will send out a figure and a description of those locations in the next couple of days.

Jason

JASON HASSRICK | ICF | jason.hassrick@icf.com **| +1.530.312.3275 mobile**
ICF Fish and Aquatic Science Team

From: Hassrick, Jason <Jason.Hassrick@icf.com>
Date: Monday, July 11, 2022 at 1:14 PM
To: John Spranza <John.Spranza@hdrinc.com>, Peters, Jeff <Jeff.Peters@icf.com>
Cc: Angela Bezzone <bezzone@mbkengineers.com>, Lecky, Jim <Jim.Lecky@icf.com>
Subject: Re: Stone and Funks gauge/measurement locations

Hi John,

Adding Jeff Peters to this in case he has something we can respond to directly before we share the study plan.

JASON HASSRICK | ICF | jason.hassrick@icf.com **| +1.530.312.3275 mobile**
ICF Fish and Aquatic Science Team

From: Spranza, John <John.Spranza@hdrinc.com>
Date: Tuesday, July 5, 2022 at 12:04 PM
To: Lecky, Jim <Jim.Lecky@icf.com>, Hassrick, Jason <Jason.Hassrick@icf.com>
Cc: Angela Bezzone <bezzone@mbkengineers.com>
Subject: Stone and Funks gauge/measurement locations

Jim and Jason,
Following up on an action item from our call last week, do you have the proposed locations where you want to gauge the creeks available for MBK to review
Thanks,
John

John Spranza, MS, CCN
Senior Ecologist / Regulatory Specialist

HDR
2379 Gateway Oaks Drive, Suite 200
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D 916.679.8858 M 818.640.2487
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From: Spranza, John [John.Spranza@hdrinc.com]
Sent: 8/4/2022 8:06:53 AM
To: Gokce Sencan [sencan@ppic.org]
CC: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: RE: Sites Project Fishery Resources Discussion Group

Hello Gokce,

You can absolutely join the call, we are really trying to reach a broad audience and it's great Jeff forwarded you the invite.
Regards,
John

John Spranza

D 916.679.8858 M 818.640.2487

From: Gokce Sencan <sencan@ppic.org>
Sent: Wednesday, August 3, 2022 3:19 PM
To: Spranza, John <John.Spranza@hdrinc.com>
Subject: RE: Sites Project Fishery Resources Discussion Group

Dear John,

Jeff Mount forwarded me the discussion group invitation below. I am a research associate at PPIC and if possible I would like to join in to listen to this discussion. Let me know if that is possible, and I'll fill the Doodle form.

Thank you very much!
Gokce

Gokce Sencan
she | her | hers
Research Associate
PPIC Water Policy Center

PUBLIC POLICY
INSTITUTE OF CALIFORNIA
500 Washington Street, Suite 600
San Francisco, CA 94111
tel 415 291 4408
fax 415 291 4401
web www.ppic.org

---------- Forwarded message ---------
From: **Spranza, John** <John.Spranza@hdrinc.com>
Date: Wed, Aug 3, 2022 at 8:49 AM
Subject: Sites Project Fishery Resources Discussion Group
To: barbarav@aqualliance.net <barbarav@aqualliance.net>, jimb@aqualliance.net <jimb@aqualliance.net>,

bobker@bay.org <bobker@bay.org>, greg@bayecotarium.org <greg@bayecotarium.org>, natalie.carter@becnet.org <natalie.carter@becnet.org>, don_hankins@sbcglobal.net <don_hankins@sbcglobal.net>, holstein@cal.net <holstein@cal.net>, cshutes@calsport.org <cshutes@calsport.org>, deltakeep@me.com <deltakeep@me.com>, caroleekrieger7@gmail.com <caroleekrieger7@gmail.com>, info@calwild.org <info@calwild.org>, sevans@calwild.org <sevans@calwild.org>, cmorrill@calwild.org <cmorrill@calwild.org>, mkbe.sparkles3@gmail.com <mkbe.sparkles3@gmail.com>, alevine@mcn.org <alevine@mcn.org>, rzwillinger@defenders.org <rzwillinger@defenders.org>, colin@ejcw.org <colin@ejcw.org>, connere@ewccalifornia.org <connere@ewccalifornia.org>, ashbaugh.lowell@gmail.com <ashbaugh.lowell@gmail.com>, mrockwell1945@gmail.com <mrockwell1945@gmail.com>, rstork@friendsoftheriver.org <rstork@friendsoftheriver.org>, sevans@friendsoftheriver.org <sevans@friendsoftheriver.org>, rebeccadawnwu@yahoo.com <rebeccadawnwu@yahoo.com>, john@goldengatesalmon.org <john@goldengatesalmon.org>, konrad@klamathriver.org <konrad@klamathriver.org>, dobegi@nrdc.org <dobegi@nrdc.org>, chelsea@yournec.org <chelsea@yournec.org>, outreachcusp@gmail.com <outreachcusp@gmail.com>, noah@ifrfish.org <noah@ifrfish.org>, mike@ifrfish.org <mike@ifrfish.org>, jminton@pcl.org <jminton@pcl.org>, gary.estes@wdlikenoname.net <gary.estes@wdlikenoname.net>, tbsletteland@gmail.com <tbsletteland@gmail.com>, lucas@sacrivertrust.org <lucas@sacrivertrust.org>, Larryglass71@gmail.com <Larryglass71@gmail.com>, ben@baykeeper.org <ben@baykeeper.org>, jon@baykeeper.org <jon@baykeeper.org>, wvt@infomania.com <wvt@infomania.com>, amerrill@americanrivers.org <amerrill@americanrivers.org>, tstokely@att.net <tstokely@att.net>, regina@californiasalmon.org <regina@californiasalmon.org>, Dyane.osorio@sierraclub.org <Dyane.osorio@sierraclub.org>, livingstonjohn@att.net <livingstonjohn@att.net>, connere@gmail.com <connere@gmail.com>, k@omrl.org <k@omrl.org>, Skyhorse3593@sbcglobal.net <Skyhorse3593@sbcglobal.net>, caleenwintu@gmail.com <caleenwintu@gmail.com>, ahayden@edf.org <ahayden@edf.org>, mhall@edf.org <mhall@edf.org>, mount.jeffrey@gmail.com <mount.jeffrey@gmail.com>, mlynes@audubon.org <mlynes@audubon.org>, mbiddlecomb@ducks.org <mbiddlecomb@ducks.org>, eforsburg@tnc.org <eforsburg@tnc.org>, jaltamirano@audubon.org <jaltamirano@audubon.org>, mhennelly@calwaterfowl.org <mhennelly@calwaterfowl.org>, jbrantigan@tnc.org <jbrantigan@tnc.org>, jvolberg@calwaterfowl.org <jvolberg@calwaterfowl.org>, chickey@pointblue.org <chickey@pointblue.org>, glink@ducks.org <glink@ducks.org>, mark@smithpolicygroup.com <mark@smithpolicygroup.com>, ewehr@gwdwater.org <ewehr@gwdwater.org>, tgstoked@gmail.com <tgstoked@gmail.com>, barry@westernwaterstrategies.com <barry@westernwaterstrategies.com>, reis@bayecotarium.org <reis@bayecotarium.org>, jrentner@riverpartners.org <jrentner@riverpartners.org>, jcain@riverpartners.org <jcain@riverpartners.org>, cknight@caltrout.org <cknight@caltrout.org>, DMierau@caltrout.org <DMierau@caltrout.org>, brian.johnson@tu.org <brian.johnson@tu.org>, rene.henery@tu.org. <rene.henery@tu.org>, Julie.zimmerman@tnc.org <Julie.zimmerman@tnc.org>, Jay_Ziegler@tnc.org <Jay_Ziegler@tnc.org>, barbara@restorethedelta.org <barbara@restorethedelta.org>, jbuse@biologicaldiversity.org <jbuse@biologicaldiversity.org>, JRose@biologicaldiversity.org <JRose@biologicaldiversity.org>, summerchum@yahoo.com <summerchum@yahoo.com>, anthony@asaracino.com <anthony@asaracino.com>, craig@suitsandsigns.com <craig@suitsandsigns.com>, chicojerry@yahoo.com <chicojerry@yahoo.com>, Mstargali@gmail.com <Mstargali@gmail.com>, vhelliwell@mcn.org <vhelliwell@mcn.org>, asanchez@calwild.org <asanchez@calwild.org>, tyap@biologicaldiversity.org <tyap@biologicaldiversity.org>, aoverhouse@defenders.org <aoverhouse@defenders.org>
CC: Alicia Forsythe <aforsythe@sitesproject.org>

Hello,

The Authority would like to continue our group discussions by providing an update on activities that have occurred post release of the Revised Draft EIR/Supplemental Draft EIS that affect the fishery analysis. The

Draft analysis can be found here: https://sitesproject.org/revised-draft-environmental-impact-report-supplemental-draft-environmental-impact-statement/

Please provide your availability for the meeting by using the link below.

Thanks,
John

https://doodle.com/meeting/participate/id/e76Gpvjd

John Spranza, MS, CCN

Sites Project Permitting and Agreements Integration Lead
Senior Ecologist / Regulatory Specialist

HDR

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Stone Corral Creek and Funks Creek Aquatic Study Plan

July 29, 2022

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Contents

Figures

1.0 Introduction and Purpose

1.1 Introduction

This Stone Corral Creek and Funks Creeks Aquatic Study Plan (Aquatic Study Plan) has been prepared for the Sites Project Authority (~~Auabthority~~Authority) to guide fisheries technical studies to be conducted prior to and during construction of the Sites Reservoir Project (Project), as well as ongoing monitoring during Project operations. The Project is a proposed offstream storage project located on the west side of the Sacramento Valley, approximately 10 miles west of the community of Maxwell in Glenn and Colusa Counties. It is designed to store unappropriated water from winter and spring storm events in the northern Sacramento River watershed. The Project would impound a maximum of 1.5 million acre-feet of water in a reservoir. The reservoir would be created by building Sites Dam on Stone Corral Creek, Golden Gate Dam on Funks Creek, and a series of saddle dams on the northeastern rims of Antelope Valley. While a portion of naturally occurring seasonal flows in Stone Corral and Funks Creeks would be retained in the reservoir under an Area of Origin agreement with Colusa and Glenn Counties, the primary source of water for the reservoir would be diversions from the Sacramento River. These diversions would be up to 4,200 ~~3,900~~ cubic feet per second (cfs) via two existing facilities: the Red Bluff fish screen and pumping plant (operated by the Tehama-Colusa Canal Authority [TCCA]) and the Glenn-Colusa Irrigation District's (GCID) fish screen and pumping plant near Hamilton City.

Commented [SJ1]: This includes "plus losses"

1.2 Purpose of Aquatics Study Plan

As part of the Project alternatives development, the Authority has committed in the Project's Final Environmental Impact Report (EIR) and Environmental Impact Statement (EIS) to conduct technical studies to document ~~update~~ the two creeks' existing hydrology, assess flow levels needed to maintain fluvial geomorphic processes, and update the information on aquatic species presence and habitat use in the reaches of interest ~~and downstream~~ to establish ~~collect~~ system-wide aquatic baseline ~~and monitoring information~~ that will be used to manage environmental releases into the creeks from the Project. These studies, which are part of this Aquatic Study Plan, would be initiated once access permission to the creeks through private property is obtained and would be used to inform final design for Sites Dam and Golden Gate Dam release facilities and operational requirements. The following studies would be designed and conducted ~~out~~ in collaboration with the California Department of Fish and Wildlife (CDFW) and State Water Resources Control Board (SWRCB).

- Determine existing fish assemblages in these creeks, including fish species presence and habitat use.
- Characterize habitats available (e.g., spawning, rearing, foraging, and sheltering habitats) at varying flow levels, including the presence or absence of pools that persist through summer which may require some supplemental flow.
- Characterize flows, including assessing the baseflow during summer and conducting a fluvial geomorphologic study to characterize habitat conditions, substrate compositions, and flow levels necessary for protection of aquatic habitat and sediment mobilization.
- Conduct a Surface Water Ambient Monitoring Program (SWAMP) technical study (i.e., a stream bioassessment) that focuses on relationships between physical habitat, water quality, and benthic macroinvertebrates.

- Implement hydrological studies to define flow temperature relationships.

The Authority will use information from the results of implementation of this Aquatic Study Plan, including field studies described below, to prepare a Reservoir Operations Plan for Stone Corral Creek and Funks Creek. The Reservoir Operations Plan will identify the approach for flow releases, including release schedule and volumes, and an adaptive management plan to maintain fish in good condition consistent with California Fish and Game Code (CFGC) Section 5937 in the creek reaches of interest. These reaches are below the locations of Sites and Golden Gate Dams and above GCID Main Canal. The information will be integrated to focus on aquatic species of concern in the lower portions of the two creeks with an emphasis on maintaining existing community structure and habitat conditions. It is expected that flow releases from the Sites Reservoir into these creeks will mimic the natural discharge seasonality of the associated creeks, and that releases will be lower during Sacramento River Index Dry and Critically Dry Water Years. Conversely, flow releases will be higher during Above Normal Water Years.

This Aquatics Study Plan summarizes the methods and reporting strategies for the reaches downstream of the proposed impoundments on Stone Corral Creek and Funks Creek. Using information obtained from these field studies, along with currently available information, the Authority would prepare a Stone Corral Creek and Funks Creek flow schedule to be incorporated into the Reservoir Operations Plan. The Reservoir Operations Plan would identify the approach for flow releases, including release schedules and volumes, a monitoring plan for fish and stream function, and an adaptive management plan to maintain fish in good condition that is consistent with CFGC Section 5937. Flow releases into these creeks would be made in consideration of the flood control benefits of the Project and would not overtop the stream banks or flood downstream areas. Appendix 2D, *Best Management Practices, Management Plans, and Technical Studies* of the *Sites Reservoir Project Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement* (Sites Project Authority and Bureau of Reclamation 2021) describes the purpose, objectives, content, and timing of the field studies identified above.

The Authority has also proposed to adapt this study program into a post-~~construction~~ operation monitoring program with a duration of 5 to 10 years to document and adaptively manage the timing and magnitude of flow releases to maintain fish below the dams and the habitats upon which they depend. Performance standards would be developed in conjunction with the Authority and the relevant permitting agencies (CDFW, SWRCB and the Central Valley Regional Water Quality Control Board [CVRWQCB]) prior to the start of post-~~construction~~ operation monitoring.

Commented [SJ2]: We should explain why we ended the study reach here and not further downstream

Commented [SJ3]: This is an interesting idea, we need to vette this with ops. We will be measuring inflow, so we could use that as well

Commented [SJ4]: Is this the same as the Ops Plan for Stone corral creek and Funks Creek described above, or will it be a chapter or section in that ops plan? It's a bit confusing.

Commented [SJ5]: I would include this as an appendix or an attachment to this document. You could also excerpt section 2D.4 and include that as an attachment

Commented [SJ6]: Global change: Construction to operation. Please work with the EIR/S folks to make that change in their document if needed.

2.0 Environmental Setting

2.1 Environmental Setting of Stone Corral and Funks Creeks

Both Stone Corral Creek and Funks Creek are small watersheds originating below the snowline on the eastern foothills of the California Coast Range at elevations of 700 to 850 feet. Consequently, they do not receive cold snowmelt water. Rather, they respond rapidly to significant rainfall events and flow intermittently, mostly during winter and early spring. From their origins, both creeks flow through low foothills, across Antelope Valley (the proposed site of Sites Reservoir), through a series of ridges, and onto the Sacramento Valley floor (Figure 1). For much of their courses on the valley floor, they are confined to narrow channels between berms along the edge of agricultural fields and road prisms. While the stream channels of these creeks are not actively managed, their straight alignment and angular turns around agricultural fields and along roads indicate that they were modified from their natural historic channels. In the upper parts of the watersheds just above the dam locations, these streams are largely devoid of riparian cover resulting from livestock use (Bureau of Reclamation and California Department of Water Resources 2008:3-20). In the lower reaches where the streams run through and around agricultural fields, shaded riparian habitat is sparse and consists mostly of low shrubs, grasses, and occasional (*Quercus* sp.) and cottonwood (*Populus* sp.) trees.

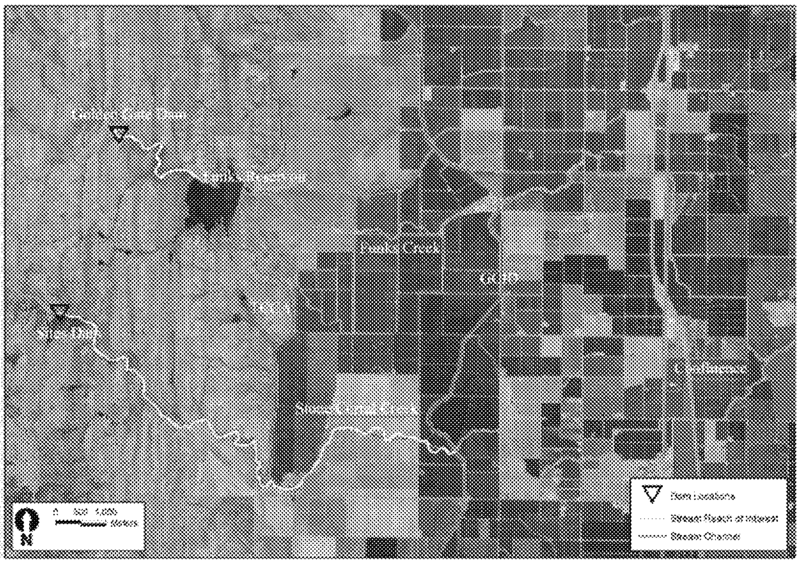


Figure 1. Stone Corral and Funks Creek reaches of interest and downstream reaches.

2.1.1 Stone Corral Creek

Stone Corral Creek has a drainage area of 32.8 square miles. From the proposed location of the Sites Dam, Stone Corral Creek meanders through a shallow canyon onto the valley floor, where it flows through an incised channel across grazing lands. At 4.6 miles from the Sites Dam location, Stone Corral Creek crosses over a siphon in the Tehama-Colusa Canal (TC Canal) and begins to travel through agricultural lands. About 3 miles below the TC Canal siphon, Stone Corral Creek crosses the GCID Main Canal ~~siphon~~. Although most of the water in the canal passes under Stone Corral Creek in ~~the~~ a siphon, GCID releases water from the canal into Stone Corral Creek for delivery to agricultural fields downstream. About 5.5 miles below the GCID Main Canal, Stone Corral Creek merges with Funks Creek and then flows an additional 5.7 miles to the Colusa Basin Drain.

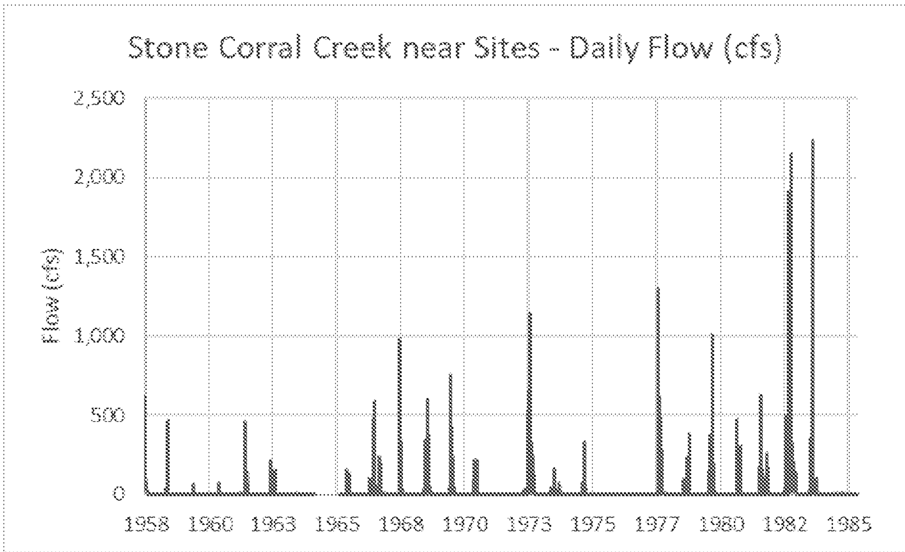
Commented [SJ7]: MBK's memo has the area at the historical gage on Stone Corral Creek at approximately 38.3 square miles, with approximately 35.4 square miles located upstream of the proposed Sites Dam location. We should go with what is in the water right , which is 38 for stone and 43 for Funks

The U.S. Geological Survey collected 27 years of discharge measurements in Stone Corral Creek near the community of Sites from 1958 through 1985 (Figure 2). The data demonstrate high variability of flow over the period of record. There were 3 years of zero flow: 1972, 1976, and 1977. Yates (1989) estimated the recurrence interval of a winter without flow at 12 to 14 years. Of the 26 years with data, 24 years had mean annual flow of less than 25 cfs. The maximum annual discharge during the period of record was 50.1 thousand acre-feet (TAF) in 1983. Based on the U.S. Geological Survey period of record, the long-term annual average discharge through the creek was 6.~~7~~ 5 TAF per year.

Commented [SJ8]: Daily?

Commented [SJ9]: Mean annual daily is 9.02 cfs with a SD of 67.5, median is 0. Maybe we get into this a bit? I don't think 25cfs is really representative.

Commented [SJ10]: I have 39 TAF...we are looking at different data



Source: U.S. Geological Survey stream gage 11390672

Figure 2. Mean Daily Flow in Stone Corral Creek near Sites (cfs)

Because the historical gage record for Stone Corral Creek is limited and Funks Creek is ungaged, historical stream gage data from Elder Creek was used to produce an estimate of streamflow on Stone Corral and Funks creeks. The Elder Creek gage was chosen because it was the nearest gage on the valley floor with a long record of data available. It was assumed that Elder Creek has relatively similar precipitation and runoff patterns to Stone Corral and Funks creeks. The streamflow of Elder Creek, located in Tehama County, has been measured since 1948 (USGS Gage No. 11379500), is approximately 49 miles northwest of the proposed Sites Reservoir and has a drainage area above the Elder Creek gage of 92.4 square miles(Attachment 1- MBK Engineers 2022). The overlapping period of gage records for Stone Corral Creek and Elder Creek (1958-1985) was used to determine a logarithmic correlation between the two gages for each month of the year. Table 1 below provides the results of this analysis. Identifying the average monthly flow volume by water year type (MBK Engineers 2022). The average monthly flow volumes are calculated using the gage record for October 1958 through August 1985 and using the logarithmic monthly correlations for September 1985 through September 2021. Results are summarized by Sacramento Valley Water Year Type: wet (W), above normal (AN), below normal (BN), dry (D), and critical (C).

Commented [SJ11]: Let's include the MBK memo as an attachment so we don't need to go into all the R^2 detail.

	Water Year Type					
Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	41	13	2	4	0	17
Dec	836	292	27	46	54	342
Jan	3,783	3,340	685	335	171	1,883
Feb	5,185	5,366	1,229	131	307	2,657
Mar	2,394	1,777	389	258	179	1,169
Apr	1,058	364	112	25	35	433
May	159	145	14	6	9	76
Jun	23	9	2	1	1	9
Jul	1	0	0	0	0	1
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	13,479	11,308	2,459	805	757	6,587

Commented [SJ12]: Will need to be formatted

Table 1. Stone Corral Creek at Proposed Sites Dam Average Monthly Flow Volume (ac-ft) by Water Year Type (1958-2021)

Commented [SJ13]: Sorry for screwing up your table numbering buit I think this helps tell a good story

2.1.2 Funks Creek

Funks Creek, a tributary to Stone Corral Creek, has a drainage area of 43 square miles. From the proposed location of Golden Gate Dam, Funks Creek meanders through a series of low ridges and grazing lands for about 1.8 miles to Funks Reservoir. Funks Reservoir is a re-regulating reservoir on the TC Canal and is created by a low dam on Funks Creek. Funks Dam is operated by TCCA ~~mostly for flood control purposes~~and to manage water levels within the TC Canal. However, ~~T~~the Funks Dam gates are opened during large storm events to pass flood waters through the reservoir and downstream to avoid compromising the TC Canal and its operations. There are no requirements to maintain flows in Funks Creek below Funks Reservoir, but seepage through the dam gates maintains perennial flow in Funks Creek.

Below Funks Dam, Funks Creek travels 3.9 miles through agricultural fields in a combination of natural and straightened channels to where it crosses the GCID Main Canal. While the GCID Main Canal passes under Funks Creek in a siphon, GCID releases water from the canal to Funks Creek, and like Stone Corral Creek, GCID uses the downstream portions of Funks Creek as part of its conveyance system to deliver water to agricultural fields. Approximately 2 miles northeast of Maxwell and 1 mile east of Interstate 5, Funks Creek flows into Stone Corral Creek.

There is no flow record for Funks Creek, but given the comparable size, geology, and topography of the two watersheds and their proximity to each other, Funks Creek hydrology is like Stone Corral Creek in terms of the amount and seasonality of flow. Because the Funks Creek drainage area (43 square miles) is 13% greater than the drainage area of Stone Corral Creek (38 square miles). ~~, runoff from the Funks Creek watershed is approximated here as 113% of that for Stone Corral Creek runoff. Therefore, the estimated maximum flow for 1983 is 56.7 TAF.~~

Since there is no streamflow data available for Funks Creek, the same correlation approach used to estimate Stone Corral creek streamflow cannot be followed to estimate Funks Creek streamflow. Therefore, the flow in Funks Creek was estimated by prorating the monthly Stone Corral Creek streamflow data by the ratio of Funks and Stone Corral Creek's watershed areas upstream of the proposed dam locations (MBK Engineers 2022). Table 2 below provides the results of this analysis. Identifying the average monthly flow volume by water year type.

	Water Year Type					
Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	58	19	3	6	1	24
Dec	1,187	415	39	65	77	486
Jan	5,372	4,743	972	476	243	2,674
Feb	7,363	7,621	1,745	185	436	3,773
Mar	3,400	2,523	552	367	255	1,660
Apr	1,502	517	158	35	49	616
May	226	207	20	9	13	108
Jun	32	13	2	1	2	13
Jul	2	0	0	0	0	1
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	19,142	16,059	3,492	1,144	1,075	9,355

Table 2. Funks Creek Average Monthly Flow Volume (ac-ft) by Water Year Type (1958-2021)

Physical Characteristics

The only drainages that exit Antelope Valley are Stone Corral Creek and Funks Creek. Each creek continues through the steeper, foothill environments and then transitions to the Sacramento Valley floor, where each is generally shallow and highly altered, primarily for water conveyance and agricultural purposes. Although the channels of these creeks are not actively managed, their straight channels and angular turns associated with agricultural fields and roads indicate that their natural channels have been extensively modified. Along their reaches on the valley floor, these creeks are confined to narrow channels between berms adjacent to agricultural fields and road prisms.

Stone Corral Creek and Funks Creek are largely devoid of riparian habitat in their upper reaches (foothill environments) due to heavy livestock use. In the lower reaches where the creeks run through and around agricultural fields, riparian habitat is sparse and consists mostly of low shrubs, grasses, and occasional oak and cottonwood trees.

Although the reaches of interest have been modified by livestock grazing, channelization, irrigation conveyance systems and minor diversions, they are expected to still have available aquatic (i.e., benthic macroinvertebrate [BMI]) habitat). They also both experience much of their natural hydrograph and fluvial geomorphic processes and provide water sediment that ultimately flows into the Colusa Basin Drain during rain events. Some of the larger flow events are considered important for water (and sediment) contributions to the Colusa National Wildlife Refuge.

Commented [SJ14]: This needs to be re-written. Its full of unsubstantiated generalizations and inaccuracies. See the 404 permit or EIR/S for a description of this, Mike V has it.

Commented [SJ15]: Not true, some level of maintenance is done to convey irrigation water and prevent flooding. We can talk to Jeff at TCCA and the GCID folks to get a better understanding.

Commented [SJ16]: I suggest this be revised. Stone corral is the opposite of this as it has dense cottonwoods in the canyons at and below the dam site.

Commented [SJ17]: This paragraph seems like a statement based on field examination. I've rephrased a bit.

Commented [SJ18]: I'm not sure it's natural in the channelized, maintained areas used for conveyance.

Commented [SJ19]: Suspended?

Commented [SJ20]: Again, do we know this, or is this what we are trying to figure out? If it's know, let's get a reference in here.

3.0 Fish Monitoring

Commented [SJ21]: We would not be sampling Funks Reservoir.

3.1 Study Design

Assessment of the goal to maintain fish in good condition consistent with CFGC Section 5937 would be made using a Before-After-Impact experimental study design. Pre-construction sampling would be conducted to assess fish community and habitat present in the study area for up to ~~over~~ a 5-year period prior to operation of the Project ~~implementation~~. Following completion of the pre-construction survey, fish communities and aquatic habitats in the study area would be monitored in a similar fashion over a 5-to-10-year period after the Project is operational ~~constructed~~. Fish community and habitat data that showed statistically significant negative departures from baseline data would trigger reassessment of downstream flow management under a proposed adaptive management plan.

Commented [SJ22]: reference

Commented [SJ23]: we can still do the study during construction as they will be passing inflow through/around the construction areas. Also, we start construction in 2024

Commented [SJ24]: this makes me a little worried as other divers can also influence this. I'll keep reading to see if this gets better defined.

Commented [SJ25]: Is this different that the project AMP? If so then we need to get this written.

3.1.1 Pre-construction Baseline Monitoring

Pre-construction baseline monitoring would be conducted within the study area to identify, quantify, and map habitats (see Chapter 4), document aquatic species distribution and population characteristics (e.g., relative abundance, diversity), and identify triggers (e.g., decrease in relative abundance) for adaptive management actions. This monitoring establishes a baseline condition from which success criteria are measured and includes initial reconnaissance and pre-construction sampling.

The pre-construction surveys would first involve a reconnaissance survey to observe and record variables that may affect sampling efforts and establish monitoring stations. Data collection would include information about the site, habitat, and fauna that are observed during site visits. Aquatic habitat and fish species sampling would be conducted once the reconnaissance is complete and sampling stations have been established. Data would be collected via standardized electronic or paper forms by experienced biologists during assessments and sampling. Data collected as part of pre-construction efforts would be summarized into yearly reports and a final pre-construction baseline report to the Authority at the end of the ~~5-year~~pre-construction survey period. Surveys would provide the information required to characterize baseline conditions of the fisheries resources, as well as threats and stressors to fish species and habitat in the pre-construction conditions.

Because of the lack of data regarding fish community composition in the study areas, this Aquatic Study Plan proposes to conduct baseline fish surveys for up to 5 years prior to start of construction.

3.1.2 Post-construction Monitoring

Post-construction monitoring would occur periodically at appropriate intervals specified herein, or as required by other plans and programs, or as established by the Authority. Post-construction sampling would document fish abundance and distribution and compare the results with data collected on habitat area, location, and changes in habitat characteristics over time. Data from the fish study ~~and SWAMP bioassessment~~ would be used in documenting compliance with CFGC Section 5937, with data from the SWAMP assessments providing additional details on overall stream status.

Commented [SJ26]: We would want to have condition factor calculated for fish.

Commented [SJ27]: I am leaning towards fish being used for compliance but having the SWAMP data will help inform where any issues are that are showing up in fish condition (K). It's a starting position.

Post-construction sampling methods would be identical to the pre-construction sampling, including returning to established stations and tracking fish abundance, diversity, and distribution through time. Threats and stressors identified in the pre-construction survey would be assessed in post-construction surveys to differentiate changes in habitat or fish communities not related to the construction of the Project. Data collected as part of the post-construction sampling effort would be compared against the

Commented [SJ28]: What if we lose access? It's happened to me.

baseline data, as well as previous years data and summarized into interim and final reports to the Authority.

Commented [SJ29]: We can track some metrics year by year to look for trends.

This Aquatic Study Plan proposes to conduct post-construction fish surveys for 5 years following start of ~~construction~~Project operation.

3.1.3 Integration with Aquatic Habitat Survey Methods

Aquatic habitat survey methods for both pre- and post-construction sampling are described below. Note that the field observations and results from other studies (i.e., stream bioassessment study and hydrogeomorphic study) would aid in the ~~determination~~ assessment of aquatic habitat and are referenced where applicable.

An initial reconnaissance survey would provide information on existing habitat and inform the selection of sampling stations within the Stone Corral Creek and Funks Creek drainages. Stations would initially be set at fixed distances apart to accommodate between 10 and 15 sampling stations within each drainage. Stations would be mapped prior to going into the field and then field-verified during the reconnaissance survey. Some leeway would be given to adjust locations to prioritize reaches containing optimal fish habitat. Stations that fell within dry or sub-optimal aquatic habitat for fish survival would be de-prioritized or curtailed.

Commented [SJ30]: Good idea, you are going to have dry areas

As part of the pre-construction sampling for fish community and aquatic habitat, the following data would be collected and/or integrated into the fish study:

- Fish community – Surveys would characterize local fish communities using methods described below. As feasible and appropriate, methods would be consistent with those used in previous and ongoing fish community survey efforts (e.g., methods accepted as standard practice for sampling aquatic systems; Meador et al. 1993). (Fish Study)

- Substrate composition – Surveys would document stream bed substrate particle size using Wolman pebble counts (Wolman 1954; Kondolf and Li 1992), gravelometer, substrate facies mapping, or similar methods. (Hydrogeomorphic Study)

- Riparian vegetation cover – Surveys would measure the relative amount (e.g., percent cover) of riparian vegetation cover over aquatic habitat to document conditions. Riparian vegetation cover would be monitored using the California Rapid Assessment Method (Brown 2013), or similar method. (Hydrogeomorphic Study)

- Habitat connectivity – Surveys would be conducted to assess longitudinal connectivity between stream reaches with current or potentially suitable fish habitat. Potential fish passage barriers would be identified, mapped, and surveyed as part of stream habitat surveys. The extent to which features may present a barrier to fish passage would be assessed using the best available information on leaping ability, swimming speed, and other fish performance information for known species, or for similar species, as found in published and unpublished sources including the FishXing software (Furniss et al. 2000). The California Passage Assessment Database or other information sources can be referenced to determine potential barrier locations. In addition, these potential barriers would be physically measured to field-verify passage potential. (Hydrogeomorphic Study)

Commented [SJ31]: I am not so sure this is needed as upstream of the dams will be inundated and downstream of the dams would have hydrology that attempts to mimic the historical. Let's talk about what value this brings this this particular project.

- Benthic macroinvertebrate presence – A SWAMP bioassessment that focuses on the relationships between physical habitat, water quality, benthic macroinvertebrates, and algal communities would be conducted on the reaches downstream of the proposed impoundments on Funks Creek and Stone Corral Creek. The bioassessment study would be conducted using the methods described in the State Water Resources Control Board's (State Water Board's) SWAMP protocols (Ode et al. 2016a, 2016b) (SWAMP Bioassessment Study).

- Water quality – Surveys would be conducted to monitor the quality of surface water (e.g., temperature, turbidity, pH, conductivity, salinity, dissolved oxygen). Water quality monitoring would be conducted using methods described in the State Water Board's SWAMP protocols (Ode et al. 2016a, 2016b). (SWAMP Bioassessment Study and Fish Study)

- Water Temperature – Water temperature profiles for Stone Corral Creek and Funks Creek would be developed. These water temperature profiles would be used to inform decisions about which tiers of the inlet/outlet (I/O) tower to use when conducting releases into downstream water bodies. The goal would be to mimic existing temperature profiles to benefit native fish in Funks Creek, which are accustomed to the warm temperatures present in this creek under existing conditions (Temperature Study).

Commented [SJ32]: This is not going to really be practical during some times of the year and when we have low volume of storage. We will need to build in some flexibility to the resulting recommendations.

3.1.4 Fish Sampling Methods

Commented [SJ33]: Please include assessment for condition factors (K) for species. This is something that is commonly understood even with all the concerns folks have with it. We don't need to do everything, we can pick representative species from each trophic level.

Beach Seining

Commented [SJ34]: Based on what I have seen out there you're going to be mostly shocking

Seining is a low cost, low impact method for capturing aquatic organisms. Circumstances that may affect efficacy include the amount or type of benthic structure, presence/absence of aquatic vegetation, water clarity, flow rate, and water depth. Seining is most effective in smooth bottom habitats free of aquatic debris or vegetation, with elevated turbidity, and are shallow enough for biologists to wade in. When benthic structure is complex, water clarity is high, and habitats contain extremely deep, shallow, or rapidly moving water that may exclude biologists from deploying nets, efficacy is dramatically decreased.

Seines with a "bag" to minimize aquatic organism handling stress are preferred. Seines with a bag are also preferred where obstructions make access to the water (or deployment/retrieval of the seine) difficult (U.S. Fish and Wildlife Service 2012). Blocking nets typically improve efficacy by reducing opportunities for target species to move out of the area being seined. Where the area to be isolated for sampling includes culverts, deep pools, undercut banks, or other cover attractive to fish (e.g., thick overhanging vegetation, root wads, logjams) it may be appropriate to isolate a portion or portions of the study area in phases, rather than attempting to herd fish from the entirety of the work area in a single downstream pass.

The size of the seines used for sampling would depend on the size of the habitat being sampled. Larger seines may be up to 30 feet long, 6 feet high, with a mesh size of 0.25 inch and a pocket size of 5 feet by 5 feet. Smaller seines used for small pools and ponds may be 12 feet long, 4 feet high, with a mesh size of 3/16 inch and a pocket that is 5 feet by 5 feet. Seines would be used or deployed in conjunction with block nets to prevent fish from moving out of the area prior to being sampled. Captured specimens would be held in floating net pens or large aerated containers, based on site conditions, prior to being processed. Specimens would be identified to species and the first 20 of each species would be measured for fork length to the nearest millimeter before being released at the capture site. Additional specimens would be tallied and released. Representative specimens would be photographed for positive identification.

Electrofishing with Block Nets

The effects of electrofishing are typically short-term and limited to fish in the area immediately surrounding the electrical field. However, electrofishing has limited use in deeper water and in low and high conductivity water (Beauchamp 1995). Additionally, not all species are easily targeted by electrofishing (e.g., benthic species may be under-represented) (Beauchamp 1995), and capture may be biased towards larger fish.

Previous work in Stone Corral and Funks Creeks indicates that total dissolved solids are high enough to prevent the use of electrofishing as a means of sampling (California Department of Fish and Game and California Department of Water Resources 2000). During reconnaissance surveys, basic water quality measurements would be taken to confirm this observation. If total dissolved solids values are above levels known to interfere with electrofishing, the method would be curtailed in favor of seining. If employed, electrofishing would be done with a Smith-Root type backpack electrofisher. Sections of creeks would be isolated using blocking nets before biologists wade into them, starting from the upstream net and moving downstream. Captured specimens would be held in buckets, floating net pens, or large aerated containers prior to being identified and measured as above for seine sampling. Effort would be calculated using shock time. If fish exhibit signs of stress, including symptoms of tetany or bruising, electrofisher settings would be adjusted accordingly to reduce impacts.

Visual Surveys

Any visual observations by biologists during reconnaissance and pre- and post-construction sampling of stream fauna would be systematically recorded based on pre-determined reach locations. This would include documenting amphibians and reptiles that may be observed incidentally during fish sampling efforts.

Basic Water Quality

Water quality data would be measured at every station using a YSI Pro DSS unit (or similar collection device), following Chapter 3 of the 2016 version of the SWAMP *Standard Operating Procedures for the Collection of Field Data for Bioassessments of California Wadeable Streams: Benthic Macroinvertebrates, Algae, and Physical Habitat* (SWAMP 2016 SOP) (Ode et al. 2016a) and recorded on standard SWAMP data forms. Water quality data obtained would include temperature, specific conductivity, salinity, dissolved oxygen, turbidity, and pH.

3.1.5 Fish Response

Abundance

All sampling efforts would be quantified using catch per unit effort (CPUE). Catch metrics would be computed based on the CPUE for a specific sampling method. Tracking CPUE by sites would be organized into charts or tables that accurately portray the CPUE for a given site and control effort. When a negative response in the CPUE of a target fish community for a given method is observed over three or more sites or three or more visits to the same site, investigators would assess whether the decline exceeded the threshold for triggering reassessment of flows under the proposed Adaptive Management Plan (AMP). If declines were observed to exceed thresholds, the Authority would be notified.

Commented [SJ35]: Based on the life history of the species we are dealing with, variability in spatial and temporal abundance would be expected. We should focus not on any single year, but instead we would need to have multiple years of any one trend occurring prior to determining if further assessment is needed.

The CPUE would be computed for each sample method and assessed once multiple data sets are available for comparison. Numbers of individuals, weight, and area sampled would be recorded. A decline in CPUE, in comparison to baseline values and accounting for threats and stressors, would reflect a potential adaptive management trigger.

Distribution

Fish presence would be recorded and tracked through the study area. Fish distribution would be determined through reconnaissance and pre-construction surveys, known distributions, and incidental observations made during other sampling efforts. Records may be kept as count data and volumetric data but would ultimately be provided as presence or absence of fish species within sampling reaches.

3.2 Timing and Frequency

Commented [SJ36]: We are working this out. Expect limited access in 2022 so think about, what do we REALLY need in 2022. Flows and temps would be good for a start. So, stream gauges and tidbit loggers. MBK will have some ideas as well.

The schedule and effort for the pre- and post-construction portions of the proposed study are detailed below. The pre-construction surveys would be five consecutive annual visits staged at any point prior to start of construction and within the seasonal restrictions indicated below. Monitoring efforts would be one-per-year visits each year following initiation of construction up to a 5- or 10-year timeline as determined by the Authority.

Pre-Project implementation:

- Desktop scoping effort: lay out sampling reaches using geographic information system (GIS) data overlaid on aerial imagery, organize data sheets, and coordinate with water quality and SWAMP efforts. Spring 2022
- Initial reconnaissance: 2 days with 2-person crew; ideal timing would be fall when water levels are most restricted. Fall 2022
- Pre-construction effort 1: 14 days with 4-person crew. Fall 2022
- Pre-construction effort 2: 14 days with 4-person crew. Fall 2023
- Pre-construction effort 3: 14 days with 4-person crew. Fall 2024
- Pre-construction effort 4: 14 days with 4-person crew. Fall 2025
- Pre-construction effort 5: 14 days with 4-person crew. Fall 2026

Commented [SJ37]: If we only sample in fall, we are going overrepresent the average annual flow. I get why fall would be the best time, I'm just noting that we can't extrapolate this data out too far as it's a seasonal stream under existing contains.

Post-Project implementation:

- Post-construction effort 1: 14 days with 4-person crew. Fall 20XX
- Post-construction effort 2: 14 days with 4-person crew. Fall 20XX
- Post-construction effort 3: 14 days with 4-person crew. Fall 20XX
- Post-construction effort 4: 14 days with 4-person crew. Fall 20XX
- Post-construction effort 5: 14 days with 4-person crew. Fall 20XX
- Additional post-construction efforts up to 10 years after initial construction as determined by the Authority.

Permitting Requirements

A CDFW Scientific Collecting Permit (Specific Use) or Memorandum Of Understanding permit would be required to complete the study design as proposed. BMI samples would be the only sacrificed species.

4.0 SWAMP Bioassessment Study Designs and Methods

4.1 Purpose of Bioassessment Monitoring Program

Stream bioassessment monitoring is a method of evaluating and monitoring the environmental health and integrity of freshwater wadeable streams by using BMI, water quality parameters, and physical habitat (PHAB) conditions indicators of stream condition. Bioassessments are especially useful in tracking the aquatic conditions before and after a project is implemented to determine the post-project effects on aquatic communities. A SWAMP bioassessment that focuses on the relationships between physical habitat, water quality, BMI, and algal communities would be conducted on the reaches downstream of the proposed impoundments on Stone Corral Creek and Funks Creek.

The ultimate goal of the bioassessment study is to evaluate the environmental condition of both Stone Corral Creek and Funks Creek by using the indicators of stream condition. This information, along with the other required studies (i.e., Fish Assemblage Study and Flow Characterization and Geomorphic Study), would help to inform the type of flow releases that should be made to the creeks under various operating conditions.

Commented [SJ38]: Yes, but not using anything other than fish for 5937 compliance metrics. That will just be fish until CDFW absolutely forces us to use other metrics. We will be having discussions with them about this.

4.2 Overview of Proposed Methods

The bioassessment effort would be conducted using the methods described in the SWAMP 2016 SOP (Ode et al. 2016a, 2016b), or any updated version thereof. The reach-wide benthos method, which requires collection from each of 11 designated major transects across the sampling reach regardless of stream habitat type (e.g., riffle, run, pool), would be employed.

The ultimate number of individual sites, herein referred to as sampling reaches, on each creek would be based on access and safety; however, it is anticipated that five sampling reaches would be located on Funks Creek and that six sampling reaches would be located on Stone Corral Creek (Figure 3). Since there is no stringent guidance on establishing the number of bioassessment sampling reaches for a project such as this (Rehn pers. comm.), the number of sampling reaches was chosen to both best capture and quantify the two different elevational gradients within the study area (i.e., foothill and valley floor environments), and to have adequate spacing/distance between the sampling reaches (approximately 500 meters apart on Funks Creek above Funks Reservoir and approximately 2 kilometers apart elsewhere).

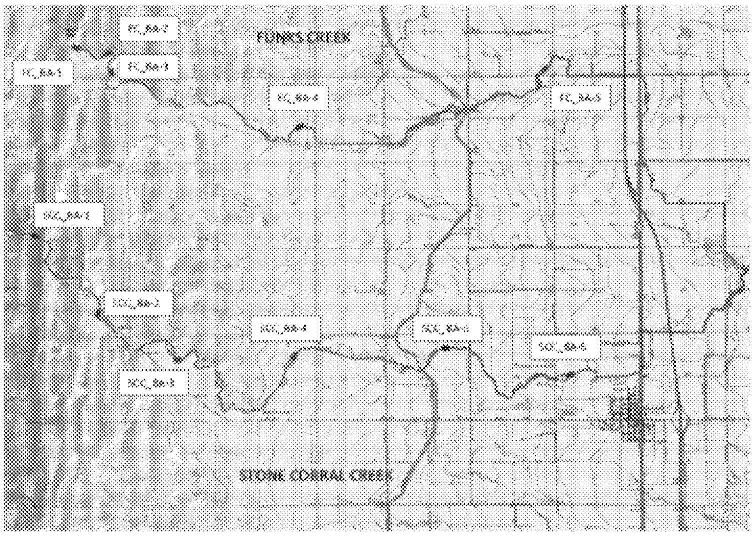


Figure 3. Potential Bioassessment Sampling Reaches, Stone Corral and Funks Creeks

4.3 Field Methods

This section summarizes the methods that would be used to collect all bioassessment data. All surveys would be performed by a qualified team of a biologist or biologists and a geomorphologist with expertise in benthic macroinvertebrate and algae collection, water quality monitoring, and physical habitat data collection.

4.3.1 Sampling Reach Delineation

As described in Chapter 2 of the SWAMP 2016 SOP, the average wetted width of each sampling reach would be used to determine the sampling reach length (Ode et al. 2016a). The SWAMP 2016 SOP specifies standard sampling reach lengths that are based on wetted width (150 meters for sampling reaches with average wetted widths less than or equal to 10 meters, and 250 meters for sampling reaches with average wetted widths greater than 10 meters).

Commented [SJ39]: During which time of year? This only flows after rainfall.

After the sampling reach length is determined, it would be laid out using marked surveyor's flags for transect identification and transects would be labeled according to the SWAMP 2016 SOP (main transects A–K and inter-transects AB, BC, etc.) for a total of 11 main transects and 10 inter-transects.

4.3.2 Basic Data Collection

Basic information collected at each sampling site would include project name, sampling reach name, time and date of survey, stream/watershed name, Global Positioning System (GPS) coordinates, and the names of the survey crew members. GPS coordinates would be recorded with an appropriate collection device (e.g., hand-held GPS receiver or iPad). Data collected at the sampling reaches would include water quality and stream discharge measurements, physical habitat information, and BMI and algae sample collections. The most recent version of the SWAMP *Stream Habitat Characterization Form Full Version* field forms would be used to enter data in the field.

4.3.3 Water Quality and Discharge Measurements

Water quality data would be measured using a YSI Pro DSS unit (or similar collection device), following Chapter 3 of the SWAMP 2016 SOP (Ode et al. 2016a) and recorded on standard SWAMP data forms. Water quality data obtained would include temperature, specific conductivity, salinity, dissolved oxygen, alkalinity, turbidity, and pH.

To determine alkalinity (which is a standard YSI is not capable of doing), a water sample would be collected at each sampling reach. The sample would be taken at approximately 10 to 15 centimeters below the water surface. Using gloves, collectors would fill the water sample bottles to the brim to ensure that air bubbles would not get trapped in the sample bottle. The bottle would then be placed on ice in a cooler until all field data collections were completed. In the evening following each day's sample collection, the water samples would be removed from the coolers and allowed to warm to room temperature. Alkalinity would then be determined by the double endpoint titration method using a Hach Digital Titrator.

Stream discharge would be measured using a Marsh-McBirney Flo-Mate Model 2000 flow meter and following the Velocity Area Method (Module O in Chapter 8 of the SWAMP 2016 SOP (Ode et al. 2016a, 2016b). Every effort would be made to select a stream transect with a relatively uniform cross section and laminar flow, and at least 20 equally spaced data points would be used to estimate streamflow.

Commented [SJ40]:

4.3.4 Physical Habitat Assessment and Photo-Documentation

As required by the SWAMP 2016 SOP, PHAB information would be collected at the sampling reaches at each transect and inter-transect location. At the 11 main transects, the full measurements listed in Chapter 6 of the SWAMP 2016 SOP would be taken (Ode et al. 2016a, 2016b). At the 10 inter-transects, fewer measurements would be taken per the SWAMP *Stream Habitat Characterization Form Full Version* field forms.

Digital photo documentation for each sampling reach would consist of upstream and downstream views at transects A, F, and K (i.e., the downstream, middle, and upstream portions of the sampling reach). Incidental observations such as recent rainfall, fire effects, flooding, and other disturbances would also be recorded.

At each sampling reach, reach-wide PHAB conditions relative to three Rapid Bioassessment Protocol (RBP) habitat parameters would be evaluated based on visual observations. These observations would include epifaunal substrate/cover, sediment deposition, and channel alteration. Each of these parameters would be scored using a numeric value and ranked using the following 20-point scale, per the SWAMP 2016 SOP:

- 1–5 rank as poor;
- 6–10 rank as marginal;
- 11–15 rank as suboptimal; and
- 16–20 rank as optimal.

4.3.5 Benthic Macroinvertebrate Sample Collection

BMI collection would be conducted according to the SWAMP 2016 SOP, using the reach-wide benthos method, which requires collection from each of the 11 major transects across the sampling reach regardless of stream habitat type (e.g., riffle, run, and pool). The BMI samples would be collected 1 meter downstream of each major transect by sampling a 1-foot-square area using a D-frame net. The sampling would begin at transect A (the downstream end) and continue upstream to transect K, with the sample location alternating from left (25% of width), to center (50% of width), to right (75% of width) on each subsequent transect.

All collections from the 11 major transects would be composited into a single sample and transferred into a 1-liter, wide-mouth plastic jar and preserved with 95% ethanol, following the SWAMP 2016 SOP. Samples would be labeled with collection site, time, and collector's name; and a chain-of-custody form would be filled out to accompany the samples on their way to the laboratory for identification. Replicate samples would be collected according to the SWAMP 2016 SOP at one sampling reach for quality assurance/quality control (QA/QC) purposes.

4.3.6 Algae Sample Collection

Algae would be collected in the same manner as the BMI samples, except that the algae would be collected 25 centimeters above the location where the BMI sample would be located. Algae samples would be collected using the sampling tools identified in the SWAMP 2016 SOP, which vary according to the substrate being sampled. A rubber delimiter would be used for large gravel and cobble; a PVC delimiter would be used for fines and gravels; and a syringe scrubber would be used for bedrock and large boulders (if present).

Similar to the BMI sampling, each algae sample collected at the 11 major transects would be composited into a single sample for processing. The processing of the algae would follow the SWAMP 2016 SOP, which would involve removal of algae from the substrates collected and processing the sample for the four algae analyses: quantitative soft-bodied algae, quantitative diatoms, ash-free dry mass (AFDM), and chlorophyll a. A soft-bodied algae qualitative sample would also be collected from each sampling reach by collecting a composite of all types of soft-bodied algae observed within the sampling reach into a single sample. This sample would aid in the identification of soft-bodied algae in the quantitative sample and would be used in the calculation of some of the algae metrics. Replicate algae samples would be collected at the same sampling reaches where replicate BMI samples would be collected.

4.4 Laboratory Processing

Commented [SJ41]: Can we grab some fish and have then sent to the lab for toxicity testing, I'd like to know what's there now as mercury is going to be a continuing question.

This section summarizes the methods that would be used to process all bioassessment data.

4.4.1 Water Quality

Two water samples would be collected at each sampling reach to determine total nitrogen and total phosphorus, constituents necessary for helping to determine algal results. Samples would be sent to a local water quality processing laboratory in northern California. The water quality analyses would be consistent with SWAMP protocols for water chemistry. Total nitrogen would be analyzed according to U.S. Environmental Protection Agency Method 351.2, and total phosphorous would be analyzed according to Standard Methods 4500-P B and 4500-P E.

4.4.2 Benthic Macroinvertebrate Sample Processing

BMI sample taxa identification would be conducted by an outside laboratory (most likely by the Chico Aquatic Bioassessment Laboratory [Chico ABL] in Chico, California). BMI samples would be picked, sorted, and identified completely or until a 600 count (SAFIT Level 2) is reached. Chico ABL follows QA/QC procedures developed under the SWAMP program.

4.4.3 Algae Sample Processing

Five types of algae would be collected and processed: qualitative grab, soft-bodied algae, diatoms, AFDM, and chlorophyll a. The qualitative grab, soft algae, and diatom samples would be sent to the CDFW Group at the Marine Pollution Studies Laboratory at Moss Landing Marine Laboratories (MPSL-MLML). MPSL-MLML would report the data to Marco Sigala at Moss Landing in SWAMP template formats. Mr. Sigala would calculate the Algae Stream Condition Index (ASCI) from the data. The samples of AFDM and chlorophyll a would also be sent to MPSL-MLML, who would report the data in California Environmental Data Exchange Network template formats. PSL-MLML follows the QA/QC procedures developed under the SWAMP.

4.5 Data Analysis

PHAB information would be entered using the SWAMP Version 2.5 bioassessment data entry forms (Marine Pollution Studies Laboratory 2022) and then loaded into the Microsoft Structured Query Language (SQL) Server database of the MPSL-MLML. BMI and algae taxonomy data, as well as water chemistry data would be loaded from Microsoft Excel templates into the same Microsoft SQL Server database. The data entry forms and templates would be obtained from the MPSL-MLML Data Center website. All data would be verified and checked for completeness after input into the database.

4.5.1 Physical Habitat Information

PHAB data would be entered by the MPSL-MLML using the SWAMP Bioassessment Field Form Microsoft Access database, and then loaded into the MPSL-MLML's Microsoft SQL Server database. After loading, additional error and completeness checks would be run following SWAMP business rules. The data would be sent to the California Environmental Data Exchange Network, where it would be available to the public for viewing and download.

PHAB metrics would be calculated using the SWAMP Bioassessment Reporting Module. The SWAMP protocol contains a subset of parameters measured within the U.S. Environmental Protection Agency's Environmental Monitoring and Assessment Program for freshwater wadeable streams; therefore, many of their metrics described in Kaufmann et al. (1999) form the basis of the SWAMP Bioassessment Reporting Module output. SWAMP also has added metrics specific to its protocol and analyses, as well as metrics specific to the Sierra Nevada Aquatic Research Laboratory protocol.

Commented [SJ42]: Anything for costal range?

SWAMP has developed a PHAB Index similar to the California Stream Condition Index (CSCI) (see Section 4.5.3) for BMI data. The PHAB Index (called the "IPI") combines eight GIS-calculated metrics with 12 PHAB metrics to produce one IPI value (Rehn et al. 2018). For the purposes of statewide assessments, the IPI has thresholds of physical condition: greater than or equal to 0.94 indicates likely intact condition; 0.93 to 0.84 indicates possibly altered condition; 0.83 to 0.71 indicates likely altered condition; and less than or equal to 0.70 indicates very likely altered condition.

Commented [SJ43]: Is the goal to do this analysis yearly and see if this changes? We're building a dam so it probably will. Let's talk about this and what it means.

In addition, the results would be compared to key stressor thresholds that best highlight the conditions at the sampling reaches identified in *Ecological Condition Assessment of California's Perennial Wadeable Streams: Highlights from the Surface Water Ambient Monitoring Program's Perennial Stream Assessment (PSA) (2000–2007)* (Ode et al. 2011). These select stressor thresholds are not regulatory limits set by the State Water Board; rather, they are biology-based stressor thresholds developed by researchers as an objective means to set meaningful, regionally appropriate water quality standards. Specifically, two statewide and regional physical habitat biological stressor thresholds, the Percent Fines & Sand and Mean Embeddedness thresholds, would be evaluated.

Commented [SJ44]: Why these? And Why only these?

4.5.2 Water Quality

Similar to the PHAB analysis described above, water quality results would be compared to key stressor thresholds that best highlight the conditions at the sampling reaches identified in *Ecological Condition Assessment of California's Perennial Wadeable Streams: Highlights from the Surface Water Ambient Monitoring Program's Perennial Stream Assessment (PSA) (2000-2007)* (Ode et al. 2011). Specifically, the Turbidity and Specific conductance water chemistry biological stressor thresholds (statewide and regional) would be evaluated.

Commented [SJ45]: Same question as above

4.5.3 Benthic Macroinvertebrates

MPSL-MLML would be contracted to assist in the analysis of the BMI data. MPSL-MLML would use the BMI taxonomic data obtained from Chico ABL to calculate CSCI scores for each sampling reach. The CSCI is a statewide biological scoring tool that translates complex data about individual BMIs found living in a stream into an overall measure of stream health (Rehn et al. 2015).

CSCI scores and output would be calculated using R scripts defined in Mazor et al. (2017). CSCI score categories would be applied as defined in Rehn et al. (2015).

- less than or equal to 0.62: very likely altered
- 0.63–0.79: likely altered
- 0.80–0.91: possibly altered
- greater than or equal to 0.92: likely intact

MPSL-MLML would also calculate several BMI metrics from the taxonomic data for each sampling reach. These individual metrics would be reviewed to discuss the individual results for each sampling reach and event. Representative metrics may include measures of taxa richness, composition, tolerance, functional feeding groups, and habit measures. These other metrics may be more insightful for determining the biological integrity of the BMI communities than the CSCI scores alone (at least in the valley floor sampling reaches), as valley floor reference sites (the sites used in the CSCI calculations) are relatively limited in abundance (Rehn pers. Comm.).

4.5.4 Algae

Diatoms and Soft Algae

MPSL-MLML would be contracted to calculate the statewide diatom, soft algae, and hybrid ASCI and associated metrics. These predictive biological indices replace past regional indices with a statewide index allowing for improved comparisons across diverse landscapes in a consistent and comparable manner. While ASCI can be calculated for soft algae and diatoms separately, the hybrid ASCI produces stronger species distribution models for more accurate and integrative assessments of biological condition.

Chlorophyll a and Ash-Free Dry Mass

Ode et al. (2011) in their analysis of the results from the statewide Perennial Stream Assessment between 2000 and 2007, have included stressor thresholds for chlorophyll a and AFDM. These thresholds are more protective than levels proposed by previous authors, which were 100 milligrams per square meter for chlorophyll a and 50 grams per square meter for AFDM (Barbour et al. 1999, Welch et al. 1988, Dodds et al. 1998, Sosiak 2002, Dodds and Welch 2000, U.S. Environmental Protection Agency 2000, Biggs 2000). The thresholds proposed by Ode et al. (2011) are not regulatory limits or requirements but rather recommendations. The chlorophyll a and AFDM stressor thresholds (statewide and regional) would be evaluated for each sampling reach by MPSL-MLML.

Commented [SJ46]: What is Ode et als? I'm more comfortable going with USEPA for our ecoregion but am willing to discuss.

4.6 Timing and Frequency

The bioassessment surveys would be conducted during the appropriate index period for Central Valley streams (June through August[1]), which is typically 4 to 6 weeks following the last winter storm event. Baseline (pre-construction monitoring) would occur in the spring for 5 years prior to project ~~construction~~ operation~~(dam and reservoir construction)~~. Follow-up (post-baseline) surveys would be conducted on an annual basis during the same time period for up to 10 years after ~~construction~~ operation activities – the Authority and the relevant permitting agencies (CDFW, SWRCB and the CVRWQCB) would ~~determine~~ be consulted if the frequency of monitoring would be ~~can be~~ shortened after 5 years.

Commented [SJ47]: 90% chance they will be dry with a few pools and seeps.

Commented [SJ48]: The timing in the bullets above says Fall of every year, so these are done separately from the fish sampling. Can we not do them all at the same time?

4.6.1 Permitting Requirements

A CDFW Scientific Collecting Permit (Specific Use) or Memorandum Of Understanding permit would be required to complete the study design as proposed. BMI samples would be the only sacrificed species.

4.7 Additional Water Quality Measurements

In addition to the standard water quality measurements included in the SWAMP bioassessment as described above, water samples will also be collected for laboratory measurements of cyanobacteria, cyanotoxins, and a full suite of total and dissolved metals (as described below). The objectives for taking these additional measurements will be to compare pre-Project and post-Project values, determine any effect of operational adjustments on sampled water quality constituents, and compare water quality measurement values to key stressor thresholds.

The suite of metals includes aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, methylmercury, nickel, selenium, silver, and zinc. The cyanobacteria water samples will be collected for the purpose of laboratory analysis for cyanobacteria presence and density and the presence of cyanotoxins (specifically microcystins, anatoxin-a, and cylindrospermopsin).

When these additional water quality samples are collected, the following basic survey information and data described above would be collected: project name, sampling reach name, time and date of survey,

[1] Depending on stream conditions, bioassessment surveys may need to be performed prior to the appropriate index period to ensure adequate flow for benthic and algal sampling is present.

stream/watershed name, and the names of the survey crew members. Incidental observations such as recent rainfall, fire effects, flooding, and other disturbances would also be recorded. Basic data collected at the sampling sites would include stream discharge measurements, temperature, specific conductivity, dissolved oxygen, turbidity, pH, and water samples for total nitrogen and total phosphorus laboratory measurements. In addition, water samples will be collected for laboratory measurements of dissolved organic carbon and hardness as these parameters influence water quality standards for aquatic life protection for some metals.

These measurements will be taken twice a year, once during a high flow period and once during a low flow period, at the upstream and downstream bioassessment sampling locations on each creek. Sampling would occur during the same years as the rest of the bioassessment studies.

5.0 Hydrogeomorphic Study

5.1 Purpose of Flow Characterization and Geomorphic Study

The overall purpose of the Flow Characterization and Geomorphic Study (hydrogeomorphic technical study) would be to characterize historical and present-day streamflows, including baseflow during the spring and summer months, on Funks and Stone Corral Creeks; the relevant geomorphic characteristics of each creek (herein called 'geomorphic indicators'); and flow levels necessary for channel maintenance of geomorphic processes required to maintain the channels in their current condition.

A hydrogeomorphic technical study with quantitative and qualitative monitoring data to fully characterize the existing hydrologic regime of Funks and Stone Corral Creeks, as well as the overall type and abundance of sediment available for aquatic organisms, would be developed. To inform the appropriate streamflows for the creeks under inquiry, a geomorphic assessment of the reaches of interest (i.e., the stream reaches below the dams) would constitute the first step in the analysis. The channel segments upstream of the dams would also be examined to provide a greater understanding of the local watershed geomorphic characteristics. The focus of the geomorphic assessment would be to determine the dominant geomorphic processes, document the surrounding landforms and channel bed topography, and to determine how the observed morphology of each creek is influenced by the hydrologic regime and the surrounding land uses. Likewise, collection of geomorphic information would aid in the determination of overall channel stability for each creek, which has important implications for the proposed releases.

Commented [SJ49]: Is this needed to achieve the goals? Our interest is in the downstream channels and a flow regime post operation that would be needed to maintain in current condition.

The hydrogeomorphic technical study to examine the hydrologic regime of Funks and Stone Corral Creeks would include a desktop modeling exercise, as well as installation of stilling wells, staff gages, and real-time water surface level collection devices. The ultimate goal of the hydrogeomorphic technical study would be to evaluate the physical and hydrologic condition of the reaches of interest withing both Stone Corral Creek and Funks Creek. This information, along with the other required studies as discussed in previous chapters (i.e., Fish Assemblage Study and SWAMP bioassessment study), would help to inform the type of flow releases that should be made to the creeks under various Project operating conditions.

After completion of the baseline studies, consideration would be given to when and how flows would be released and ~~;~~ whether a portion of these flows are needed to maintain fluvial geomorphic processes (based on the findings from the geomorphic assessment)~~, and what level of variability in base flows would satisfy CFGC Section 5937~~.

5.2 Study Design

The (baseline) hydrogeomorphic study components are discussed below. *Field site locations* are applicable to the geomorphic component of the hydrogeomorphic technical study; *hydrologic monitoring locations* represent the potential locations where stilling wells, staff gages, and real-time water surface level collection devices would be installed (i.e., the hydrologic component of the hydrogeomorphic technical study). The ultimate number of field site locations on each creek would be based on access and safety; however, it is anticipated that five sites would be located on Funks Creek and that six would be located on Stone Corral Creek. The locations for the geomorphic component of the hydrogeomorphic technical study would presumably be the same as the bioassessment sampling reaches as part of the SWAMP bioassessment study as described in Chapter 4 (see Figure 3).

The ultimate number of hydrologic monitoring locationns on each creek would primarily be based on access, due to the need for monitoring during and after precipitation events. It is anticipated that two sites would be located on each creek: one in the foothills and one on the valley floor as shown on Figure 4.

5.2.1 Geomorphic Conditions

Data collected during the geomorphic component of the hydrogeomorphic technical study (geomorphic assessment) would include a host of geomorphic attributes, or indicators, as described below. Topographic data (longitudinal profile and cross sections) needed for the hydrologic model (further described below) would also be collected during the geomorphic assessment. The geomorphic assessment would be conducted by a geomorphologist with expertise in channel and floodplain dynamics, channel stability analyses, and topographic surveying techniques.

Commented [SJ50]: We just flew LIDAR and this could be used as it is survey grade

The geomorphic assessment would include evaluation of the following indicators.

- channel classification
- local watershed inputs
- hydrologic and flow patterns
- riparian vegetation condition
- bankfull width and depth and wetted width
- bank instability and bank characteristics
- channel bed substrate composition and embeddedness
- channel complexity
- degree of channel incision
- stage of channel evolution
- cross section and longitudinal profile surveys

These indicators would be assessed for each field site location (Figure 3). In addition, at least three permanent cross sections would be established within each field site location and within each hydrologic monitoring location (Figure 4) for collection of quantitative channel morphology information and required modeling input. Evaluation methods for these indicators are described below.

Channel Classification

River segments can be grouped into three generalized classifications based on their position in the watershed and the relative balance of transport capacity to sediment supply (Montgomery and Buffington 1998). Headwater source areas are typically transport-limited (often due to limited channel runoff) but do offer sediment storage that is intermittently initiated under large flow events, debris flows, or other gravitational events. Transport segments are composed of morphologically resilient, supply-limited reaches (e.g., bedrock, cascade, and step-pool) that rapidly convey increased sediment inputs. Response segments consist of lower-gradient, more transport-limited depositional reaches (e.g., plane-bed, pool-riffle) where channel adjustments occur in response to changes in sediment supply delivered from upstream.

Based on field observations and the stream classification methodology of Montgomery and Buffington (1998), each field site location would be classified accordingly. The classification would aid in the determination of the sediment regime and bedform morphology, which would help characterize the stream habitat and function of each field site location on the reaches of interest.

Local Watershed Inputs

Any major inputs of sediment and runoff into the field site locations (e.g., landslides or other mass wasting features, recent burn scars) will be summarized. The objective would be to identify any land use changes that could alter the balance of sediment supply and runoff that could lead to future instability (e.g., channel aggradation of degradation) within the reaches of interest. This will aid in the determination of channel stability and the potential for available habitat to be disrupted or altered in the vicinity of the field site locations.

Hydrologic and Flow Patterns

The hydrologic pattern would be determined throughout the length of the field site locations and would include identification of whether streamflow is perennial, intermittent, or ephemeral. Perennial streams are those which flow year-round; intermittent streams are those which flow for only certain times of the year and receive water from both surface water and groundwater; and ephemeral streams are those which have their channels above the water table year-round and only receive water from surface runoff. This geomorphic indicator would rely on the field-based hydrologic component of the overall hydrogeomorphic technical study, as describe below.

Riparian Vegetation Condition

Riparian vegetation is an important indicator for overall stream habitat and function as it serves to stabilize streambanks and allows for canopy cover to create suitable water temperatures for aquatic species. Riparian condition refers to a description of the general health of the riparian area, focusing on the amount and type of vegetative cover.

Within each field site location, riparian condition would be described as low (0–25 % vegetative cover), moderate (25–50 % vegetative cover), high (50–75 % vegetative cover), or very high (75–100 % vegetative cover). The size and approximate age of any riparian vegetation growing in the channel bed would be documented because this is evidence of channel adjustment and possible re-stabilization from a prior disturbance.

Bankfull Width and Depth and Wetted Width

Bankfull width and depth measurements would be recorded to assess the hydraulic capacity of the channel in the field site locations. Specifically, a geomorphic or effective bankfull surface would be identified in the field. The geomorphic bankfull or effective surface is the surface that gets inundated by the discharge that performs the most geomorphic work on a system, typically a flow that occurs every 1.5–2 years (Knighton 1999). This discharge, known as the geomorphic bankfull discharge, is defined as that water discharged when stream water just begins to overflow into the active floodplain. The geomorphic bankfull or effective surface would be identified based on the methodology of Harrelson et al. (1994) and Hauer and Lamberti (1996). Once this surface is recognized, width and depth measurements would be recorded.

Similar to bankfull width and depth measurements, wetted width and depth measurements would be recorded. Specifically, the wetted surface would be determined identified in the field and width and depth measurements would be recorded.

Bankfull and wetted width and depth data collection would help to determine the size of the channel, which would help in assessing overall available habitat conditions in the field site locations and reaches of interest.

In addition, the "active channel" width would be identified, which typically represents a typical low to moderate flow regime and is usually bounded by the width of the in-channel vegetation.

Bank Instability and Bank Characteristics

The term 'bank instability' refers to streambanks that are either actively retreating or have the potential to retreat in the near future. In brief, weakening processes are any bank or near-bank processes that act to erode or prepare streambanks for further erosion (Lawler 1992). The purpose of assessing this indicator will be to identify fluvial erosion (erosion associated with flowing water) and bank failure (erosion associated with gravitational forces and weakening processes). Fluvial erosion is closely related to boundary shear stress, which can be loosely approximated by unit stream power variations, and bank failure is collapse of all or part of the streambank in situ (Lawler 1995).

Bank stability would be defined as the natural streambank that has stable groundcover. Stable ground cover includes rooted trees, shrubs, herbaceous plants, and naturally occurring rocky substrates. Bank composition and bank height/angle would also be determined. The results, in conjunction with the other indicators, can be used to detect where the channel may be downcutting as suggested by over-steepened banks, and can also be used to describe the potential for the channel to potentially laterally migrate and increase the risk of bank instability.

Bank stability analyses will aid in determination of the sediment regime and bedform morphology, which will help characterize the stream habitat and function of the field site locations, as well as the determination of channel stability and the potential for available habitat to be disrupted or altered in the field site locations.

Channel Bed Substrate Composition and Embeddedness

Substrate composition and embeddedness refer to the size of the substrate materials on the channel bed, and the degree to which these materials are embedded. These conditions indicate how frequently the channel substrate is mobilized. Substrate composition and embeddedness would be measured using the methods described by Bunte and Abt (2001). Substrate composition would identify the available substrate (overall type and abundance) for aquatic species in the vicinity of each field site location and would allow for determination as to whether the Reservoir Operations Plan would require gravel augmentation in the reaches of interest.

Channel Complexity

The presence or absence of gravel bar development and evidence of scour and/or deposition would be determined throughout the length of each field site location. Pool and riffle habitats containing in-channel structures (e.g., instream woody material) that create complexity and habitat niches for aquatic organisms would also be documented. Basic channel or habitat units (e.g., pool, riffle, and flatwater) would be delineated according to standard habitat mapping descriptions in each field site location. A rough proportion of unit types will be calculated.

Channel or habitat units would be defined as follows.

- Pool: Slow water, length and width at least one-half the bankfull channel width, and a 10-inch minimum residual pool depth. Subcategories define the general type of pool and include scour (lateral, channel, channel confluence, plunge), dam, and backwater, as defined by Overton et al. (1997).

- Riffle: Swiftly flowing, turbulent water, some partially exposed substrate, substrate cobble, and/or boulder dominated (McCain et al. 1990).
- Flatwater: Wide, uniform channel bottom, low to moderate water velocity, and little surface agitation. Encompasses any areas that do not qualify as pool or riffle (McCain et al. 1990).

If appropriate (i.e., if the habitat diversity merits such a method), the field site locations would be habitat typed to provide a more detailed stream habitat inventory based on the methods described in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al. 2010). Stream habitats would be delineated into one of the six Level-III habitat classification types (per Flosi et al. 2010) based on morphological characteristics. These include overall channel gradient, water velocity and depth, substrate, and, where applicable, the channel features (e.g., boulder, bedrock, woody material, converging flow) causing the formation of the habitat unit through scour and sediment deposition (Flosi et al. 2010). Channel/habitat type determination would allow for identification of available habitat types for aquatic species.

Commented [SJ51]: We don't have salmonids and this may draw some concern from the locals.

Degree of Channel Incision

The degree to which the channel is incised will be recorded as negligible, low, moderate, high, or very high. The degree of incision will be qualitatively analyzed using the following criteria.

Identification of any Quaternary landforms on the floodplain (e.g., terraces, low floodplain, fan, etc.). Terraces typically have steep streambanks and the channel may not necessarily be incised. Steep, unstable streambanks adjacent to a low floodplain surfaces, however, typically indicate incision.

Identification of bedforms downstream of the site where and if the channel is less incised. Bed and streambank material from incised channels would typically be deposited downstream in somewhat uncharacteristically large deposits on the channel bed (downstream aggradation).

Recognition of base level changes downstream. Dams and other barriers can create upstream changes in channel bed elevation (i.e., headward migration of incision).

Visual survey of channel bed at the field site location. Channel or habitat sequences, such as pool-riffle sequences, are rare in incised channels, and those that do exist do so for only limited time intervals. Additionally, the increased depth of flow associated with incision, coupled with an increased flashy regime, results in bed armoring and a decreased frequency of bed mobilization.

Determination of the health of the riparian and floodplain plant species. Plants that are found in similar, un-incised reaches are usually not present in incised reaches. No vegetation at all is an indicator of no hydrologic interaction between the floodplain and the channel and therefore incision.

Identification of recent evidence of overbank deposition of fine sediment, plant debris, or other organic matter. A channel that floods its streambanks frequently would typically have splay (i.e., sand) deposits and vegetation with a smoothed, flooded appearance in the downstream direction. Natural levee development is also an indication of frequent flooding.

Stage of Channel Evolution

A stream evolution model (Cluer and Thorne 2013) would be applied to the entirety of the reaches of interest on Funks and Stone Corral Creeks to provide a template for understanding geomorphic responses and processes within the immediate watershed. The stream evolution model of Cluer and Thorne (2013) revisits and updates two well-established channel evolution models (Schumm et al. 1984, Simon and Hupp 1987) in light of recent research and the authors' practical experiences.

In addition, a channel stability analysis would be conducted at each field site location. The chosen methodology would be dictated by site conditions but could include the methods as presented in the modified Pfankuch procedure (Pfankuch 1975) as described by Rosgen (2001), Simon and Down (1995), Bledsoe et al. (2011), or other applicable method. The stream evolution model and the channel stability analyses would aid in the determination of how on Funks and Stone Corral Creeks may evolve (e.g., deepen/widen) or remain in a state of equilibrium in the future, thus having implications for the available habitat within the channels.

Cross Section and Longitudinal Profile Surveys

As mentioned above, at least three permanent cross sections would be established within each field site location (Figure 3) and within each hydrologic monitoring location (Figure 4) for collection of quantitative channel morphology information and required modeling input. Permanent cross sections would be established perpendicular to the primary channel following the methodology of Harrelson et al. (1994). Each transect would be surveyed using ground-based surveying equipment to capture and track channel morphology. Elevations along the cross sections would be collected at intervals close enough to capture slope breaks and distinct morphological features within the floodplain (if present), and along the channel sides and bottom.

The location of each cross section would be permanently marked in the field using 4-feet-tall metal t-posts or wooden lathes (to easily find the general transect location) and with rebar driven vertically into the ground surface, capped with an appropriate cover (to establish known permanent elevations [permanent monuments or benchmarks] on each side of the transect). The permanent benchmarks for each transect would be placed in a stable location above the active channel on the left and right (as viewed facing downstream) banks or terraces of the channel. Transect endpoints (i.e., the permanent monuments) would be documented using a GPS receiver. Representative photographs would be taken at each cross section.

In addition to the cross sections, a longitudinal profile would be surveyed throughout the length of the channel within a field site location. The spacing between channel bed data points would vary depending on the complexity of the channel bed characteristics. Digital photographs would be taken in the upstream and downstream directions at various locations throughout the longitudinal profile. The location(s) of each cross section would be surveyed on the longitudinal profile for graphical plotting purposes.

Channel Geometry Metrics

As mentioned previously, bankfull width and depth measurements would be recorded to assess the hydraulic capacity of the channels. This would be completed at the cross sections measured in the field. In addition to bankfull, wetted, and active channel width and depth measurements, the bankfull and entire channel width-to-depth ratio would be calculated for each cross section, and sinuosity and gradient of the longitudinal profile would be determined.

5.2.2 Hydrologic Conditions

Commented [SJ52]: We do have some H&H modeling that the design team did that might be used instead. I will send it over.

The hydrologic component of the hydrogeomorphic technical study would consist of both desktop (modeling and historical conditions review) and field-based efforts (generation of stage-discharge relationships), both of which are summarized below. The desktop effort would provide detailed information on various (modeled) flows of interest (i.e., the 2-year, 5-year, 10-year, 50-year, and 100-year flow events), while the field-based efforts would validate/calibrate the modeling results via collection of real-time streamflow data, especially for smaller streamflow events (the flows that are expected to occur most of the time on each creek).

Summary of Modeling Approach

A HEC-HMS rainfall-runoff-routing watershed hydrology model would be created to generate hydrographs for both Stone Corral Creek and Funks Creek. Inputs into the hydrology model would include watershed land use, percent impervious inputs, soil types, precipitation and evapotranspiration, drainage network characteristics, and topography (which will be generated from available LiDAR).

The topographic surveys as described above would also serve to augment the existing LiDAR data with on-the-ground data to better capture topography in areas requiring additional detail (such as densely vegetated areas). The topographic surveys would be tied into the State Plane Coordinate System and would be sufficient to generate contours at a 1-foot interval. The data collected via the topographic surveys would also be required for generation of stage discharge relationships, as described below.

It should be noted that HEC-HMS rainfall-runoff-routing watershed hydrology model constitutes the first (somewhat exploratory) step in the hydrologic analysis. Releases into Funks Creek will be made through the transition manifold at the base of Golden Gate Dam and a new pipeline that terminates at Funks Creek below the dam. These facilities will carry up to 100 cfs with a release range of 0 to 100 cfs into Funks Creek. Releases into Stone Corral Creek will be made through the permanent outlet at Sites Dam. This outlet will have a release range of 0 to 100 cfs, with an emergency release capacity of up to 2,500 cfs. The modeling effort will be the first step in verifying that this proposed range described in the EIR is adequate to address the purpose of CFGC Section 5937 given the modeled hydrology.

Summary of Field-Based Analysis

The primary objective of the field investigation would be to provide an accurate description of the existing watershed hydrology and variations in streamflow and water surface elevations (i.e., stage) on both Stone Corral Creek and Funks Creek. Periodic streamflow measurements (depth and velocity measurements) would be taken to develop stage-discharge relationships (rating curves) to translate the continuous water depth measurements measured with continuous stage recorders (i.e., HOBO water level loggers [Onset Computer Corporation]) into continuous estimates of flow. These measurements would occur at the hydrologic monitoring locations as shown on Figure 4.

To determine continuous estimates for streamflow, the stage recorders, which measure water temperature and pressure, and vertical stilling wells would be installed in relatively deep portions of the creeks at the locations as shown on Figure 4. The HOBO water level loggers would be set to monitor water depth every 15 or 30 minutes. Additional HOBO water level loggers would also be installed to monitor barometric pressure every 15 or 30 minutes for the purpose of calibrating the depth (water pressure) measurements, which are also affected by barometric pressure. These additional data loggers would be secured to upland surfaces (e.g., trees). Streamflow measurements would be collected to develop equations to convert the continuous stage recorder data into estimated streamflows (discharge). During variable discharge conditions, streamflows would be estimated using a Marsh-McBirney Flo-Mate Model 2000 flow meter and top-setting rod following the procedures described in Module O in Chapter 8 of the SWAMP 2016 SOP (Ode et al. 2016a, 2016b).

Daily precipitation data from obtained from the California Data Exchange Center would be used to characterize the rainfall patterns during the study period. Rainfall patterns would be displayed concurrently with the measured streamflow data.

If necessary, acoustic Doppler current profiler (ADCP) technology could be used to capture high flow events. ADCP equipment is particularly useful for collecting accurate and precise water depth and 2-D/3-D velocity data, especially at high flows when other standard surveying techniques as described above are impractical or unsafe. ADCP technology also offers the advantage of detecting bed elevation change resulting from high flow events that would be useful for evaluating sediment mobility in the reaches of interest. The applicability of ADCP would be investigated during the first season of hydrologic monitoring (once biologists ascertain the field conditions at the field site locations).

5.3 Timing, Frequency, and Post-Construction Monitoring

5.3.1 Pre-Construction Monitoring

Commented [SJ53]: GLOBAL, change construction to operation. They will be passing flows until that time.

The baseline geomorphic component of the hydrogeomorphic study would first be conducted during the winter/spring of 2023. It is anticipated that all relevant geomorphic indicators could be collected during one field trip. Additional baseline geomorphic data collection during subsequent years would be necessary if precipitation patterns are highly variable during the pre-construction period.

The desktop hydrologic component of the hydrogeomorphic study would occur during 2023. The field-based hydrologic component of the hydrogeomorphic study would occur at the locations as shown on Figure 4 until the dams are constructed.

5.3.2 Post-Construction Monitoring

Follow-up (post-baseline/post dam construction) geomorphic and hydrologic surveys would be conducted on an annual basis for up to 10 years after ~~construction~~ operations begin~~activities~~. The Authority will consult with ~~and~~ the relevant permitting agencies (CDFW, SWRCB and the CVRWQCB) ~~would determine~~ if the frequency of monitoring would ~~can~~ be shortened after 5 years. Additional information on each component of is provided below.

Geomorphic Stability Monitoring Plan

Post-construction geomorphic monitoring would generally be similar to the pre-construction efforts, including returning to established field site locations and collecting information on geomorphic indicators by performing a geomorphic assessment as described above. Data collected as part of the post-construction geomorphic monitoring effort would be compared against the baseline data and summarized into interim and final reports to the Authority.

The focus of the post-construction geomorphic monitoring effort, however, would be geomorphic stability monitoring. As such, the primary survey components of the Geomorphic Stability Monitoring Plan would include cross section and longitudinal profile surveys, channel bed substrate composition determination, and channel stability evaluations. All methods for these efforts would be identical to those described above. The objectives of these monitoring elements and their relevance to geomorphic stability are summarized below.

Cross Section and Longitudinal Profile Surveys

The objectives of collecting data at the cross sections would be to collect primarily lateral stability information to determine the rate of lateral migration through bank erosion and overall cross-sectional area change. The rate, magnitude, and direction of lateral change and area change would be determined over time using repeat longitudinal profile surveys.

The objective of collecting data at the longitudinal profiles would be to collect primarily vertical stability information to determine rates of aggradation or degradation (whether the stream is downcutting [degrading], filling [aggrading], or remaining static). The rate, magnitude, and direction of vertical change would be determined over time using repeat longitudinal profile surveys.

Channel Bed Substrate Composition and Embeddedness

The objectives of collecting channel bed substrate composition and embeddedness information would be to observe potential shifts in bed material size-frequency distribution, which can be determined over time. Collected grain size information would aid in interpretation in specific geomorphic changes if they occur (such as any changes identified via the cross-sectional and longitudinal profile analyses above).

Channel Stability Evaluations

The chosen methodology for channel stability evaluations would be dictated by site conditions but could include the methods as presented in the modified Pfankuch procedure (Pfankuch 1975) as described by Rosgen (2001), Simon and Down (1995), Bledsoe et al. (2011), or other applicable method. Together with the stream evolution model (Cluer and Thorne 2013), the channel stability analyses would aid in the determination of how on Funks and Stone Corral Creeks may continue to evolve (e.g., deepen/widen) or remain in a state of equilibrium in the future, thus having implications for the available habitat within the channels.

Hydrologic Monitoring Plan

Post-construction hydrologic monitoring would be similar to the pre-construction field-based efforts, including returning to established hydrologic monitoring locations ~~and~~, monitoring stage and stream discharge over time. Data collected as part of the post-construction hydrologic monitoring effort would be compared against the baseline data and summarized into interim and final reports to the Authority.

The level of effort of the post-construction Hydrologic Monitoring Plan, however, would be considerably less than for the pre-construction effort because, depending on the streamflow and precipitation patterns during the pre-construction time-period, there would presumably already be numerous years of pre-construction hydrologic monitoring data at the hydrologic monitoring locations (in other words, a robust data set with multiple discharge measurements and associated stages would be available). The post-construction hydrologic monitoring effort would therefore primarily consist of measuring streamflow values that were not obtained during the pre-construction monitoring effort (presumably higher flow events) and conducting routine field maintenance activities such as periodic downloads of the HOBO water level loggers and upkeep of field equipment.

5.4 Applicable Methods for Maintaining Streamflows

After baseline hydrogeomorphic conditions are obtained and evaluated in context with the studies from other disciplines (i.e., Fish Assemblage Study and SWAMP bioassessment study), various approaches for estimation of minimum streamflows to maintain ecosystem and geomorphic function would be reviewed, such as "the functional flow" approach suggested by Yarnell et al. (2015), the Instream Flow Incremental Methodology (IFIM) (National Biological Service, U.S. Department of the Interior 1995), the CDFW Instream Flow Program (IFP), and the Richter et al. (2011) approach. These methods would be investigated for their applicability to determine appropriate streamflows on Funks and Stone Corral Creeks to maintain fish in good condition. Coordination with the permitting agencies would be required before a chosen method is selected.

6.0 Temperature Study Design and Methods

6.1 Overview of Proposed Methods

Commented [SJ54]: Anne H is proposing some WQ monitoring, please coordinate with her so that we don't double up.

A temperature study would be conducted to characterize temperatures under existing conditions and determine flow and storage effects on temperature in Stone Corral and Funks Creeks under post-construction conditions. The study would involve evaluating temperatures in the creeks before and after Project construction and would be conducted in combination with the flow characterization study (Appendix 2D, Section 2D.4.2 in the *Sites Reservoir Project Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement* (Sites Project Authority and Bureau of Reclamation 2021) and Sites Reservoir storage data. The study would assess:

- The temperatures that support the aquatic community under existing conditions.
- Reservoir discharge needed to establish suitable temperatures in Stone Corral Creek downstream of Sites Dam after construction.
- Reservoir discharge needed to establish suitable temperatures in Funks Creek downstream of Golden Gate Dam after construction.

Commented [SJ55]: Suitable for what?

6.2 Study Design

Once access to Stone Corral Creek is obtained, a temperature probe would be installed in Stone Corral Creek at the location of Sites Dam release, and four additional probes would be installed downstream by approximately 0.5 mile, 1 mile, 2.4 miles (near where Stone Corral Creek goes under Maxwell Sites Road), and 4.4 miles (near where TC Canal goes under Stone Corral Creek).

Once access to Funks Creek is obtained, a temperature probe would be installed in Funks Creek at the location of the I/O tower release to Funks Creek, and two additional probes would be installed downstream by approximately 0.5 mile and 1 mile (far enough upstream of Funks Reservoir to be unaffected by it). In addition, probes would be installed at the TC Canal inlet to Funks Reservoir, at the TC Canal outlet from Funks Reservoir, and at the Funks Creek outlet from Funks Reservoir.

As described in the Reservoir Management Plan, once construction is complete, water temperature profiles would be measured near Golden Gate Dam once every 2 weeks at 5-feet depth intervals to inform decisions about which ports of the I/O tower to use during March through October. The temperature probes in the creeks would continuously record hourly temperatures. These temperatures would be used along with specific fish requirements to develop target temperature ranges for post-construction conditions.

Commented [SJ56]: You may not have this, you might want to do midwater

Temperatures recorded after Sites Reservoir construction would be used in conjunction with flow and storage data to determine flow and storage effects on creek temperatures. If creek temperatures cannot be accurately estimated with flow, storage, and the reservoir temperature profiles, water temperature modeling would be performed for both Sites Reservoir and Funks and Stone Corral Creeks. If modeling is necessary, models would be calibrated with the measured flow, storage, and temperature data.

Water released into Stone Corral Creek will originate from the lower-half ~~bottom~~ of Sites Reservoir and will likely be cooler than equilibrium values during months when the reservoir is stratified. The biggest differential between release temperatures and equilibrium values will occur when the reservoir is full and ambient air temperature conditions are high. If it is determined that flow should be maintained in

Stone Corral Creek at times when releases will be relatively cool compared to temperatures under existing conditions, lower flows will allow the water to warm farther upstream than higher flows.

Water released to Funks Creek will originate from the I/O tower and, when the reservoir is stratified, will be warmer than the water released to Stone Corral Creek. The temperatures will be warmer because the withdrawals will come from higher in the reservoir and, as described in the Reservoir Management Plan, the I/O tower port openings will be chosen to provide 65°F or higher water temperatures during the rice growing season (May to September).

6.3 Timing and Frequency

Water temperature measurements would occur before, during, and after construction. Measurements during the initial fill period would be useful for evaluating water temperature under low-storage conditions. Reservoir profile measurements and measurements at the Stone Corral Creek and Funks Creek releases may need to continue in the long term. Measurements downstream of the release locations could be discontinued if the following conditions are met:

- Sites Reservoir has made releases for at least 2 years when the reservoir was at least 75% full.
- Flow and storage effects on creek temperatures are understood well enough that creek temperatures can be estimated within 3°F based on meteorological conditions, flow, reservoir storage, and reservoir temperature profiles.

7.0 Reporting and Permit Requirements

7.1 Annual Reporting Requirements

Reporting requirements would be met through the preparation and submittal of annual and final reports as part of the Stone Corral and Funks Creeks Aquatics Study Plan that would be implemented as a part of the Sites Authority's commitments and responsibilities to maintain fish in good condition consistent with CFGC Section 5937.

The first five annual reports would summarize the first 5 years of baseline conditions. All future (post-construction) reporting efforts would compare the conditions at that time to those collected during the baseline conditions.

Annual and Final Reports: The following information would be addressed in comprehensive annual reports with multiple chapters covering fish, bioassessment, hydrogeomorphic, and temperature study results:

- **Fish Study Results:** The annual report would include descriptions and locations of fish communities in Stone Corral and Funks creeks, summarizing monitoring results in the study area. The report would document monitoring results and link results to objectives. The report would identify new or ongoing management issues, threats and stressors, and provide recommendations for future monitoring and management. The following information would be addressed in annual reports.

- **Bioassessment Results:** The annual reports would include BMI, algae, water quality, and PHAB output and results and a summary of each of these indicators. The most recent version of the SWAMP *Stream Habitat Characterization Form, Full Version* field forms would be provided in appendix format, along with representative photography of the sampling reaches.

- **Hydrogeomorphic Results:** The annual reports would include a summary of the monitoring methods; a summary and analysis of the hydrogeomorphic monitoring results, including an evaluation of site conditions in the context of the performance standards; a discussion of the monitoring results; a discussion of any modifications made to the monitoring methods; a discussion of the previous year's monitoring efforts; and photographs taken from the cross sections and longitudinal profiles.

- **Temperature Results:** The annual reports would include a summary of temperatures that support the aquatic community under existing conditions, and a recommendation of reservoir discharge needed to establish suitable temperatures in Stone Corral Creek downstream of Sites Dam and Funks Creek downstream of Golden Gate Dam after construction.

Monitoring Program Evaluation: The annual reports would evaluate the Aquatic Study Plan to ensure that data (1) are collected efficiently, (2) address information needs, and (3) adequately assess resource responses to management actions. Changes in monitoring methods, protocols, or frequency would be summarized in the annual reports.

Objective Criteria Evaluation: Post-construction annual reports would evaluate whether management actions are meeting project objectives or performance standards (described below). Where the cause of fish and BMI community declines is understood, corrective actions would be recommended based on monitoring data or other scientifically defensible sources of information. An assessment would be made as to causal factors of observed declines, including the potential role of external stressors outside the parameters of Project effects.

Adaptive Management Thresholds: The link between the technical and decision-making steps requires regular interaction and exchange of information between technical staff and decision-makers. This would be accomplished by bi-annual meetings (approximately every 6 months) involving the Authority and the permitting agencies where both regulatory and technical expertise can be integrated into revising goals and objectives, adjusting management and/or monitoring activities, or allocating funding. Meetings should be timed such that any new information discussed assists with the planning of upcoming seasonal work.

7.2 Performance Standards

Performance standards for the Aquatic Study Plan would be based on quantitative metrics. These performance standards would be designed specifically as a means of monitoring the progress and performance of the physical and biological conditions of the study reaches.

Fish community performance standards would include measures of community diversity and percent area occupied for both available and total reach distance within the study areas. BMI performance standards would likely include three main indicators – PHAB IPI scores, BMI CSCI scores, and algae ASCI scores. Geomorphic performance standards would focus on channel stability evaluations such as:(1) evidence of significant and detrimental morphologic changes at any of the cross sections; (2) evidence of channel headcutting; (3) significant loss of gravels via dam impoundment; and (4) significant decrease in the channel stability score during the duration of monitoring activities.

Commented [SJ57]: Let's talk about this. I want to keep the compliance component about fish condition until told otherwise by CDFW. Everything else goes into explaining any variance in what we see in fish condition, assessing general condition of the stream as well as complying with MM's in the EIR/S. The reason I want to keep focused on fish condition is that if we get litigated on 5937, the fewer compliance metrics the better.

Performance standards would be developed in conjunction with the Authority and the relevant permitting agencies (CDFW and the CVRWQCB) prior to the start of post-construction monitoring.

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8.2 Personal Communications

Rehn, Andrew. Biologist, California Department of Fish and Wildlife. April 6, 2022—Phone conversation with Jeff Peters of ICF and Marco Sigala at Moss Landing Marine Laboratories regarding a suitable number of bioassessment sampling reaches on Funks Creek and Stone Corral Creek for the Sites Reservoir Project.

Stone Corral Creek and Funks Creek Aquatic Study Plan

July 29, 2022

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Contents

Figures

1.0 Introduction and Purpose

1.1 Introduction

This Stone Corral Creek and Funks Creeks Aquatic Study Plan (Aquatic Study Plan) has been prepared for the Sites Project Authority (~~AuabthorityA~~uthority) to guide fisheries technical studies to be conducted prior to and during construction of the Sites Reservoir Project (Project), as well as ongoing monitoring during Project operations. The Project is a proposed offstream storage project located on the west side of the Sacramento Valley, approximately 10 miles west of the community of Maxwell in Glenn and Colusa Counties. It is designed to store unappropriated water from winter and spring storm events in the northern Sacramento River watershed. The Project would impound a maximum of 1.5 million acre-feet of water in a reservoir. The reservoir would be created by building Sites Dam on Stone Corral Creek, Golden Gate Dam on Funks Creek, and a series of saddle dams on the northeastern rims of Antelope Valley. While a portion of naturally occurring seasonal flows in Stone Corral and Funks Creeks would be retained in the reservoir under an Area of Origin agreement with Colusa and Glenn Counties, the primary source of water for the reservoir would be diversions from the Sacramento River. These diversions would be up to 4,200 ~~3,900~~ cubic feet per second (cfs) via two existing facilities: the Red Bluff fish screen and pumping plant (operated by the Tehama-Colusa Canal Authority [TCCA]) and the Glenn-Colusa Irrigation District's (GCID) fish screen and pumping plant near Hamilton City.

Commented [SJ1]: This includes "plus losses"

1.2 Purpose of Aquatics Study Plan

As part of the Project alternatives development, the Authority has committed in the Project's Final Environmental Impact Report (EIR) and Environmental Impact Statement (EIS) to conduct technical studies to document ~~update~~ the two creeks' existing hydrology, assess flow levels needed to maintain fluvial geomorphic processes, and update the information on aquatic species presence and habitat use in the reaches of interest ~~and downstream~~ to establish ~~acollect~~ system-wide aquatic baseline ~~and monitoring information~~ that will be used to manage environmental releases into the creeks from the Project. These studies, which are part of this Aquatic Study Plan, would be initiated once access permission to the creeks through private property is obtained and would be used to inform final design for Sites Dam and Golden Gate Dam release facilities and operational requirements. The following studies would be designed and conducted ~~out~~ in collaboration with the California Department of Fish and Wildlife (CDFW) and State Water Resources Control Board (SWRCB).

- Determine existing fish assemblages in these creeks, including fish species presence and habitat use.
- Characterize habitats available (e.g., spawning, rearing, foraging, and sheltering habitats) at varying flow levels, including the presence or absence of pools that persist through summer which may require some supplemental flow.
- Characterize flows, including assessing the baseflow during summer and conducting a fluvial geomorphologic study to characterize habitat conditions, substrate compositions, and flow levels necessary for protection of aquatic habitat and sediment mobilization.
- Conduct a Surface Water Ambient Monitoring Program (SWAMP) technical study (i.e., a stream bioassessment) that focuses on relationships between physical habitat, water quality, and benthic macroinvertebrates.

- Implement hydrological studies to define flow temperature relationships.

The Authority will use information from the results of implementation of this Aquatic Study Plan, including field studies described below, to prepare a Reservoir Operations Plan for Stone Corral Creek and Funks Creek. The Reservoir Operations Plan will identify the approach for flow releases, including release schedule and volumes, and an adaptive management plan to maintain fish in good condition consistent with California Fish and Game Code (CFGC) Section 5937 in the creek reaches of interest. These reaches are below the locations of Sites and Golden Gate Dams and above GCID Main Canal. The information will be integrated to focus on aquatic species of concern in the lower portions of the two creeks with an emphasis on maintaining existing community structure and habitat conditions. It is expected that flow releases from the Sites Reservoir into these creeks will mimic the natural discharge seasonality of the associated creeks, and that releases will be lower during Sacramento River Index Dry and Critically Dry Water Years. Conversely, flow releases will be higher during Above Normal Water Years.

Commented [SJ2]: We should explain why we ended the study reach here and not further downstream

Commented [SJ3]: This is an interesting idea, we need to vette this with ops. We will be measuring inflow, so we could use that as well

This Aquatics Study Plan summarizes the methods and reporting strategies for the reaches downstream of the proposed impoundments on Stone Corral Creek and Funks Creek. Using information obtained from these field studies, along with currently available information, the Authority would prepare a Stone Corral Creek and Funks Creek flow schedule to be incorporated into the Reservoir Operations Plan. The Reservoir Operations Plan would identify the approach for flow releases, including release schedules and volumes, a monitoring plan for fish and stream function, and an adaptive management plan to maintain fish in good condition that is consistent with CFGC Section 5937. Flow releases into these creeks would be made in consideration of the flood control benefits of the Project and would not overtop the stream banks or flood downstream areas. Appendix 2D, *Best Management Practices, Management Plans, and Technical Studies* of the *Sites Reservoir Project Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement* (Sites Project Authority and Bureau of Reclamation 2021) describes the purpose, objectives, content, and timing of the field studies identified above.

Commented [SJ4]: Is this the same as the Ops Plan for Stone corral creek and Funks Creek described above, or will it be a chapter or section in that ops plan? It's a bit confusing.

Commented [SJ5]: I would include this as an appendix or an attachment to this document. You could also excerpt section 2D.4 and include that as an attachment

The Authority has also proposed to adapt this study program into a post-~~construction~~ operation monitoring program with a duration of 5 to 10 years to document and adaptively manage the timing and magnitude of flow releases to maintain fish below the dams and the habitats upon which they depend. Performance standards would be developed in conjunction with the Authority and the relevant permitting agencies (CDFW, SWRCB and the Central Valley Regional Water Quality Control Board [CVRWQCB]) prior to the start of post-~~construction~~ operation monitoring.

Commented [SJ6]: Global change: Construction to operation. Please work with the EIR/S folks to make that change in their document if needed.

2.0 Environmental Setting

2.1 Environmental Setting of Stone Corral and Funks Creeks

Both Stone Corral Creek and Funks Creek are small watersheds originating below the snowline on the eastern foothills of the California Coast Range at elevations of 700 to 850 feet. Consequently, they do not receive cold snowmelt water. Rather, they respond rapidly to significant rainfall events and flow intermittently, mostly during winter and early spring. From their origins, both creeks flow through low foothills, across Antelope Valley (the proposed site of Sites Reservoir), through a series of ridges, and onto the Sacramento Valley floor (Figure 1). For much of their courses on the valley floor, they are confined to narrow channels between berms along the edge of agricultural fields and road prisms. While the stream channels of these creeks are not actively managed, their straight alignment and angular turns around agricultural fields and along roads indicate that they were modified from their natural historic channels. In the upper parts of the watersheds just above the dam locations, these streams are largely devoid of riparian cover resulting from livestock use (Bureau of Reclamation and California Department of Water Resources 2008:3-20). In the lower reaches where the streams run through and around agricultural fields, shaded riparian habitat is sparse and consists mostly of low shrubs, grasses, and occasional (*Quercus* sp.) and cottonwood (*Populus* sp.) trees.

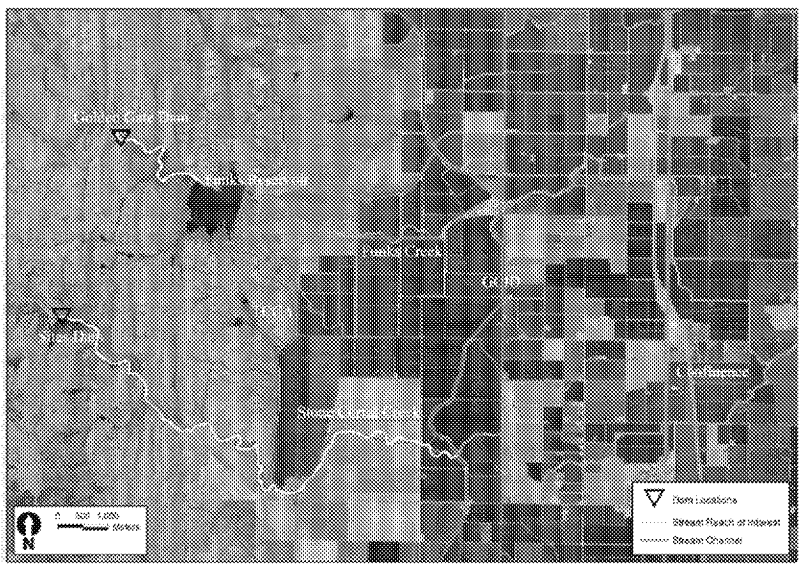


Figure 1. Stone Corral and Funks Creek reaches of interest and downstream reaches.

2.1.1 Stone Corral Creek

Stone Corral Creek has a drainage area of 32.8 square miles. From the proposed location of the Sites Dam, Stone Corral Creek meanders through a shallow canyon onto the valley floor, where it flows through an incised channel across grazing lands. At 4.6 miles from the Sites Dam location, Stone Corral Creek crosses over a siphon in the Tehama-Colusa Canal (TC Canal) and begins to travel through agricultural lands. About 3 miles below the TC Canal siphon, Stone Corral Creek crosses the GCID Main Canal ~~siphon~~. Although most of the water in the canal passes under Stone Corral Creek in ~~the~~ a siphon, GCID releases water from the canal into Stone Corral Creek for delivery to agricultural fields downstream. About 5.5 miles below the GCID Main Canal, Stone Corral Creek merges with Funks Creek and then flows an additional 5.7 miles to the Colusa Basin Drain.

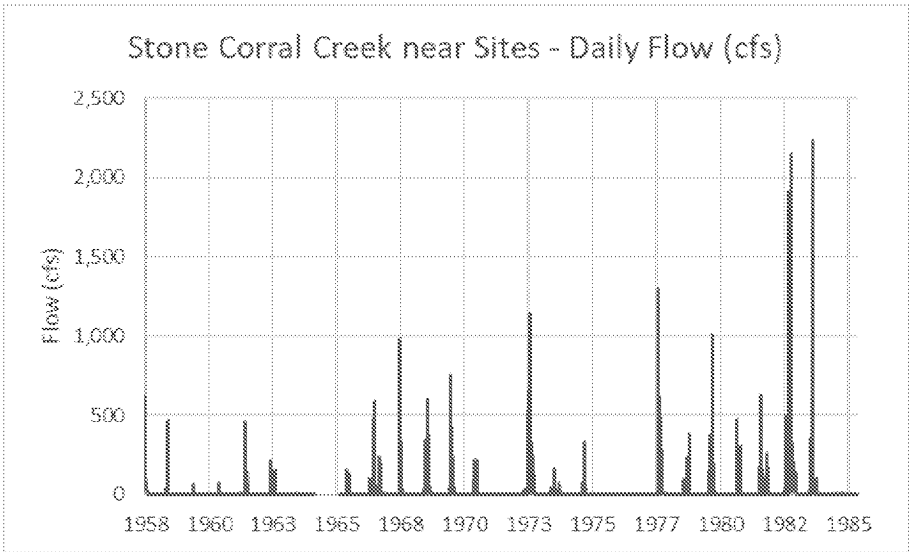
The U.S. Geological Survey collected 27 years of discharge measurements in Stone Corral Creek near the community of Sites from 1958 through 1985 (Figure 2). The data demonstrate high variability of flow over the period of record. There were 3 years of zero flow: 1972, 1976, and 1977. Yates (1989) estimated the recurrence interval of a winter without flow at 12 to 14 years. Of the 26 years with data, 24 years had mean annual flow of less than 25 cfs. The maximum annual discharge during the period of record was 50.1 thousand acre-feet (TAF) in 1983. Based on the U.S. Geological Survey period of record, the long-term annual average discharge through the creek was 6.~~7~~ 5 TAF per year.

Commented [SJ7]: MBK's memo has the area at the historical gage on Stone Corral Creek at approximately 38.3 square miles, with approximately 35.4 square miles located upstream of the proposed Sites Dam location. We should go with what is in the water right , which is 38 for stone and 43 for Funks

Commented [SJ8]: Daily?

Commented [SJ9]: Mean annual daily is 9.02 cfs with a SD of 67.5, median is 0. Maybe we get into this a bit? I don't think 25cfs is really representative.

Commented [SJ10]: I have 39 TAF...we are looking at different data



Source: U.S. Geological Survey stream gage 11390672

Figure 2. Mean Daily Flow in Stone Corral Creek near Sites (cfs)

Because the historical gage record for Stone Corral Creek is limited and Funks Creek is ungaged, historical stream gage data from Elder Creek was used to produce an estimate of streamflow on Stone Corral and Funks creeks. The Elder Creek gage was chosen because it was the nearest gage on the valley floor with a long record of data available. It was assumed that Elder Creek has relatively similar precipitation and runoff patterns to Stone Corral and Funks creeks. The streamflow of Elder Creek, located in Tehama County, has been measured since 1948 (USGS Gage No. 11379500), is approximately 49 miles northwest of the proposed Sites Reservoir and has a drainage area above the Elder Creek gage of 92.4 square miles(Attachment 1- MBK Engineers 2022). The overlapping period of gage records for Stone Corral Creek and Elder Creek (1958-1985) was used to determine a logarithmic correlation between the two gages for each month of the year. Table 1 below provides the results of this analysis. Identifying the average monthly flow volume by water year type (MBK Engineers 2022). The average monthly flow volumes are calculated using the gage record for October 1958 through August 1985 and using the logarithmic monthly correlations for September 1985 through September 2021. Results are summarized by Sacramento Valley Water Year Type: wet (W), above normal (AN), below normal (BN), dry (D), and critical (C).

Commented [SJ11]: Let's include the MBK memo as an attachment so we don't need to go into all the R^2 detail.

	Water Year Type					
Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	41	13	2	4	0	17
Dec	836	292	27	46	54	342
Jan	3,783	3,340	685	335	171	1,883
Feb	5,185	5,366	1,229	131	307	2,657
Mar	2,394	1,777	389	258	179	1,169
Apr	1,058	364	112	25	35	433
May	159	145	14	6	9	76
Jun	23	9	2	1	1	9
Jul	1	0	0	0	0	1
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	13,479	11,308	2,459	805	757	6,587

Commented [SJ12]: Will need to be formatted

Table 1. Stone Corral Creek at Proposed Sites Dam Average Monthly Flow Volume (ac-ft) by Water Year Type (1958-2021)

Commented [SJ13]: Sorry for screwing up your table numbering buit I think this helps tell a good story

2.1.2 Funks Creek

Funks Creek, a tributary to Stone Corral Creek, has a drainage area of 43 square miles. From the proposed location of Golden Gate Dam, Funks Creek meanders through a series of low ridges and grazing lands for about 1.8 miles to Funks Reservoir. Funks Reservoir is a re-regulating reservoir on the TC Canal and is created by a low dam on Funks Creek. Funks Dam is operated by TCCA ~~mostly for flood control purposes~~and to manage water levels within the TC Canal. However, ~~T~~the Funks Dam gates are opened during large storm events to pass flood waters through the reservoir and downstream to avoid compromising the TC Canal and its operations. There are no requirements to maintain flows in Funks Creek below Funks Reservoir, but seepage through the dam gates maintains perennial flow in Funks Creek.

Below Funks Dam, Funks Creek travels 3.9 miles through agricultural fields in a combination of natural and straightened channels to where it crosses the GCID Main Canal. While the GCID Main Canal passes under Funks Creek in a siphon, GCID releases water from the canal to Funks Creek, and like Stone Corral Creek, GCID uses the downstream portions of Funks Creek as part of its conveyance system to deliver water to agricultural fields. Approximately 2 miles northeast of Maxwell and 1 mile east of Interstate 5, Funks Creek flows into Stone Corral Creek.

There is no flow record for Funks Creek, but given the comparable size, geology, and topography of the two watersheds and their proximity to each other, Funks Creek hydrology is like Stone Corral Creek in terms of the amount and seasonality of flow. Because the Funks Creek drainage area (43 square miles) is 13% greater than the drainage area of Stone Corral Creek (38 square miles). ~~, runoff from the Funks Creek watershed is approximated here as 113% of that for Stone Corral Creek runoff. Therefore, the estimated maximum flow for 1983 is 56.7 TAF.~~

Since there is no streamflow data available for Funks Creek, the same correlation approach used to estimate Stone Corral creek streamflow cannot be followed to estimate Funks Creek streamflow. Therefore, the flow in Funks Creek was estimated by prorating the monthly Stone Corral Creek streamflow data by the ratio of Funks and Stone Corral Creek's watershed areas upstream of the proposed dam locations (MBK Engineers 2022). Table 2 below provides the results of this analysis. Identifying the average monthly flow volume by water year type.

	Water Year Type					
Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	58	19	3	6	1	24
Dec	1,187	415	39	65	77	486
Jan	5,372	4,743	972	476	243	2,674
Feb	7,363	7,621	1,745	185	436	3,773
Mar	3,400	2,523	552	367	255	1,660
Apr	1,502	517	158	35	49	616
May	226	207	20	9	13	108
Jun	32	13	2	1	2	13
Jul	2	0	0	0	0	1
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	19,142	16,059	3,492	1,144	1,075	9,355

Table 2. Funks Creek Average Monthly Flow Volume (ac-ft) by Water Year Type (1958-2021)

Physical Characteristics

The only drainages that exit Antelope Valley are Stone Corral Creek and Funks Creek. Each creek continues through the steeper, foothill environments and then transitions to the Sacramento Valley floor, where each is generally shallow and highly altered, primarily for water conveyance and agricultural purposes. Although the channels of these creeks are not actively managed, their straight channels and angular turns associated with agricultural fields and roads indicate that their natural channels have been extensively modified. Along their reaches on the valley floor, these creeks are confined to narrow channels between berms adjacent to agricultural fields and road prisms.

Stone Corral Creek and Funks Creek are largely devoid of riparian habitat in their upper reaches (foothill environments) due to heavy livestock use. In the lower reaches where the creeks run through and around agricultural fields, riparian habitat is sparse and consists mostly of low shrubs, grasses, and occasional oak and cottonwood trees.

Although the reaches of interest have been modified by livestock grazing, channelization, irrigation conveyance systems and minor diversions, they are expected to still have available aquatic (i.e., benthic macroinvertebrate [BMI]) habitat). They also both experience much of their natural hydrograph and fluvial geomorphic processes and provide water sediment that ultimately flows into the Colusa Basin Drain during rain events. Some of the larger flow events are considered important for water (and sediment) contributions to the Colusa National Wildlife Refuge.

Commented [SJ14]: This needs to be re-written. Its full of unsubstantiated generalizations and inaccuracies. See the 404 permit or EIR/S for a description of this, Mike V has it.

Commented [SJ15]: Not true, some level of maintenance is done to convey irrigation water and prevent flooding. We can talk to Jeff at TCCA and the GCID folks to get a better understanding.

Commented [SJ16]: I suggest this be revised. Stone corral is the opposite of this as it has dense cottonwoods in the canyons at and below the dam site.

Commented [SJ17]: This paragraph seems like a statement based on field examination. I've rephrased a bit.

Commented [SJ18]: I'm not sure it's natural in the channelized, maintained areas used for conveyance.

Commented [SJ19]: Suspended?

Commented [SJ20]: Again, do we know this, or is this what we are trying to figure out? If it's know, let's get a reference in here.

3.0 Fish Monitoring

Commented [SJ21]: We would not be sampling Funks Reservoir.

3.1 Study Design

Assessment of the goal to maintain fish in good condition consistent with CFGC Section 5937 would be made using a Before-After-Impact experimental study design. Pre-construction sampling would be conducted to assess fish community and habitat present in the study area for up to ~~over~~ a 5-year period prior to operation of the Project ~~implementation~~. Following completion of the pre-construction survey, fish communities and aquatic habitats in the study area would be monitored in a similar fashion over a 5-to-10-year period after the Project is operational ~~constructed~~. Fish community and habitat data that showed statistically significant negative departures from baseline data would trigger reassessment of downstream flow management under a proposed adaptive management plan.

Commented [SJ22]: reference

Commented [SJ23]: we can still do the study during construction as they will be passing inflow through/around the construction areas. Also, we start construction in 2024

Commented [SJ24]: this makes me a little worried as other divers can also influence this. I'll keep reading to see if this gets better defined.

Commented [SJ25]: Is this different that the project AMP? If so then we need to get this written.

3.1.1 Pre-construction Baseline Monitoring

Pre-construction baseline monitoring would be conducted within the study area to identify, quantify, and map habitats (see Chapter 4), document aquatic species distribution and population characteristics (e.g., relative abundance, diversity), and identify triggers (e.g., decrease in relative abundance) for adaptive management actions. This monitoring establishes a baseline condition from which success criteria are measured and includes initial reconnaissance and pre-construction sampling.

The pre-construction surveys would first involve a reconnaissance survey to observe and record variables that may affect sampling efforts and establish monitoring stations. Data collection would include information about the site, habitat, and fauna that are observed during site visits. Aquatic habitat and fish species sampling would be conducted once the reconnaissance is complete and sampling stations have been established. Data would be collected via standardized electronic or paper forms by experienced biologists during assessments and sampling. Data collected as part of pre-construction efforts would be summarized into yearly reports and a final pre-construction baseline report to the Authority at the end of the ~~5-year~~pre-construction survey period. Surveys would provide the information required to characterize baseline conditions of the fisheries resources, as well as threats and stressors to fish species and habitat in the pre-construction conditions.

Because of the lack of data regarding fish community composition in the study areas, this Aquatic Study Plan proposes to conduct baseline fish surveys for up to 5 years prior to start of construction.

3.1.2 Post-construction Monitoring

Post-construction monitoring would occur periodically at appropriate intervals specified herein, or as required by other plans and programs, or as established by the Authority. Post-construction sampling would document fish abundance and distribution and compare the results with data collected on habitat area, location, and changes in habitat characteristics over time. Data from the fish study ~~and SWAMP bioassessment~~ would be used in documenting compliance with CFGC Section 5937, with data from the SWAMP assessments providing additional details on overall stream status.

Commented [SJ26]: We would want to have condition factor calculated for fish.

Commented [SJ27]: I am leaning towards fish being used for compliance but having the SWAMP data will help inform where any issues are that are showing up in fish condition (K). It's a starting position.

Post-construction sampling methods would be identical to the pre-construction sampling, including returning to established stations and tracking fish abundance, diversity, and distribution through time. Threats and stressors identified in the pre-construction survey would be assessed in post-construction surveys to differentiate changes in habitat or fish communities not related to the construction of the Project. Data collected as part of the post-construction sampling effort would be compared against the

Commented [SJ28]: What if we lose access? It's happened to me.

baseline data, as well as previous years data and summarized into interim and final reports to the Authority.

Commented [SJ29]: We can track some metrics year by year to look for trends.

This Aquatic Study Plan proposes to conduct post-construction fish surveys for 5 years following start of ~~construction~~Project operation.

3.1.3 Integration with Aquatic Habitat Survey Methods

Aquatic habitat survey methods for both pre- and post-construction sampling are described below. Note that the field observations and results from other studies (i.e., stream bioassessment study and hydrogeomorphic study) would aid in the ~~determination~~ assessment of aquatic habitat and are referenced where applicable.

An initial reconnaissance survey would provide information on existing habitat and inform the selection of sampling stations within the Stone Corral Creek and Funks Creek drainages. Stations would initially be set at fixed distances apart to accommodate between 10 and 15 sampling stations within each drainage. Stations would be mapped prior to going into the field and then field-verified during the reconnaissance survey. Some leeway would be given to adjust locations to prioritize reaches containing optimal fish habitat. Stations that fell within dry or sub-optimal aquatic habitat for fish survival would be de-prioritized or curtailed.

Commented [SJ30]: Good idea, you are going to have dry areas

As part of the pre-construction sampling for fish community and aquatic habitat, the following data would be collected and/or integrated into the fish study:

- Fish community – Surveys would characterize local fish communities using methods described below. As feasible and appropriate, methods would be consistent with those used in previous and ongoing fish community survey efforts (e.g., methods accepted as standard practice for sampling aquatic systems; Meador et al. 1993). (Fish Study)

- Substrate composition – Surveys would document stream bed substrate particle size using Wolman pebble counts (Wolman 1954; Kondolf and Li 1992), gravelometer, substrate facies mapping, or similar methods. (Hydrogeomorphic Study)

- Riparian vegetation cover – Surveys would measure the relative amount (e.g., percent cover) of riparian vegetation cover over aquatic habitat to document conditions. Riparian vegetation cover would be monitored using the California Rapid Assessment Method (Brown 2013), or similar method. (Hydrogeomorphic Study)

- Habitat connectivity – Surveys would be conducted to assess longitudinal connectivity between stream reaches with current or potentially suitable fish habitat. Potential fish passage barriers would be identified, mapped, and surveyed as part of stream habitat surveys. The extent to which features may present a barrier to fish passage would be assessed using the best available information on leaping ability, swimming speed, and other fish performance information for known species, or for similar species, as found in published and unpublished sources including the FishXing software (Furniss et al. 2000). The California Passage Assessment Database or other information sources can be referenced to determine potential barrier locations. In addition, these potential barriers would be physically measured to field-verify passage potential. (Hydrogeomorphic Study)

Commented [SJ31]: I am not so sure this is needed as upstream of the dams will be inundated and downstream of the dams would have hydrology that attempts to mimic the historical. Let's talk about what value this brings this this particular project.

- Benthic macroinvertebrate presence – A SWAMP bioassessment that focuses on the relationships between physical habitat, water quality, benthic macroinvertebrates, and algal communities would be conducted on the reaches downstream of the proposed impoundments on Funks Creek and Stone Corral Creek. The bioassessment study would be conducted using the methods described in the State Water Resources Control Board's (State Water Board's) SWAMP protocols (Ode et al. 2016a, 2016b) (SWAMP Bioassessment Study).

- Water quality – Surveys would be conducted to monitor the quality of surface water (e.g., temperature, turbidity, pH, conductivity, salinity, dissolved oxygen). Water quality monitoring would be conducted using methods described in the State Water Board's SWAMP protocols (Ode et al. 2016a, 2016b). (SWAMP Bioassessment Study and Fish Study)

- Water Temperature – Water temperature profiles for Stone Corral Creek and Funks Creek would be developed. These water temperature profiles would be used to inform decisions about which tiers of the inlet/outlet (I/O) tower to use when conducting releases into downstream water bodies. The goal would be to mimic existing temperature profiles to benefit native fish in Funks Creek, which are accustomed to the warm temperatures present in this creek under existing conditions (Temperature Study).

Commented [SJ32]: This is not going to really be practical during some times of the year and when we have low volume of storage. We will need to build in some flexibility to the resulting recommendations.

3.1.4 Fish Sampling Methods

Commented [SJ33]: Please include assessment for condition factors (K) for species. This is something that is commonly understood even with all the concerns folks have with it. We don't need to do everything, we can pick representative species from each trophic level.

Beach Seining

Commented [SJ34]: Based on what I have seen out there you're going to be mostly shocking

Seining is a low cost, low impact method for capturing aquatic organisms. Circumstances that may affect efficacy include the amount or type of benthic structure, presence/absence of aquatic vegetation, water clarity, flow rate, and water depth. Seining is most effective in smooth bottom habitats free of aquatic debris or vegetation, with elevated turbidity, and are shallow enough for biologists to wade in. When benthic structure is complex, water clarity is high, and habitats contain extremely deep, shallow, or rapidly moving water that may exclude biologists from deploying nets, efficacy is dramatically decreased.

Seines with a "bag" to minimize aquatic organism handling stress are preferred. Seines with a bag are also preferred where obstructions make access to the water (or deployment/retrieval of the seine) difficult (U.S. Fish and Wildlife Service 2012). Blocking nets typically improve efficacy by reducing opportunities for target species to move out of the area being seined. Where the area to be isolated for sampling includes culverts, deep pools, undercut banks, or other cover attractive to fish (e.g., thick overhanging vegetation, root wads, logjams) it may be appropriate to isolate a portion or portions of the study area in phases, rather than attempting to herd fish from the entirety of the work area in a single downstream pass.

The size of the seines used for sampling would depend on the size of the habitat being sampled. Larger seines may be up to 30 feet long, 6 feet high, with a mesh size of 0.25 inch and a pocket size of 5 feet by 5 feet. Smaller seines used for small pools and ponds may be 12 feet long, 4 feet high, with a mesh size of 3/16 inch and a pocket that is 5 feet by 5 feet. Seines would be used or deployed in conjunction with block nets to prevent fish from moving out of the area prior to being sampled. Captured specimens would be held in floating net pens or large aerated containers, based on site conditions, prior to being processed. Specimens would be identified to species and the first 20 of each species would be measured for fork length to the nearest millimeter before being released at the capture site. Additional specimens would be tallied and released. Representative specimens would be photographed for positive identification.

Electrofishing with Block Nets

The effects of electrofishing are typically short-term and limited to fish in the area immediately surrounding the electrical field. However, electrofishing has limited use in deeper water and in low and high conductivity water (Beauchamp 1995). Additionally, not all species are easily targeted by electrofishing (e.g., benthic species may be under-represented) (Beauchamp 1995), and capture may be biased towards larger fish.

Previous work in Stone Corral and Funks Creeks indicates that total dissolved solids are high enough to prevent the use of electrofishing as a means of sampling (California Department of Fish and Game and California Department of Water Resources 2000). During reconnaissance surveys, basic water quality measurements would be taken to confirm this observation. If total dissolved solids values are above levels known to interfere with electrofishing, the method would be curtailed in favor of seining. If employed, electrofishing would be done with a Smith-Root type backpack electrofisher. Sections of creeks would be isolated using blocking nets before biologists wade into them, starting from the upstream net and moving downstream. Captured specimens would be held in buckets, floating net pens, or large aerated containers prior to being identified and measured as above for seine sampling. Effort would be calculated using shock time. If fish exhibit signs of stress, including symptoms of tetany or bruising, electrofisher settings would be adjusted accordingly to reduce impacts.

Visual Surveys

Any visual observations by biologists during reconnaissance and pre- and post-construction sampling of stream fauna would be systematically recorded based on pre-determined reach locations. This would include documenting amphibians and reptiles that may be observed incidentally during fish sampling efforts.

Basic Water Quality

Water quality data would be measured at every station using a YSI Pro DSS unit (or similar collection device), following Chapter 3 of the 2016 version of the SWAMP *Standard Operating Procedures for the Collection of Field Data for Bioassessments of California Wadeable Streams: Benthic Macroinvertebrates, Algae, and Physical Habitat* (SWAMP 2016 SOP) (Ode et al. 2016a) and recorded on standard SWAMP data forms. Water quality data obtained would include temperature, specific conductivity, salinity, dissolved oxygen, turbidity, and pH.

3.1.5 Fish Response

Abundance

All sampling efforts would be quantified using catch per unit effort (CPUE). Catch metrics would be computed based on the CPUE for a specific sampling method. Tracking CPUE by sites would be organized into charts or tables that accurately portray the CPUE for a given site and control effort. When a negative response in the CPUE of a target fish community for a given method is observed over three or more sites or three or more visits to the same site, investigators would assess whether the decline exceeded the threshold for triggering reassessment of flows under the proposed Adaptive Management Plan (AMP). If declines were observed to exceed thresholds, the Authority would be notified.

Commented [SJ35]: Based on the life history of the species we are dealing with, variability in spatial and temporal abundance would be expected. We should focus not on any single year, but instead we would need to have multiple years of any one trend occurring prior to determining if further assessment is needed.

The CPUE would be computed for each sample method and assessed once multiple data sets are available for comparison. Numbers of individuals, weight, and area sampled would be recorded. A decline in CPUE, in comparison to baseline values and accounting for threats and stressors, would reflect a potential adaptive management trigger.

Distribution

Fish presence would be recorded and tracked through the study area. Fish distribution would be determined through reconnaissance and pre-construction surveys, known distributions, and incidental observations made during other sampling efforts. Records may be kept as count data and volumetric data but would ultimately be provided as presence or absence of fish species within sampling reaches.

3.2 Timing and Frequency

Commented [SJ36]: We are working this out. Expect limited access in 2022 so think about, what do we REALLY need in 2022. Flows and temps would be good for a start. So, stream gauges and tidbit loggers. MBK will have some ideas as well.

The schedule and effort for the pre- and post-construction portions of the proposed study are detailed below. The pre-construction surveys would be five consecutive annual visits staged at any point prior to start of construction and within the seasonal restrictions indicated below. Monitoring efforts would be one-per-year visits each year following initiation of construction up to a 5- or 10-year timeline as determined by the Authority.

Pre-Project implementation:

- Desktop scoping effort: lay out sampling reaches using geographic information system (GIS) data overlaid on aerial imagery, organize data sheets, and coordinate with water quality and SWAMP efforts. Spring 2022
- Initial reconnaissance: 2 days with 2-person crew; ideal timing would be fall when water levels are most restricted. Fall 2022
- Pre-construction effort 1: 14 days with 4-person crew. Fall 2022
- Pre-construction effort 2: 14 days with 4-person crew. Fall 2023
- Pre-construction effort 3: 14 days with 4-person crew. Fall 2024
- Pre-construction effort 4: 14 days with 4-person crew. Fall 2025
- Pre-construction effort 5: 14 days with 4-person crew. Fall 2026

Commented [SJ37]: If we only sample in fall, we are going overrepresent the average annual flow. I get why fall would be the best time, I'm just noting that we can't extrapolate this data out too far as it's a seasonal stream under existing contains.

Post-Project implementation:

- Post-construction effort 1: 14 days with 4-person crew. Fall 20XX
- Post-construction effort 2: 14 days with 4-person crew. Fall 20XX
- Post-construction effort 3: 14 days with 4-person crew. Fall 20XX
- Post-construction effort 4: 14 days with 4-person crew. Fall 20XX
- Post-construction effort 5: 14 days with 4-person crew. Fall 20XX
- Additional post-construction efforts up to 10 years after initial construction as determined by the Authority.

Permitting Requirements

A CDFW Scientific Collecting Permit (Specific Use) or Memorandum Of Understanding permit would be required to complete the study design as proposed. BMI samples would be the only sacrificed species.

4.0 SWAMP Bioassessment Study Designs and Methods

4.1 Purpose of Bioassessment Monitoring Program

Stream bioassessment monitoring is a method of evaluating and monitoring the environmental health and integrity of freshwater wadeable streams by using BMI, water quality parameters, and physical habitat (PHAB) conditions indicators of stream condition. Bioassessments are especially useful in tracking the aquatic conditions before and after a project is implemented to determine the post-project effects on aquatic communities. A SWAMP bioassessment that focuses on the relationships between physical habitat, water quality, BMI, and algal communities would be conducted on the reaches downstream of the proposed impoundments on Stone Corral Creek and Funks Creek.

The ultimate goal of the bioassessment study is to evaluate the environmental condition of both Stone Corral Creek and Funks Creek by using the indicators of stream condition. This information, along with the other required studies (i.e., Fish Assemblage Study and Flow Characterization and Geomorphic Study), would help to inform the type of flow releases that should be made to the creeks under various operating conditions.

Commented [SJ38]: Yes, but not using anything other than fish for 5937 compliance metrics. That will just be fish until CDFW absolutely forces us to use other metrics. We will be having discussions with them about this.

4.2 Overview of Proposed Methods

The bioassessment effort would be conducted using the methods described in the SWAMP 2016 SOP (Ode et al. 2016a, 2016b), or any updated version thereof. The reach-wide benthos method, which requires collection from each of 11 designated major transects across the sampling reach regardless of stream habitat type (e.g., riffle, run, pool), would be employed.

The ultimate number of individual sites, herein referred to as sampling reaches, on each creek would be based on access and safety; however, it is anticipated that five sampling reaches would be located on Funks Creek and that six sampling reaches would be located on Stone Corral Creek (Figure 3). Since there is no stringent guidance on establishing the number of bioassessment sampling reaches for a project such as this (Rehn pers. comm.), the number of sampling reaches was chosen to both best capture and quantify the two different elevational gradients within the study area (i.e., foothill and valley floor environments), and to have adequate spacing/distance between the sampling reaches (approximately 500 meters apart on Funks Creek above Funks Reservoir and approximately 2 kilometers apart elsewhere).

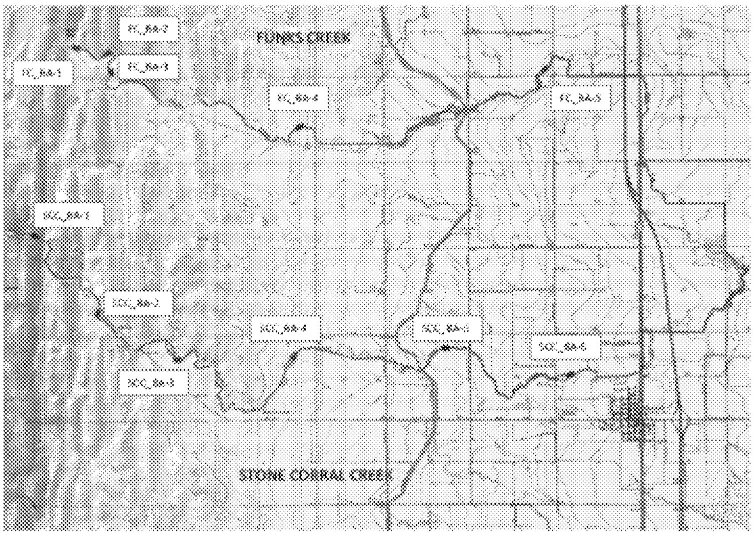


Figure 3. Potential Bioassessment Sampling Reaches, Stone Corral and Funks Creeks

4.3 Field Methods

This section summarizes the methods that would be used to collect all bioassessment data. All surveys would be performed by a qualified team of a biologist or biologists and a geomorphologist with expertise in benthic macroinvertebrate and algae collection, water quality monitoring, and physical habitat data collection.

4.3.1 Sampling Reach Delineation

As described in Chapter 2 of the SWAMP 2016 SOP, the average wetted width of each sampling reach would be used to determine the sampling reach length (Ode et al. 2016a). The SWAMP 2016 SOP specifies standard sampling reach lengths that are based on wetted width (150 meters for sampling reaches with average wetted widths less than or equal to 10 meters, and 250 meters for sampling reaches with average wetted widths greater than 10 meters).

Commented [SJ39]: During which time of year? This only flows after rainfall.

After the sampling reach length is determined, it would be laid out using marked surveyor's flags for transect identification and transects would be labeled according to the SWAMP 2016 SOP (main transects A–K and inter-transects AB, BC, etc.) for a total of 11 main transects and 10 inter-transects.

4.3.2 Basic Data Collection

Basic information collected at each sampling site would include project name, sampling reach name, time and date of survey, stream/watershed name, Global Positioning System (GPS) coordinates, and the names of the survey crew members. GPS coordinates would be recorded with an appropriate collection device (e.g., hand-held GPS receiver or iPad). Data collected at the sampling reaches would include water quality and stream discharge measurements, physical habitat information, and BMI and algae sample collections. The most recent version of the SWAMP *Stream Habitat Characterization Form Full Version* field forms would be used to enter data in the field.

4.3.3 Water Quality and Discharge Measurements

Water quality data would be measured using a YSI Pro DSS unit (or similar collection device), following Chapter 3 of the SWAMP 2016 SOP (Ode et al. 2016a) and recorded on standard SWAMP data forms. Water quality data obtained would include temperature, specific conductivity, salinity, dissolved oxygen, alkalinity, turbidity, and pH.

To determine alkalinity (which is a standard YSI is not capable of doing), a water sample would be collected at each sampling reach. The sample would be taken at approximately 10 to 15 centimeters below the water surface. Using gloves, collectors would fill the water sample bottles to the brim to ensure that air bubbles would not get trapped in the sample bottle. The bottle would then be placed on ice in a cooler until all field data collections were completed. In the evening following each day's sample collection, the water samples would be removed from the coolers and allowed to warm to room temperature. Alkalinity would then be determined by the double endpoint titration method using a Hach Digital Titrator.

Stream discharge would be measured using a Marsh-McBirney Flo-Mate Model 2000 flow meter and following the Velocity Area Method (Module O in Chapter 8 of the SWAMP 2016 SOP (Ode et al. 2016a, 2016b). Every effort would be made to select a stream transect with a relatively uniform cross section and laminar flow, and at least 20 equally spaced data points would be used to estimate streamflow.

Commented [SJ40]:

4.3.4 Physical Habitat Assessment and Photo-Documentation

As required by the SWAMP 2016 SOP, PHAB information would be collected at the sampling reaches at each transect and inter-transect location. At the 11 main transects, the full measurements listed in Chapter 6 of the SWAMP 2016 SOP would be taken (Ode et al. 2016a, 2016b). At the 10 inter-transects, fewer measurements would be taken per the SWAMP *Stream Habitat Characterization Form Full Version* field forms.

Digital photo documentation for each sampling reach would consist of upstream and downstream views at transects A, F, and K (i.e., the downstream, middle, and upstream portions of the sampling reach). Incidental observations such as recent rainfall, fire effects, flooding, and other disturbances would also be recorded.

At each sampling reach, reach-wide PHAB conditions relative to three Rapid Bioassessment Protocol (RBP) habitat parameters would be evaluated based on visual observations. These observations would include epifaunal substrate/cover, sediment deposition, and channel alteration. Each of these parameters would be scored using a numeric value and ranked using the following 20-point scale, per the SWAMP 2016 SOP:

- 1–5 rank as poor;
- 6–10 rank as marginal;
- 11–15 rank as suboptimal; and
- 16–20 rank as optimal.

4.3.5 Benthic Macroinvertebrate Sample Collection

BMI collection would be conducted according to the SWAMP 2016 SOP, using the reach-wide benthos method, which requires collection from each of the 11 major transects across the sampling reach regardless of stream habitat type (e.g., riffle, run, and pool). The BMI samples would be collected 1 meter downstream of each major transect by sampling a 1-foot-square area using a D-frame net. The sampling would begin at transect A (the downstream end) and continue upstream to transect K, with the sample location alternating from left (25% of width), to center (50% of width), to right (75% of width) on each subsequent transect.

All collections from the 11 major transects would be composited into a single sample and transferred into a 1-liter, wide-mouth plastic jar and preserved with 95% ethanol, following the SWAMP 2016 SOP. Samples would be labeled with collection site, time, and collector's name; and a chain-of-custody form would be filled out to accompany the samples on their way to the laboratory for identification. Replicate samples would be collected according to the SWAMP 2016 SOP at one sampling reach for quality assurance/quality control (QA/QC) purposes.

4.3.6 Algae Sample Collection

Algae would be collected in the same manner as the BMI samples, except that the algae would be collected 25 centimeters above the location where the BMI sample would be located. Algae samples would be collected using the sampling tools identified in the SWAMP 2016 SOP, which vary according to the substrate being sampled. A rubber delimiter would be used for large gravel and cobble; a PVC delimiter would be used for fines and gravels; and a syringe scrubber would be used for bedrock and large boulders (if present).

Similar to the BMI sampling, each algae sample collected at the 11 major transects would be composited into a single sample for processing. The processing of the algae would follow the SWAMP 2016 SOP, which would involve removal of algae from the substrates collected and processing the sample for the four algae analyses: quantitative soft-bodied algae, quantitative diatoms, ash-free dry mass (AFDM), and chlorophyll a. A soft-bodied algae qualitative sample would also be collected from each sampling reach by collecting a composite of all types of soft-bodied algae observed within the sampling reach into a single sample. This sample would aid in the identification of soft-bodied algae in the quantitative sample and would be used in the calculation of some of the algae metrics. Replicate algae samples would be collected at the same sampling reaches where replicate BMI samples would be collected.

4.4 Laboratory Processing

Commented [SJ41]: Can we grab some fish and have then sent to the lab for toxicity testing, I'd like to know what's there now as mercury is going to be a continuing question.

This section summarizes the methods that would be used to process all bioassessment data.

4.4.1 Water Quality

Two water samples would be collected at each sampling reach to determine total nitrogen and total phosphorus, constituents necessary for helping to determine algal results. Samples would be sent to a local water quality processing laboratory in northern California. The water quality analyses would be consistent with SWAMP protocols for water chemistry. Total nitrogen would be analyzed according to U.S. Environmental Protection Agency Method 351.2, and total phosphorous would be analyzed according to Standard Methods 4500-P B and 4500-P E.

4.4.2 Benthic Macroinvertebrate Sample Processing

BMI sample taxa identification would be conducted by an outside laboratory (most likely by the Chico Aquatic Bioassessment Laboratory [Chico ABL] in Chico, California). BMI samples would be picked, sorted, and identified completely or until a 600 count (SAFIT Level 2) is reached. Chico ABL follows QA/QC procedures developed under the SWAMP program.

4.4.3 Algae Sample Processing

Five types of algae would be collected and processed: qualitative grab, soft-bodied algae, diatoms, AFDM, and chlorophyll a. The qualitative grab, soft algae, and diatom samples would be sent to the CDFW Group at the Marine Pollution Studies Laboratory at Moss Landing Marine Laboratories (MPSL-MLML). MPSL-MLML would report the data to Marco Sigala at Moss Landing in SWAMP template formats. Mr. Sigala would calculate the Algae Stream Condition Index (ASCI) from the data. The samples of AFDM and chlorophyll a would also be sent to MPSL-MLML, who would report the data in California Environmental Data Exchange Network template formats. PSL-MLML follows the QA/QC procedures developed under the SWAMP.

4.5 Data Analysis

PHAB information would be entered using the SWAMP Version 2.5 bioassessment data entry forms (Marine Pollution Studies Laboratory 2022) and then loaded into the Microsoft Structured Query Language (SQL) Server database of the MPSL-MLML. BMI and algae taxonomy data, as well as water chemistry data would be loaded from Microsoft Excel templates into the same Microsoft SQL Server database. The data entry forms and templates would be obtained from the MPSL-MLML Data Center website. All data would be verified and checked for completeness after input into the database.

4.5.1 Physical Habitat Information

PHAB data would be entered by the MPSL-MLML using the SWAMP Bioassessment Field Form Microsoft Access database, and then loaded into the MPSL-MLML's Microsoft SQL Server database. After loading, additional error and completeness checks would be run following SWAMP business rules. The data would be sent to the California Environmental Data Exchange Network, where it would be available to the public for viewing and download.

PHAB metrics would be calculated using the SWAMP Bioassessment Reporting Module. The SWAMP protocol contains a subset of parameters measured within the U.S. Environmental Protection Agency's Environmental Monitoring and Assessment Program for freshwater wadeable streams; therefore, many of their metrics described in Kaufmann et al. (1999) form the basis of the SWAMP Bioassessment Reporting Module output. SWAMP also has added metrics specific to its protocol and analyses, as well as metrics specific to the Sierra Nevada Aquatic Research Laboratory protocol.

Commented [SJ42]: Anything for costal range?

SWAMP has developed a PHAB Index similar to the California Stream Condition Index (CSCI) (see Section 4.5.3) for BMI data. The PHAB Index (called the "IPI") combines eight GIS-calculated metrics with 12 PHAB metrics to produce one IPI value (Rehn et al. 2018). For the purposes of statewide assessments, the IPI has thresholds of physical condition: greater than or equal to 0.94 indicates likely intact condition; 0.93 to 0.84 indicates possibly altered condition; 0.83 to 0.71 indicates likely altered condition; and less than or equal to 0.70 indicates very likely altered condition.

Commented [SJ43]: Is the goal to do this analysis yearly and see if this changes? We're building a dam so it probably will. Let's talk about this and what it means.

In addition, the results would be compared to key stressor thresholds that best highlight the conditions at the sampling reaches identified in *Ecological Condition Assessment of California's Perennial Wadeable Streams: Highlights from the Surface Water Ambient Monitoring Program's Perennial Stream Assessment (PSA) (2000–2007)* (Ode et al. 2011). These select stressor thresholds are not regulatory limits set by the State Water Board; rather, they are biology-based stressor thresholds developed by researchers as an objective means to set meaningful, regionally appropriate water quality standards. Specifically, two statewide and regional physical habitat biological stressor thresholds, the Percent Fines & Sand and Mean Embeddedness thresholds, would be evaluated.

Commented [SJ44]: Why these? And Why only these?

4.5.2 Water Quality

Similar to the PHAB analysis described above, water quality results would be compared to key stressor thresholds that best highlight the conditions at the sampling reaches identified in *Ecological Condition Assessment of California's Perennial Wadeable Streams: Highlights from the Surface Water Ambient Monitoring Program's Perennial Stream Assessment (PSA) (2000-2007)* (Ode et al. 2011). Specifically, the Turbidity and Specific conductance water chemistry biological stressor thresholds (statewide and regional) would be evaluated.

Commented [SJ45]: Same question as above

4.5.3 Benthic Macroinvertebrates

MPSL-MLML would be contracted to assist in the analysis of the BMI data. MPSL-MLML would use the BMI taxonomic data obtained from Chico ABL to calculate CSCI scores for each sampling reach. The CSCI is a statewide biological scoring tool that translates complex data about individual BMIs found living in a stream into an overall measure of stream health (Rehn et al. 2015).

CSCI scores and output would be calculated using R scripts defined in Mazor et al. (2017). CSCI score categories would be applied as defined in Rehn et al. (2015).

- less than or equal to 0.62: very likely altered
- 0.63–0.79: likely altered
- 0.80–0.91: possibly altered
- greater than or equal to 0.92: likely intact

MPSL-MLML would also calculate several BMI metrics from the taxonomic data for each sampling reach. These individual metrics would be reviewed to discuss the individual results for each sampling reach and event. Representative metrics may include measures of taxa richness, composition, tolerance, functional feeding groups, and habit measures. These other metrics may be more insightful for determining the biological integrity of the BMI communities than the CSCI scores alone (at least in the valley floor sampling reaches), as valley floor reference sites (the sites used in the CSCI calculations) are relatively limited in abundance (Rehn pers. Comm.).

4.5.4 Algae

Diatoms and Soft Algae

MPSL-MLML would be contracted to calculate the statewide diatom, soft algae, and hybrid ASCI and associated metrics. These predictive biological indices replace past regional indices with a statewide index allowing for improved comparisons across diverse landscapes in a consistent and comparable manner. While ASCI can be calculated for soft algae and diatoms separately, the hybrid ASCI produces stronger species distribution models for more accurate and integrative assessments of biological condition.

Chlorophyll a and Ash-Free Dry Mass

Ode et al. (2011) in their analysis of the results from the statewide Perennial Stream Assessment between 2000 and 2007, have included stressor thresholds for chlorophyll a and AFDM. These thresholds are more protective than levels proposed by previous authors, which were 100 milligrams per square meter for chlorophyll a and 50 grams per square meter for AFDM (Barbour et al. 1999, Welch et al. 1988, Dodds et al. 1998, Sosiak 2002, Dodds and Welch 2000, U.S. Environmental Protection Agency 2000, Biggs 2000). The thresholds proposed by Ode et al. (2011) are not regulatory limits or requirements but rather recommendations. The chlorophyll a and AFDM stressor thresholds (statewide and regional) would be evaluated for each sampling reach by MPSL-MLML.

Commented [SJ46]: What is Ode et als? I'm more comfortable going with USEPA for our ecoregion but am willing to discuss.

4.6 Timing and Frequency

The bioassessment surveys would be conducted during the appropriate index period for Central Valley streams (June through August[1]), which is typically 4 to 6 weeks following the last winter storm event. Baseline (pre-construction monitoring) would occur in the spring for 5 years prior to project ~~construction~~ operation~~(dam and reservoir construction)~~. Follow-up (post-baseline) surveys would be conducted on an annual basis during the same time period for up to 10 years after ~~construction~~ operation activities – the Authority and the relevant permitting agencies (CDFW, SWRCB and the CVRWQCB) would ~~determine~~ be consulted if the frequency of monitoring would be ~~can be~~ shortened after 5 years.

Commented [SJ47]: 90% chance they will be dry with a few pools and seeps.

Commented [SJ48]: The timing in the bullets above says Fall of every year, so these are done separately from the fish sampling. Can we not do them all at the same time?

4.6.1 Permitting Requirements

A CDFW Scientific Collecting Permit (Specific Use) or Memorandum Of Understanding permit would be required to complete the study design as proposed. BMI samples would be the only sacrificed species.

4.7 Additional Water Quality Measurements

In addition to the standard water quality measurements included in the SWAMP bioassessment as described above, water samples will also be collected for laboratory measurements of cyanobacteria, cyanotoxins, and a full suite of total and dissolved metals (as described below). The objectives for taking these additional measurements will be to compare pre-Project and post-Project values, determine any effect of operational adjustments on sampled water quality constituents, and compare water quality measurement values to key stressor thresholds.

The suite of metals includes aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, methylmercury, nickel, selenium, silver, and zinc. The cyanobacteria water samples will be collected for the purpose of laboratory analysis for cyanobacteria presence and density and the presence of cyanotoxins (specifically microcystins, anatoxin-a, and cylindrospermopsin).

When these additional water quality samples are collected, the following basic survey information and data described above would be collected: project name, sampling reach name, time and date of survey,

[1] Depending on stream conditions, bioassessment surveys may need to be performed prior to the appropriate index period to ensure adequate flow for benthic and algal sampling is present.

stream/watershed name, and the names of the survey crew members. Incidental observations such as recent rainfall, fire effects, flooding, and other disturbances would also be recorded. Basic data collected at the sampling sites would include stream discharge measurements, temperature, specific conductivity, dissolved oxygen, turbidity, pH, and water samples for total nitrogen and total phosphorus laboratory measurements. In addition, water samples will be collected for laboratory measurements of dissolved organic carbon and hardness as these parameters influence water quality standards for aquatic life protection for some metals.

These measurements will be taken twice a year, once during a high flow period and once during a low flow period, at the upstream and downstream bioassessment sampling locations on each creek. Sampling would occur during the same years as the rest of the bioassessment studies.

5.0 Hydrogeomorphic Study

5.1 Purpose of Flow Characterization and Geomorphic Study

The overall purpose of the Flow Characterization and Geomorphic Study (hydrogeomorphic technical study) would be to characterize historical and present-day streamflows, including baseflow during the spring and summer months, on Funks and Stone Corral Creeks; the relevant geomorphic characteristics of each creek (herein called 'geomorphic indicators'); and flow levels necessary for channel maintenance of geomorphic processes required to maintain the channels in their current condition.

A hydrogeomorphic technical study with quantitative and qualitative monitoring data to fully characterize the existing hydrologic regime of Funks and Stone Corral Creeks, as well as the overall type and abundance of sediment available for aquatic organisms, would be developed. To inform the appropriate streamflows for the creeks under inquiry, a geomorphic assessment of the reaches of interest (i.e., the stream reaches below the dams) would constitute the first step in the analysis. The channel segments upstream of the dams would also be examined to provide a greater understanding of the local watershed geomorphic characteristics. The focus of the geomorphic assessment would be to determine the dominant geomorphic processes, document the surrounding landforms and channel bed topography, and to determine how the observed morphology of each creek is influenced by the hydrologic regime and the surrounding land uses. Likewise, collection of geomorphic information would aid in the determination of overall channel stability for each creek, which has important implications for the proposed releases.

Commented [SJ49]: Is this needed to achieve the goals? Our interest is in the downstream channels and a flow regime post operation that would be needed to maintain in current condition.

The hydrogeomorphic technical study to examine the hydrologic regime of Funks and Stone Corral Creeks would include a desktop modeling exercise, as well as installation of stilling wells, staff gages, and real-time water surface level collection devices. The ultimate goal of the hydrogeomorphic technical study would be to evaluate the physical and hydrologic condition of the reaches of interest withing both Stone Corral Creek and Funks Creek. This information, along with the other required studies as discussed in previous chapters (i.e., Fish Assemblage Study and SWAMP bioassessment study), would help to inform the type of flow releases that should be made to the creeks under various Project operating conditions.

After completion of the baseline studies, consideration would be given to when and how flows would be released and ~~,~~ whether a portion of these flows are needed to maintain fluvial geomorphic processes (based on the findings from the geomorphic assessment)~~, and what level of variability in base flows would satisfy CFGC Section 5937~~.

5.2 Study Design

The (baseline) hydrogeomorphic study components are discussed below. *Field site locations* are applicable to the geomorphic component of the hydrogeomorphic technical study; *hydrologic monitoring locations* represent the potential locations where stilling wells, staff gages, and real-time water surface level collection devices would be installed (i.e., the hydrologic component of the hydrogeomorphic technical study). The ultimate number of field site locations on each creek would be based on access and safety; however, it is anticipated that five sites would be located on Funks Creek and that six would be located on Stone Corral Creek. The locations for the geomorphic component of the hydrogeomorphic technical study would presumably be the same as the bioassessment sampling reaches as part of the SWAMP bioassessment study as described in Chapter 4 (see Figure 3).

The ultimate number of hydrologic monitoring ~~27~~locationns on each creek would primarily be based on access, due to the need for monitoring during and after precipitation events. It is anticipated that two sites would be located on each creek: one in the foothills and one on the valley floor as shown on Figure 4.

5.2.1 Geomorphic Conditions

Data collected during the geomorphic component of the hydrogeomorphic technical study (geomorphic assessment) would include a host of geomorphic attributes, or indicators, as described below. Topographic data (longitudinal profile and cross sections) needed for the hydrologic model (further described below) would also be collected during the geomorphic assessment. The geomorphic assessment would be conducted by a geomorphologist with expertise in channel and floodplain dynamics, channel stability analyses, and topographic surveying techniques.

Commented [SJ50]: We just flew LIDAR and this could be used as it is survey grade

The geomorphic assessment would include evaluation of the following indicators.

- channel classification
- local watershed inputs
- hydrologic and flow patterns
- riparian vegetation condition
- bankfull width and depth and wetted width
- bank instability and bank characteristics
- channel bed substrate composition and embeddedness
- channel complexity
- degree of channel incision
- stage of channel evolution
- cross section and longitudinal profile surveys

These indicators would be assessed for each field site location (Figure 3). In addition, at least three permanent cross sections would be established within each field site location and within each hydrologic monitoring location (Figure 4) for collection of quantitative channel morphology information and required modeling input. Evaluation methods for these indicators are described below.

Channel Classification

River segments can be grouped into three generalized classifications based on their position in the watershed and the relative balance of transport capacity to sediment supply (Montgomery and Buffington 1998). Headwater source areas are typically transport-limited (often due to limited channel runoff) but do offer sediment storage that is intermittently initiated under large flow events, debris flows, or other gravitational events. Transport segments are composed of morphologically resilient, supply-limited reaches (e.g., bedrock, cascade, and step-pool) that rapidly convey increased sediment inputs. Response segments consist of lower-gradient, more transport-limited depositional reaches (e.g., plane-bed, pool-riffle) where channel adjustments occur in response to changes in sediment supply delivered from upstream.

Based on field observations and the stream classification methodology of Montgomery and Buffington (1998), each field site location would be classified accordingly. The classification would aid in the determination of the sediment regime and bedform morphology, which would help characterize the stream habitat and function of each field site location on the reaches of interest.

Local Watershed Inputs

Any major inputs of sediment and runoff into the field site locations (e.g., landslides or other mass wasting features, recent burn scars) will be summarized. The objective would be to identify any land use changes that could alter the balance of sediment supply and runoff that could lead to future instability (e.g., channel aggradation of degradation) within the reaches of interest. This will aid in the determination of channel stability and the potential for available habitat to be disrupted or altered in the vicinity of the field site locations.

Hydrologic and Flow Patterns

The hydrologic pattern would be determined throughout the length of the field site locations and would include identification of whether streamflow is perennial, intermittent, or ephemeral. Perennial streams are those which flow year-round; intermittent streams are those which flow for only certain times of the year and receive water from both surface water and groundwater; and ephemeral streams are those which have their channels above the water table year-round and only receive water from surface runoff. This geomorphic indicator would rely on the field-based hydrologic component of the overall hydrogeomorphic technical study, as describe below.

Riparian Vegetation Condition

Riparian vegetation is an important indicator for overall stream habitat and function as it serves to stabilize streambanks and allows for canopy cover to create suitable water temperatures for aquatic species. Riparian condition refers to a description of the general health of the riparian area, focusing on the amount and type of vegetative cover.

Within each field site location, riparian condition would be described as low (0–25 % vegetative cover), moderate (25–50 % vegetative cover), high (50–75 % vegetative cover), or very high (75–100 % vegetative cover). The size and approximate age of any riparian vegetation growing in the channel bed would be documented because this is evidence of channel adjustment and possible re-stabilization from a prior disturbance.

Bankfull Width and Depth and Wetted Width

Bankfull width and depth measurements would be recorded to assess the hydraulic capacity of the channel in the field site locations. Specifically, a geomorphic or effective bankfull surface would be identified in the field. The geomorphic bankfull or effective surface is the surface that gets inundated by the discharge that performs the most geomorphic work on a system, typically a flow that occurs every 1.5–2 years (Knighton 1999). This discharge, known as the geomorphic bankfull discharge, is defined as that water discharged when stream water just begins to overflow into the active floodplain. The geomorphic bankfull or effective surface would be identified based on the methodology of Harrelson et al. (1994) and Hauer and Lamberti (1996). Once this surface is recognized, width and depth measurements would be recorded.

Similar to bankfull width and depth measurements, wetted width and depth measurements would be recorded. Specifically, the wetted surface would be determined identified in the field and width and depth measurements would be recorded.

Bankfull and wetted width and depth data collection would help to determine the size of the channel, which would help in assessing overall available habitat conditions in the field site locations and reaches of interest.

In addition, the "active channel" width would be identified, which typically represents a typical low to moderate flow regime and is usually bounded by the width of the in-channel vegetation.

Bank Instability and Bank Characteristics

The term 'bank instability' refers to streambanks that are either actively retreating or have the potential to retreat in the near future. In brief, weakening processes are any bank or near-bank processes that act to erode or prepare streambanks for further erosion (Lawler 1992). The purpose of assessing this indicator will be to identify fluvial erosion (erosion associated with flowing water) and bank failure (erosion associated with gravitational forces and weakening processes). Fluvial erosion is closely related to boundary shear stress, which can be loosely approximated by unit stream power variations, and bank failure is collapse of all or part of the streambank in situ (Lawler 1995).

Bank stability would be defined as the natural streambank that has stable groundcover. Stable ground cover includes rooted trees, shrubs, herbaceous plants, and naturally occurring rocky substrates. Bank composition and bank height/angle would also be determined. The results, in conjunction with the other indicators, can be used to detect where the channel may be downcutting as suggested by over-steepened banks, and can also be used to describe the potential for the channel to potentially laterally migrate and increase the risk of bank instability.

Bank stability analyses will aid in determination of the sediment regime and bedform morphology, which will help characterize the stream habitat and function of the field site locations, as well as the determination of channel stability and the potential for available habitat to be disrupted or altered in the field site locations.

Channel Bed Substrate Composition and Embeddedness

Substrate composition and embeddedness refer to the size of the substrate materials on the channel bed, and the degree to which these materials are embedded. These conditions indicate how frequently the channel substrate is mobilized. Substrate composition and embeddedness would be measured using the methods described by Bunte and Abt (2001). Substrate composition would identify the available substrate (overall type and abundance) for aquatic species in the vicinity of each field site location and would allow for determination as to whether the Reservoir Operations Plan would require gravel augmentation in the reaches of interest.

Channel Complexity

The presence or absence of gravel bar development and evidence of scour and/or deposition would be determined throughout the length of each field site location. Pool and riffle habitats containing in-channel structures (e.g., instream woody material) that create complexity and habitat niches for aquatic organisms would also be documented. Basic channel or habitat units (e.g., pool, riffle, and flatwater) would be delineated according to standard habitat mapping descriptions in each field site location. A rough proportion of unit types will be calculated.

Channel or habitat units would be defined as follows.

- Pool: Slow water, length and width at least one-half the bankfull channel width, and a 10-inch minimum residual pool depth. Subcategories define the general type of pool and include scour (lateral, channel, channel confluence, plunge), dam, and backwater, as defined by Overton et al. (1997).

- Riffle: Swiftly flowing, turbulent water, some partially exposed substrate, substrate cobble, and/or boulder dominated (McCain et al. 1990).

- Flatwater: Wide, uniform channel bottom, low to moderate water velocity, and little surface agitation. Encompasses any areas that do not qualify as pool or riffle (McCain et al. 1990).

If appropriate (i.e., if the habitat diversity merits such a method), the field site locations would be habitat typed to provide a more detailed stream habitat inventory based on the methods described in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al. 2010). Stream habitats would be delineated into one of the six Level-III habitat classification types (per Flosi et al. 2010) based on morphological characteristics. These include overall channel gradient, water velocity and depth, substrate, and, where applicable, the channel features (e.g., boulder, bedrock, woody material, converging flow) causing the formation of the habitat unit through scour and sediment deposition (Flosi et al. 2010). Channel/habitat type determination would allow for identification of available habitat types for aquatic species.

Commented [SJ51]: We don't have salmonids and this may draw some concern from the locals.

Degree of Channel Incision

The degree to which the channel is incised will be recorded as negligible, low, moderate, high, or very high. The degree of incision will be qualitatively analyzed using the following criteria.

Identification of any Quaternary landforms on the floodplain (e.g., terraces, low floodplain, fan, etc.). Terraces typically have steep streambanks and the channel may not necessarily be incised. Steep, unstable streambanks adjacent to a low floodplain surfaces, however, typically indicate incision.

Identification of bedforms downstream of the site where and if the channel is less incised. Bed and streambank material from incised channels would typically be deposited downstream in somewhat uncharacteristically large deposits on the channel bed (downstream aggradation).

Recognition of base level changes downstream. Dams and other barriers can create upstream changes in channel bed elevation (i.e., headward migration of incision).

Visual survey of channel bed at the field site location. Channel or habitat sequences, such as pool-riffle sequences, are rare in incised channels, and those that do exist do so for only limited time intervals. Additionally, the increased depth of flow associated with incision, coupled with an increased flashy regime, results in bed armoring and a decreased frequency of bed mobilization.

Determination of the health of the riparian and floodplain plant species. Plants that are found in similar, un-incised reaches are usually not present in incised reaches. No vegetation at all is an indicator of no hydrologic interaction between the floodplain and the channel and therefore incision.

Identification of recent evidence of overbank deposition of fine sediment, plant debris, or other organic matter. A channel that floods its streambanks frequently would typically have splay (i.e., sand) deposits and vegetation with a smoothed, flooded appearance in the downstream direction. Natural levee development is also an indication of frequent flooding.

Stage of Channel Evolution

A stream evolution model (Cluer and Thorne 2013) would be applied to the entirety of the reaches of interest on Funks and Stone Corral Creeks to provide a template for understanding geomorphic responses and processes within the immediate watershed. The stream evolution model of Cluer and Thorne (2013) revisits and updates two well-established channel evolution models (Schumm et al. 1984, Simon and Hupp 1987) in light of recent research and the authors' practical experiences.

In addition, a channel stability analysis would be conducted at each field site location. The chosen methodology would be dictated by site conditions but could include the methods as presented in the modified Pfankuch procedure (Pfankuch 1975) as described by Rosgen (2001), Simon and Down (1995), Bledsoe et al. (2011), or other applicable method. The stream evolution model and the channel stability analyses would aid in the determination of how on Funks and Stone Corral Creeks may evolve (e.g., deepen/widen) or remain in a state of equilibrium in the future, thus having implications for the available habitat within the channels.

Cross Section and Longitudinal Profile Surveys

As mentioned above, at least three permanent cross sections would be established within each field site location (Figure 3) and within each hydrologic monitoring location (Figure 4) for collection of quantitative channel morphology information and required modeling input. Permanent cross sections would be established perpendicular to the primary channel following the methodology of Harrelson et al. (1994). Each transect would be surveyed using ground-based surveying equipment to capture and track channel morphology. Elevations along the cross sections would be collected at intervals close enough to capture slope breaks and distinct morphological features within the floodplain (if present), and along the channel sides and bottom.

The location of each cross section would be permanently marked in the field using 4-feet-tall metal t-posts or wooden lathes (to easily find the general transect location) and with rebar driven vertically into the ground surface, capped with an appropriate cover (to establish known permanent elevations [permanent monuments or benchmarks] on each side of the transect). The permanent benchmarks for each transect would be placed in a stable location above the active channel on the left and right (as viewed facing downstream) banks or terraces of the channel. Transect endpoints (i.e., the permanent monuments) would be documented using a GPS receiver. Representative photographs would be taken at each cross section.

In addition to the cross sections, a longitudinal profile would be surveyed throughout the length of the channel within a field site location. The spacing between channel bed data points would vary depending on the complexity of the channel bed characteristics. Digital photographs would be taken in the upstream and downstream directions at various locations throughout the longitudinal profile. The location(s) of each cross section would be surveyed on the longitudinal profile for graphical plotting purposes.

Channel Geometry Metrics

As mentioned previously, bankfull width and depth measurements would be recorded to assess the hydraulic capacity of the channels. This would be completed at the cross sections measured in the field. In addition to bankfull, wetted, and active channel width and depth measurements, the bankfull and entire channel width-to-depth ratio would be calculated for each cross section, and sinuosity and gradient of the longitudinal profile would be determined.

5.2.2 Hydrologic Conditions

Commented [SJ52]: We do have some H&H modeling that the design team did that might be used instead. I will send it over.

The hydrologic component of the hydrogeomorphic technical study would consist of both desktop (modeling and historical conditions review) and field-based efforts (generation of stage-discharge relationships), both of which are summarized below. The desktop effort would provide detailed information on various (modeled) flows of interest (i.e., the 2-year, 5-year, 10-year, 50-year, and 100-year flow events), while the field-based efforts would validate/calibrate the modeling results via collection of real-time streamflow data, especially for smaller streamflow events (the flows that are expected to occur most of the time on each creek).

Summary of Modeling Approach

A HEC-HMS rainfall-runoff-routing watershed hydrology model would be created to generate hydrographs for both Stone Corral Creek and Funks Creek. Inputs into the hydrology model would include watershed land use, percent impervious inputs, soil types, precipitation and evapotranspiration, drainage network characteristics, and topography (which will be generated from available LiDAR).

The topographic surveys as described above would also serve to augment the existing LiDAR data with on-the-ground data to better capture topography in areas requiring additional detail (such as densely vegetated areas). The topographic surveys would be tied into the State Plane Coordinate System and would be sufficient to generate contours at a 1-foot interval. The data collected via the topographic surveys would also be required for generation of stage discharge relationships, as described below.

It should be noted that HEC-HMS rainfall-runoff-routing watershed hydrology model constitutes the first (somewhat exploratory) step in the hydrologic analysis. Releases into Funks Creek will be made through the transition manifold at the base of Golden Gate Dam and a new pipeline that terminates at Funks Creek below the dam. These facilities will carry up to 100 cfs with a release range of 0 to 100 cfs into Funks Creek. Releases into Stone Corral Creek will be made through the permanent outlet at Sites Dam. This outlet will have a release range of 0 to 100 cfs, with an emergency release capacity of up to 2,500 cfs. The modeling effort will be the first step in verifying that this proposed range described in the EIR is adequate to address the purpose of CFGC Section 5937 given the modeled hydrology.

Summary of Field-Based Analysis

The primary objective of the field investigation would be to provide an accurate description of the existing watershed hydrology and variations in streamflow and water surface elevations (i.e., stage) on both Stone Corral Creek and Funks Creek. Periodic streamflow measurements (depth and velocity measurements) would be taken to develop stage-discharge relationships (rating curves) to translate the continuous water depth measurements measured with continuous stage recorders (i.e., HOBO water level loggers [Onset Computer Corporation]) into continuous estimates of flow. These measurements would occur at the hydrologic monitoring locations as shown on Figure 4.

To determine continuous estimates for streamflow, the stage recorders, which measure water temperature and pressure, and vertical stilling wells would be installed in relatively deep portions of the creeks at the locations as shown on Figure 4. The HOBO water level loggers would be set to monitor water depth every 15 or 30 minutes. Additional HOBO water level loggers would also be installed to monitor barometric pressure every 15 or 30 minutes for the purpose of calibrating the depth (water pressure) measurements, which are also affected by barometric pressure. These additional data loggers would be secured to upland surfaces (e.g., trees). Streamflow measurements would be collected to develop equations to convert the continuous stage recorder data into estimated streamflows (discharge). During variable discharge conditions, streamflows would be estimated using a Marsh-McBirney Flo-Mate Model 2000 flow meter and top-setting rod following the procedures described in Module O in Chapter 8 of the SWAMP 2016 SOP (Ode et al. 2016a, 2016b).

Daily precipitation data from obtained from the California Data Exchange Center would be used to characterize the rainfall patterns during the study period. Rainfall patterns would be displayed concurrently with the measured streamflow data.

If necessary, acoustic Doppler current profiler (ADCP) technology could be used to capture high flow events. ADCP equipment is particularly useful for collecting accurate and precise water depth and 2-D/3-D velocity data, especially at high flows when other standard surveying techniques as described above are impractical or unsafe. ADCP technology also offers the advantage of detecting bed elevation change resulting from high flow events that would be useful for evaluating sediment mobility in the reaches of interest. The applicability of ADCP would be investigated during the first season of hydrologic monitoring (once biologists ascertain the field conditions at the field site locations).

5.3 Timing, Frequency, and Post-Construction Monitoring

5.3.1 Pre-Construction Monitoring

Commented [SJ53]: GLOBAL, change construction to operation. They will be passing flows until that time.

The baseline geomorphic component of the hydrogeomorphic study would first be conducted during the winter/spring of 2023. It is anticipated that all relevant geomorphic indicators could be collected during one field trip. Additional baseline geomorphic data collection during subsequent years would be necessary if precipitation patterns are highly variable during the pre-construction period.

The desktop hydrologic component of the hydrogeomorphic study would occur during 2023. The field-based hydrologic component of the hydrogeomorphic study would occur at the locations as shown on Figure 4 until the dams are constructed.

5.3.2 Post-Construction Monitoring

Follow-up (post-baseline/post dam construction) geomorphic and hydrologic surveys would be conducted on an annual basis for up to 10 years after ~~construction~~ operations begin~~activities~~. The Authority will consult with ~~and~~ the relevant permitting agencies (CDFW, SWRCB and the CVRWQCB) ~~would determine~~ if the frequency of monitoring would ~~can~~ be shortened after 5 years. Additional information on each component of is provided below.

Geomorphic Stability Monitoring Plan

Post-construction geomorphic monitoring would generally be similar to the pre-construction efforts, including returning to established field site locations and collecting information on geomorphic indicators by performing a geomorphic assessment as described above. Data collected as part of the post-construction geomorphic monitoring effort would be compared against the baseline data and summarized into interim and final reports to the Authority.

The focus of the post-construction geomorphic monitoring effort, however, would be geomorphic stability monitoring. As such, the primary survey components of the Geomorphic Stability Monitoring Plan would include cross section and longitudinal profile surveys, channel bed substrate composition determination, and channel stability evaluations. All methods for these efforts would be identical to those described above. The objectives of these monitoring elements and their relevance to geomorphic stability are summarized below.

Cross Section and Longitudinal Profile Surveys

The objectives of collecting data at the cross sections would be to collect primarily lateral stability information to determine the rate of lateral migration through bank erosion and overall cross-sectional area change. The rate, magnitude, and direction of lateral change and area change would be determined over time using repeat longitudinal profile surveys.

The objective of collecting data at the longitudinal profiles would be to collect primarily vertical stability information to determine rates of aggradation or degradation (whether the stream is downcutting [degrading], filling [aggrading], or remaining static). The rate, magnitude, and direction of vertical change would be determined over time using repeat longitudinal profile surveys.

Channel Bed Substrate Composition and Embeddedness

The objectives of collecting channel bed substrate composition and embeddedness information would be to observe potential shifts in bed material size-frequency distribution, which can be determined over time. Collected grain size information would aid in interpretation in specific geomorphic changes if they occur (such as any changes identified via the cross-sectional and longitudinal profile analyses above).

Channel Stability Evaluations

The chosen methodology for channel stability evaluations would be dictated by site conditions but could include the methods as presented in the modified Pfankuch procedure (Pfankuch 1975) as described by Rosgen (2001), Simon and Down (1995), Bledsoe et al. (2011), or other applicable method. Together with the stream evolution model (Cluer and Thorne 2013), the channel stability analyses would aid in the determination of how on Funks and Stone Corral Creeks may continue to evolve (e.g., deepen/widen) or remain in a state of equilibrium in the future, thus having implications for the available habitat within the channels.

Hydrologic Monitoring Plan

Post-construction hydrologic monitoring would be similar to the pre-construction field-based efforts, including returning to established hydrologic monitoring locations ~~and~~, monitoring stage and stream discharge over time. Data collected as part of the post-construction hydrologic monitoring effort would be compared against the baseline data and summarized into interim and final reports to the Authority.

The level of effort of the post-construction Hydrologic Monitoring Plan, however, would be considerably less than for the pre-construction effort because, depending on the streamflow and precipitation patterns during the pre-construction time-period, there would presumably already be numerous years of pre-construction hydrologic monitoring data at the hydrologic monitoring locations (in other words, a robust data set with multiple discharge measurements and associated stages would be available). The post-construction hydrologic monitoring effort would therefore primarily consist of measuring streamflow values that were not obtained during the pre-construction monitoring effort (presumably higher flow events) and conducting routine field maintenance activities such as periodic downloads of the HOBO water level loggers and upkeep of field equipment.

5.4 Applicable Methods for Maintaining Streamflows

After baseline hydrogeomorphic conditions are obtained and evaluated in context with the studies from other disciplines (i.e., Fish Assemblage Study and SWAMP bioassessment study), various approaches for estimation of minimum streamflows to maintain ecosystem and geomorphic function would be reviewed, such as "the functional flow" approach suggested by Yarnell et al. (2015), the Instream Flow Incremental Methodology (IFIM) (National Biological Service, U.S. Department of the Interior 1995), the CDFW Instream Flow Program (IFP), and the Richter et al. (2011) approach. These methods would be investigated for their applicability to determine appropriate streamflows on Funks and Stone Corral Creeks to maintain fish in good condition. Coordination with the permitting agencies would be required before a chosen method is selected.

6.0 Temperature Study Design and Methods

6.1 Overview of Proposed Methods

Commented [SJ54]: Anne H is proposing some WQ monitoring, please coordinate with her so that we don't double up.

A temperature study would be conducted to characterize temperatures under existing conditions and determine flow and storage effects on temperature in Stone Corral and Funks Creeks under post-construction conditions. The study would involve evaluating temperatures in the creeks before and after Project construction and would be conducted in combination with the flow characterization study (Appendix 2D, Section 2D.4.2 in the *Sites Reservoir Project Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement* (Sites Project Authority and Bureau of Reclamation 2021) and Sites Reservoir storage data. The study would assess:

- The temperatures that support the aquatic community under existing conditions.
- Reservoir discharge needed to establish suitable temperatures in Stone Corral Creek downstream of Sites Dam after construction.
- Reservoir discharge needed to establish suitable temperatures in Funks Creek downstream of Golden Gate Dam after construction.

Commented [SJ55]: Suitable for what?

6.2 Study Design

Once access to Stone Corral Creek is obtained, a temperature probe would be installed in Stone Corral Creek at the location of Sites Dam release, and four additional probes would be installed downstream by approximately 0.5 mile, 1 mile, 2.4 miles (near where Stone Corral Creek goes under Maxwell Sites Road), and 4.4 miles (near where TC Canal goes under Stone Corral Creek).

Once access to Funks Creek is obtained, a temperature probe would be installed in Funks Creek at the location of the I/O tower release to Funks Creek, and two additional probes would be installed downstream by approximately 0.5 mile and 1 mile (far enough upstream of Funks Reservoir to be unaffected by it). In addition, probes would be installed at the TC Canal inlet to Funks Reservoir, at the TC Canal outlet from Funks Reservoir, and at the Funks Creek outlet from Funks Reservoir.

As described in the Reservoir Management Plan, once construction is complete, water temperature profiles would be measured near Golden Gate Dam once every 2 weeks at 5-feet depth intervals to inform decisions about which ports of the I/O tower to use during March through October. The temperature probes in the creeks would continuously record hourly temperatures. These temperatures would be used along with specific fish requirements to develop target temperature ranges for post-construction conditions.

Commented [SJ56]: You may not have this, you might want to do midwater

Temperatures recorded after Sites Reservoir construction would be used in conjunction with flow and storage data to determine flow and storage effects on creek temperatures. If creek temperatures cannot be accurately estimated with flow, storage, and the reservoir temperature profiles, water temperature modeling would be performed for both Sites Reservoir and Funks and Stone Corral Creeks. If modeling is necessary, models would be calibrated with the measured flow, storage, and temperature data.

Water released into Stone Corral Creek will originate from the lower-half ~~bottom~~ of Sites Reservoir and will likely be cooler than equilibrium values during months when the reservoir is stratified. The biggest differential between release temperatures and equilibrium values will occur when the reservoir is full and ambient air temperature conditions are high. If it is determined that flow should be maintained in

Stone Corral Creek at times when releases will be relatively cool compared to temperatures under existing conditions, lower flows will allow the water to warm farther upstream than higher flows.

Water released to Funks Creek will originate from the I/O tower and, when the reservoir is stratified, will be warmer than the water released to Stone Corral Creek. The temperatures will be warmer because the withdrawals will come from higher in the reservoir and, as described in the Reservoir Management Plan, the I/O tower port openings will be chosen to provide 65°F or higher water temperatures during the rice growing season (May to September).

6.3 Timing and Frequency

Water temperature measurements would occur before, during, and after construction. Measurements during the initial fill period would be useful for evaluating water temperature under low-storage conditions. Reservoir profile measurements and measurements at the Stone Corral Creek and Funks Creek releases may need to continue in the long term. Measurements downstream of the release locations could be discontinued if the following conditions are met:

- Sites Reservoir has made releases for at least 2 years when the reservoir was at least 75% full.
- Flow and storage effects on creek temperatures are understood well enough that creek temperatures can be estimated within 3°F based on meteorological conditions, flow, reservoir storage, and reservoir temperature profiles.

7.0 Reporting and Permit Requirements

7.1 Annual Reporting Requirements

Reporting requirements would be met through the preparation and submittal of annual and final reports as part of the Stone Corral and Funks Creeks Aquatics Study Plan that would be implemented as a part of the Sites Authority's commitments and responsibilities to maintain fish in good condition consistent with CFGC Section 5937.

The first five annual reports would summarize the first 5 years of baseline conditions. All future (post-construction) reporting efforts would compare the conditions at that time to those collected during the baseline conditions.

Annual and Final Reports: The following information would be addressed in comprehensive annual reports with multiple chapters covering fish, bioassessment, hydrogeomorphic, and temperature study results:

- **Fish Study Results:** The annual report would include descriptions and locations of fish communities in Stone Corral and Funks creeks, summarizing monitoring results in the study area. The report would document monitoring results and link results to objectives. The report would identify new or ongoing management issues, threats and stressors, and provide recommendations for future monitoring and management. The following information would be addressed in annual reports.

- **Bioassessment Results:** The annual reports would include BMI, algae, water quality, and PHAB output and results and a summary of each of these indicators. The most recent version of the SWAMP *Stream Habitat Characterization Form, Full Version* field forms would be provided in appendix format, along with representative photography of the sampling reaches.

- **Hydrogeomorphic Results:** The annual reports would include a summary of the monitoring methods; a summary and analysis of the hydrogeomorphic monitoring results, including an evaluation of site conditions in the context of the performance standards; a discussion of the monitoring results; a discussion of any modifications made to the monitoring methods; a discussion of the previous year's monitoring efforts; and photographs taken from the cross sections and longitudinal profiles.

- **Temperature Results:** The annual reports would include a summary of temperatures that support the aquatic community under existing conditions, and a recommendation of reservoir discharge needed to establish suitable temperatures in Stone Corral Creek downstream of Sites Dam and Funks Creek downstream of Golden Gate Dam after construction.

Monitoring Program Evaluation: The annual reports would evaluate the Aquatic Study Plan to ensure that data (1) are collected efficiently, (2) address information needs, and (3) adequately assess resource responses to management actions. Changes in monitoring methods, protocols, or frequency would be summarized in the annual reports.

Objective Criteria Evaluation: Post-construction annual reports would evaluate whether management actions are meeting project objectives or performance standards (described below). Where the cause of fish and BMI community declines is understood, corrective actions would be recommended based on monitoring data or other scientifically defensible sources of information. An assessment would be made as to causal factors of observed declines, including the potential role of external stressors outside the parameters of Project effects.

Adaptive Management Thresholds: The link between the technical and decision-making steps requires regular interaction and exchange of information between technical staff and decision-makers. This would be accomplished by bi-annual meetings (approximately every 6 months) involving the Authority and the permitting agencies where both regulatory and technical expertise can be integrated into revising goals and objectives, adjusting management and/or monitoring activities, or allocating funding. Meetings should be timed such that any new information discussed assists with the planning of upcoming seasonal work.

7.2 Performance Standards

Performance standards for the Aquatic Study Plan would be based on quantitative metrics. These performance standards would be designed specifically as a means of monitoring the progress and performance of the physical and biological conditions of the study reaches.

Fish community performance standards would include measures of community diversity and percent area occupied for both available and total reach distance within the study areas. BMI performance standards would likely include three main indicators – PHAB IPI scores, BMI CSCI scores, and algae ASCI scores. Geomorphic performance standards would focus on channel stability evaluations such as:(1) evidence of significant and detrimental morphologic changes at any of the cross sections; (2) evidence of channel headcutting; (3) significant loss of gravels via dam impoundment; and (4) significant decrease in the channel stability score during the duration of monitoring activities.

Commented [SJ57]: Let's talk about this. I want to keep the compliance component about fish condition until told otherwise by CDFW. Everything else goes into explaining any variance in what we see in fish condition, assessing general condition of the stream as well as complying with MM's in the EIR/S. The reason I want to keep focused on fish condition is that if we get litigated on 5937, the fewer compliance metrics the better.

Performance standards would be developed in conjunction with the Authority and the relevant permitting agencies (CDFW and the CVRWQCB) prior to the start of post-construction monitoring.

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8.2 Personal Communications

Rehn, Andrew. Biologist, California Department of Fish and Wildlife. April 6, 2022—Phone conversation with Jeff Peters of ICF and Marco Sigala at Moss Landing Marine Laboratories regarding a suitable number of bioassessment sampling reaches on Funks Creek and Stone Corral Creek for the Sites Reservoir Project.

From: Joseph, Trevor [TJoseph@roseville.ca.us]
Sent: 8/4/2022 4:58:09 PM
To: Alicia Forsythe [aforsythe@sitesproject.org]; Heydinger, Erin [erin.heydinger@hdrinc.com]
Subject: RE: American River Watershed and SITES - coordination meeting (save the date)

Thanks Ali Appreciate the update.

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Thursday, August 4, 2022 2:23 PM
To: Joseph, Trevor <TJoseph@roseville.ca.us>; Heydinger, Erin <erin.heydinger@hdrinc.com>
Subject: RE: American River Watershed and SITES - coordination meeting (save the date)

EXTERNAL: This email originated from outside of the organization. Do not click on any links or open attachments unless you recognize the sender and know the content is safe.

Hi Trevor – Great to hear from you!

All of the bullets below still stand. Here's an update on the progress of our environmental planning and permitting efforts:

- Final EIR/EIS – This has moved out just slightly, but we still expect to complete and release the document in early spring 2023.
- Water Right application – We submitted this to the State Board in early May. We are still waiting to hear if the application is sufficient and will be noticed or if they determine it incomplete and need additional information. We're hoping to hear on this any day now.
- Developing operating agreements with DWR and Reclamation – We continue to meet monthly or more frequently with the agencies to develop a tri-party operations agreement. We're targeting to complete this around the same time as the Final EIR/EIS (early spring 2023).
- Submitting the Biological Assessment and CESA Operations Incidental Take Permit application for the project – These are moving along. Both are targeted for submittal in the next few months.

Hope you are doing well!

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Joseph, Trevor <TJoseph@roseville.ca.us>
Sent: Wednesday, August 3, 2022 7:49 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Heydinger, Erin <erin.heydinger@hdrinc.com>
Subject: RE: American River Watershed and SITES - coordination meeting (save the date)

Hi Ali and Erin

Thanks for this summary it was very helpful.. Can you update this summary with an current new news on SITES?

Thanks
Trevor

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Monday, May 9, 2022 12:37 PM
To: Joseph, Trevor <TJoseph@roseville.ca.us>; Heydinger, Erin <erin.heydinger@hdrinc.com>
Subject: RE: American River Watershed and SITES - coordination meeting (save the date)

Hi Trevor – Below

- The Authority is shifting its focus from Alternative 1 to Alternative 3 for its Final EIR/EIS. Alternative 3 maintains a reservoir size of 1.5 MAF, but it looks at a federal investment of up to 25% of project costs (Alternative 1 includes federal investment of up to 7%).
- The authority is currently preparing its Final EIR/EIS and responding to comments received on the draft document. The goal is to have this document completed in early 2023.
- The reference made to environmental flows depends on the way Reclamation uses its storage. As the project is currently envisioned, the State will receive 17% of the storage in Sites. With a Reclamation investment up to 25%, 17+25 = 42% of the project that could be used to the benefit of the environment. Reclamation is still determining how it would like to use its Sites water, but expect that it will be used to benefit anadromous fish to some degree.
- The project received an invitation to apply for a WIFIA loan of up to 49% of the project costs – estimated at $2.2B. An invitation to apply is similar to a pre-approval for a loan. The project was also awarded some additional potential funding by the State, both an inflation adjustment as well as an additional amount to fully fund the benefits. The additional funds awarded were $38.6M for a total of $875.4M
- The other big initiatives for the year include submitting the water right application to the State Board (which will occur this week), developing operating agreements with DWR and Reclamation, and submitting the Biological Assessment and CESA Operations Incidental Take Permit application for the project.

Hope these help. Happy to answer any questions.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Joseph, Trevor <TJoseph@roseville.ca.us>
Sent: Monday, May 9, 2022 7:18 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Heydinger, Erin <erin.heydinger@hdrinc.com>
Subject: RE: American River Watershed and SITES - coordination meeting (save the date)

Hi Ali and Erin

Can you give me a few bullets on the current status and next steps on SITES?

I assume the 1.5 MAF has not changed. I believe there is some potential federal interest and you are evaluating that now? My understanding the environmental document is complete and the project authority is working with NGOs and other interests to address comments? Did I hear correctly that 40% of flows may be for environmental benefit? Also did you obtain a WIFIA loan and secured additional Prop 1 funding? What would you say are the next steps?

If busy is there a source I can mine this info? I'm briefing our electeds tomorrow and want to give them the current status.

Thank so much.

trevor

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Monday, January 24, 2022 9:11 AM
To: Joseph, Trevor <TJoseph@roseville.ca.us>; Brett Ewart <BEwart@cityofsacramento.org>; Darin Reintjes <dreintjes@pcwa.net>; Benjamin Barker (bbarker@pcwa.net) <bbarker@pcwa.net>; Heydinger, Erin <erin.heydinger@hdrinc.com>; Grinstead. Michael <GrinsteadM@saccounty.net>
Cc: Spranza, John <john.spranza@hdrinc.com>; Angela Bezzone <bezzone@mbkengineers.com>
Subject: RE: American River Watershed and SITES - coordination meeting (save the date)

American River Team – Attached is the more detailed water right map for the American River area. There are 2 sheets in here as the American River watershed falls on the edge of the map. We would appreciate your feedback on:

1. Can we physically get water from the Sacramento River further into the American River watershed? We want to define a realistic place of use boundary, but we also don't want to overly restrict ourselves for the future.
2. Any points of rediversion we should add? I have a note from our call to add Woodland-Davis. But anything else? Recall we can not adding RiverArc at this time (but will add later and likely adjust the place of use boundary once RiverArc has a water right).

If a KMZ file would be more useful, please let me know and I can send that over.

Would be happy to chat about this on a call if that would be helpful to the group. Any feedback you have is much appreciated.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

-----Original Appointment-----
From: Joseph, Trevor <TJoseph@roseville.ca.us>
Sent: Monday, January 3, 2022 3:39 PM
To: Joseph, Trevor; Brett Ewart; Alicia Forsythe; Darin Reintjes; Benjamin Barker (bbarker@pcwa.net); Heydinger, Erin; Grinstead. Michael

Subject: American River Watershed and SITES - coordination meeting (save the date)
When: Tuesday, January 18, 2022 3:30 PM-4:30 PM (UTC-08:00) Pacific Time (US & Canada).
Where: Microsoft Teams Meeting

Microsoft Teams meeting

Join on your computer or mobile app
Click here to join the meeting

Learn More | Meeting options

Meeting: **Sites Reservoir Committee Operations & Engineering Workgroup**

Locations: Maxwell Project Office, 122 Old Highway 99W, Maxwell, CA 95955
See below for alternate meeting locations.

Call in: **1-213-379-5743** Code: **223 227 280#** **Click here to join the meeting**

Workgroup Chair: Robert Kunde (Wheeler Ridge Maricopa WSD)

Workgroup Vice Chair: Mike Azevedo (Colusa County)

Staff Lead: JP Robinette, Engineering & Construction Manager

AGENDA

Wednesday, August 10, 2022; 1:30 – 3:30 pm

NO ACTION or DECISION WILL BE TAKEN

ROLL CALL & CALL TO ORDER:

- Introductions
- Period for Public Comment

1. Discussion and Information Items:

1.1 Review and comment on approach to implementing the Amendment 3 "rolling" cost estimate.

1.2 Review and comment on assumptions used in development of a master schedule through project completion.

2. Upcoming Meetings:

Reservoir Committee
Friday, August 19, 2022 (9:00 AM – 12:00 PM)

Authority Board
Wednesday, August 24, 2022 (1:30 PM – 4:00 PM)

Engineering & Operations Workgroup
Wednesday, October 12, 2022 (1:30 PM – 3:30 PM)

Virtual Information will be provided before all meetings at Sitesproject.org.

ADJOURN

PERIOD OF PUBLIC COMMENT: Any person may speak about any subject of concern, provided it is within the jurisdiction of the Reservoir Committee Operations & Engineering Workgroup and is not already on today's agenda. The total amount of time allotted for receiving such public communication shall be limited to a total of 10 minutes per issue and each individual or group will be limited to no more than 3 minutes each within the 10 minutes allocated per issue. **Note:** No action shall be taken on comments made under this comment period.

ADA COMPLIANCE: Upon request, agendas will be made available in alternative formats to accommodate persons with disabilities. In addition, any person with a disability who requires a modification or accommodation to participate or attend this meeting may request necessary accommodation. Please make your request to the Board Clerk, specifying your disability, the format in which you would like to receive this Agenda and any other accommodation required no later than 24 hours before the start of the meeting.

Alternate Meeting Locations:

Coachella Valley Water District, 51501 Tyler Street, Coachella, CA 92236

Glenn-Colusa Irrigation District, 344 East Laurel Street, Willows, CA 95988

Metropolitan Water District, 700 North Alameda Street, Los Angeles, CA 90012

Reclamation District 108/Dunnigan WD, 975 Wilson Bend Road, Grimes, CA 95950

San Bernardino Valley Municipal WD, 380 E. Vanderbuilt Way, San Bernardino, CA 92408

Wheeler Ridge-Maricopa Water Storage District, 12109 Hwy 166, Bakersfield, CA 93313

Westside Water District, 5005 State Hwy 20, Williams, CA 95987

Santa Clarita Valley Water Agency, 27235 Bouquet Canyon Road, Santa Clarita, CA 91551

Zone 7 Water Agency, 100 North Canyons Parkway, Livermore CA 94551

Sites Project Authority
Community Working Group Structure and Process

Purpose
The Community Working Group (CWG) will provide informed input and feedback to the Sites Project Authority regarding opportunities to avoid or minimize potential impacts from the construction and operation of Sites Reservoir. Issues for discussion will include, but are not limited to: jobs and the economy; traffic; and land use.

Outcome
The process will be considered a success if the CWG identifies issues and provides substantive input and ideas to the Sites Project Authority on opportunities to avoid or minimize potential impacts from the future construction and operations of Sites Reservoir.

Membership
Members will be invited to join the CWG by invitation from the Chair of the Sites Project Authority's Board of Directors. Members will be sought based upon their demonstrated ability to present the perspective of an organization or constituency concerned with issues related to the design and construction of the Sites Reservoir.

A member's position on the CWG may be declared vacant if the member:

- Resigns from the CWG
- Fails to attend more than two meetings without prior notice

In a case where a member's position is declared vacant, the Sites Project Authority may invite an alternative representative from the same interest group to fill the position.

Community Working Group Operating Guidelines
<u>Convening of Meetings</u>

- Meetings will be held monthly from [10am to 12pm] at the Sites Reservoir Maxwell Office.
- It is anticipated that there will be at least eight meetings.
- Committees may be formed to bring suggestions related to a specific issue back to the CWG for discussion.
- CWG members will be informed of meetings through email or direct mail, depending on his/her preference, at least one week prior to the meeting.

<u>Communication</u>

- Meetings will be advertised on the Sites Project Authority website.
- CWG documents and notices will be posted on the Sites Project Authority website.

<u>Conduct of Meetings</u>

- Meetings will be open to all but are designed and intended for the specific purposes of CWG's members.
- Meetings will be facilitated.
- After all meeting agenda items have been addressed, time will be provided for non-members in attendance to ask questions and voice their opinions.
- Public attendees and any Media present will be asked to introduce themselves for the benefit of CWG members.
- Meetings will end with a clear understanding of expectations and assignments for next steps.
- Meetings are expected to be two hours.
- Staff will keep a record of meeting attendees, key issues raised, and actions required. Comments from individual members will generally not be attributed and a verbatim record of the meeting will not be prepared.
- The previous meeting summary and a draft meeting agenda will be forwarded to members of the CWG at least one week before the next meeting.

Roles and Responsibilities

CWG members agree to:

- Provide specific local expertise, including identifying emerging local issues;
- Attend all meetings possible;
- Review all agendas and documents distributed by staff prior to the meetings;
- Relay information to his/her respective constituency after each meeting and gather information/feedback as practicable before each meeting;
- Articulate and reflect the interests that CWG members bring to the table;
- Maintain a focus on suggestions that benefit multiple interests or the overall project area;
- Refrain from making public statements to the media about the CWG's deliberations that would tend to hamper constructive discussions and the CWG's ability to work cooperatively; and
- Help create a respectful and productive working environment.

The Sites Project Authority agrees to:

- Provide CWG members the opportunity to collaborate on input and ideas for the Sites Project Authority to consider;
- Provide technical expertise;
- Brief local decision makers and produce briefing materials and reports;
- Provide early notification of CWG meetings and provide any documents for review at least one week before each meeting;
- Conduct public meetings or workshops if/when necessary to inform and engage the local community;
- Manage logistics for CWG meetings; and
- Provide feedback on how input from the CWG influenced planned project design and construction activities.

Decision Making
The CWG is primarily a forum for providing input and feedback. The Sites Project Authority Reservoir Board of Directors will retain decision-making authority.

Conflict Resolution
When an issue arises that cannot be easily resolved, CWG members agree to:

- Determine if the issue should be resolved within or outside of the CWG and participate however is appropriate.
- Ensure the appropriate decision makers are at the table to resolve the issue.

Proposed Meeting Schedule
Note – these are suggested dates. Based on a variety of factors, these may be modified.

- Meeting #1: Sept. 21, 2022
- Meeting #2: Oct. 19, 2022
- Project Tour: Oct. 29, 2022 or Nov. 5, 2022
- Meeting #3: Nov. 16, 2022
- Meeting #4: Dec. 14, 2022
- Meeting #5: Jan. 18, 2023
- Meeting #6: Feb. 15, 2023
- Meeting #7: Mar. 15, 2023
- Meeting #8: Apr. 19, 2023
- Meeting #9: May 17, 2023 *(if needed)*
- Meeting #10: Jun. 21, 2023 *(if needed)*

Community Working Group meetings will be held at the Sites Reservoir Maxwell Office:
122 Old Highway 99 West, Maxwell, CA 95955

Meeting: **Sites Reservoir Committee's Coordination Workgroup**

Locations: Maxwell Project Office, 122 Old Highway 99W, Maxwell, CA 95955
See below for alternate meeting locations.

Call in: **1-916-538-7066** Code: **372 979 656#** Click here to join the meeting

Workgroup Chair: Thad Bettner (RC Chair/Glenn-Colusa Irrigation District)
Workgroup Vice-Chair: Valerie Pryor (RC Vice-Chair/Zone 7 Water Agency)
Staff Lead: Jerry Brown, Executive Director

AGENDA

Thursday, August 11, 2022, 9:00 – 10:00 am

NO ACTION or DECISION WILL BE TAKEN

ROLL CALL & CALL TO ORDER:

- Introductions
- Period for Public Comment

1. Discussion and Information Items:

1.1 Board Meeting Agenda Planning

1.2 General Coordination Among Committees and Workgroups

2. Closed Session:

2.1 Potential Litigation – Gov. Code Sec. 54956.9(d)(3)

3. Upcoming Meetings:

Reservoir Committee Meeting
Friday, August 19, 2022 (9:00 am – 12:00 pm)

Authority Board Meeting
Wednesday, August 24, 2022 (1:00 – 4:00 pm)

Coordination Workgroup
Thursday, September 8, 2022 (9:00 – 10:00 am)

Virtual Information will be provided before all meetings at Sitesproject.org.

ADJOURN

PERIOD OF PUBLIC COMMENT: Any person may speak about any subject of concern, provided it is within the jurisdiction of the Reservoir Committee and is not already on today's agenda. The total amount of time allotted for receiving such public communication shall be limited to a total of 10 minutes per issue and each individual or group will be limited to no more than 3 minutes each within the 10 minutes allocated per issue. **Note:** No action shall be taken on comments made under this comment period.

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Alternate Meeting Locations:

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Davis Water District, 6505 Hillgate Road, Arbuckle, CA 95912

Glenn-Colusa Irrigation District, 344 East Laurel Street, Willows, CA 95988

San Bernardino Valley Municipal WD, 380 E. Vanderbilt Way, San Bernardino, CA 92408

Wheeler Ridge-Maricopa Water Storage District, 12109 Hwy 166, Bakersfield, CA 93313

Zone 7 Water Agency, 100 North Canyons Parkway, Livermore, CA 94551

File Provided Natively

Valley Water Comments on Draft Sites Guiding Principles (July 7, 2022 version)

Overall Comments:

1. The document is asking participants to agree to terms which have not been fully developed or defined. Valley Water has provided comments and identified terms which are problematic at the current conceptual level, however we may have additional comments or concerns as terms are further developed and defined.
2. Before approving this document, we'd like to have some additional discussions with Sites staff to fully understand the potential liability that the Guiding Principles would have the participants take on. There seems to be a disconnect between amount of liability participants are being asked to take on, the level of control that participants have in the project, and the project benefits received. We would like to better understand the potential liability for all issues (e.g. who is ultimately liable for property damages if dam fails?) and ensure that the benefits received and amount of control that participants have is commensurate with the risk that we are being asked to take on.
3. Before approving this document, we would like to better understand the potential outcomes that may be realized under these Principles if a Participant defaults on their payments. An example question is: What options or tools would the JPA have to pursue mitigation if a Participant goes into default?
4. We are still soliciting comments from our Board and executive management, so we may provide additional comments once they have completed their review.

Section 1: Roles and Responsibilities

1. The role and responsibility of the JPA is described as the developer and operator of the project, but it is unclear what the overall mission and objectives of the JPA, as owner and operator, are. One reasonable idea for the mission and purpose of the JPA is to ensure cost effective and efficient operation and management of the project to provide benefits paid for by the Participants, while also ensuring that local agencies have a strong role to ensure no harm to local agencies. A similar discussion can be had regarding the role and responsibility of the Participants. We'd like to discuss this further before finalizing the Principles.
2. Section 1.1.1 – Roles and Responsibility: Recommend that reference be made to indicate that the JPA will act in the best interest of Participants in evaluating funding options and obtaining financing, to achieve the most cost-effective financing and funding methods.
3. Sections 1.1, 1.1.2 and 1.2 – The Principles state that the JPA is the operator and is responsible for allocating water to and from storage in accordance with the Storage Principles and requests from Participants. There are no principles providing Participants with input and feedback regarding Project operations. Before we approve these Guiding Principles, we should discuss what the implications of this are, and how Participants can be assured that they will realize the benefits they are paying for if they have no influence in how Sites is operated.
4. Section 1.2.2. – Please evaluate the feasibility of making the following edit: "...risk management decisions that will materially affect Project costs and/or Participant's risk exposure *shall* ~~should~~

be made by the JPA consistent with duly authorized recommendations of the Reservoir Committee"

Section 2: Project Assets and Ownership

1. Section 2.2.2 and Section 2.2.3: These principles make clear that a Participant's storage capacity and water stored in that storage capacity are assets owned by Participants. The principle also states that Participants will control its storage capacity. However, the principles do not state that Participants can control the water stored in its storage capacity. Before we can approve these Principles, we would need to better understand what this means.

Section 4: Financing

1. General Comment: Valley water recommends the JPA incorporate language that speaks to the fiduciary duty of the JPA to comply with all state and federal laws related to debt issuance and administration, including a debt policy, and ensuring the JPA structures all debt issuances in a manner that minimizes the financing costs.
2. Sections 4.2.1.1 & Sections 4.2.3: Before approving the Guiding Principles, Valley Water would like to better understand how the Project Sufficiency Pledge and the shared default concepts outlined in these sections can result in an equitable distribution of benefits, costs, and risks. Our initial understanding of the proposal as written suggests that there may be outsized risks and cost exposure for small participants with good ratings. We request that the Sites team explore alternative approaches and discuss alternatives with Participants.

Section 5: Leasing or Sale of Storage and Sales of Water

1. Section 5.1: Can you provide additional information on how one could ascertain whether a sale will result in a change to the Project's bond rating, or risk Project financing? It's difficult to know the effects of this term without additional information.
2. Section 5.1: Typo in the second sentence should be fixed to make the sentence more comprehensible.
3. Section 5.1 and 5.2: Can author explain what's intended by the phrase: "...must not negatively impact other Participants' proportional share of first priority allocated benefits"?

Section 6: Minimum Contract Term

1. Section 6.1: This section doesn't address contract terms for participants who opt out of financing through the JPA.
2. Section 6.4: Consider removing the reference to Amendment 3 since Amendment 3 has already been executed.

Draft Financing Plan Comments

Page 1: We recommend revising the language regarding pay-go participants deposit funds from "well ahead of each group borrowing" to "on or before the closing date of each group borrowing". Depositing funds prior to the group borrowing closing date should satisfy the funding requirements. Having an undefined "well ahead" date is not ideal.

Page 8 – Please provide additional information on how the USDA $449M loan will be handled. Will the cost of the loan be allocated among all participants?

Page 14 – Pay go – We recommend revising the term regarding the pay-go partners paying their share of the capital costs "prior to the date the Authority posts a preliminary offering document or executes a debt financing agreement" to "on or prior to the closing date". This will mitigate any market risk of the JPA debt issuance not being able to close for any unforeseen reasons.

From: Kevin Spesert [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=DEF2E3FB8FBE4310BB65B7A20F658C0F-KSPESERT000]
Sent: 8/8/2022 1:31:32 PM
To: Sara M. Katz [skatz@katzandassociates.com]; Sharon Han [shan@katzandassociates.com]
CC: Ann Newton [anewton@katzandassociates.com]; Sarah Rossetto [srossetto@katzandassociates.com]
Subject: RE: Wikipedia page edits
Attachments: Sites Wikipedia Page_consolidated edits.docx

Here are my thoughts...after reading thru this...we need to do a complete rewrite...just editing won't cut it

I recommend that we pull a lot of text from the project description...or the EIR/EIS executive summary...for language

Kevin

From: Sara M. Katz <skatz@katzandassociates.com>
Sent: Friday, July 29, 2022 11:53 AM
To: Sharon Han <shan@katzandassociates.com>; Kevin Spesert <kspesert@sitesproject.org>
Cc: Ann Newton <anewton@katzandassociates.com>; Sarah Rossetto <srossetto@katzandassociates.com>
Subject: RE: Wikipedia page edits

It would be great if we can use a different map – this is simply a map of California and does nothing to show where the reservoir would be located etc. and any other demographic identifiers such as a few cities or even where other large Nor Cal reservoirs are located.

K&A
KATZ & ASSOCIATES

Sara M. Katz
Founder/CEO
mobile: 619.813.9551
San Diego · Los Angeles · San Francisco

From: Sharon Han <shan@katzandassociates.com>
Sent: Friday, July 29, 2022 11:33 AM
To: Kevin Spesert <kspesert@sitesproject.org>
Cc: Sara M. Katz <skatz@katzandassociates.com>; Ann Newton <anewton@katzandassociates.com>; Sarah Rossetto <srossetto@katzandassociates.com>
Subject: Wikipedia page edits

Hi Kevin,

Please see the edits to the Wikipedia page attached. We've also included some questions/flags for your review.

Once we have a final copy, we will go ahead and update the Wikipedia page.

Thanks so much,
Sharon

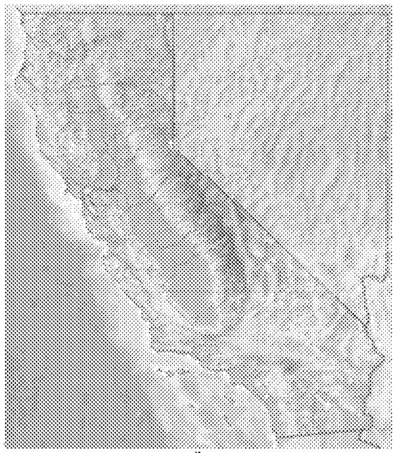
Sites Reservoir

Commented [KS1]: We need to do a complete rewrite of this this

From Wikipedia, the free encyclopedia

Jump to navigationJump to search

Sites Reservoir



Sites Reservoir

Coordinates	39°21′18″N 122°20′29″WCoordinates: 39°21′18″N 122°20′29″W
Type	Offstream reservoir
Primary outflows	Stone Corral Creek, Funks Creek
Managing agency	~~California Department of Water Resources~~Sites Project Authority
Built	2024 start; 2030 completion (proposed)
Max. length	13 miles (21 km)
Surface area	14,000 acres (5,700 ha)
Max. depth	310 ft (94 m)

Water volume	1.8×10^6 acre-feet (2.2 km^3) (max. as proposed)
Surface elevation	580 ft (180 m)

Commented [AN2]: Kevin, can you confirm these numbers? And can you confirm that the project is $3.5 billion? Or $4 billion?

Commented [KS3R2]: Use $4 Billion

The **Sites Reservoir** is a proposed $~~5.~~23.~~56~~-billion 1.5 million acre foot offstream reservoir project west of ~~Colusa~~ Maxwell in the Sacramento Valley of northern California, to be built by the ~~California Department of Water Resources~~Sites Project Authority, a joint powers authority comprised of public water agencies, cities, counties and local irrigation districts throughout California. The project would ~~pump~~ divert ~~470,000 to 640,000 acre-feet (580,000,000 to 790,000,000 m³) per year of the winter flood flow~~ excess flows from the Sacramento River upstream of the Sacramento–San Joaquin River Delta, through existing canals to ~~an artificial lake 14 miles~~the reservoir (23 km) away. Annual yield will depend on precipitation and environmental restrictions and water will only be diverted when all other water rights and regulatory requirements are met~~.~~

Construction is planned to begin in mid-2024,[1] ~~with final design expected to be done in 2025 and~~ with full operations targeted to begin by 2030.[2]

The ~~California State Water Project (SWP)~~Sites Project Authority would operate the ~~$3.55.2 billion~~the project. ~~Estimated economic benefits are around $260 million per year, with an operating cost of $10–20 million~~Sites would create hundreds of construction related jobs during each year of construction, and long-term jobs related to operations in recreation in the Sacramento Valley. ~~In 2018, the state awarded $820 million from a bond (Proposition 1) to the reservoir project. About 30 water agencies in California have tentatively committed funding.~~

Contents

History[edit]

The initial Sites Reservoir was proposed in the 1980s. California had serious droughts in 2006–2010 and 2011–2017, raising concern about water insecurity.[3] The project is intended to improve reliability of water supply during severe drought conditions.[4]

Commented [AN4]: Can we please confirm the exact year Sites was initially proposed?

Commented [KS5R4]: 1957

Preliminary studies were conducted at a cost of $50 million during 1996–2014.[5] ~~The reservoir would be reduced in size if funding were cut back, but backers believe the project would still be built.~~ Construction is scheduled to begin in 2024 and is projected to be completed in 2030.[6][7] The California Water Commission voted in favor of the feasibility of the project in December 2021.[8]

Commented [KS6]: This section needs a lot of work

Cost and funding[edit]

The Sites Reservoir Project is led by a Joint Powers Authority made up of irrigation agencies, water districts, cities and counties in the Sacramento Valley area. The Project is being developed on a beneficiary pays principle which means that the benefits received are paid for by those receiving the benefits. The beneficiaries of the Project include the federal government, state government, and local public agencies. The water generated by the Project will be used for agriculture, meeting water demands of businesses and residents, and serving the needs of the environment throughout California.

In 2021, the U.S. Environmental Protection Agency (EPA) formally invited the Sites Reservoir Project to apply for a $2.2 billion loan. Additionally, Sites received a low-interest loan through the Water Infrastructure Finance & Innovation Act which added to the already substantial contributions made by local participants and other public funding received through Proposition 1 and the USDA.

Commented [KS7]: Need to include text regarding the CWC Prop 1 funding...USDA funding...and local agency funding

~~The estimated cost of the reservoir is $5.2 billion.[9]~~

~~In 2018, the state awarded the reservoir project $820 million from a bond (Proposition 1), half the funding originally sought. Project backers were displeased with the funding shortfall. Additional funding was tentatively pledged from water agencies ("agricultural districts") in the Sacramento Valley, Fresno and urban agencies including Los Angeles. Each agency will be entitled to store water in the lake, in proportion to its share of the construction funding. In view of the shortfall, the pledges are being reassessed.[10]~~

~~The high cost of storage has led irrigation districts in the Sacramento Valley to reduce their funding and share of ownership. Water agencies in southern California and the San Joaquin Valley have increased their share. Crops grown in the San Joaquin Valley, such as pistachios and almonds, have a higher value than typical crops in the Sacramento Valley. The San Joaquin Valley and urban agencies can afford to acquire higher-cost water. However, by state law, agencies in the Sacramento Valley control the entire governing board for the project.[11]~~

~~The federal Bureau of Reclamation could put $1 billion into the project.[12] The state will fund 16% or $820 million of the $5.2 billion project in exchange for rights to nine percent of the yield or 50,000 acre-feet (62,000,000 m^3) per year, to protect habitat for endangered Delta smelt and for wildlife refuges.[citation needed]~~

~~Approval of the project feasibility by the California Water Commission in December 2021 meant that the project stays eligible to receive more than $800 million in public funding.[9]~~

Specifications[edit]

~~The California State Water Project (SWP)~~~~Sites Project Authority~~ ~~would operate the project[4] with an operating cost of $10–20 million,[13] estimated economic benefits are around $260 million per year.[14]~~

The ~~14,000-acre (5,700 ha)~~1.5 million acre ft reservoir would be formed by several dams located in the east foothills of the California Coast Ranges, flooding the long and narrow Antelope Valley. The main dams, Sites and Golden Gate, would be built across Stone Corral and Funks Creeks, respectively. ~~Six~~ Nine smaller saddle dams and saddle dikes would hold in the north end of the lake.[15] The total capacity would be between 1.3 to 1.~~8~~ 5 million acre-feet ~~(1.6 to 2.2 km³).[13][16]~~ ~~Capacity could be expanded in the future, by raising the surrounding dikes.[16]~~

~~The project would pump 470,000 to 640,000 acre-feet (580,000,000 to 790,000,000 m³) per year of the winter flood flow from the Sacramento River upstream of the Sacramento–San Joaquin River Delta, through existing canals to an artificial lake 14 miles (23 km) away. Annual yield will depend on precipitation and environmental restrictions.[13] The maximum inflow, 5,900 cubic feet per second (170 m³/s), will be carried by the existing Tehama-Colusa and Glenn-Colusa Canals and a new pumping station on the Sacramento River near Red Bluff.[16]~~

~~The project is a pumped-storage hydroelectric plant, similar to San Luis Reservoir in the San Joaquin Valley, and would be a net power consumer; however, it would be able to generate peaking power. It will provide large-scale grid energy storage.[citation needed]~~

Environmental impacts[edit]

Transformational projects of the magnitude and importance of Sites are not without tradeoffs. There are specific elements of the Project that are critical to enhancing environmental conditions. First, the State has made a large investment, through the 2014 passage of Proposition 1, to enhance their ability to support critical aquatic needs. Second, there are opportunities to partner with the State and Federal water projects in coordinated operations that will enhance fishery protections associated with their operations. Beyond these enhancements, the Project itself is being designed to avoid and lessen any environmental concerns and, when necessary, provide appropriate mitigation.

In addition, Sites Reservoir does not threaten salmon and other fish. In fact, there are highly protective operating conditions in place that must be in place before diversions into Sites Reservoir can proceed, including adapting to evolving conditions. In addition, the intakes being used for diverting water into Sites Reservoir include state-of-the-art fish screens that are proven to be highly effective at protecting fish. And, the current proposed project includes more cold water for salmon in the driest years when it is needed most. Not only is no harm done, but there is also a net benefit from this project to Sacramento River salmon, Delta smelt, and the Sacramento-San Joaquin Delta estuary.

Commented [SH8]: Kevin, can you please confirm that these statistics/descriptions are accurate? And can you please make a note of which stats are false?

Commented [KS9]: We should pull text from the Project Description for this section

Commented [SH10]: Kevin, can you please confirm these numbers?

Commented [KS11]: Remove this section

Commented [KS12]: This Section needs to be rewritten

The reservoir does not dam a major river system and would not block fish migration or spawning. Specifically t~~T~~o protect fisheries, the pumping stations along the Sacramento River will have fish screens. There are potential modifications upstream at Shasta Dam that could increase the supply of cold water. The intakes at the Tehama-Colusa and Glenn-Colusa Canals will be modified.[17]

~~State regulators announced environmental restrictions in 2018 that would limit river withdrawals to protect fish, but the state has not included strong protections in infrastructure plans. The water supply could fall short of projections.[12]~~

~~The proposed reservoir is not located on a major river but as part of California water infrastructure it would affect salmon fisheries by impounding water diverted from salmon-bearing watersheds, particularly the Trinity River via Lewiston Dam. Major negative impacts to imperiled salmon species already diminished by current and past water diversions to agriculture far from the sensitive watersheds of the north state had not been taken into account by the state government's planning as of early 2020.[13]~~

~~Diversions could take 60 percent of the Sacramento River's flow at times, potentially harming salmon and other fish. (The Sacramento River's flows include water allocated from the Trinity and other northern tributaries, despite harm to salmon runs in source watersheds.) The reservoir itself would affect habitat for 23 sensitive, threatened or endangered wildlife species.[18] Evaporation from the 14,000 acres (5,700 ha) reservoir would remove 30,000 acre-feet (37,000,000 m³) per year.[19]~~

~~According to "Final Feasibility Report" submitted by the Bureau of Reclamation in December 2020 : "A substantial portion of the project's water would be specifically dedicated to environmental uses, helping to improve conditions for Delta smelt, preserving the cold-water pool in Lake Shasta to support salmon development, spawning and rearing, and providing a reliable water supply to improve the habitat for migratory birds and other native species." .[20]~~

From: Sara M. Katz [skatz@katzandassociates.com]
Sent: 8/8/2022 1:37:26 PM
To: Kevin Spesert [kspesert@sitesproject.org]; Sharon Han [shan@katzandassociates.com]
CC: Ann Newton [anewton@katzandassociates.com]; Sarah Rossetto [srossetto@katzandassociates.com]
Subject: RE: Wikipedia page edits

I would agree Kevin. I was not sure we had that option, not knowing who advanced the first version that has been in place for some time. And when doing so, ideally we can use another graphic. Thanks

Sharon – when Ann returns from PTO this week, please advise her and if the two of you can take ownership of this rewrite, that would be appreciated. Thanks

Sara M. Katz
Founder/CEO
mobile: 619.813.9551
San Diego · Los Angeles · San Francisco

From: Kevin Spesert <kspesert@sitesproject.org>
Sent: Monday, August 8, 2022 1:32 PM
To: Sara M. Katz <skatz@katzandassociates.com>; Sharon Han <shan@katzandassociates.com>
Cc: Ann Newton <anewton@katzandassociates.com>; Sarah Rossetto <srossetto@katzandassociates.com>
Subject: RE: Wikipedia page edits

Here are my thoughts…after reading thru this…we need to do a complete rewrite…just editing won't cut it

I recommend that we pull a lot of text from the project description…or the EIR/EIS executive summary…for language

Kevin

From: Sara M. Katz <skatz@katzandassociates.com>
Sent: Friday, July 29, 2022 11:53 AM
To: Sharon Han <shan@katzandassociates.com>; Kevin Spesert <kspesert@sitesproject.org>
Cc: Ann Newton <anewton@katzandassociates.com>; Sarah Rossetto <srossetto@katzandassociates.com>
Subject: RE: Wikipedia page edits

It would be great if we can use a different map – this is simply a map of California and does nothing to show where the reservoir would be located etc. and any other demographic identifiers such as a few cities or even where other large Nor Cal reservoirs are located.

Sara M. Katz
Founder/CEO
mobile: 619.813.9551
San Diego · Los Angeles · San Francisco

From: Sharon Han <shan@katzandassociates.com>
Sent: Friday, July 29, 2022 11:33 AM
To: Kevin Spesert <kspesert@sitesproject.org>
Cc: Sara M. Katz <skatz@katzandassociates.com>; Ann Newton <anewton@katzandassociates.com>; Sarah Rossetto <srossetto@katzandassociates.com>
Subject: Wikipedia page edits

Hi Kevin,

Please see the edits to the Wikipedia page attached. We've also included some questions/flags for your review.

Once we have a final copy, we will go ahead and update the Wikipedia page.

Thanks so much,
Sharon

From: JP Robinette [jrobinette@sitesproject.org]
Sent: 8/9/2022 7:14:47 AM
To: Cheyanne Harris [charris@brwncald.com]; Pat Tangora [ptangora@BrwnCald.com]
Subject: Fwd: [EXTERNAL] FW: Sites Engineering Schedule Workshop
Attachments: Sites Contract 1 - P2 Geotech 12-31-2025.mpp; Sites Contract 1 - P2 Geotech 12-31-2026.mpp; Sites Contract 1 - P2 Geotech 12-31-2027.mpp

FYI
Get Outlook for iOS

From: Wisniewski, Jeffrey <jeffrey.wisniewski@aecom.com>
Sent: Monday, August 8, 2022 9:16:22 PM
To: Luu, Henry <Henry.Luu@hdrinc.com>; JP Robinette <jrobinette@sitesproject.org>
Cc: Smith, Michael (orange) <michael.g.smith@aecom.com>; Forrest, Mike <michael.forrest@aecom.com>; Rude, Pete/RDD <Pete.Rude@jacobs.com>
Subject: RE: [EXTERNAL] FW: Sites Engineering Schedule Workshop

Henry, JP: Attached three (3) Microsoft Project .mpp files for the three scenarios.

- All P2 Geotech data by 12/31/2027 (baseline at start of meeting)
- All P2 Geotech data by 12/31/2026 (updated assumption)
- All P2 Geotech data by 12/31/2025 (the "idealized" early date for all geotech data)

As discussed on the call, the CMAR award data has been updated to be 1/1/25. Additionally, for each of the scenarios above, the Shoo-Fly temporary detour is assumed to be used.

Let me know if you have any questions.

Jeffrey Wisniewski, PE
AECOM | 510-205-4230

From: Wisniewski, Jeffrey
Sent: Friday, August 5, 2022 3:02 PM
To: Luu, Henry <Henry.Luu@hdrinc.com>; JP Robinette <jrobinette@sitesproject.org>; Smith, Michael (orange) <michael.g.smith@aecom.com>; Forrest, Mike <michael.forrest@aecom.com>; Rude, Pete/RDD <Pete.Rude@jacobs.com>; Gary.Nuss@jacobs.com; Alexander, Jeriann <jalexander@fugro.com>; Pat Tangora <ptangora@BrwnCald.com>
Cc: Smith, Jeff/SAC <Jeff.Smith1@jacobs.com>; Dan Hertel <Dhertel@Engineering-Solutionsmt.com>
Subject: RE: [EXTERNAL] FW: Sites Engineering Schedule Workshop

Henry: Action items from HR/HC per my notes. Also attached slide deck.

- Jacobs to discuss with Geosyntec use of excavated material from TRR West in dam/road embankment
- AECOM to prepare I/O design schedule ready for construction 2/2027
- AECOM to review lessons learned from San Vicente -- separate contracts for foundation, grouting, embankment
- AECOM to prepare more detailed DSOD engagement schedule (with products/discussion)
- AECOM/Jacobs to update schedule in .MPP formats and send to Henry
- AECOM to review shoo-fly cost/schedule comparison
- Team to prepare list of potential "proceed at risk" activities

Jeffrey Wisniewski, PE
AECOM | 510-205-4230

-----Original Appointment-----
From: Luu, Henry <Henry.Luu@hdrinc.com>
Sent: Friday, August 5, 2022 11:09 AM
To: Luu, Henry; Wisniewski, Jeffrey; JP Robinette; Smith, Michael (orange); Forrest, Mike; Rude, Pete/RDD; Gary.Nuss@jacobs.com; Alexander, Jeriann; Pat Tangora
Cc: Smith, Jeff/SAC; Dan Hertel
Subject: [EXTERNAL] FW: Sites Engineering Schedule Workshop
When: Friday, August 5, 2022 11:00 AM-3:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where: HDR (2379 Gateway Oaks Dr Ste 200, Sacramento, CA 95833)

-----Original Appointment-----
From: Luu, Henry <Henry.Luu@hdrinc.com>
Sent: Monday, July 11, 2022 12:53 PM
To: Luu, Henry; JP Robinette; Smith, Michael (orange); Forrest, Mike; Rude, Pete/RDD; Gary.Nuss@jacobs.com; Alexander, Jeriann
Subject: Sites Engineering Schedule Workshop
When: Friday, August 5, 2022 11:00 AM-3:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where: HDR (2379 Gateway Oaks Dr Ste 200, Sacramento, CA 95833)

Note that this is an in-person meeting. Please forward to others that are critical to this conversation.

DRAFT WSIP CUMULATIVE FLOW ANALYSIS-NARRATIVE

(DWR – August 2022)

1. Introduction

The Water Storage Investment Program (WSIP) is a $2.7 billion program for investments in water storage projects in California, approved by the voters through Proposition 1 in 2014 and administered by the California Water Commission (CWC). Seven projects have been selected for funding consideration based on a rigorous review process. In addition to water storage benefits, the CWC selected projects that demonstrate an ability to provide public benefits related to flood control, ecosystem improvement, water quality improvement, recreation, and/or emergency response. The selected WSIP projects range from expanding existing reservoirs to boosting groundwater storage to building modern surface storage facilities. Once operational, the seven WSIP projects listed below would increase California's water storage capacity by 4.3 million acre-feet over the current (2021) baseline. The projects are listed below and are described in Section 2.

- Chino Basin Program (Chino Basin)
- Kern Fan Groundwater Storage Project (Kern Fan)
- Willow Springs Water Bank Conjunctive Use Project (WSWB)
- Los Vaqueros Reservoir Expansion Project (LVE)
- Sites Reservoir Project (Sites)
- Pacheco Reservoir Expansion Project (Pacheco)
- Harvest Water Program (Harvest Water)

The purpose of the cumulative flow analysis is to describe changes to the flows in the Feather River, Sacramento River, and Delta areas if the WSIP projects were in operation. There has been no similar analysis done by any of the individual WSIP projects. The projects have evolved, and some are still evolving, since the CWC application stage. This analysis puts the cumulative flow changes associated with the projects in the context of overall flows in the waterways on a monthly and water-year-type basis.

The quantitative analysis is based on a CalSim II post processing study done by Stantec – "Cumulative Flow Effect Analysis of Water Storage Investment Program Projects" – Draft July 2022 (Stantec Report). The Stantec Report did not include the Pacheco project as that project has minimal impacts of the waterways studied in this flow analysis[1].

This paper helps interpret modeling results from the Stantec Report and includes WSIP project information from publicly available information. It summarizes anticipated changes in flows due to these projects including amounts, monthly variations, and year types. It also considers the magnitude of these changes compared to baseline flows and hydrologic conditions (i.e., excess, or balanced conditions) to provide context for the anticipated changes.

[1] Draft EIR Pacheco Reservoir Expansion Project November 2021 Tables 3.12.33 and 3.12.34

This analysis is intended to assess potential cumulative hydraulic impacts to waterways and Delta exports and therefore does not attempt to assess potential cumulative impacts to aquatic or biological resources- as these impacts occur on a daily/ short-term time step as compared to a monthly, annual, long-term timestep as evaluated here. This memorandum does not address the environmental impacts of the WSIP projects pursuant to the California Environmental Quality Act (CEQA). Each WSIP project has either completed or is in the process of completing its own environmental documentation for CEQA compliance, including a discussion of cumulative effects as required by CEQA.

2. Background

This section provides background information on the State Water Project (SWP) and the seven WSIP projects.

The California Department of Water Resources (DWR) holds contracts with 29 public agencies for water supplies from the SWP. Key SWP facilities are Lake Oroville, the Harvey O. Banks Pumping Plant, and San Luis Reservoir. These facilities are operated and connected by a network of canals, aqueducts, and other facilities to deliver on average approximately 2.6 million acre-feet of contracted water supplies annually (Reclamation, 2019).

The U.S. Department of the Interior Bureau of Reclamation (Reclamation) also delivers water through the Delta at its Central Valley Project (CVP) pumping plant in the south Delta, Jones Pumping Plant, and either delivers it directly or stores water in San Luis Reservoir for later delivery to its contractors south of the Delta. DWR and Reclamation coordinate their operations on a daily basis. Some factors that DWR and Reclamation consider when coordinating their joint operations include required in-Delta flows, Delta outflow, water quality, fish species protections, schedules for the joint use facilities (e.g., San Luis Reservoir), pumping/wheeling arrangements,[2] and facility capacity limitations.

During balanced water conditions, DWR and Reclamation share a responsibility to meet in-basin uses and maintain a daily water accounting of the SWP and CVP obligations in conformance with the Coordinated Operation Agreement between the two projects. Balanced water conditions are defined as periods when it is mutually agreed that releases from upstream reservoirs plus unregulated flows approximately equal the water supply needed to meet Sacramento Valley in-basin uses plus exports. Excess water conditions are periods when it is mutually agreed that releases from upstream reservoirs plus unregulated flows exceed Sacramento Valley in-basin uses plus exports. The duration of balanced water conditions varies from year to year. While balanced conditions may never occur in some very wet years, some very dry years may have long continuous periods of balanced conditions, and still other years may have several periods of balanced conditions interspersed with excess water conditions. During excess water conditions, sufficient water is available to meet all beneficial uses, and the CVP and SWP are not required to supplement the supply with water from reservoir storage. As specified in the Coordinated Operation Agreement, DWR and Reclamation have the responsibility during excess water conditions to store and export as much water as possible within physical, legal, and contractual limits (Reclamation, 2019). If there is additional water supply beyond the capacity of the SWP and CVP to store or deliver in excess conditions, that water can be made available to individual CVP and SWP contractors.

Article 21 water is one of several types of SWP water supply made available to the SWP contractors under the long-term water supply contracts between DWR and the SWP contractors. Unlike Table A water, which is the maximum allocated annual supply made available for scheduled delivery throughout the year, Article 21 water is made available only when certain conditions exist (which occur predominately in wet years). As with all SWP water, Article 21 water is supplied under existing SWP

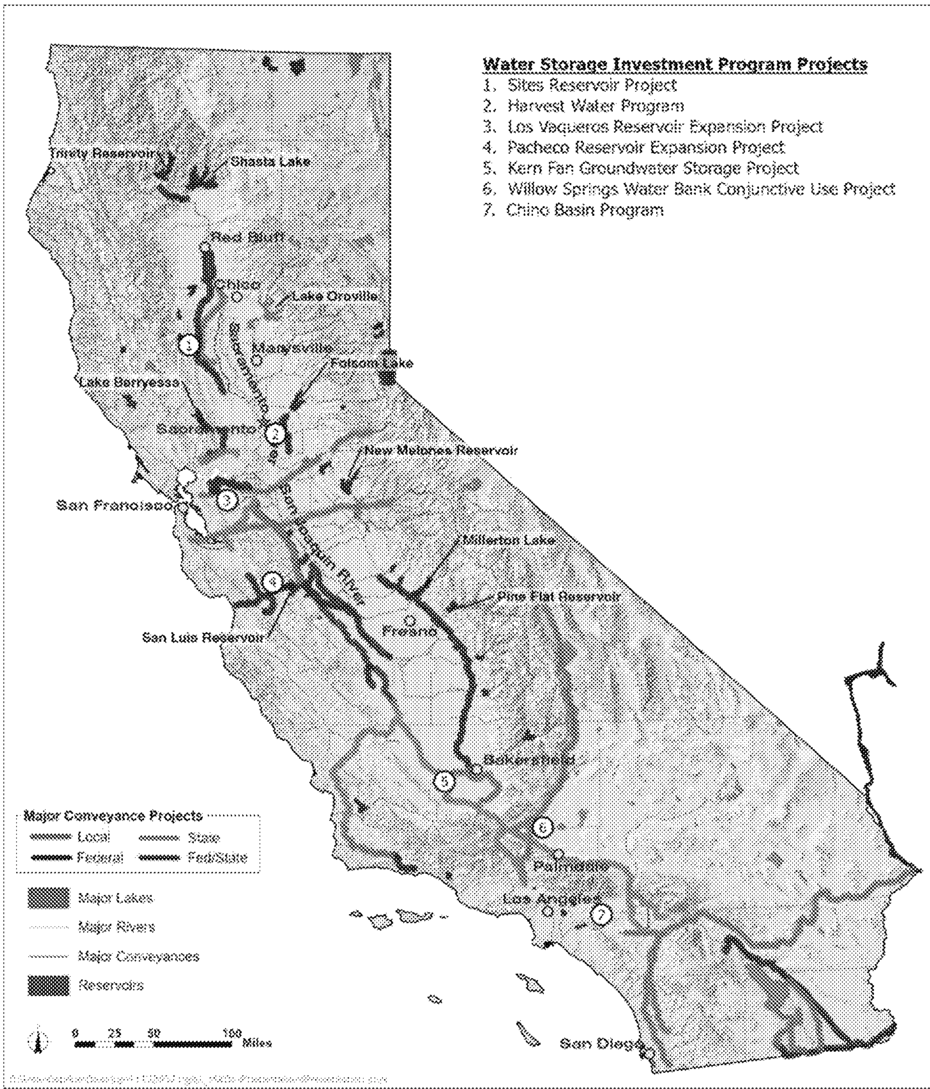
[2] Wheeling means using the water supply facilities by someone other than the owner or operator to transport water for a fee.

water rights permits and is pumped from the Delta under the same environmental, regulatory, and operational constraints that apply to all SWP supplies.

Article 21 water is typically offered to contractors on a weekly basis when all of the following conditions exist: (1) the SWP share of San Luis Reservoir is physically full, or projected to be physically full within approximately 1 week at permitted pumping rates; (2) other SWP reservoirs south of the Delta are at their storage targets or the conveyance capacity to fill these reservoirs is maximized; (3) the Delta is in excess condition; (4) current Table A demand is being fully met; and (5) Banks Pumping Plant has export capacity beyond that which is needed to meet current Table A and other SWP operational demands. The increment of available unused Banks Pumping Plant capacity is offered as the Article 21 delivery capacity (Reclamation, 2008).

The seven WSIP projects are described below. The location of each of the projects and how operations can affect hydrologic conditions are also described below. For the five WSIP projects that involve the SWP (Chino Basin, Kern Fan, WSWB, Sites and LVE), DWR has not yet approved operations of the projects, so the operations described below are subject to change.

The flow numbers in this paper come from several sources. Each WSIP project used flow models at various stages of project development (i.e., application, feasibility study and CEQA). The Stantec Report uses a 2021 version of CalSim II that the WSIP projects generally did not use. This can create some differences in flow data such as baseline flows in waterways. This can affect calculations such as the percentage of flow in a waterway impacted by a WSIP project. Data sources are footnoted to show where data came from.



Pulse Flow Projects

The following are operations common to the three Pulse Flow Projects (Chino Basin, Kern Fan and WSWB),

In dry and below normal years, stored water would be used to provide pulse flows to enhance spring instream flows in the Feather River below Lake Oroville. The amount of a pulse flow in a given year will be determined by California Department of Fish and Wildlife (CDFW) requests and DWR approval of a pulse flow. The modeling uses assumed maximum amounts of water stored for each project. A water exchange process is required to replace water used for pulse flows with stored groundwater. This will require agreements with SWP Partner Contractors to forego SWP Table A deliveries equivalent to the pulse flow amount in exchange for receiving an equivalent amount of water from the groundwater bank. South-of-Delta exports needed to meet SWP Partner Contractor Table A demands would be reduced by the amount of water released for pulse flows. A credit for a reduction of Delta carriage water requirements is being considered. Also required are agreements with DWR and CDFW to re-operate Lake Oroville and manage the water to provide the pulse flows

Chino Basin Program

Chino Basin would construct a new advanced water treatment facility and distribution facilities in western San Bernardino County that would store up to 15 thousand acre-feet (TAF) per year of treated wastewater in the Chino Basin (groundwater bank). Chino Basin would be operated to dedicate blocks of water, assumed to be in increments of 50 TAF,[3] for Oroville pulse flows. The Partner Contractor will be the Metropolitan Water District of Southern California. After the initial 25 years of operation and fulfilling ecosystem public benefits, pulse flows would cease, and Chino Basin would be operated for local water supply benefits.

Kern Fan Groundwater Storage Project

Kern Fan would develop a regional groundwater bank in Kern County, west of Bakersfield, that would store up to 100 TAF per year of Article 21 water and other available water supplies, including Federal Section 215 water. Kern Fan would be operated so that in wet years, the project would store these water supplies in the water bank. Twenty-five percent of the stored water, up to 25 TAF would be stored in an "ecosystem account" and would be dedicated for Oroville pulse flows in blocks of water assumed to be 18 TAF[4] each. The remaining water would be stored by the project participants for water supply reliability purposes. The Partner Contractors are anticipated to be Kern County Water Agency and Dudley Ridge Water District. After the initial 50 years of operation and fulfilling ecosystem public benefits, pulse flows would cease, Kern Fan would be operated for local water supply benefits.

Willow Springs Water Bank Conjunctive Use Project

WSWB would enhance the existing Willow Springs Water Bank located in southern Kern County, northwest of the City of Lancaster, in the adjudicated Antelope Valley Groundwater Basin. WSWB is a conjunctive use and reservoir reoperation project that would leverage 560 TAF of existing groundwater storage facilities at the Willow Springs Water Bank and High Desert Water Bank and operate conjunctively with the SWP.

WSWB will pre-position SWP water to WSWB between November and April in years when there is not a low volume concern in San Luis Reservoir. This SWP water would be "owned" by DWR and used in any SWP allocation calculation. Article 21 water would not be utilized. Pre-positioning SWP water in the groundwater bank reduces the amount of water stored in San Luis Reservoir, thus increasing available storage capacity in the reservoir to be filled at a later date. "New" water is created when the pre-positioning allows SWP facilities to capture water that would otherwise not be pumped at Banks Pumping Plant due to storage capacity limitations. Pumping would occur when the SWP has water rights to divert and storage space or direct delivery capability in excess or balanced conditions. This operation could impact the availability of Article 21 by delaying conditions when Article 21 would be

[3] Pulse flows are modeled as 50 TAF but may vary in amounts per CDFW requests.
[4] Pulse flows are modeled as 18 TAF but may vary in amounts per CDFW requests.

available. DWR is expected to mitigate this impact by allowing SWP contractors to take Article 21 before San Luis Reservoir fills to mimic conditions without WSWB.

WSWB would be operated to dedicate blocks of water assumed to be 28 TAF[5] for Oroville pulse flows. The Partner Contractor is anticipated to be Antelope Valley East Kern Water Agency. After the initial 50 years of operation and fulfilling ecosystem public benefits, pulse flows would cease, and WSWB would be operated for local water supply benefits.

Los Vaqueros Reservoir Expansion Project

LVE is a surface storage project located in southeastern Contra Costa County that would enlarge the capacity of an existing off-stream reservoir by 115 TAF (from 160 TAF to 275 TAF). This project would also upgrade existing conveyance facilities, construct new conveyance, and re-operate existing facilities to develop water supplies for ecosystem public benefits and increased water supply reliability for project participants. LVE would divert water from the Delta at Rock Slough, Old River, and Middle River intakes that are operated by Contra Costa Water District, divert water from the Sacramento River at the Freeport Intake, and deliver water to project participants within Contra Costa Water District's service area, the Bay Area, the Delta, neighboring regions, and south-of-Delta wildlife refuges.

Diversions for LVE can be used for direct deliveries and for diversion to storage. Diversions would occur during excess and balanced conditions. During balanced conditions, total diversions at the Delta and Freeport intakes would increase by a long-term average of 58 TAF per year.[6] These diversions represent a reduction of about 0.5 percent or less of Delta outflow during dry and critical dry years[7],. During excess conditions total diversions at the Delta and Freeport intakes would increase by a long-term average of 69 TAF per year.[8] These diversions represent less than 0.3 percent reduction of Delta outflow during wet and above normal years.[9]

Commented [D1]: CCWD to check these numbers to conform to page 11 and Table 1.

The maximum diversion rates at the intakes are 250 cubic feet per second (cfs) for the Old River Intake, 250 cfs for the Middle River Intake (320 cfs for the Old River and Middle River Intakes combined), 350 cfs for the Rock Slough Intake, and 155 cfs (of project supplies) at the Freeport Intake. Diversion to storage from all sources requires the use of the Transfer Pump Station, which has a pumping capacity of 200 cfs, so the rate of diversion to storage is limited to 200 cfs. Direct deliveries up to 300 cfs can be made to the California Aqueduct through the proposed Transfer-Bethany Pipeline.

Sites Reservoir Project

Sites is a new surface storage reservoir located in Colusa County in the Sacramento Valley west of the town of Maxwell. Sites would be an off-stream 1.5 million acre-feet (MAF) reservoir that would impound Funks Creek and Stone Coral Creek and provide storage capacity for Sacramento River diversions. This project also includes conveyance through the use of the existing Tehama Colusa (T-C) Canal and Glenn-Colusa Irrigation District Canal (GCID) diversion and conveyance facilities. Operation of the proposed reservoir would be in cooperation with the operations of existing CVP and SWP system facilities. Sites would release water to the GCID Canal and the T-C Canal. A new Dunnigan Pipeline will allow water in the T-C Canal to flow into the Colusa Basin Drain and ultimately

[5] Pulse flows are modeled as 28 TAF but may vary in amounts per CDFW requests.
[6] This value represents the difference between Alternative 1B with transfers and the no project/no action alternative under existing conditions (see Reclamation 2020, revised Table 4.2-6 in Appendix B-1, Updated Modeling Analysis).
[7] Long-term Delta outflow is estimated at 16.3 million acre-feet per year (MAF/yr), with an average of 28.7 MAF/yr in wet years, 17.7 MAF/yr in above normal years, 9.5 MAF/yr in below normal years, 9.5 MAF/yr in dry years, and 5.3 MAF/yr in critical dry years (Reclamation 2019, Appendix D – Modeling, Table 41-1, Current Operations).
[8] This value represents the difference between Alternative 1B and the no project/no action alternative under existing conditions (see Reclamation, 2020; Revised Table 4.2-8 in Appendix B-1, Updated Modeling Analysis).
[9] See footnote 6.

back into the Sacramento River. Using these facilities, Sites water would be delivered to participants within neighboring areas, to SWP and CVP contractors, to the Yolo Bypass and to north- and south-of-Delta wildlife refuges. The project also includes exchanges with upstream reservoirs to preserve cold water releases for fishery benefits.

Diversions would range from an average of 61 to 406 TAF per year, depending on water year type, availability of Sacramento River water, and diversion and conveyance facility capacities.[10] Diversions would occur only under excess conditions. The maximum Sacramento River diversion rate is 3,900 cfs. Sacramento River flows would be diverted at the Red Bluff Pumping Plant (up to 2,100 cfs) and the Hamilton City Pump Station (up to 1,800 cfs). Modeling for the environmental documents show that the Sites Project diversions during wet years from January through March when excess conditions are expected shows a 3 to 4 percent reduction in flows in the Sacramento River downstream of Red Bluff Diversion Dam.

Excess condition diversions could occur anytime between September 1 to June 15, the timeframe that the Sacramento River is not fully appropriated; however, most diversions would occur from December through March during wet and above normal water years. Diversions are expected to decrease Sacramento River inflow to the Delta by approximately 2 percent (and less during wet water years), assuming an average diversion rate for above normal years of 406 TAF.[11]

Average annual releases from the Sites Project would range from 70 to 427 TAF per year, depending on water year type, with a long-term average annual release to Sacramento River or Yolo Bypass of 140 TAF (over all year types).[12] Water would be conveyed via existing waterways. The Dunnigan Pipeline diverts water released into the Tehama-Colusa Canal from Sites into the Colusa Basin Drain that eventually flows into the Sacramento River or the Yolo Bypass. Maximum releases to the Sacramento River would be 1,000 cfs. Releases would occur during balanced conditions.

Delta exports range from 13-203 TAF per year for Sites participants south of the Delta and for environmental water delivers to south of Delta refuges.

The table below summarizes the estimated Sites average diversions and releases by water year type.

Water Year Type (Sacramento Valley 40-30-30 Index)	Diversions to Storage (TAF)	Releases from Reservoir (TAF)	Releases through Dunnigan Pipeline to Sacramento River or Yolo Bypass (TAF)	Delta Exports for Sites Participants and Refuges (TAF)
Wet	390	86	70	13
Above Normal	406	154	78	34
Below Normal	213	224	140	53
Dry	134	427	254	179
Critically Dry	61	348	187*	203*

[10] Sites Project Authority, 2021; Section 2.5.2.
[11] Long-term Sacramento River flow at Freeport is estimated at 15.5 MAF/yr, with an average of 22.4 MAF/yr in wet years, 18.2 MAF/yr in above normal years, 12.2 MAF/yr in below normal years, 11.5 MAF/yr in dry years, and 7.6 MAF/yr in critical dry years (Reclamation 2019, Appendix D – Modeling, Table 29-1, Current Operations).
[12] Sites Project Authority, 2020; Table 5-2 and 5-3 and Table B1-1.

Average Annual	257	232	140	87
*Values for exports can be higher than values for releases due to exchanges with the CVP				

Sites operations also includes exchanges with State and Federal facilities. Exchanges with upstream reservoirs could occur to preserve cold water in the upstream reservoirs for fishery benefits, with most of the exchanges occurring in dry and critical water year types.[13] These releases from Sites for exchanges would typically occur in spring and early summer with the exchanges listed below occurring in late summer and fall. The following exchanges would likely occur during balanced conditions, but do not represent the only timeline that they would be considered.

- Shasta Lake exchanges would result in Sites releasing water in the spring in exchange for Shasta Lake releases in August and September.
- Lake Oroville exchanges would result in Sites releasing water in June and July in exchange for Lake Oroville releases in August through November.
- Folsom Lake exchanges would result in Sites releasing water in the spring and early summer in exchange for Folsom Lake releases in late summer and fall.
- Real-time exchanges with local participants would result in deliveries from Sites to CVP partner contractors in lieu of direct diversions from the Sacramento River.

Pacheco Reservoir Expansion Project

Pacheco is a surface storage project located in southeast Santa Clara County that would enlarge an existing reservoir by 136 TAF (from 6 TAF to 142 TAF). The project would construct new conveyance infrastructure to the CVP San Felipe Division in Santa Clara County and deliver water supply to up to eight south-of-Delta wildlife refuges in Merced County. Pacheco benefits include increased delivery of water to south-of-Delta wildlife refuges, improved local habitat for threatened South-Central California Coast Steelhead, and emergency water storage. The primary water sources to fill the expanded reservoir would be natural inflows from the North and East Forks of Pacheco Creek and imported water from San Luis Reservoir. Supplemental flows to the expanded reservoir would arrive from Valley Water's and the San Benito County Water District's share of contracted CVP pumped water from San Luis Reservoir as well as water from excess condition diversions, when available.

San Luis Reservoir stored water is expected to decrease due to transfers to Pacheco Reservoir. This would increase the amount of available San Luis Reservoir storage that can be used by the SWP and CVP. South-of-Delta diversions could increase in both excess and balanced conditions. Valley Water has simulated SWP exports from Banks Pumping Plant by water year type[14]. This analysis shows a percent change in Banks exports ranging from -0.5% to +0.2%. Simulated SWP south of Delta allocations by water year type shows a range of -1% to +1% change.[15] Operation of Pacheco could impact the availability of Article 21 by delaying conditions when Article 21 would be available. DWR is expected to mitigate this impact by allowing SWP contractors to take Article 21 before San Luis spills to mimic conditions without Pacheco.

Pacheco was not modeled in the Stantec Report because it has minimal effects on the waterways included in that analysis.

[13] Sites Project Authority, 2020; Section 5.2.
[14] Draft EIR Pacheco Reservoir Expansion Project November 2021 Table 3.12.33
[15] Draft EIR Pacheco Reservoir Expansion Project November 2021 Table 3.12.34

Harvest Water Program

Harvest Water is a conjunctive use project in Sacramento County, Harvest Water would store and manage groundwater via in lieu recharge during the irrigation season and passive recharge by applying recycled water to sandhill crane habitat in the winter while improving stream flow, enhancing groundwater dependent riparian habitats, sustaining prime agricultural lands, and improving regional water supply reliability. Sources of water would be up to 50 TAF per year of tertiary-treated recycled water produced by Sacramento Regional County Sanitation District (Regional San) and diverted from discharge into the Sacramento River. Water produced from Harvest Water would be used to irrigate up to 16,000 acres of agriculture and habitat lands in Sacramento County near the lower Cosumnes River and Stone Lakes National Wildlife Refuge.

Up to 50 TAF per year of recycled water would be applied to lands in lieu of groundwater pumped from the South American Subbasin portion of the Sacramento Valley groundwater basin. An estimated 32.5 TAF per year of recycled water would be used for irrigation during the growing season (April through October). In a dry year, irrigation demands could be as much as 37.5 TAF per year. An additional 8.75 to 17.5 TAF per year of recycled water would be applied to lands during the non-growing season for wildlife enhancement. The recycled water for wildlife enhancement does not reduce groundwater pumping but does provide passive recharge of groundwater. In the future, an additional 5.5 TAF per year could also be used for wildlife enhancement purposes (to be confirmed). Return flows from irrigation are assumed to be minimal. In theory, reuse of up to 50 TAF per year of recycled water could potentially result in a reduction of up to 50 TAF per year in wastewater outflow to the Sacramento River. The flow rate of the reduction will vary over the year based on annual pattern of wastewater generation. In any event, this represents a relatively small change in Sacramento River flow – less than a 0.7 % decrease in Sacramento River inflow to the Delta.[16] The amount of water that is sent to the project area rather than to the Sacramento River (i.e., the flow rate of the reduction) is not based upon wastewater supply at the recycled water treatment plant. Rather, the flow rate of the reduction depends upon demand for recycled water by users in the project area (i.e., agricultural and habitat lands). Therefore, reductions in Sacramento River flow may be greater during periods of high demand (e.g., in drier years and in summertime when farmers need more recycled water) than the calculated average (0.7%).

Commented [D2]: Sac Regional - please confirm/clarify

However, after 20 years, as documented in reference 2 (Modeling TM) and reference 6 (Implementation Water Rights TM) in the Harvest Water list of references, the net outflow to the Sacramento River and the downstream Delta environment, is projected to be reduced by approximately 25 TAF per year (50% of the 50 TAF per year remains in the groundwater basin and 50% returns to the Delta). This is from the result of projections of the groundwater basin filling. This represents an even smaller change in Sacramento River flow – less than a 0.4 percent decrease in Sacramento River inflow to the Delta. By the end of the 84-year modeling period, 80% of the flow eventually returns to the Delta. To mitigate this potential affect during the first 20 years, Regional San has agreed through its Wastewater Petition for Change (Order No. 0092) negotiation process to cut back recycled water deliveries in Shasta Critical and in Critically Dry years by 50% (of the 32.5-37.5 TAF per year) and 25% respectively. These cutbacks sunset only after the 50% threshold described above is reached as demonstrated by the latest calibrated groundwater-surface water model maintained by Regional San.

3. Analysis

This section describes the individual effects of each of the WSIP projects, considers how they interact, and addresses cumulative changes to Delta, Feather River, and Sacramento River flows, and other

[16] See Footnote 11.

parts of the SWP system. Table 1 provides a summary of expected changes from each of the WSIP projects. The following is a summary of Hydrology Changes for Individual WSIP Projects.

Chino Basin Program

- Project Additional Groundwater Storage: 15 TAF/year
- Feather River pulse flows: up to 50 TAF in selected years
- Reduced Delta Exports: up to 50 TAF in pulse flow years,
- Additional Delta Outflow: up to 50 TAF in pulse flow years

Kern Fan Groundwater Storage Project

- Project Additional Groundwater Storage: up to 100 TAF/year, with up to 25 TAF stored in an "ecosystem account" dedicated for ecosystem benefits.
- Feather River pulse flows: up to 18 TAF in selected years
- Delta Exports, Excess Conditions: up to 100 TAF/year when Article 21 water is available under excess conditions
- Reduced Delta Exports: up to 18 TAF in pulse flow years
- Additional Delta Outflow: up to 18 TAF in pulse flow years

Willow Springs Water Bank Conjunctive Use Project

- Project Additional Groundwater Storage: 34 TAF/yr w/ 2030 hydrology and 39.2 TAF/yr under 2070 hydrology[17]
- Feather River pulse flows: up to 28 TAF in selected years
- Delta Exports: Pre-positioning of SWP Water to WSWB allows for additional Delta exports averaging about 8.4 TAF/year.
- Reduced Delta Exports: up to 28 TAF in pulse flow years
- Additional Delta Outflow: up to 28 TAF in pulse flow years.

Los Vaqueros Reservoir Expansion Project

- Additional Surface Water Storage: 115 TAF (reservoir increase)
- Sacramento River Diversions: up to 155 cfs at Freeport (long-term average up to 6 TAF/year[18])
- Delta Exports increase, Balanced Conditions: up to 500 cfs[19] (long term average 42 TAF/year)
- Delta Exports increase, Excess Conditions: up to 50 cfs (long term average 48 TAF/year)

Commented [D3]: Note to CCWD - check math here. If necessary change Table 1 and page 6

Sites Reservoir Project

- Additional Surface Water Storage: 1,500 TAF (reservoir capacity)

[17] WSWB 2019 and Table 1 of AVWS 2017
[18] Freeport diversions would occur during balanced and excess conditions. The long-term average Freeport diversions increased by 1 TAF/yr during balanced conditions, and by 6 TAF/yr during excess conditions.
[19] This represents the combination of diversion to storage (up to 200 cfs) and direct diversions made to the California Aqueduct (up to 300 cfs).

- Sacramento River Diversions: up to 3,900 cfs (average of 60 to 406 TAF/year) depending on year type during excess conditions
- Sacramento River Releases: up to 1,000 cfs (70 to 254 TAF/year) during balanced conditions. This includes possible releases for exchanges with upstream reservoirs. Additional releases are delivered to local Sites participants or north-of-Delta refuges.
- Increased Delta Exports, Balanced Conditions: average of 203 TAF/year in critically dry years from deliveries pumped at Banks and Jones Pumping Plants

Pacheco Reservoir Expansion Project

- Additional Surface Water Storage: 136 TAF (reservoir increase)
- Delta Exports: Modeling shows changes in CVP and SWP exports to be minimal, within uncertainty ranges of models. San Luis Reservoir will have increased capacity due to the Pacheco project that will allow some additional SWP and CVP export from the Delta. These exports could occur in balanced or excess conditions.

Harvest Water Program

- Sacramento River discharge reductions: During first 20 years up to 50 TAF/year in both balanced and excess conditions. However, during Shasta Critical and in Critically Dry years, treated wastewater deliveries are reduced 50% and 25%, respectively. described in Section 2 above under balanced and excess conditions, thus reducing net decreases of flows into the Sacramento River.
- Project Additional Groundwater Storage: up to 50 TAF/year in lieu use except in “cutback years” as described in the point above.
- After the first 20 years, lower discharge reductions.

3.1 Cumulative Flows

This section summarizes the analysis done in the Stantec Report. See the Stantec Report for scope, limitations and assumptions made. The Stantec Report used a CalSim II post-processing technique to “layer” operations of each project to show cumulative changes. Pacheco was not included in the Stantec Report because it has a minimal effect on the waterways included in this analysis.

The Stantec Report modeling analyzes flows at the following locations:

-Delta Surplus flows

-Banks Pumping Plant

-Delta Inflow from Sacramento River

-Delta Inflow from the Yolo Bypass

-Feather River (at Thermalito outfall)

-Feather River (at Sacramento River junction)

-Groundwater Bank Storage

CalSim II simulates water project operations over an 82-year hydrologic period (1921-2002). For each location a long-term monthly average is shown that includes applicable WSIP projects. Not all WSIP projects impact all locations. This set of data is followed by the same data by water year type: wet, above normal, below normal, dry and critical. Data is shown as plotted and in tabular form. The Stantec Report analyzes Sites, LVE and Harvest Water (Upstream Projects), then separately analyzes impacts from Kern Fan, Chino and WSWB (Groundwater Projects). The data from both analyses can be used to show combined effects.

<u>The following is a summary of the Stantec Report analysis organized by location.</u>

Delta Surplus (This is a measure of flows when the Delta is in excess conditions – it can also be considered a measure of Delta outflow when excess conditions exist)

Upstream Projects: The largest changes in Delta surplus are from Sites and LVE. These projects divert relatively large amounts of water under excess conditions. In balanced conditions, changes to Delta surplus flows are assumed to be unchanged by WSIP projects because of operational constraints to limit impacts to existing water users. The exception is Harvest Water that is allowed by its water rights to reduce wastewater discharges to the Sacramento River under some balanced conditions.

Mean annual reductions in Delta surplus under excess conditions throughout the simulation period are 317 TAF, or 3% of the total 10,473 TAF of mean annual Delta surplus under excess conditions[20]. These reductions mainly occur in the months of January-March. Year type analysis shows that the largest reductions occur in wet and above normal years. In these types of years average monthly reductions in Delta surplus range from 97 TAF to 127 TAF[21]. This represents about 2-5% of Delta surplus in these years[22]. In drier years there are still some smaller opportunities to divert under excess conditions.

Groundwater Projects: Kern Fan and WSWB also impact Delta surplus by using surplus flows to create Exchange Water. This use of surplus flows by these projects are an order of magnitude smaller than the Upstream Projects mostly due to conveyance constraints. Mean annual reductions in Delta surplus (excluding pulse flows) under excess conditions throughout the simulation period are 11 TAF of the total 10,473 TAF of mean annual Delta surplus under excess conditions - less than 0.1%.[23] This occurs in Wet and Above Normal years.

A spring pulse flow in Below Normal and Dry years adds to Delta outflow, but has little impact on Delta surplus, because in Below Normal and Dry years there are small amounts of Delta surplus in April when the pulse flows are simulated in the modeling. The model results in the tables shows an average 45-50 TAF pulse flow over a month because the 100 TAF pulse flow is modeled over a two-week period.

Banks Pumping Plant (Banks)

Upstream Projects: Sites results in increases in pumping at Banks, mostly in Dry and Critical years in July-September from deliveries of stored water to SWP participants south of the Delta. Since these are deliveries of stored water, there is no impact on other water users. Carriage water assessments are applied to deliveries during this period. Year type analysis show that these deliveries mostly occur in Dry and Critical years. Monthly average delivery rates are 967 cfs or less[24]. During July-September

[20] Stantec Report Table 3
[21] Stantec Report Tables 4 and 5
[22] ibid
[23] Stantec Report Table 40
[24] Stantec Report Tables 13 and 14 and Figure 6

of Dry and Critical years, these monthly average additional deliveries are modeled to be 12%-114% of WSIP Baseline pumping[25].

Groundwater Projects: Kern Fan and WSWB increase Banks pumping during excess conditions when pumping capacity exists by a monthly average of up to 137 cfs in January-May of Wet and Above Normal years.[26] Banks pumping is reduced by a monthly average of 47 to 549 cfs by all three Groundwater Projects to replenish Lake Oroville pulse flows by exchange during July-September in a pulse flow year.[27] In July and August of pulse flow years this is a monthly average reduction of 5% to 12% of WSIP Baseline pumping[28].

Combined Effect: The reduction in Banks pumping by the Groundwater Projects pulse flow exchange occurs in July-September in dryer years when a pulse flow is made. This could be the same time period and year type where Sites is delivering stored water to participants south of the Delta. However, a pulse flow will likely not occur in a critical year, but Sites deliveries are likely in critical years. These actions are of the same order of magnitude and may offset each other to some degree in dryer water years.[29]

Delta Inflow from Sacramento River

Upstream Projects: Sacramento River inflows to the Delta are mostly reduced by Sites diversions under excess conditions in wetter years[30]. There is a corresponding increase in inflow during the July-November transfer window in drier years when water is released from storage from Sites for delivery to participants south of the Delta. There is a small decrease in inflow from reduction of wastewater discharges from Harvest Water.

Year type analyses shows that in wetter years there are more reductions in inflow in the winter as would be expected with Sites diverting under excess conditions. The average monthly percent reduction for Upstream Projects in December-March of Wet and Above Normal years is 1%-3% with a maximum monthly average reduction of 74 TAF[31]. In Dry and Critical years Sites deliveries mostly in the July through October time frame. Combined effects of Upstream Projects on Sacramento River inflow result in an increase of 0.4%-11%, as much as 66 TAF per month[32].

Groundwater Projects: A spring pulse flow in Below Normal and Dry years adds to Delta inflow. The analysis shows an average 45-50 TAF pulse flow over a month because the 100 TAF pulse flow is modeled to occur over a two-week period[33]. Delta inflow from the Sacramento River is decreased during the summer months where Lake Oroville releases are decreased to replenish Lake Oroville pulse flows. Delta inflow is reduced by a monthly average of 3 TAF to 34 TAF during July-September of Below Normal and Dry years with the largest decrease being 3% of the WSIP Baseline[34].

Combined Effect: Oroville pulse flows are expected to occur in dry and below normal years while diversions to Upstream Projects that reduce Delta inflow from Upstream Projects will occur in wetter years under excess conditions. The reduction in Delta inflow from decreased Lake Oroville releases to replenish Lake Oroville pulse flows can occur the same months and year types as increases in stored water deliveries from Sites. These changes in flows can be of the same order of magnitude so there can be an offsetting effect. Tables 54 thorough 56 in the Stantec Report shows this relationship.

[25] Stantec Report Tables 13 and 14.
[26] Stantec Report Tables 47 and 48
[27] Stantec Report Tables 49 and 50
[28] ibid
[29] Stantec Report Table 50
[30] Stantec Report Figure 8
[31] Stantec Report Tables 17 and 18
[32] Stantec Report Tables 20 and 21
[33] Stantec Report Figure 20 and Tables 55 and 56
[34] Stantec Report Tables 55 and 56.

Delta Inflow from Yolo Bypass

This flow is measured where the Yolo Bypass feeds into the Sacramento River near Rio Vista. Only Sites impacts Yolo Bypass flows in any significant way. Since Sites diverts under excess conditions, there will be times when these diversions delay Sacramento River overflows into the Yolo Bypass and return flow back into the Sacramento River. In the summer months Sites is conveying stored water through the Yolo Bypass for environmental purposes. Other WSIP projects have no significant impact on the Yolo Bypass.

Year type analysis shows that the reductions in Yolo Bypass flows are mostly in wet and above normal years. Modeling shows a monthly average reduction in December through April of 7 TAF to 77 TAF in Wet and Above Normal years[35]. This is in approximately a 1% to 10% reduction in Yolo Bypass monthly flows[36]. Additions to the Yolo Bypass from Sites come in all years from August through October (minimal flow in critical years). These additions are a monthly average of 20 TAF or less[37].

Feather River below Thermalito Junction

Upstream Projects: This location is in the Feather River at the junction of the discharge of the Thermalito Afterbay. The low flow channel of the Feather River is upstream of this point. Apart from the pulse flow operations, the only project that has significant impacts to the Feather River is Sites. As part of a cold water management process to benefit salmon, Sites would exchange water with the SWP by providing Sacramento River flows in June and July to meet some of SWP flow obligations and in return have the SWP release the same amount of water mostly in August and September. Year type analysis shows that these exchanges occur mostly in in Dry and Critical years. The highest average monthly flow reduction in June and July of dry and critical years is 659 cfs and reduced flows are well above minimum flow standards in the Feather River.[38] These reductions can reduce average monthly Feather River flows 1% to 16% in these months.[39]

Groundwater Projects: The spring pulse flows in Below Normal and Dry years add to Feather River flows. Assuming a 100 TAF pulse flow, the modeled flow was a pulse of 3,000 cfs over a 10-day period with a ramp down of 500 cfs per day. The analysis shows an average 700-800 cfs pulse flow over a month because the 3,000 cfs pulse flow is assumed to occur over a 10-day period (with an 8-day ramp down)[40]. Monthly baseline average monthly flows in this part of the Feather River during April in Below Normal and Dry years are in the range of 900-1000 cfs[41]. In a pulse flow year, Lake Oroville releases are reduced in July through September to replenish Lake Oroville. The volume of the reduction match to pulse flow amounts. The modeled reduction in Feather River flows range from a monthly average of 47 cfs to 550 cfs or from 2% to 8% of Feather River flows at this location[42].

Combined Effect: The cold water exchange between Sites and Lake Oroville occurs in June through September with the SWP releasing extra water into the Feather River mostly in August and September. August and September are some of the same months that the Groundwater Projects cause Lake Oroville to release less water to replenish storage from the spring pulse flow. These flows are the same order of magnitude and can partially offset each other in some years if Sites is in operation.

Feather River at Sacramento River Junction

[35] Stantec Report Figure 10 and Tables 23 and 24
[36] Stantec Report Tables 23 and 24
[37] Stantec Report Figure 10 and Tables 23 through-27
[38] Stantec Report Figure 12
[39] Stantec Report Tables 31 and 32
[40] Stantec Report Figure 22
[41] Stantec Report Tables 61 and 62
[42] Stantec Report Table 61 and 62

Flow patterns in the Feather River at the Junction of the Sacramento River approximately mirror those at the Thermalito Junction[43]. Baseline flows are higher in the Feather River at this point, due to inflows in the Feather River between Thermalito and the Sacramento River. Flow changes from the WSIP projects are the same, but the impacts are less due to the higher baseline flows.

Groundwater Banking Operations

The Stantec Report also analyzes how the three groundwater banks would provide Exchange Water for pulse flows. Each project, in their application for Prop 1 funding and subsequent updates, made assumptions about the rate of input of water supplies into their groundwater banks and under what conditions they would provide Exchange Water for pulse flows. These arrangements are expected to be specified in Contracts for Administration of Public Benefit with CDFW. It is the responsibility of the WSIP projects to meet environmental obligations in these contracts. The Stantec Report models how all three projects could contribute to pulse flows based on assumptions made by each project and historical hydrology included in CalSim II. This narrative report will not summarize this part of the Stantec Report. The Stantec Report generally shows that it is possible to meet the pulse flow obligations, but much depends on hydrology, particularly for Kern Fan and WSWB who depend on excess conditions water diversions to develop Exchange Water.

The Stantec Report treats Article 21 availability different than what is contemplated in current draft operating agreements with DWR that are under development for Kern Fan and WSWB. The draft operating agreements assume that Article 21 water will come from Article 21 allocations of their Partner Contractors. The Stantec Report assumes that Article 21 water supplies for these projects are in addition to the Article 21 deliveries simulated in the WSIP Baseline. This may not make too much of a difference because Kern Fan and WSWB may increase allocated Article 21 demand above current levels.

The analysis does not include calculations for carriage water savings (also called Efficiency Credits) from delivery of water supplies from groundwater banks to Partner Contractors to replace Table A diverted from the Delta.

<u>This section summarizes cumulative flows in the context of diversions, releases and exports.</u>

Sacramento River Diversions

LVE (through use of the Freeport diversion) and Sites would increase Sacramento River diversions and Harvest Water would reduce inflow into the Sacramento River.

Sites is by far the largest Sacramento River diversion at 3,900 cfs, which would occur only during excess conditions. LVE Freeport diversion has a capacity of 155 cfs and may divert under excess conditions for LVE. Since the Harvest Water reduces Sacramento River inflows by 50 TAF per year on a continuous basis, that amount averages to a reduction of 69 cfs per day (or less as described in Section 2.2 above according to negotiated cutback in the first 20 years of operations).

The LVE Freeport diversion could also divert in balanced conditions such as for diverting SWP Table A supplies into LVE. This type of relatively small diversion would be scheduled and coordinated through the LVE operating agreements with the SWP and CVP to eliminate any adverse consequences and will be diverted in conformance with all permits and regulations. Any Harvest Water reductions in

[43] Stantec Report Figure 23

balanced conditions are not substantial (less than 0.7 percent or less during Shasta Critical and Critically Dry cutback years).[44]

Summary: The largest diversion, Sites, occurs in excess conditions and is a relatively small percentage of Sacramento River flows during wet time periods. The LVE Freeport diversion is expected to be utilized less frequently than the LVE Delta diversion locations and is a relatively small diversion rate. Harvest Water reductions in discharges are relatively small given the volume of Sacramento River flows.

Sacramento River Releases

Sites would release flows back to the Sacramento River during balanced conditions. The releases from Sites to the Sacramento River are estimated to be a maximum of 1,000 cfs. The releases will be to local waterways eventually leading to the Sacramento River and the Delta. The releases would be scheduled and coordinated through the Sites operating agreements with the SWP and CVP to avoid any substantial adverse consequences and will be diverted in conformance with all permits and regulations.

Pulse flows from Lake Oroville into the Feather River will travel down the Sacramento River and through the Delta. The pulse flows will be protected from diversion through a SWRCB instream flow dedication (Water Code 1707). These flows are expected to occur, when requested by CDFW and approved by DWR, in the spring of Dry and Below Normal years. These flows could overlap with some other WSIP project operations but the pulse flows are considered environmentally beneficial "extra" flows.

Summary: Releases in balanced conditions are coordinated with the SWP and CVP, so any WSIP operations should not impact other water users.

Delta Exports in Balanced Conditions

The Groundwater Projects do not increase Delta exports in balanced conditions. The Groundwater Projects reduce demand for Delta pumping for individual SWP Partner Contractors who receive their Table A deliveries by exchange with water recovered from the Groundwater Projects instead of the Delta or San Luis Reservoir. This reduced demand results in less pumping at Banks Pumping Plant in the summer of pulse flow years. Note that the reduced diversions could result in the SWP using that unused pumping capacity at Banks Pumping Plant for additional exports, but Delta conditions during that period are unlikely to provide opportunities for additional exports.

Sites releases water from storage during balanced conditions for delivery to project participants and for exchanges with upstream SWP and CVP reservoirs. Most of the deliveries to project participants will be provided at SWP and CVP export facilities. LVE will also divert water from the Delta during balanced conditions. An example would be export of SWP Table A water for SWP South Bay Aqueduct contractors.

Pacheco results in increased available capacity in San Luis Reservoir that would allow a small amount of additional SWP and CVP export from the Delta in both balanced and excess conditions.

Combined Delta exports in balanced conditions for Sites and LVE are approximately 245 TAF per year.[45] For this analysis additional Delta exports resulting from the Pacheco project are not included. Note that these exports would occur under the same environmental, regulatory, and operational constraints that apply to all SWP supplies.

[44] Average annual flow in the Sacramento River at Freeport is 10,400 to 30,900 cfs depending on year type (Reclamation 2019, Appendix D – Modeling, Table 29-1); a reduction of 69 cfs per day would decrease annual flow by no more than 0.7 percent.
[45] Assumed 203 TAF from the Sites Project and 42 TAF from the LVE Project.

For the Groundwater Projects there are carriage water "credits" under discussion where the projects could be credited with water savings from not having to move Table A water through the Delta (because water equivalent to Table A is provided by groundwater banks). The potential savings is because when water is moved through the Delta for export, a fraction of that export is used as Delta outflow to maintain Delta water quality standards. The carriage water savings matter is being discussed with SWP and CVP operators, but no final decision has been made. CalSim II modeling accounts for carriage water with changes in Delta exports. The carriage water credits would affect water accounting for the Groundwater Projects' obligations for Exchange Water.

Summary: Delta exports in balanced conditions are coordinated with the SWP and CVP, so any WSIP operations should not impact other water users.

Delta Exports in Excess Conditions

Kern Fan, WSWB, and the LVE would increase Delta exports during excess conditions. Pacheco results in increased available capacity in San Luis Reservoir that will allow some additional SWP and CVP exports from the Delta in both balanced and excess conditions. The exports during excess conditions would cause a small reduction in Delta outflow. Combined flows are expected to be a relatively small percentage of Delta outflow during excess conditions.These exports would occur under the same environmental, regulatory, and operational constraints that apply to all SWP supplies.

Summary: Delta diversions during excess conditions are a relatively small percentage of Delta outflow.

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Table 1. Resulting Changes from the WSIP Projects

Location or Type	Chino Basin Program	Kern Fan Project	WSWB Project	LVE Project	Sites Project	Pacheco Project	Harvest Water Program
Additional Surface Reservoir Storage	--	--	--	115 TAF	1,500 TAF	136 TAF	--
Additional Groundwater Storage	15 TAF/yr	up to 100 TAF/yr (up to 25 TAF/yr for ecosystem use)	34 TAF/yr	--	--	--	up to 50 TAF/yr in lieu use
Feather River Pulse Flows volumes	Up to 50 TAF	Up to 18 TAF	Up to 28 TAF	--	--	--	--
Sacramento River Diversions or Reductions	--	--	--	up to 155 cfs (7 TAF/yr average) in diversions @ Freeport	up to 3,900 cfs (60-406 TAF/yr average) diversions in excess conditions	--	up to 50 TAF/yr in reduced wastewater discharge (with reduced reductions in critically dry years and in later project operations)
Sacramento River Releases	--	--	--	--	up to 1,000 cfs (70-254 TAF/yr average) in balanced conditions. Plus local and environmental releases	--	--
Delta Exports, Balanced Conditions	Reduced export in pulse flow years of up to 50 TAF	Reduced export in pulse flow years up to 18 TAF	Reduced exports in pulse flow years up to 28 TAF. Average 8.4 TAF/yr increase in Delta exports in balanced and excess conditions	Increased exports up to 500 cfs (42 TAF/yr average)	Increased exports -avg of 203 TAF/yr in critical years from deliveries	some additional exports due to increased capacity available in San Luis Reservoir	--
Delta Export Increases, Excess Conditions	--	up to 100 TAF/yr	Average 8.4 TAF/yr increase in Delta exports in balanced and excess conditions	Up to 50 cfs (48 TAF/yr average)	--	some additional due to increased capacity available	--

Commented [D4]: CCWD to check this number

Location or Type	Chino Basin Program	Kern Fan Project	WSWB Project	LVE Project	Sites Project	Pacheco Project	Harvest Water Program
						in San Luis Reservoir	

).

Years of Experience:

16

Education:

Ph.D., Environmental and Water Resources Engineering, Minor in Ecotoxicology, 2012, University of California, Davis

M.S., Environmental Engineering, 2007, University of California, Davis

B.S.E., Civil Concentration, 2005, Calvin College, Grand Rapids, MI.

Professional Affiliations:

Professional Engineer (Civil), California No. 81595

Expertise:

- Wastewater Studies
- Water Quality Modeling
- Recycled Water Master Plans and Market Assessments
- Wastewater and Recycled Water Preliminary/Conceptual Design and Analysis
- Hydraulic Modeling for Water and Recycled Water Systems
- Environmental Fate and Transport
- Ecotoxicology

Ben D. Giudice, Ph.D.

Senior Environmental Engineer

Dr. Ben D. Giudice is an environmental engineer with 16 years of experience studying and practicing environmental and water resources engineering. His expertise includes water and wastewater engineering, hydraulics, environmental fate and transport, risk assessment, ecotoxicology, constituents of emerging concern, analytical chemistry, and field and laboratory data collection, compilation, and analysis. His academic work includes site, watershed, and regional scale risk assessments of roadside applied herbicides in highway runoff; studies of endocrine disruptors, pharmaceuticals, and personal care products in runoff from land applied municipal biosolids; and studies on the effects of endocrine disruptors on reproduction in aquatic invertebrates. Ben joined RBI in 2009 and performs technical evaluations for wastewater and stormwater permitting and compliance, engineering evaluations for wastewater and recycled water projects, and technical evaluations and management for environmental impact assessments.

REPRESENTATIVE PROJECT EXPERIENCE

California WaterFix/Bay Delta Conservation Plan EIR/EIS

Served as project manager and technical lead, and led development of the water quality methodology, including assessment of over 190 constituents, detailed assessment of 15 constituent categories, and integrated use of three models used to assess water quality impacts resulting from the implementation of the proposed project and its alternatives. Developed post-processing tools necessary to assess impacts in the Delta. Led or assisted with all constituent-specific assessments. Worked with multiple local, State, and Federal agencies to resolve issues and participated in stakeholder and public outreach efforts.

Tule Red Tidal Restoration Project

Assisted the project proponents with water quality related aspects of the project. Designed and helped implement a water quality monitoring program and analyzed resulting data. Prepared presentations and memorandum advising on dissolved oxygen and methylmercury issues related to the project.

California Department of Fish and Game Suction Dredging EIR

Conducted a literature review concerning the water quality and toxicological impacts of recreational suction dredging. The review included published and unpublished scientific studies, reviews, and public comments, and focused on suction dredging impacts on turbidity and mercury release, fate, transport, and effects. Results informed the development of a methodology for assessing impacts of mercury discharged from suction dredging.

Sites Reservoir Recirculated Draft EIR and Supplemental Draft EIS

Co-authored the water quality chapter technical appendix for mercury and methylmercury. This included development of a conceptual model for mercury and methylmercury fate and transport within the Sacramento River, Yolo Bypass, and Sacramento-San Joaquin Delta, and discussion of quantitative model results for the impact analysis. Data output from CALSIM II was integrated with a quantitative fish tissue mercury model (developed for the Central Valley Regional Water Quality Control Board mercury total maximum daily load) to determine the potential magnitude of changes in Delta fish tissue mercury concentrations associated with the proposed project and its alternatives.

Ben D. Giudice, Ph.D.

Associate Engineer

Years of Experience:

16

Education:

Ph.D., Environmental and Water Resources Engineering, Minor in Ecotoxicology, 2012, University of California, Davis

M.S., Environmental Engineering, 2007, University of California, Davis

B.S.E., Civil Concentration, 2005, Calvin College, Grand Rapids, Michigan

Professional Certifications:

Professional Engineer (Civil), California No. 81595

Expertise:

- Wastewater Studies
- Water Quality Modeling
- Recycled Water Master Plans and Market Assessments
- Wastewater and Recycled Water Preliminary/Conceptual Design and Analysis
- Hydraulic Modeling for Water and Recycled Water Systems
- Environmental Fate and Transport
- Ecotoxicology

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REPRESENTATIVE PROJECT EXPERIENCE

California WaterFix/Bay Delta Conservation Plan EIR/EIS

Served as project manager and technical lead, and led development of the water quality methodology, including assessment of over 190 constituents, detailed assessment of 15 constituent categories, and integrated use of three models used to assess water quality impacts resulting from the implementation of the proposed project and its alternatives. Developed post-processing tools necessary to assess impacts in the Delta. Led or assisted with all constituent-specific assessments. Worked with multiple local, State, and Federal agencies to resolve issues and participated in stakeholder and public outreach efforts.

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Sites Reservoir Recirculated Draft EIR and Supplemental Draft EIS – Mercury Analysis

Co-authored the water quality chapter technical appendix for mercury and methylmercury. This included development of a conceptual model for mercury and methylmercury fate and transport within the Sacramento River, Yolo Bypass, and Sacramento-San Joaquin Delta, and discussion of quantitative model results for the impact analysis. Data output from CALSIM II was integrated with a quantitative fish tissue mercury model (developed for the Central Valley Regional Water Quality Control Board mercury total maximum daily load) to determine the potential magnitude of changes in Delta fish tissue mercury concentrations associated with the proposed project and its alternatives.

From: Alicia Forsythe [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A6CDF06A7E904B65BAA21702A82AD329-AFORSYTHE]
Sent: 8/9/2022 2:00:39 PM
To: Garrett Rapp [grapp@westyost.com]; Sites Project [info@sitesproject.org]
CC: Carolina Sanchez [csanchez@westyost.com]
Subject: RE: Sites Reservoir Water Availability Analysis
Attachments: Final Sites WAA Report 05.10.2022.pdf

Hi Garrett – Great to hear from you. We completed three separate analyses for the WAA report – historical, CalSim II, and Face Value. The Face Value analysis included all water rights upstream of Shasta Reservoir, including those on the Pit River. The other analyses were limited to downstream of Shasta Reservoir.

Attached is the WAA Report. We are happy to answer any questions you may have on the document and different approaches.

Hope this helps your efforts!

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Garrett Rapp <grapp@westyost.com>
Sent: Tuesday, August 9, 2022 1:03 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Sites Project <info@sitesproject.org>
Cc: Carolina Sanchez <csanchez@westyost.com>
Subject: Sites Reservoir Water Availability Analysis

Hi Alicia,

My name is Garrett Rapp, with West Yost. We are exploring the possibility of applying for a temporary surface water diversion permit on behalf of Modoc County to support the implementation of their Groundwater Sustainability Plan. During this process, we have met with staff from the State Board to understand the necessary components of the Water Availability Analysis (WAA). The State Board staff suggested that we reach out to you to inquire about the WAA that you recently submitted as part of the water rights application for the Sites Reservoir. We would greatly appreciate responses to the following:

1. Does your WAA analyze the water rights upstream of Shasta Lake along the Pit River?

2. Can you please share the WAA report if possible?

Thank you for your time. Please let me know if you have any questions.

Best,

Garrett Rapp
Associate Engineer II
We're hiring! Visit our career site, here

WEST YOST
23692 Birtcher Drive
Lake Forest, CA 92630
office 949.420.3030
direct 602.962.6761
grapp@westyost.com

www.westyost.com | LinkedIn | Facebook

From: Jerry Brown [jbrown@sitesproject.org]
Sent: 8/9/2022 2:56:43 PM
To: Rob Kunde [rkunde@wrmwsd.com]
CC: Heydinger, Erin [erin.heydinger@hdrinc.com]; Alicia Forsythe [aforsythe@sitesproject.org]
Subject: Sites exchanges with SWP

HI Rob – I was wrong this morning with what I told you about SWP exchanges. They are included in the EIR and project modeling but they are voluntary and we have not had a lot of discussion with DWR Operators about the prospects of using them (see below para from the EIR pg 2-37). We've had quite a bit of discussion with Reclamation on this topic. We have the topic of exchange agreement language within the Ops agreement for our next meeting agenda Aug 18. I've asked Marcia to set up the 5 of us (you, me, Rob Cooke, Erin and John Leahigh) up to meet for 30 min prior to 8/18 so that we can see what John thinks about the potential for these to help the SWP, ie get a gage of how interested he is in making them happen.

Also note that the SWP exchanges were identified in the State feasibility as a benefit worth ~$4M/yr or ~$120M PV. At some point the conversation needs to include how the benefit is paid for, assuming it materializes. We should hold back on this point because I'm sure the State has no money to pay for this and it could be a battle to get it from the non Sites SWP contractors.

I hope this helps.

Coordination with SWP: Exchanges with Lake Oroville would be done to primarily to increase flexibility and yield of Sites Reservoir while providing environmental benefits. Exchanges with Lake Oroville would be formulated to facilitate Project deliveries to Storage Partners and may also improve cold water pool conditions at Lake Oroville. Exchanges with Lake Oroville are expected to happen more frequently than Shasta Lake exchanges and would be driven by a variety of factors. Under a Lake Oroville exchange, water would be released from Sites Reservoir primarily in June and July to meet SWP purposes. By reducing releases from Lake Oroville in these months, the storage and cold water pool in Lake Oroville would be preserved for use later in the year, typically during critical months of the cold water pool management season (August and September). In late summer and fall (i.e., August through November), DWR would release an equivalent amount of water from Lake Oroville for Storage Partners. All exchange water would be released from Lake Oroville in late summer and fall and no exchanged water would be carried over from year to year.

From: Laurie Warner Herson [laurie.warner.herson@phenixenv.com]
Sent: 8/10/2022 6:15:58 AM
To: Alicia Forsythe [aforsythe@sitesproject.org]; Spranza, John [john.spranza@hdrinc.com]; Angela Bezzone [bezzone@mbkengineers.com]
Subject: RE: Sites Project - Work Group Presentation

Looks great – I saw speaker notations but I'm good with you doing whole presentation due to timing. Just let me know.

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, August 9, 2022 7:12 PM
To: Spranza, John <john.spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Angela Bezzone <bezzone@mbkengineers.com>
Subject: Sites Project - Work Group Presentation
Importance: High

Hi all – I shortened the Work Group presentation quite a bit. I wanted to make it more about why the members should care about these things. I also took out the detail of the Water Quality Control Plan and shortened it to one slide with things much more general. Just not ready to roll this out as though its final until we are done with the memo.

Please take a look ASAP. I will be up early tomorrow to make any last changes.

08-August

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

Meeting: **Sites Authority Board's Coordination Committee**

Locations: Maxwell Project Office, 122 Old Highway 99W, Maxwell, CA 95955
See below for alternate meeting locations.

Call in: **1-213-379-5743** Code: **703 288 727#** Click here to join the meeting

Committee Chair: Fritz Durst (AB Chair/Reclamation District 108)
Committee Vice-Chair: Jeff Sutton (AB Vice-Chair/Tehama-Colusa Canal Authority)
Staff Lead: Jerry Brown, Executive Director

AGENDA

Monday, August 15, 2022 3:00 – 4:00 pm

NO ACTION or DECISION WILL BE TAKEN

ROLL CALL & CALL TO ORDER:

- Introductions
- Period for Public Comment

1. Discussion and Information Items:

1.1 Board Meeting Agenda Planning

1.2 General Coordination among Committees and Workgroups

2. Closed Session:

2.1 Potential Litigation – Gov. Code Sec. 54956.9(d)(3)

3. Upcoming Meetings:

Reservoir Committee Meeting
Friday, August 19, 2022 (9:00 am – 12:00 pm)

Authority Board Meeting
Wednesday, August 24, 2022 (1:00 – 4:00 pm)

Coordination Committee
Monday, September 12, 2022 (3:00 – 4:00 pm)

Virtual Information will be provided before all meetings at Sitesproject.org.

ADJOURN

PERIOD OF PUBLIC COMMENT: Any person may speak about any subject of concern, provided it is within the jurisdiction of the Authority Board's Coordination Committee and is not already on today's agenda. The total amount of time allotted for receiving such public communication shall be limited to a total of 10 minutes per issue and each individual or group will be limited to no more than 3 minutes each within the 10 minutes allocated per issue. **Note:** No action shall be taken on comments made under this comment period.

ADA COMPLIANCE: Upon request, agendas will be made available in alternative formats to accommodate persons with disabilities. In addition, any person with a disability who requires a modification or accommodation to participate or attend this meeting may request necessary accommodation. Please make your request to the Board Clerk, specifying your disability, the format in which you would like to receive this Agenda and any other accommodation required no later than 24 hours before the start of the meeting.

Alternate Meeting Locations:

Davis Water District, 6505 Hillgate Road, Arbuckle, CA 95912

Glenn-Colusa Irrigation District, 344 East Laurel Street, Willows, CA 95988

Reclamation District 108, 975 Wilson Bend Road, Grimes, CA 95950

Tehama-Colusa Canal Authority, 5513 Highway 162, Willows, CA 95987

From: Marcia Kivett [MKivett@sitesproject.org]
Sent: 8/10/2022 11:22:59 AM
To: Jerry Brown [jbrown@sitesproject.org]
Subject: Fw: Diversion Coordination and Water Right (Sites)
Attachments: Sites-DWR-USBR Ops Agreement - WORKING failsafe.docx

Is this the document Jagruti needs to review?

From: Maroney, Jagruti@DWR <Jagruti.Maroney@water.ca.gov>
Sent: Wednesday, August 10, 2022 10:51 AM
To: Marcia Kivett <MKivett@sitesproject.org>
Subject: RE: Diversion Coordination and Water Right (Sites)

So, I only see the agenda—I don't see the proposed language.

Thanks

From: Marcia Kivett <MKivett@sitesproject.org>
Sent: Wednesday, August 10, 2022 10:48 AM
To: Maroney, Jagruti@DWR <Jagruti.Maroney@water.ca.gov>
Cc: Heydinger, Erin <erin.heydinger@hdrinc.com>
Subject: Re: Diversion Coordination and Water Right (Sites)

Sorry for the late response. I've attached the document. Let me know if you have any changes and I will incorporate them for you.

From: Maroney, Jagruti@DWR <Jagruti.Maroney@water.ca.gov>
Sent: Wednesday, August 10, 2022 8:19 AM
To: Marcia Kivett <MKivett@sitesproject.org>
Subject: RE: Diversion Coordination and Water Right (Sites)

Good morning Marcia

I cannot open the document below. Can you try sending it to jmaroney@water.ca.gov?

Thanks

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Wednesday, August 10, 2022 6:52 AM
To: Miller, Aaron@DWR <Aaron.Miller@water.ca.gov>; Jeff Sutton <jsutton@tccanal.com>; Levi Johnson <lejohnson@usbr.gov>; Allison Jacobson <ajacobson@usbr.gov>; Maroney, Jagruti@DWR <Jagruti.Maroney@water.ca.gov>; Wu, Janice@DWR <Janice.Wu@water.ca.gov>
Cc: Marcia Kivett <mkivett@sitesproject.org>; Jerry Brown <jbrown@sitesproject.org>
Subject: RE: Diversion Coordination and Water Right (Sites)

Hi all,

The agenda for Monday's meeting on coordinating for diversions has been attached to the meeting invite. We also added a section to the proposed agreement language that discusses a "payback provision" should Sites unintentionally divert water during balanced conditions.

Please add any comments or proposed edits directly in OneDrive here: 08.15.22 DWR-USBR-Sites Diversions Tech Discussions-AGN.docx

I am out of the office for the remainder of the week, so if you have specific comments or questions about the meeting prior to Monday, please email Jerry and cc Marcia.

Thank you!
Erin

Erin Heydinger PE, PMP
D 916.679.8863 **M** 651.307.9758

hdrinc.com/follow-us

-----Original Appointment-----
From: Marcia Kivett <MKivett@sitesproject.org>
Sent: Tuesday, August 2, 2022 4:04 AM
To: Marcia Kivett; Jerry Brown; Heydinger, Erin; Miller, Aaron@DWR; Jeff Sutton; Johnson, Levi E; Allison Jacobson; Maroney, Jagruti@DWR; Janice Wu
Subject: Diversion Coordination and Water Right (Sites)
When: Monday, August 15, 2022 2:00 PM-3:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where:

Please see the attached agenda.

The objective is to review the diversion coordination language and new language Sites will draft on a "repayment provision" if Sites diverts during balanced conditions.

Microsoft Teams meeting

Join on your computer or mobile app
Click here to join the meeting

Meeting ID: 219 880 346 081
Passcode: LHoWNj
Download Teams | Join on the web

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+1 916-538-7066,,182428803# United States, Sacramento
Phone Conference ID: 182 428 803#
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Sites Project Authority
Highlights for Gray Allen
Draft v1 – 8.10.22

- To date, the California Water Commission (CWC) has authorized a total of $875 million in Proposition 1 funds for the project.
- Earlier this year, the U.S. Environmental Protection Agency (EPA) invited Sites Reservoir to apply for a $2.2 billion Water Infrastructure and Finance Innovation Act (WIFIA) loan which, if approved, will be the largest ever WIFIA loan. It would provide for nearly half the total project cost and result in substantial cost savings for project participants. The Authority is working with the EPA on the loan application and expects to submit in 2023.
- The WIFIA loan, in combination with Proposition 1 funding and a previous $450 million USDA loan, represents nearly the entirety of the funding needed to construct the project. Construction could begin as early as 2024.
- The Sites Project Authority is on track to complete the Revised Draft Environmental Impact Report (state) and Revised Draft Environmental Impact Statement (federal) by the end of 2023.
- Coordination with landowners on right-of-entry permissions for geotechnical survey work is ongoing.
- Staff is organizing working groups for local community members and tribal nations to discuss ways to maximize local project benefits while minimizing impacts.

DIVERSION, STORAGE, RELEASE and CONVEYANCE OF SITES WATER IN AND THROUGH THE DELTA

a. Diversions to Storage

i) Within DWR and Reclamation's responsibility for meeting WQCP requirements imposed by SWRCP, Reclamation and DWR may actively regulate inflows, outflows and exports from the Delta. The coordinated operations agreement (COA) between DWR and Reclamation determines how the CVP and SWP

share that responsibility. In that, they determine excess conditions within the Delta when surplus water is available above what is needed to meet WQCP requirements. Excess conditions is one of several requirements for Sites diversions to be initiated or terminated.

ii) The Parties agree to closely coordinate respective project operations at a frequency and to a level of detail that facilitates efficient and coordinated operations at all times.

iii) The subject matter of the coordination process shall include sharing information and identifying opportunities to coordinate operation of the Parties' respective facilities. The Parties shall at all times maintain a collaborative approach to coordination and will regularly cover, at a minimum, prior actual results and lessons learned, upcoming coordination needed to achieve the operational principles described in this agreement, potential conflicts, potential modifications or actions to be taken to avoid or minimize an impact on any of the facilities, and any approvals required from other entities to successfully complete planned coordinated operations.

iv) The Parties shall jointly prepare a written assessment of the prior year's operation to review Sites, CVP, and SWP operations to evaluate how use of the Reservoir affected total SWP and CVP water deliveries and carryover storage. The assessment method will be agreed upon by all parties. The Parties agree that the assessment herein will evaluate the effects of operations on an annualized or seasonal basis; i.e., effects will be evaluated based on a comprehensive assessment of operations and not as of any particular date or month. The end result will be to determine the net effect of operations throughout the year.

If it is determined, based on the results of the assessment, that an overall negative effect occurred to CVP or SWP annual operations or Sites annual operations as measured against individual operational goals, then the Parties agree to meet and confer during their ongoing coordination to identify steps that could be taken in the following year to prevent the negative effect from recurring.

v) If it is determined, based on the results of the assessment, that an overall positive effect on annual operations resulted from Sites operations, as measured against individual operational goals, then the Parties agree to meet and confer during their ongoing coordination to determine whether operational changes should be implemented to ensure alignment with the beneficiary pays approach for Sites or whether the positive effects will be considered when evaluating whether changes in operations are warranted in future years in which negative effects occur. For example, it may be determined that operational changes are not required following a year of negative effects if the assessments show a trend of positive annual effects on CVP and SWP operations from Sites overall.

vi) The Sites Project will divert when the Delta is in excess conditions as defined under COA and when other diversion criteria are met. If it is determined that the Authority diverted water under its water right when the Delta was not in excess, the quantity of water diverted will be estimated and returned to DWR and/or Reclamation either via exchange or through transfer into Reclamation's storage

allocation in Sites Reservoir. The method by which water is returned is to be determined jointly by DWR and Reclamation. If required, the quantity of water to be returned shall be determined in accordance with the dispute resolution process described in this agreement.

b. Conveyance of Sites Water in and through the Delta

i. Carriage Water -

DWR and Reclamation shall determine the carriage water for the Sites releases to the Sacramento River for SOD water users in a similar manner as DWR and Reclamation calculate carriage water for other non-project water transfers originating from the Sacramento River1.

DWR and Reclamation recognize that if the Sites releases into the Yolo Bypass (Prop 1 ecosystem water) improve Delta water quality (and pending determination on how this Sites Yolo bypass water is classified as Delta Outflow dedication), the DWR and Reclamation determination of Sites carriage water may be adjusted (credit given) to reflect the improvement of the Delta water quality.

Should a carriage water credit be warranted, the Yolo Bypass flow must occur when the Sites releases occur during (1) the same State water year and (2) the same season as the Sites releases to the Sacramento River for SOD water users. No such credit would be considered if the Sites releases to the Yolo Bypass occur when there are no Sites releases to the Sacramento River for SOD water users. Furthermore, there would be no carryover of the carriage water credit from one year to another and the carriage water credit shall not exceed the carriage water cost of the Sites water for SOD water users.

Due to the unique nature of the Sites facility and releases, the carriage water credit methodology will need to be determined during the first years of implementation of such flows from Sites and may be revised periodically based on additional information and improved tools and methodologies. The methodology will likely follow similar principles as described in the Draft Carriage Water Overview for Non-Project Water Transfers. Given that carriage water is intended to protect SWP and CVP from harm, DWR and Reclamation will maintain sole authority in determining carriage water costs and any potential carriage water credits associated with other Sites releases. However, DWR and Reclamation shall solicit input from the Authority prior to finalizing said determination and will subsequently advise the Authority of said determination and the rationale for it. In addition, carriage water costs will be assessed in the annual written assessment identified in Section 6(a)(iv) of this agreement with potential adjustments to the carriage water estimates identified accordingly.

ii. Operations of San Luis Reservoir

Sites Imported Aggregate Briefing

August X, 2022

Sites

Agenda

- Project Description
- Dam Filter, Drain and Transition Zones
- Road Base
- Concrete Aggregate
- Summary of Quantities
- Questions

Sites

Project Description

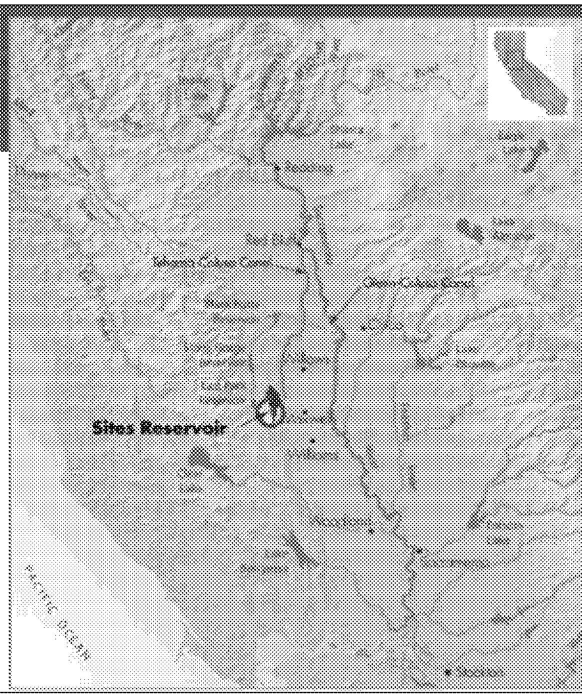
Sites

Project Location

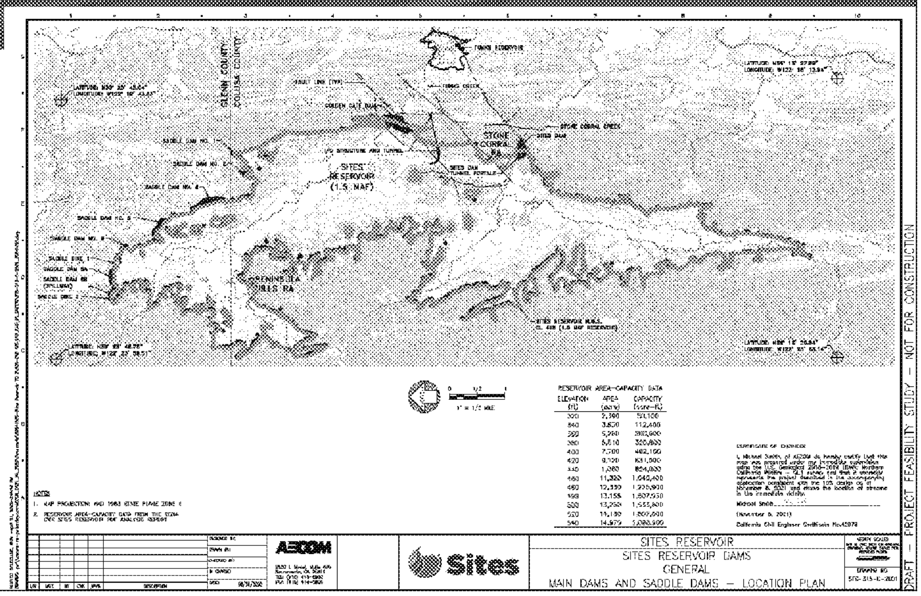
80 miles north of Sacramento

10 miles west of Maxwell

45 miles south of Orland



Sites Reservoir Features

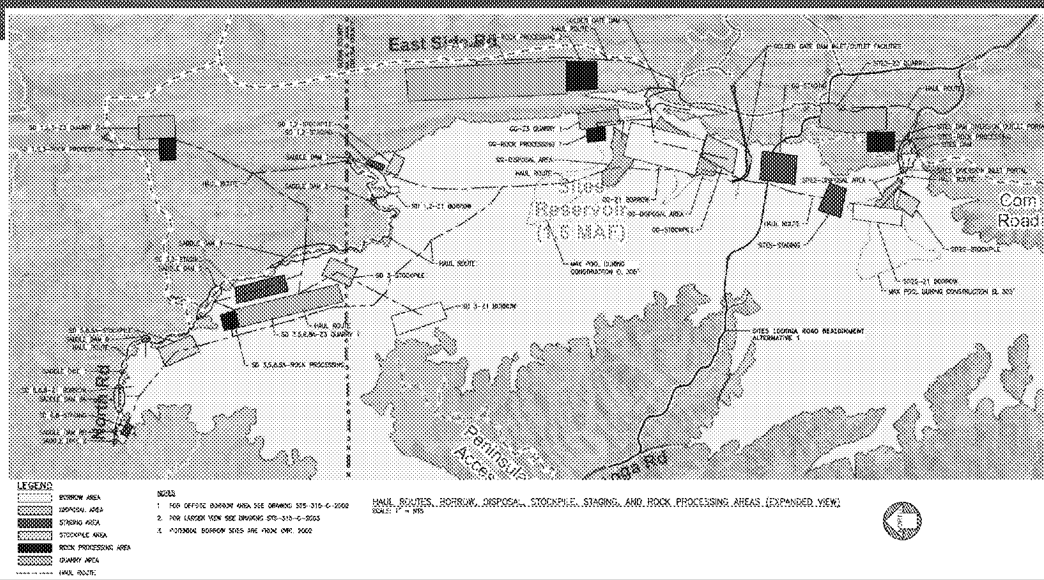


Sites Reservoir Features

Total Storage Capacity	1.5 MAF
Active Storage Capacity	1.4 MAF
Approximate Inundation Area	13,200 acres
Approximate Watershed Area	54,150 acres (84.6 mi^2)
Dam/Saddle Dam/Dike Crest Elevation (Without Camber)	517 feet
Dam Heights (approx. - max. ht. above streambed):	
Golden Gate Dam	287 feet
Sites Dam	267 feet
7 Saddle Dams*/2 Saddle Dikes (for freeboard)	12 – 107 feet
Maximum Operating Water Elevation	498 feet
Minimum Operating Water Elevation	340 feet
Top of Dead Pool	300 feet
Inlet/Outlet Facilities:	
I/O Tunnel (single), with sloping intake (south of GG Dam)	32 feet ID
Sites Diversion Tunnel (north abutment of Sites Dam)	12 feet ID

* Saddle Dam 8B is the spillway location.

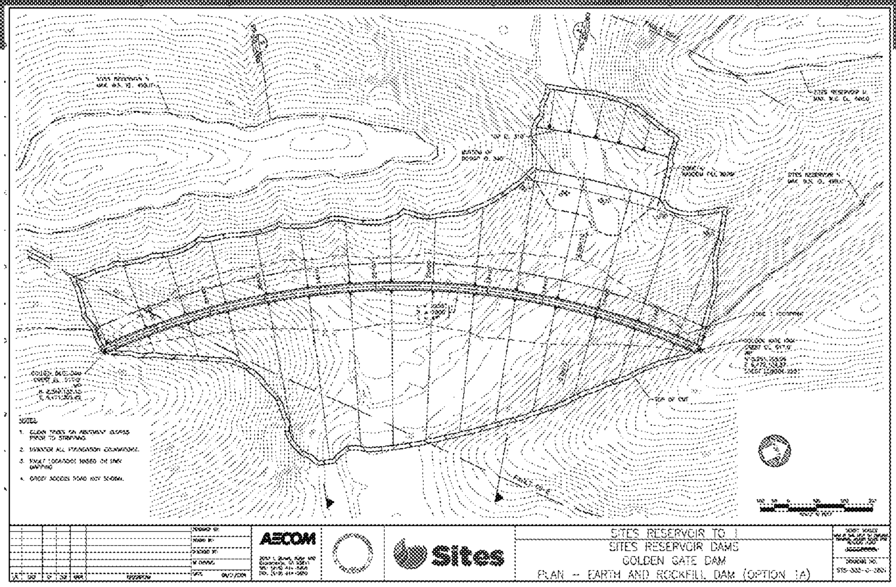
Sites Reservoir Features – Construction



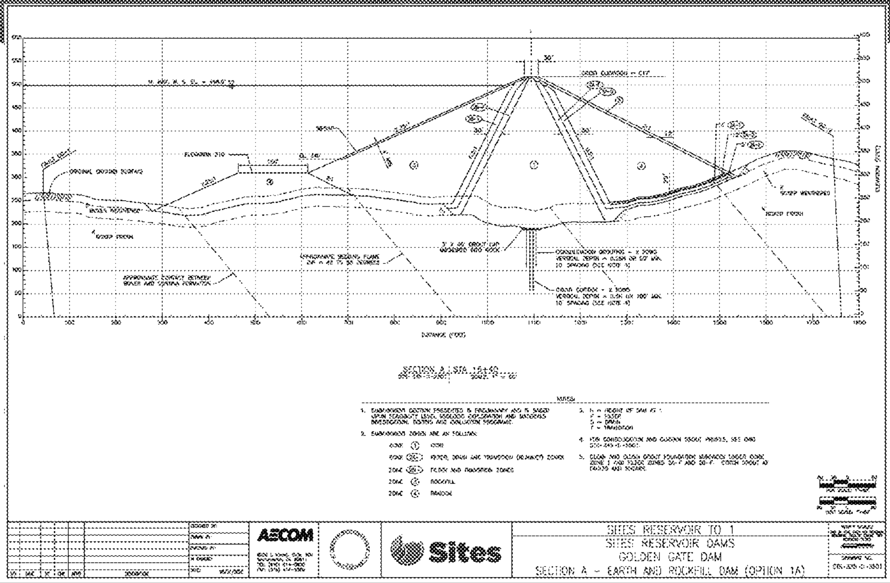
Dam Filter, Drain and Transition Zones

Sites

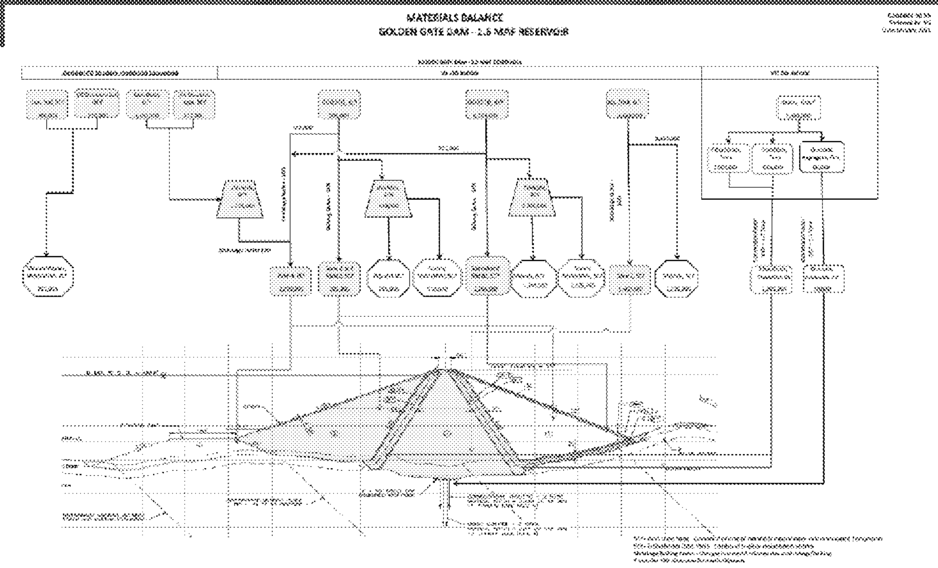
Golden Gate Dam



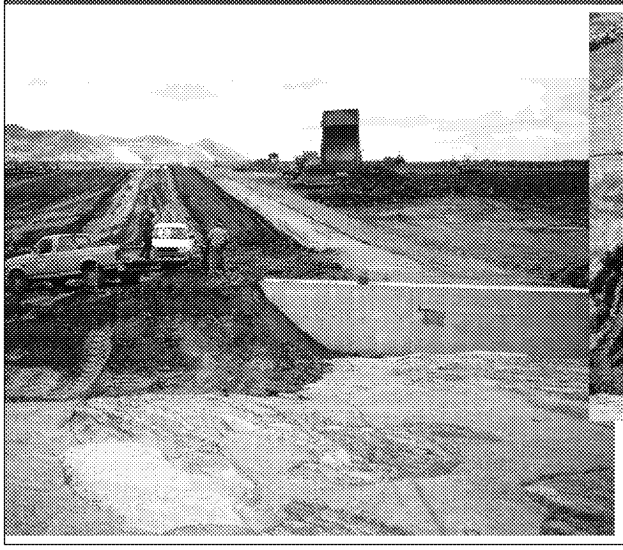
Typical Golden Gate and Sites Dam Section

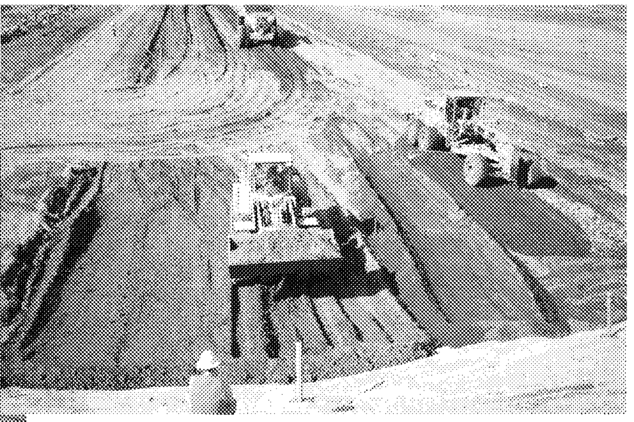


Material Balance Golden Gate Dam

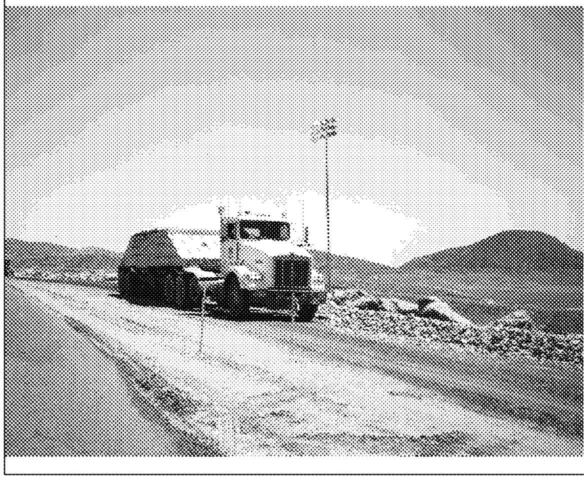


Examples of Dam Construction



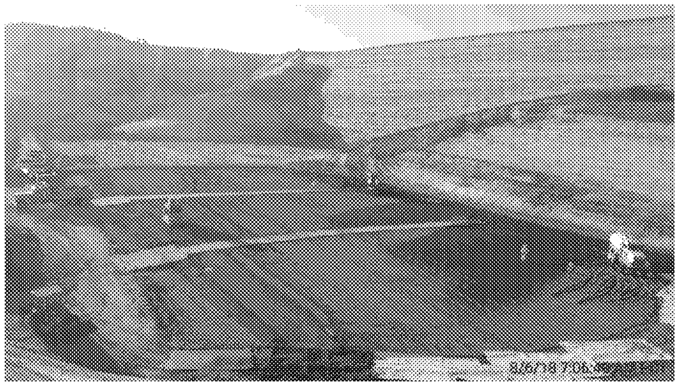


Examples of Dam Construction



Examples of Dam Construction

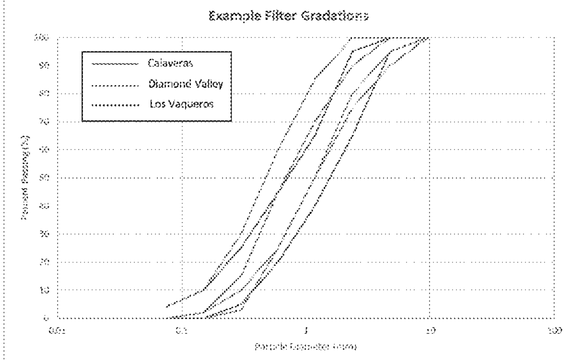
Examples of Dam Construction



Examples of Filter Gradations and Requirements

Generally meet the soundness requirements of ASTM C33 for fine aggregate plus requirements below

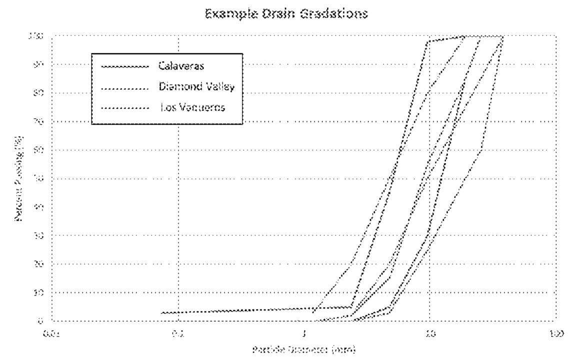
Test Type	Acceptability Standard	Criteria
Specific Gravity	ASTM C127	Greater than 2.6
Abrasion Resistance	ASTM C131	10 percent maximum loss by weight at 100 revolutions, and 40 percent loss of weight at 500 revolutions
	ASTM C535	40 percent maximum loss of weight at 1000 revolutions
Sodium Sulfate Soundness	ASTM C88	10 percent maximum weighted average loss by weight, after five cycles
Shape		Particles shall be generally equidimensional
Elongated Particles	CRD-C-119 and CRD-C-120	Not greater than 15 percent by weight
Other		Material shall be free of clay balls, organics, soft particles, and other impurities



Note. No gap or skip grading between any two consecutive sieves

Examples of Drain Gradations and Requirements

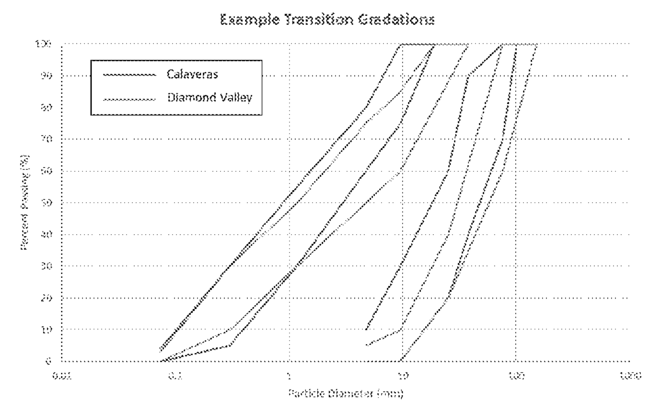
Test Type	Acceptability Standard	Criteria
Adsorption	ASTM C127	Greater than 2.6
Specific Gravity	ASTM C127 and C128	Greater than 2.6
Abrasion Resistance	ASTM C131	10 percent maximum loss by weight at 100 revolutions, and 40 percent loss of weight at 500 revolutions
Sodium Sulfate Soundness	ASTM C88	10 percent maximum weighted average loss by weight, after five cycles
Shape		Particles shall be generally equidimensional
Elongated Particles	CRD-C-119 and CRD-C-120	Not greater than 15 percent by weight
Other		Material shall be free of clay balls, organics, soft particles, and other impurities



Note: No gap or skip grading between any two consecutive sieves

Examples of Transition Gradations and Requirements

- Similar soundness requirements to filter and drain



Road Base

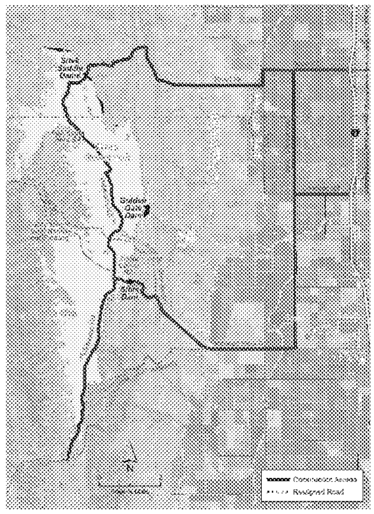
Sites

Road Base

- Caltrans Class 2 Aggregate Base (standard specifications 26-1.02)
  - Consists of clean broken stone, crushed gravel, natural rough-surfaces gravel, sand, and/or processed reclaimed AC, PCC, LCB, or CTB

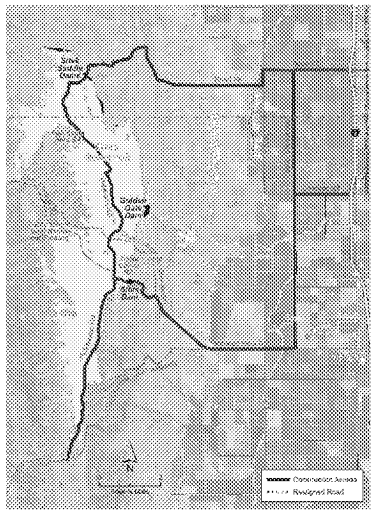
Sieve size	Percentage passing			
	1-1/2 inch maximum		3/4 inch maximum	
	Operating range	Contract compliance	Operating range	Contract compliance
2"	100	100	--	--
1-1/2"	90–100	87–100	--	--
1"	--	--	100	100
3/4"	50–85	45–90	90–100	87–100
No. 4	25–45	20–50	35–60	30–65
No. 30	10–25	6–29	10–30	5–35
No. 200	2–9	0–12	2–9	0–12

Quality characteristic	Requirement	
	Operating range	Contract compliance
Resistance (R-value, min)	--	78
Sand equivalent (min)	25	22
Durability index (min)	--	35



Road Base

- Caltrans Class 4 Aggregate Subbase (standard specifications 25-1.02)
  - Consists of clean broken stone, crushed gravel, natural rough-surfaces gravel, sand, and/or processed reclaimed AC, PCC, LCB, or CTB
  - Gradation and quality requirements to be decided based on project needs, but likely to have a minimum sand equivalent of about 20 and R-value of about 40



Concrete Aggregate

Sites

Concrete Aggregate

- Need to meet quality requirements of ASTM C33, Concrete Aggregates

Location	Approximate Quantities (tons)
Spillway (Saddle Dam 8B)	19,500
Inlet/Outlet Structure	115,900
Sites Diversion Tunnel	10,400
Golden Gate Dam Bypass	35,000
Sites Lodoga Bridge	45,585

Summary of Quantities

Sites

Summary of Quantities

Location	Approximate Quantities (Million Tons)
Zone 2A – Downstream Filter	1.5
Zone 2A – Downstream Drain	1.6
Zone 2A – Downstream Transition	0.3
Zone 2B – Upstream Filter	0.6
Zone 2B – Upstream Transition	0.6
Class 4 Aggregate Subbase	0.3
Class 2 Aggregate Base	0.5
Concrete Aggregate	0.6
Total	**6.0 million tons**

Crude Average Delivery Schedule

- Overall Project Schedule = 800 to 1200 days
- Overall Quantity of Material = 6 million tons
- Average Delivery = 6,000 to 7,500 tons per day

Questions

Sites

Questions

- Do you have the quality of materials needed and their location(s)?
- Do you have the plants to create the materials in spec and their location(s)?
- Do you have the capacity to deliver the quality and quantities of materials in the time needed?

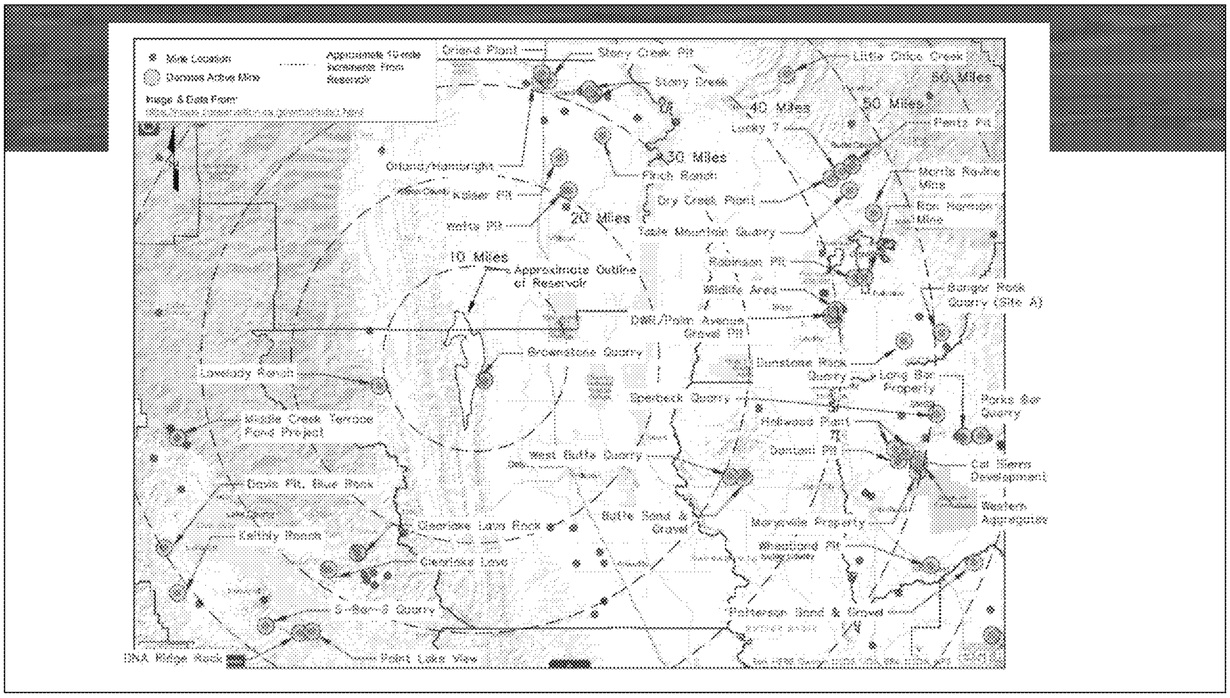
Questions – cont’d.

- Do you have technical specifications/lab certifications such as durability, gradation, petrographic analysis, LA rattler, R-value, available?
- What is the location of quarry and type of material; alluvium, hard rock, soft rock?
- What are the available material remaining/duration of permitted operations?

Questions – cont'd.

- What are the productivity rates for different materials?
- What is the maximum amount of material you can deliver per day?
- What are the approximate at plant costs for different materials?
- Will you be using prevailing labor rates for trucking?

Extra Slides



Mine Location
Denotes Active Mine
Approximate 10-mile Increments From Reservoir
Image & Data From:
Orland Plant
Stony Creek Pit
Little Chico Creek
Stony Creek
50 Miles
40 Miles
50 Miles
Lucky 7
Pentz Pit
Orland/Hamright
30 Miles
Finch Ranch
Morris Ravine Mine
Kaiser Pit
Dry Creek Plant
Ron Harmon Mine
Wells Pit
20 Miles
Table Mountain Quarry
10 Miles
Approximate Outline of Reservoir
Robinson Pit
Wildlife Area
Bangor Rock Quarry (Site A)
DWR/Palm Avenue Gravel Pit
Brownstone Quarry
Lovelady Ranch
Dunstone Rock Quarry
Long Bar Property
Sperbeck Quarry
Parks Bar Quarry
Middle Creek Terrace Pond Project
Hallwood Plant
Dantoni Pit
West Butte Quarry
Cal Sierra Development
Davis Pit, Blue Rock
Western Aggregates
Clearlake Lava Rock
Butte Sand & Gravel
Marysville Property
Kelsey Ranch
Wheatland Pit
Clearlake Lava
S-Bar-S Quarry
Patterson Sand & Gravel
DNA Ridge Rock
Point Lake View

File Provided Natively

File Provided Natively

From: Spranza, John [John.Spranza@hdrinc.com]
Sent: 8/11/2022 3:11:29 PM
To: Berryman, Ellen [Ellen.Berryman@icf.com]; Webber, Lisa [Lisa.Webber@icf.com]
CC: Briard, Monique [Monique.Briard@icf.com]; Arsenijevic, Jelica [jelica.arsenijevic@hdrinc.com]; Newens, Richard [Richard.Newens@hdrinc.com]
Subject: RE: Sites Bio Survey LOE and schedule using Cultural LOE by Package format
Attachments: BIO_LOE_DAM_ConstructionPackage_Aug2022 Rev1.xlsx

Thanks.
We just got done reviewing this with Ali and the design/construction team and I made some revisions based on our discussions:
1. Removed Julian month and replaced with Year 1, Year 2…
2. Move SWHA, TCBB and BASW surveys to same time in 2023
3. Include time for VELB transfer after first/each survey season
4. Perform rare plant surveys in consecutive years (if this is not something that can be done please let me know)
5. Include reconsultation time, we are assuming a 6 month processing time post finalization of the last protocol survey report
6. Securing mitigation would take 2 years and would end 6 months after completion of reconsultation
7. Move BUOW survey, report and relocation to year of construction (This way we don't get any recolonization or waste time/efforts relocating and collapsing burrows too soon. Let me know if you se a problem with this)
T
he format was well received, Ali and Henry are okay with taking the rest of August to complete the schedules/rough costs for the other survey packages. We also want to start talking about what wildlife studies are needed and getting that moving so we can provide at least some input on what will likely be required to the design team this year. If you can gather the right people at ICF and schedule a call I would appreciate it.

Happy to jump on a call to discuss any of this.
John

John Spranza

D 916.679.8858 M 818.640.2487

From: Berryman, Ellen <Ellen.Berryman@icf.com>
Sent: Thursday, August 11, 2022 2:15 PM
To: Webber, Lisa <Lisa.Webber@icf.com>; Spranza, John <John.Spranza@hdrinc.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sites Bio Survey LOE and schedule using Cultural LOE by Package format

Note that there are additional assumptions in the top left corner. ☺

From: Webber, Lisa <Lisa.Webber@icf.com>
Sent: Thursday, August 11, 2022 11:12 AM
To: John Spranza <John.Spranza@hdrinc.com>; Berryman, Ellen <Ellen.Berryman@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sites Bio Survey LOE and schedule using Cultural LOE by Package format

Hi John,

Here is our table for the bio surveys. I've included several footnotes for the survey acreages based on assumptions in our scope of work, but please let me know if you have questions or need some clarification.

--Lisa

Lisa Webber | Senior Botanist | +1.916.231.7669 direct | lisa.webber@icf.com | icf.com
ICF | 980 9th Street, Suite 1200, Sacramento, CA 95814 USA | +1.916. 549.4990 mobile

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Thursday, August 11, 2022 9:42 AM
To: Berryman, Ellen <Ellen.Berryman@icf.com>
Cc: Webber, Lisa <Lisa.Webber@icf.com>
Subject: RE: Sites Bio Survey LOE and schedule using Cultural LOE by Package format

I agree with your re-survey rational. Thanks for keeping this moving.

John Spranza

D 916.679.8858 M 818.640.2487

From: Berryman, Ellen <Ellen.Berryman@icf.com>
Sent: Thursday, August 11, 2022 9:37 AM
To: Spranza, John <John.Spranza@hdrinc.com>
Cc: Webber, Lisa <Lisa.Webber@icf.com>
Subject: RE: Sites Bio Survey LOE and schedule using Cultural LOE by Package format

Okay, I'll leave them as-is with caveats for now – in terms of checking 10(a)1a permits, that might work for the ***listed*** species, although it partly depends on the purpose and results of the survey. For wildlife, I think the only time we'd be re-doing surveys is where we've deemed an area "unoccupied" based on survey results and dispersal distance, etc, right? Or maybe for VELB to update stem counts.

Lisa's adding some information on survey acres and will be sending you the table later this morning. We don't have costs yet but this will give you something to discuss with Ali today.

Ellen

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Thursday, August 11, 2022 9:03 AM
To: Berryman, Ellen <Ellen.Berryman@icf.com>
Subject: RE: Sites Bio Survey LOE and schedule using Cultural LOE by Package format

Maybe check with some of your team who have done protocol surveys, anyone with a 10(a)1a permit should have an idea of what the latest survey lifespan is. For now, use what I have but if you can check with your biologist we can update.

John Spranza

D 916.679.8858 M 818.640.2487

From: Berryman, Ellen <Ellen.Berryman@icf.com>
Sent: Thursday, August 11, 2022 8:50 AM
To: Spranza, John <John.Spranza@hdrinc.com>
Subject: RE: Sites Bio Survey LOE and schedule using Cultural LOE by Package format

So these were actually written into the permits? Maybe we should keep what you have just to be on the safe side as long as the document is internal and we aren't making any commitments with the agencies.

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Thursday, August 11, 2022 8:48 AM
To: Berryman, Ellen <Ellen.Berryman@icf.com>; Briard, Monique <Monique.Briard@icf.com>; Tannourji, Danielle <Danielle.Tannourji@icf.com>
Cc: Arsenijevic, Jelica <Jelica.Arsenijevic@hdrinc.com>; Newens, Richard <Richard.Newens@hdrinc.com>
Subject: RE: Sites Bio Survey LOE and schedule using Cultural LOE by Package format

Use the assumptions you are comfortable with, I unfortunately don't have the time to revisit that data dive through my old project permits.

John Spranza

D 916.679.8858 M 818.640.2487

From: Berryman, Ellen <Ellen.Berryman@icf.com>
Sent: Thursday, August 11, 2022 7:03 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Briard, Monique <Monique.Briard@icf.com>; Tannourji, Danielle <Danielle.Tannourji@icf.com>
Cc: Arsenijevic, Jelica <Jelica.Arsenijevic@hdrinc.com>; Newens, Richard <Richard.Newens@hdrinc.com>
Subject: RE: Sites Bio Survey LOE and schedule using Cultural LOE by Package format

I guess I'd like to learn more about the circumstances under which the agencies said the surveys weren't good anymore in your experience – some of those "shelf lives" seem awfully short.

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Wednesday, August 10, 2022 2:03 PM
To: Berryman, Ellen <Ellen.Berryman@icf.com>; Briard, Monique <Monique.Briard@icf.com>; Tannourji, Danielle <Danielle.Tannourji@icf.com>

Cc: Arsenijevic, Jelica <Jelica.Arsenijevic@hdrinc.com>; Newens, Richard <Richard.Newens@hdrinc.com>
Subject: RE: Sites Bio Survey LOE and schedule using Cultural LOE by Package format

My meeting's at 1, the shelf life came off of other projects I worked on but if you see any issues with them please revise.

John Spranza

D 916.679.8858 M 818.640.2487

From: Berryman, Ellen <Ellen.Berryman@icf.com>
Sent: Wednesday, August 10, 2022 1:58 PM
To: Spranza, John <John.Spranza@hdrinc.com>; Briard, Monique <Monique.Briard@icf.com>; Tannourji, Danielle <Danielle.Tannourji@icf.com>
Cc: Arsenijevic, Jelica <Jelica.Arsenijevic@hdrinc.com>; Newens, Richard <Richard.Newens@hdrinc.com>
Subject: RE: Sites Bio Survey LOE and schedule using Cultural LOE by Package format

Hi John. We have an internal meeting tomorrow morning at 9 am and can probably give you a better idea after that meeting. What time is your call with Ali?

Also – can you tell me the origin of the "shelf life" information for wildlife surveys?

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Wednesday, August 10, 2022 1:54 PM
To: Briard, Monique <Monique.Briard@icf.com>; Tannourji, Danielle <Danielle.Tannourji@icf.com>; Berryman, Ellen <Ellen.Berryman@icf.com>
Cc: Arsenijevic, Jelica <Jelica.Arsenijevic@hdrinc.com>; Newens, Richard <Richard.Newens@hdrinc.com>
Subject: RE: Sites Bio Survey LOE and schedule using Cultural LOE by Package format

Hi Folks,

I have a meeting on this with Ali tomorrow afternoon and I wanted to check on progress. How's the dams portion coming?

John Spranza

D 916.679.8858 M 818.640.2487

From: Spranza, John
Sent: Monday, August 1, 2022 3:53 PM
To: Briard, Monique <Monique.Briard@icf.com>
Cc: Tannourji, Danielle <Danielle.Tannourji@icf.com>; Berryman, Ellen <Ellen.Berryman@icf.com>
Subject: RE: Sites Bio Survey LOE and schedule using Cultural LOE by Package format

Hi,
30 hours for just the dams, or for all the construction packages? Either way, needs to get done but clarification would be appreciated. The format would be similar to what Susan did and will eventually be moved into P3. Ali did ask for a few subheadings to help delineate different types of surveys, I am not a fan but she did not bend. Subheadings would include, but not be limited to:

- Initial recon surveys for landcover, suitable habitat, wetland delineation verification, etc. Pretty much what I had on the MS Project schedule I put together, including the clarification Danielle and Ellen made in their email over the weekend to me.
- Protocol surveys with a note indicating the time the surveys are valid for.
- Mitigation implementation. This will be different for each of the construction packets and a bit more clear once we get phasing. You can use a placeholder until then
- Precon surveys (I just lumped the 30 and 15 day ones which is what I suggest)

I'll be working with Ellen on a list of bio plans that we will need (transplant, relocation, aquatic...) that we will then put into the Biological Resources Management Plan that we have scoped. See attached for an example that I got through the agencies and is pretty relevant process-wise with the reconsultation this project will need to do.

We are ramping up to start these surveys in 2023, and it's my intention to go out and do as much as we can to better understand what is out there and what our mitigation needs and schedule will look like. We will for sure need to re-do some surveys prior to constuction, but Ali is aware of that and is on board that time and money spent up front will pay huge dividends later. I'm happy to listen to and discuss any suggestions you all might have as this is a team effort and everyone's ideas are important.

Thanks.
John

John Spranza

D 916.679.8858 M 818.640.2487

From: Briard, Monique <Monique.Briard@icf.com>
Sent: Monday, August 1, 2022 3:20 PM
To: Spranza, John <John.Spranza@hdrinc.com>
Cc: Tannourji, Danielle <Danielle.Tannourji@icf.com>; Berryman, Ellen <Ellen.Berryman@icf.com>
Subject: Sites Bio Survey LOE and schedule using Cultural LOE by Package format

John,

Changing the name of this email chain so that I can track it easier since we now have multiple emails going on this topic.

To help us get started on this effort do you now want us to use a format like what Susan produced for CR (per your email earlier today) or what you used for HSR (per our conversation last week) that you are going to send to us? Attached is what we prepared back in 2019.

I spoke with Susan and she used GIS data to develop the schedule for CR. She's been working on this off/on over the years, so the level of effort for this deliverable was around 30 hrs. Doable under our budget/scope but not by this Thursday.

Also, below are some questions that we'll need answered to move forward.

Monique Briard
916.231.9551 (direct) | 916.842.0894 (mobile)

From: Tannourji, Danielle <Danielle.Tannourji@icf.com>
Sent: Monday, August 1, 2022 7:26 AM
To: John Spranza <John.Spranza@hdrinc.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sites - Biweekly Planning and Permitting Catch Up

Hi John,

I apologize for the late response, but in reviewing the schedule I don't see any main drivers missing. However, Ellen, Lisa and I were wondering if the dates in your schedule will be further refined?

We also had a few other suggestions and questions, see below. Apologies in advance if these were already covered but I was not in the meeting last week:

1) The phase that involves land cover verification should also involve habitat mapping. They are not one in the same. The person verifying land cover won't necessarily be looking for suitable habitat characteristics for the species – the hope is to go from a habitat model based on land cover categories to an actual identification of suitable habitat – at least for the listed species (I'm not sure about CEQA). And then only that suitable habitat would be surveyed for the species later. For example, the typical first step in the CRLF assessment is doing a large scale habitat assessment, looking for specific habitat features.
2) The dates and length for the plant surveys may need another look. For example, the fall plant survey is scheduled for December, when it should be earlier like Sept-Oct. Early Spring surveys are only 15 days long, I would imagine that we would need more days to complete but that will be based on access agreements. Summer surveys are 45 days which may be enough, but for only one season.
3) Are delineation surveys supposed to be included in this table? Didn't see it and not sure it is a real schedule driver but wanted to mention it.

Lastly, Monique mentioned that you would like to start on the Bio Survey Plan and that you mentioned an example you would like to use as a starting point. I can be of assistance starting later next week, just send me the template and I can hit the ground running when I return from vacation.

Thanks,
Danielle

Danielle Tannourji, MS | Senior Biologist – Conservation Planning | 408-887-3414 (cell – primary phone) |
Danielle.Tannourji@icf.com

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Monday, July 25, 2022 2:45 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Briard, Monique <Monique.Briard@icf.com>; Arsenijevic, Jelica <Jelica.Arsenijevic@hdrinc.com>; Risse, Danielle <Danielle.Risse@hdrinc.com>; Fisher, Linda <Linda.Fisher@hdrinc.com>
Cc: Heydinger, Erin <erin.heydinger@hdrinc.com>; Tannourji, Danielle <Danielle.Tannourji@icf.com>
Subject: RE: Sites - Biweekly Planning and Permitting Catch Up

Attached are MS Project and PDF version of the clearance for construction schedule that we discussed today. Only survey's and items that are schedule drivers included, if I missed any please provide that input prior to Thursday noon.
Thanks,
John

John Spranza

D 916.679.8858 M 818.640.2487

-----Original Appointment-----
From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Monday, December 20, 2021 6:32 AM
To: Alicia Forsythe; Alicia Forsythe; John Spranza (john.spranza@hdrinc.com); Laurie Warner Herson; Monique Briard (Monique.Briard@icf.com); Jelica Arsenijevic (Jelica.Arsenijevic@hdrinc.com); Risse, Danielle; Fisher, Linda
Cc: Heydinger, Erin
Subject: Sites - Biweekly Planning and Permitting Catch Up
When: Monday, July 25, 2022 2:00 PM-3:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where: Microsoft Teams Meeting

Agendas at the link below. Please add agenda items.

https://sitesreservoirproject.sharepoint.com/:f:/r/EnvPlanning/Meetings/Team%20Meetings/Bi-Weekly%20Coordination%20Meetings?csf=1&web=1&e=ZYr1aJ

Microsoft Teams meeting

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File Provided Natively

From: Marcia Kivett [MKivett@sitesproject.org]
Sent: 8/12/2022 10:00:58 AM
To: Alicia Forsythe [aforsythe@sitesproject.org]; Heydinger, Erin [erin.heydinger@hdrinc.com]
BCC: Marcia Kivett [MKivett@sitesproject.org]
Subject: Fw: WSIP Cumulative Flow Study
Attachments: WSIP Cumulative Narrative Paper 8-2-22 .docx; CFS draft 8-4-22 _clean.docx

I'm not sure if you have sent this to the Jacobs team. If yes, do you know if any of them are attending the technical meeting highlighted in yellow below?

From: Jerry Brown <jbrown@sitesproject.org>
Date: Tuesday, August 9, 2022 at 6:21 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>, "Heydinger, Erin" <erin.heydinger@hdrinc.com>
Subject: FW: WSIP Cumulative Flow Study

I took a quick glance at this material and I don't see anything here that causes me any concerns. Please ensure we provide by comments by the requested date. Also I plan to attend the general audience session. Please join fi you're available and have our modelers attend the technical session as you see fit.

thanks

From: "Okita, David@DWR" <David.Okita@water.ca.gov>
Date: Monday, August 8, 2022 at 7:39 AM
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<lmunoz@ieua.org>, Shankar Parvathinathan <shankar@mbkengineers.com>
Subject: WSIP Cumulative Flow Study

To: 7 WSIP projects, Partner Contractors and State agencies:

As you know, DWR has been working on a Cumulative Flow Study that shows how all 7 WSIP projects would affect flows key water ways. We have some new draft documents to share with you and to collect comments. First a "history" of efforts to date.
1. An initial draft Cumulative Flow Study was prepared by AECOM dated 6/21/21. Stantec as a subcontractor to AECOM had some level of review of document.
2. After review and comments by the 7 WSIP projects, state agencies and State Water Contractors, DWR agreed to do a more quantitative analysis using CalSim II post processing. That product was completed 12/19/21 in draft form.
3. The AECOM contract expired 12/31/21. After a few months of contacting delay, DWR hired Stantec independently to continue work.
4. In the meantime a "technical team" of Aaron Miller (DWR) and Chandra Chilmakuri (State Water Contractors) were assigned to review the 12/19/21 draft report. They provided some major comments.
5. Stantec provided a revised report on 6/27/22. DWR provided comments (Chandra was out of office).
6. DWR comments were incorporated into the 8/4/22 attached version.
7. DWR prepared a draft narrative summary of the 8/4/22 Stantec Report. It uses a similar format as the 6/21/21 AECOM report, but is more extensive.

Please provide any comments on both documents by September 16.

We will be having two workshops for different audiences.

First, we will have a technical workshop on the Stantec modeling on Monday August 29 from 3-5 PM. This workshop is for modeling "experts" who have questions about the Stantec work - it is not geared towards a general overview. Stantec will provide an overview of the modeling method, then take questions. To facilitate an efficient workshop, Stantec asks that technical questions and comments be provided in advance by COB August 24. Questions to be sent to Yung-Hsin Sun (yung-hsin.sun@stantec.com) and David.Okita@water.ca.gov. This will allow Stantec to prepare and group similar questions together. Time will be allotted for other questions at the meeting.

Second, we will have a workshop for a more general audience on Thursday August 25 from 3:15 - 5:00 PM. Note that 3-4 PM is the regular bi-monthly meeting of the three pulse flow projects so we will be shortening that meeting to 3:00-3:15 and holding the workshop for a larger audience after that. DWR will be making a presentation on the Narrative Report and taking questions and comments. Target audience is the 7 WSIP projects, State agency staff and State Water Contractors.

Teams meeting announcements will be sent out for these meetings. The mailing list used for this email will also be used for both meetings. Please forward invitation to others in your organization that I may have missed, in particular those who might be interested in the technical workshop.

David Okita, PE
Department of Water Resources
530 902-7588

What are the environmental implications of this project?

The environmental effects of the Project have been analyzed in detail in the Revised Draft EIR/Supplemental Draft EIS. Transformational projects of the magnitude and importance of Sites are not without tradeoffs. There are specific elements of the Project that are critical to enhancing environmental conditions. First, the State has made a large investment, through the 2014 passage of Proposition 1, to enhance their ability to support critical aquatic needs. Second, there are opportunities to partner with the State and Federal water projects in coordinated operations that will enhance fishery protections associated with their operations. Beyond these enhancements, the Project itself is being designed to avoid and lessen any environmental concerns and, when necessary, provide appropriate mitigation. The Revised Draft EIR/Supplemental Draft EIS Executive Summary (available here sitesproject.org/environmental-review) summarizes the environmental effects that have been identified, including those that are significant and unavoidable.

How much water will Sites take from the Trinity River? Or how will Sites impact the Trinity River?

No water will be diverted from the Trinity River to fill Sites Reservoir. The unique location of the reservoir means the Project is not competing for other water resources. Instead the Sites Reservoir will be complementary to these facilities and enhance the ability to optimize the limited water resources. All water diverted into Sites Reservoir will come from the Sacramento River, primarily from the streams and creeks that flow into the river downstream of the Shasta and Keswick Dams, with the exception of extreme events where Shasta Dam is releasing water to avoid flooding in which case some of this released water may be diverted into Sites.

Will the project harm fish species in the Sacramento-San Joaquin Delta?

No. Sites Reservoir does not threaten salmon and other fish. In fact, there are highly protective operating conditions in place that must be in place before diversions into Sites Reservoir can proceed, including adapting to evolving conditions. In addition, the intakes being used for diverting water into Sites Reservoir include state-of-the-art fish screens that are proven to be highly effective at protecting fish. And, the current proposed project includes more cold water for salmon in the driest years when it is needed most. Not only is no harm done, but there is also a net benefit from this project to Sacramento River salmon, Delta smelt, and the Sacramento-San Joaquin Delta estuary.

Has the Sites Project Authority analyzed and considered a comprehensive range of environmental mitigation and protections to support salmon and the Bay-Delta ecosystem?

Absolutely, and there are a couple of specific elements of the Project that are critical to supporting environmental needs. First, the State has made a large investment in the Project through Proposition 1 to enhance their ability to support these critical systems. Second, there are opportunities to partner with the State and Federal water projects in coordinated operations that will enhance fishery protections associated with their operations. Beyond these enhancements, the Project itself is being designed to avoid and lessen any environmental concerns and, when necessary, provide appropriate mitigation.

How does Sites address temperature management efforts for salmon protection?

All species have varying needs throughout their lives. Suitable water temperatures for cold-water fish are important but not the only important component. They need food to sustain and grow along with places to take cover and rest while migrating to the ocean among other things. While temperature management alone does not meet all of the needs of cold-water fish, it is an important component.

Sites has been shown to have the ability to assist in the Bureau of Reclamation's temperature management efforts for salmon protection in the Sacramento and American River systems through water exchanges. The Bureau of Reclamation would establish the criteria for these exchanges through its temperature management planning which weighs risks and rewards of various potential protective actions. Sites is a potential tool for use in managing temperature but is not limited to serving this purpose only. Sites provides additional benefits to the environment, including assisting in providing stability for flows in the fall to reduce salmon redd dewatering, providing additional food resources for Delta smelt in the north Delta, among other existing and potential benefits. It would be shortsighted to conclude that the federal government should not invest in Sites based on conclusions about current temperature management efforts being less than optimal. The fact is that Sites creates new water supply for drier periods and flexibility to deal with uncertainty of climate change. Both of these attributes are beneficial to the environment and worthy of federal investment.

Is Sites being built on native lands? How will it impact tribal people?

Both the Sites Project Authority and the Bureau of Reclamation have consulted and will continue to consult with recognized Native American Tribes regarding impacts to Tribal people and resources. This is described in detail in Chapter 23 and Chapter 29 of the Revised Draft EIR/Supplemental Draft EIS. The Authority has reached out to over a dozen Tribes under Assembly Bill 52 and is in ongoing consultation under AB 52 with several tribes. There are Native American human remains and other tribal resources in the footprint of the reservoir and the Authority is working closely with the Tribes that historically inhabited the reservoir footprint to address impacts to these resources and ensure Native American human remains are addressed consistent with the Tribes' requests. As described in Chapter 29 of the Revised Draft EIR/Supplemental Draft EIS, the Project does not occur in an area that would affect Indian hunting or water rights nor is the alternative on Indian trust lands.

Have Native American tribes been consulted?

Yes. Both the Sites Project Authority and the Bureau of Reclamation have consulted and will continue to consult with recognized Native American tribes regarding impacts to Tribal people and resources. The Authority has reached out to over a dozen tribes under Assembly Bill 52 and is in ongoing consultation under AB 52 with several tribes.

How were the RDEIR/SDEIS virtual public meetings announced?

A variety of notification methods and channels were used to announce the virtual public meetings, availability of the RDEIR/SDEIS, and public comment period, including:

- Authority's Notice of Availability emailed to agencies, Tribes, NGOs, and interested parties
- Reclamation's Notice of Availability published in the Federal Register
- Press release disseminated to media outlets
- Notices posted to the Authority and Reclamation's websites
- Numerous Authority and Reclamation social media posts
- Advertisement published in eight local area newspapers
- Direct mailing to landowners and interested parties
- A series of email blasts to interested public members

To receive future project updates, sign up to be added to the Authority's email list here: Contact - Sites Reservoir (sitesproject.org).

Sites

SITES RESERVOIR

Frequently Asked Questions: **General**

January 2022

Will Sites Reservoir help increase water supplies in future droughts?

Yes. Sites Reservoir is an insurance policy for future droughts. Sites Reservoir does not rely on snowpack and if the scientific projections are correct about the impacts of climate change (i.e. California is expected to receive about the same annual precipitation that it currently does but more will come as rain instead of snow), then having Sites Reservoir will mean we can safely collect more water in the reservoir for use during future droughts.

Will Sites Reservoir divert water from the Sacramento River even during critically dry years?

It depends. Even during drier years there can be significant precipitation events that present conditions where water can be diverted safely from the river and placed in Sites Reservoir. All diversions will be subject to the highly protective operating conditions that are currently being proposed and will ultimately be permitted by State and Federal regulatory agencies for the Sites Reservoir Project.

Will Sites Reservoir decrease Delta flows?

Yes, slightly, when the Project is diverting. However, since the Sites Reservoir diversions occur only when there are high river flows, any reduction to Delta flows would be minor and would not impact any of the beneficial uses of the water in the Delta. Storing water in Sites Reservoir during times when there is a lot of flow in the Sacramento River for use during times with the flows are low, including during drought periods, is part of the statewide strategy for adapting to changing climate conditions and to return much needed flexibility to the statewide water management system.

Have concerns about the impact of Sites Reservoir operations on the environment been addressed in the current proposal?

The Project operations have been modified substantially over the last two years to be more protective of the environment. These modifications have reduced the Project diversions from the Sacramento River substantially, in fact diversions have been reduced almost in half, as compared to the criteria proposed in 2017. The current Project operations strikes the needed balance between environmental protections and Project affordability that must exist for the Project to proceed.

How much would have been diverted in 2021?

Zero diversions into the reservoir in 2021 would have occurred if Sites Reservoir would have been in place. This is in accordance with the highly protective operating conditions that are currently being proposed for the Project. However, the one million acre-feet estimate that would have already been stored as result of the wetter years in 2017 and 2019 is the water that would be available today. And if 2022 is another dry year it is estimated there could be approximately 400,000 acre-feet of that left in Sites. This water is badly needed addition to a severely depleted water supply system that was not built to address future climate.

Is Sites Reservoir compliant with Proposition 1?

Even with the Project changes that have occurred since the original award in 2018, the Sites Reservoir Project continues to provide the public benefits the California Water Commission conditionally approved for the Project in State Proposition 1 funding in 2018. The Project meets the Proposition 1 conditions and continues to meet all the feasibility requirements for investment by the State. In December 2021, the California Water Commission deemed the Project feasible.

Who profits from Sites Reservoir?

The Sites Reservoir Project is led by a Joint Powers Authority made up of irrigation agencies, water districts, cities, and counties in the Sacramento Valley area. The Project is being developed on a beneficiary pays principle which means that the benefits received are paid for by those receiving the benefits. The beneficiaries of the Project include the federal government, state government, and local public agencies. The water generated by the Project will be used for agriculture, meeting water demands of businesses and residents, and serving the needs of the environment throughout California.

Is Sites Reservoir a private reservoir?

No. Sites Reservoir is funded 100 percent by local, state, and federal public dollars. There are environmental, recreational and flood control benefits – as well new dry year water supplies secured for public agency ratepayers throughout California. Participation in Sites is broad and diverse, including the Bureau of Reclamation, State of California, urban areas of Southern California and the Bay Area, as well as public irrigation districts in the Sacramento Valley and San Joaquin Valley.

How does the cost of water from Sites compare to other sources during dry years?

The Sites Reservoir compares favorably to other dry year water supply alternatives which improves water affordability for Project participants and the 24 million users they serve, including disadvantaged communities. With water being one of California's most scarce and valuable resources, it is essential to develop a diverse portfolio of sustainable water supply solutions. But it is equally important for decision-makers and stakeholders to evaluate the most cost-effective options available to maximize the value of these investments. The Project has been designed to put the state's limited water resources to the best use in an affordable, flexible, and sustainable way.

How can member agencies be assured that there will be water in Sites Reservoir if they are paying for storage?

Sites Reservoir is a beneficiary pays project, which means that the benefits of the project go to those paying. Each participant (including environmental uses) has control over their portion of the storage space and a proportionate share of the water diverted into Sites Reservoir. There is flexibility in the timing and uses of the water, including for the environment. The assurance of water being in the reservoir is largely the result of the individual participant decisions in their operations of their portion of the facility. This way, each member is assured to receive what they pay for in a way that works within and complements that member's water supply portfolio.

Why has it taken so much time to get Sites to the finish line?

Sites has been around for decades with efforts originally being led by the California Department of Water Resources and the Bureau of Reclamation. The Project had starts and stops, as is typically seen in large projects led by the state or federal government. The Sites Project Authority was formed in 2010 to move the Project more expeditiously. Big projects take time and careful consideration, and the Authority has done that over the last decade and will continue into the future. Sites Reservoir is anticipated to be operational around 2030. The Authority has made great strides over the last two years to "right-size" the Project for affordability and permitability, two critical success factors. This represents a huge milestone for Project advancement and sets a turning point that makes the Project more feasible and more likely to be built than ever before.

Why does this project make sense now, after 60 years?

Many aspects of water management in California have changed in the recent decade that put the Sites Reservoir on the fast track to completion. These changes include the implementation of the Sustainable Groundwater Management Act, the continued declining reliability of the state and federal water projects, increasing regulatory changes requiring diversification of water purveyors' water portfolios, and the need for water resiliency to address the inevitable uncertainty of the changing climate. Additionally, never before has California had a means to invest in storing water for the environment which was made possible with the overwhelming voter passage in 2014 of Proposition 1 making $2.7 billion available for public benefits of water storage. Approximately 18% of Sites Reservoir is dedicated to delivering water for the environmental purposes as a result of Proposition 1 funds which, for the first time, creates an asset California's regulators can use to adaptively manage for the benefit of fish and wildlife.

In hindsight, should this project have been built when originally contemplated, and if so what would be different today?

Hindsight is always 20/20 and if Sites had been built decades ago the added flexibility it would have created would have been very beneficial for California water management over the years. From a more recent perspective, if California had Sites Reservoir in a dry year like 2021 it is estimated there would be close to 1 million acre-feet of additional water supplies available for farms, cities and the environment. Sites Reservoir diverts water in wet periods and stores that water for use in the drier times.

Sites

SITES RESERVOIR

Frequently Asked Questions: **Operations**

January 2022

Is Sites being built to send more water South?

Sites is being built to provide resiliency, reliability and flexibility to the statewide water supplies for all of California to adapt to the impacts of climate change to the state's water management infrastructure. The new water created by the Project and the added flexibility that comes from being able to store water will improve and enhance water management throughout California.

Is this reservoir a stand-alone, or does it work with other regional reservoirs?

Sites Reservoir is uniquely located in relation to other major components of the state and federal water projects like Shasta Lake, Lake Oroville and Folsom Lake. Sites is complementary to these existing crucial elements of statewide water management and could act to extend the functions they serve by creating flexibility to adapt to changing river and Delta management conditions. For example, Sites can be operated in coordination with Shasta Lake to preserve and enhance cold water for endangered salmon in the Sacramento River. Or Sites could contribute to the increased fresh-water flow into the Delta during drier periods to assist with salinity management of this critical estuary. Sites would not compete for the water resources stored in these state and federal facilities but would increase the total amount of managed water in storage. With the uncertainty California water managers face in the next century, having the Sites Reservoir is a necessity for statewide water management.

Does Sites Reservoir need new Delta conveyance?

No. The project is not dependent on the construction of Delta tunnels. Sites Reservoir will function independently, with or without a new Delta conveyance system. The Draft Environmental Impact Report/Statement evaluates Sites Reservoir as a standalone project.

Since Sites only receives water when there is "surplus" flow in the Sacramento River, how long is it projected now before the reservoir is full under "normal" precipitation patterns?

In California water there is no "normal" water year. Based on 82 years of past hydrology analyzed using standard models and methods, it would take, on average, approximately five to seven years for the reservoir to fill completely on first fill. In contrast, in a single water year like 2016-2017 it would have been possible to fill the reservoir in one year. Similarly, if a string of dry years was to occur, it would take longer to fill, maybe as much 10 years. Surprisingly, there tends to be "surplus" flow in the river in all years. Even in dry and critically dry years, there would be filling opportunities, albeit fairly limited.

The original construction of Los Vaqueros Reservoir in Contra Costa County provides a real-life example of the possible variability in fill rates. The first fill of the 100,000 acre-foot reservoir was expected to take five to seven years. However, the first year of operation was 1997-1998, a fairly wet year of high-quality water being available at the intakes, which allowed the reservoir first fill to be completed in just two years.

How much above the statistical normal for rainfall in the region does rainfall have to be for Sites to receive "surplus" water from the Sacramento River?

Sites is designed to divert water through existing state-of-the-art fish screens only when actual flows on the Sacramento River exceed that needed by more senior water right holders, the Delta is in "excess" conditions, and based on stringent criteria to protect aquatic resources. Sites primarily diverts flows into the Sacramento River from streams and creeks downstream of Shasta/Keswick Dams. The exception is that Sites could pick up water that gets released from these dams under flood control conditions. The operations modeling typically conducted for water projects does not rely on rainfall statistics. Instead, model simulations (CalSim) calibrated to actual flow conditions for an 82-year period covering 1921-2003 are overlayed with current permit and operating constraints to evaluate with project conditions.

How much above the statistical normal for rainfall in the region does rainfall have to be for Sites to receive "surplus" water from the Sacramento River? *(continued)*

The beneficial thing about this approach is that you can simulate future with climate change conditions which has been done for the Sites Project. The results of these with climate change simulations demonstrate that the performance of the project actually improves 5 to 10 percent with climate change. This is good for all of the project partners including the state and federal governments which are approximately 25 percent shareholders for environmental purposes.

How will this project utilize and capitalize on existing infrastructure and what does that mean for the project footprint?

Extending the performance of existing infrastructure is good public policy, good business practice and makes for a more sustainable footprint by reducing the environmental impact of the constructed work. The Project will utilize existing facilities and infrastructure to a great extent and the existing topography of the reservoir site itself is a natural bowl perfectly situated to accommodate a water reservoir. A significant portion of the 100+ miles of conveyance (canals and pipelines) involved in the Project will be existing facilities. The only new conveyance envisioned is the inlet/outlet works for the reservoir and the four miles of 10-foot diameter pipeline to convey water back to the Sacramento River between the Tehama-Colusa Canal and the Colusa Basin Drain.

SITES RESERVOIR

Frequently Asked Questions: **Response to Prism Reports**

1. **The project claims that the Sites Reservoir will be beneficial to native birds and fish. What specific benefits will the reservoir offer?**

   As part of the Prop 1 State investment in the Sites Reservoir, approximately 240,000 acre-feet of storage space will be controlled and entitled to serve strictly as an asset for the environment. This portion of the reservoir will be specifically operated under the direction of CDFW. Among the possible uses of this asset is deliveries to the managed refuge habitats within the Pacific flyway leading to increased water for birds and fish, primarily during the driest years.

   Please refer to the Sites FAQ for additional background questions and answers related to environmental benefits.

2. **How many feet across will the reservoir be?**

   The reservoir is planned to be approximately 14,000 acres of inundated area. The expected measurements of the reservoir surface will be determined based as on survey and engineering details developed as the project progresses.

3. **The reservoir claims to "capture excess water from storms." What is "excess water"? Will water be captured in non-storm seasons, like summer?**

   Diversions to Sites will only occur under strict and protective conditions established by permits issued by state regulatory agencies. Excess is a term used to define water flow conditions in the Delta when all beneficial uses are being met with un-stored water. Aside from excess conditions, the Sites water right will include conditions to protect all other water rights and environmental needs prior to initiating diversions into Sites Reservoir. Sites would not be authorized to divert water in the summer season.

4. **Does the Sites Reservoir have a plan to mitigate methane releases? If so, what is the plan?**

   Methane release as a result of the Sites reservoir operations is not anticipated to be a significant environmental effect.

5. **Does the Sites Reservoir have a plan to mitigate evaporation? If so, what is the plan?**

   Evaporation is anticipated as part of the reservoir operation and has been accounted in the analysis of the project operations. It is not feasible to cover the reservoir of this type.

6. **What is the project's response to the numerous harms Native Tribes and leaders have alerted to, specifically those regarding salmon runs and overall population health?**

   The Sites Project Authority has been engaged in ongoing coordination with Tribes who are culturally associated with the region where the proposed project would be sited. The Authority has been actively engaging in AB 52 coordination with these Tribes and will continue to do so as we further development of the project.

   The Authority would be happy to engage in constructive dialogue on any specific questions or issues Tribes or any others interested in the Project may have. The Sites Authority is committed to a collaborative, open, and transparent process for project development.

7. Would the Sites Reservoir pull as much as 100,000 acre feet of water from tributaries even in drought years?

The project operations have been modeled to simulate operations and these simulations do show there can be very wet periods during dry years. The storms in October and December 2021 are a perfect example. As a result of record rainfall and significant snow events that occurred in October and December, the Project's diversion criteria would have been meet and some diversions would have been allowed for the Project. While diversions are expected to be minimal in drought years, there are times, like October through December of 2021, where we can have very wet conditions -- even in drought years.

8. What is the current predicted cost of operationalizing the Sites Reservoir?

The most current total project cost estimate is $3.93B in 2021 dollars.

SITES RESERVOIR

Frequently Asked Questions: **WIFIA Loan**

The Sites Reservoir Project has been invited by the US EPA to apply for the largest-ever WIFIA loan commitment of up to $2.19 billion. This WIFIA loan commitment would cover up to 49% of Project costs with low-interest, flexible financing for participating water agencies throughout California, and has the potential to reduce the unit cost of water by as much as 10%. This is a major accomplishment for the EPA, the Sites Reservoir Project participants, and California's environment, people and farms, taking a significant step toward securing our water future in an affordable way.

What is a WIFIA loan?

The Water Infrastructure Finance and Innovation Act (WIFIA) was enacted by Congress in 2014 and to date has provided over $10 billion in loans to accelerate investment in our nation's water infrastructure. The WIFIA program provides long-term, low-cost supplemental loans for regionally and nationally significant projects. Projects that qualify for WIFIA loans can benefit from substantial cost savings.

What does a WIFIA loan do to improve the financing picture for the Sites Project?

Receiving a WIFIA loan is a **game changer** for the project and would have the following benefits for the Sites Project:

- The interest rate on a WIFIA loan is tied to the rate of U.S. treasury bonds and is not impacted by the borrower's credit which, especially in an inflationary period, can be more attractive than the interest rates on municipal bonds issued through the public debt markets (as much as 1.1% lower in the current market).

- Securing a low interest rate early in the Project development through the WIFIA program can serve as a hedge against future rate increases. Conversely, the EPA has allowed WIFIA loans to be "refinanced" if interest rates go lower prior to the first draw. The interest rate is determined at execution of the loan agreement. The Project may be able to take advantage of additional flexibility through a master agreement to secure a large upfront commitment from the EPA and then close multiple loans over the life of the Project as funds are needed.

- The WIFIA loan has very flexible structuring and repayment terms with an option to defer principal and interest payments until five years after substantial completion of the Project. For participants that do not have water rates, this flexibility provides time they may need to phase in rates and could significantly improve their ability to pay, although deferring repayment does increase the overall cost of the loan because interest begins to accrue from the first draw date of the loan.

- The Project is eligible for 49% of Project development costs from the loan. When combined with the previously secured USDA loan, this package substantially covers the borrowing requirements of the Project for participating water agencies. Additionally, WIFIA loans can be used to fund preconstruction activities, providing an alternative to other interim financing options.

How did Sites Reservoir receive an invitation to apply for a WIFIA loan?

The Sites Project Authority submitted a letter of interest in July 2021, at the same time as all other applicants. At the time other projects were announced in late December, the review of Sites Reservoir's expression of interest was still ongoing, and EPA opted to postpone a decision on the project until a more comprehensive review could be completed.

Sites Reservoir **meets the criteria** for a WIFIA loan however there were several factors that required further consideration and a more exhaustive review. First, the size of the loan eligibility, $2.2 billion, is more than twice as large as the largest WIFIA loan commitment ever made. As such, this could not be considered lightly. Second, while the unique structure of the Sites Project Authority clearly demonstrates a commitment to collaboration and local Project leadership, it lengthened the review process for a WIFIA loan. Overall, while the Project will generate substantial benefits to California, the scope and scale required additional due diligence.

What are the next steps in the WIFIA loan process?

The Sites team will work with participating agencies to complete an application within one year. A major part of the application is receiving a credit rating from two rating agencies. Once the application is complete and approved, the loan agreement will be negotiated along with a master agreement, if needed.

Sites

SITES RESERVOIR

Increasing Drier Year Supplies

Sites Reservoir is generational opportunity to construct a multi-benefit water storage project that helps restore flexibility, reliability, and resiliency to our statewide water supply. Simply put, no other storage project currently under consideration in California can positively influence the operational efficiencies of our existing statewide water.

Perhaps what makes Sites Reservoir so unique is that it is not a "traditional" reservoir project. It is an off-stream facility that does not dam a major river system and would not block fish migration or spawning. Rather, Sites Reservoir offers a significant water storage opportunity that benefits both people and the environment.

Sites Reservoir captures and stores stormwater flows from the Sacramento River—after all other water rights and regulatory requirements are met—for release primarily in dry and critical years for environmental use and for California communities, farms, and businesses when it is so desperately needed. Sites Reservoir is designed to be adaptable to a changing climate. As snowpack declines due to climate change and more of our water comes in the form of atmospheric rivers – Sites Reservoir will become even more vital to the future resiliency of our statewide water supply.

How It Works

Located 10 miles west of the town of Maxwell in rural Glenn and Colusa counties, the Sites Reservoir would be an off-stream storage facility that captures and stores stormwater flows in the Sacramento River—after all other water rights and regulatory requirements are met—for release in dry and critical years for environmental use and for California communities, farms and businesses when it is so desperately needed.

When operated in coordination with other Northern California reservoirs such as Shasta, Oroville and Folsom, which function as the backbone to both the Central Valley Project and the State Water Project, Sites Reseravoir will greatly increase flexibility, reliability and resiliency of statewide water supplies in drier periods.

With Sites Reservoir, California has a rare opportunity to enhance statewide water supplies and provide a dedicated allocation of water specifically for the environment.

It provides federal and state resource agencies with a dedicated and reliable supply of water they can manage to provide environmental benefits, especially during drier years.

A significant portion of the project's annual water supplies will be provided for environmental flows, which will help to improve conditions for Delta smelt; help preserve cold-water pools in Shasta later into the summer months to support salmon development, spawning and rearing; and improve Pacific Flyway habitat for migratory birds and other native species.

Sites Reservoir Fast Facts

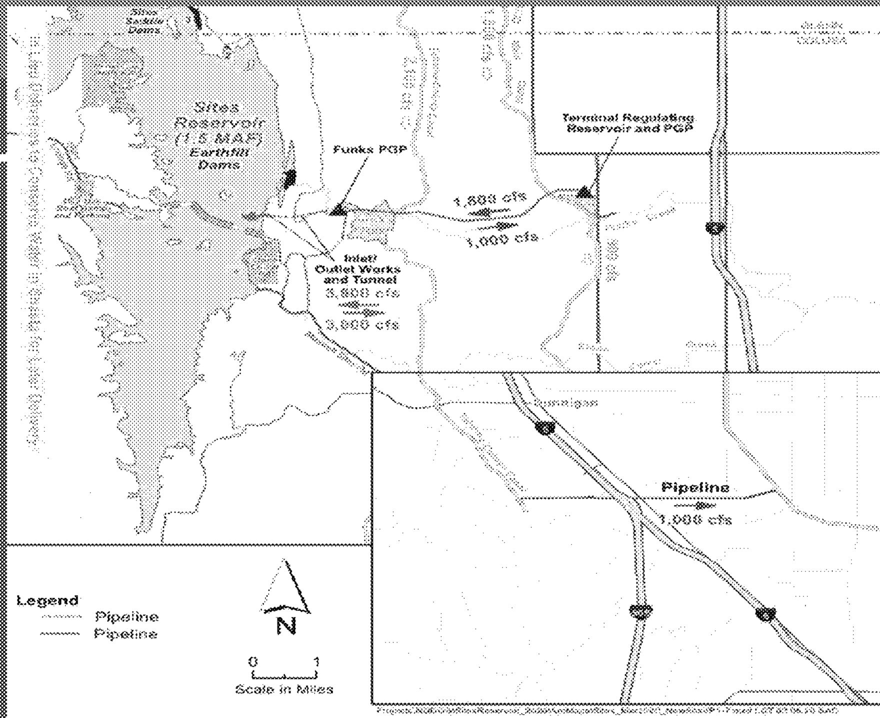
- Provide water for up to **1.5 million homes and businesses** for one year
- Increases Sacramento Valley water storage capacity
- Creates **reliable supplies** for environmental, agricultural, and municipal uses
- **29 participating agencies** representing communities across California

Sites Reservoir Benefits

- **Reliable dry-year water supply for California communities, farms and businesses**
- **Improved water quality**
- **Groundwater recharge**
- **Flood management**
- **Contribution to California's renewable energy goals**
- **Environmental water in drier periods for native fish and Pacific Flyway habitat for migratory birds and other native species**
- **Recreational opportunities**
- **Creation and protection of middle class jobs, including a large skilled work force during seven-year construction**

Support and Funding

Widely supported both regionally and statewide, the project has made significant progress. A bipartisan group of more than 175 organizations, agencies, businesses and elected officials support the Sites Reservoir Project. In 2018, the project was awarded $816 million in funding from California's Proposition 1 water bond, and secured a $449 million investment from the United States Department of Agriculture. The United States Bureau of Reclamation is also a significant project partner.



The Sites Reservoir would be an off-stream storage facility located 10 miles west of the town of Maxwell, California in rural Colusa County.

Sites Reservoir Participating Entities

Colusa County *
Colusa County Water District *
Glenn-Colusa Irrigation District *
Glenn County *
Placer County Water Agency & City of Roseville *
Reclamation District 108 *
Sacramento County Water Agency & City of Sacramento *
Tehama-Colusa Canal Authority *
Westside Water District *
TC 4 **
Western Canal Water District **
American Canyon, City of
Antelope Valley-East Kern Water Agency
CA Department of Water Resources (Ex Officio)
Carter Municipal Water Company
Coachella Valley Water District
Cortina Water District
Davis Water District
Desert Water Agency
Dunnigan Water District
LaGrande Water District
Metropolitan Water District
San Bernardino Valley Municipal Water District
San Gorgonio Pass Water Agency
Santa Clara Valley Water District
Santa Clarita Valley Water Agency
US Bureau of Reclamation (Cost-share)
Wheeler Ridge-Maricopa Water Storage District
Zone 7 Water Agency

* Authority Board Member
** Associate Board Member

What Makes Sites Reservoir Different?

Features	Benefits
Off-stream storage	Does not create barriers to native fish migration Improves local flood management Improved conservation of stored water to be available when it is needed most
Cooperative operations	Increases effectiveness and efficiency of existing water storage infrastructure
Sacramento Valley-led	Aligns with Sacramento Valley's values Authority will be an integral part of community Fosters regional and statewide collaboration
Beneficiary pays	Provides equity among participating partners Improves accountability and value creation
Federal and state agencies manage environmental water	Adaptable to current and future conditions and priorities Ensures federal and state environmental priorities are met—today and into the future
Adaptable to climate change	Operational flexibility to ensure the water will be applied to the highest beneficial uses despite an uncertain future

FOR MORE INFORMATION, PLEASE VISIT **WWW.SITESPROJECT.ORG.**

Sites Reservoir Project - 3 Month Look Ahead

Primary	Assigned To	Governing Body
August 2022		
Consent Items		
Minutes	Sandra Yarbrough	Authority Board & Reservoir Committee
Treasurer's Report	Joe Trapasso	Authority Board & Reservoir Committee
Payment of Claims	Joe Trapasso	Authority Board & Reservoir Committee
2nd Quarter 2022 Financial Report	Joe Trapasso	Authority Board & Reservoir Committee
HDR Task Order Amendment (likely also CH2M Ops and ICF Task Order Amendments)	Joe Trapasso	Authority Board & Reservoir Committee
Action Items		
Accept FY21 Financial Audit Report	Joe Trapasso	Authority Board & Reservoir Committee
Accept Final TRR Siting	Henry Luu, JP Robinette	Authority Board & Reservoir Committee
Discussion and Informational Items		
Water Right - Status Update Briefing	Ali Forsythe	Authority Board & Reservoir Committee
Final EIR/EIS Status Update	Ali Forsythe, Laurie Warner Herson	Authority Board & Reservoir Committee
Status of Consultants Revised Agreements and Closeout of Agreements and Task Orders	Joe Trapasso	Authority Board & Reservoir Committee
Monthly Reporting (Monthly Status Report, Work Plan, Action Items)	All	Authority Board & Reservoir Committee
Closed Session		
Committees/Workgroups		
Review and Comment on Approach to "rolling" cost estimate	Henry Luu, JP Robinette	Reservoir Operations & Engineering Workgroup
Review and Comment on assumptions used in the development of a master schedule through project completion	Henry Luu, JP Robinette	Reservoir Operations & Engineering Workgroup
Final EIR/EIS Status Update	Ali Forsythe, Laurie Warner Herson	Environmental Planning & Permitting Workgroup
Water Rights - Status Update Briefing	Ali Forsythe	Environmental Planning & Permitting Workgroup
BA-ITP - Adaptive Management Plan - Move to special September meeting	Ali Forsythe, John Spranza	Environmental Planning & Permitting Workgroup
Joint WIFIA Committee Formation and Charter Adoption; Review Master Resolution and Feedback on Guiding Principles	Cheyanne Harris, JP Robinette	Joint WIFIA Subcommittee & Budget/Finance
Tribal Government Working Group (September 8)	Kevin Spesert	
Land Owner Meetings (Colusa/Glenn August 16 & Yolo County August 17)	Kevin Spesert	
Payment of Claims	Joe Trapasso	Joint Budget & Finance Committee
HDR Task Order Amendment (Also Likely CH2M Ops and ICF Task Order Amendments)	Joe Trapasso	Joint Budget & Finance Committee
Credit Card Procedure (Procedure Announcement But Not Provided for Review)	Joe Trapasso	Joint Budget & Finance Committee
2nd Quarter 2022 Financial Report	Joe Trapasso	Joint Budget & Finance Committee
FY21 Financial Report	Joe Trapasso	Joint Budget & Finance Committee
TRR Siting	Kevin Spesert	Land Management Committee
Governance - 1st Meeting to review existing structure	Jerry Brown	Joint Governance Committee
September 2022 (Joint Meeting)		
Consent Items		
Minutes	Sandra Yarbrough	Joint Authority Board & Reservoir Committee
Treasurer's Report	Joe Trapasso	Joint Authority Board & Reservoir Committee
Payment of Claims	Joe Trapasso	Joint Authority Board & Reservoir Committee
Action Items		
Approve revised conflict of interest code per FPPC	Kevin Spesert	Authority Board & Reservoir Committee
Approve Consulting Agreement with Mitigation Assistance Service Provider	aforsythe@sitesproject.org, Joe Trapasso	Joint Authority Board & Reservoir Committee
PLACE HOLDER - Real Estate Actions	Kevin Spesert	Joint Authority Board & Reservoir Committee
Placeholder - Approve Master Resolution	Cheyanne Harris, Jerry Brown, JP Robinette	Joint Authority Board & Reservoir Committee
Test Pits and Trenching Draft IS/MND - Authority Release for Public Review	aforsythe@sitesproject.org	Joint Authority Board & Reservoir Committee
Discussion and Informational Items		
USDA Loan Letter of Conditions Update	Cheyanne Harris, JP Robinette	Joint Authority Board & Reservoir Committee

Placeholder: Preliminary Information for A3 Work Plan Check in	Joe Trapasso, Marcus Maltby	Joint Authority Board & Reservoir Committee
Placeholder - BO and ITP Updates (Construction and Operations)	Ali Forsythe, John Spranza	Joint Authority Board & Reservoir Committee
Update on Governance Subcommittee discussion	Jerry Brown	
Monthly Reporting (Monthly Status Report, Work Plan, Action Items)	All	Joint Authority Board & Reservoir Committee
Closed Session		
Committees/Workgroups		
Payment of Claims	Joe Trapasso	Joint Budget & Finance Committee
Placeholder: Preliminary Information for A3 Work Plan Check in	Marcus Maltby	Joint Budget & Finance Committee
Consulting Agreement with Mitigation Assistance Service Provider	Joe Trapasso	Joint Budget & Finance Committee
USDA Loan Letter of Conditions Update	Cheyanne Harris, JP Robinette	Joint Budget & Finance Committee
Recommend Draft Master Resolution	Cheyanne Harris, JP Robinette	Joint WIFIA Subcommittee & Budget/Finance
Recommend Updated Guiding Principles	Cheyanne Harris, JP Robinette	Joint WIFIA Subcommittee & Budget/Finance
Discuss Reserve Policy and Debt Management Policy Key Points	Cheyanne Harris, JP Robinette	Joint WIFIA Subcommittee & Budget/Finance
Local Community Working Group (August 25)	Kevin Spesert	
Governance - 2nd Meeting to review evaluate alternative	Jerry Brown	Joint Governance Committee
No O&E or EPP Work Group Scheduled for this Month		
September 13, 2022 - Plan of Finance Costs Workshop	Cheyanne Harris, Henry Luu, JP Robinette	
Rolling Cost Estimate Approach	Henry Luu, JP Robinette	Joint Authority Board & Reservoir Committee
Value Engineering Opportunities	Henry Luu, JP Robinette	Joint Authority Board & Reservoir Committee
Market Conditions (construction, finance, water)	Cheyanne Harris, JP Robinette	Joint Authority Board & Reservoir Committee
Schedule and Delivery Methods	Cheyanne Harris, Henry Luu, JP Robinette	Joint Authority Board & Reservoir Committee
October 2022		
Consent Items		Authority Board & Reservoir Committee
Minutes	Sandra Yarbrough	Authority Board & Reservoir Committee
Treasurer's Report	Joe Trapasso	Authority Board & Reservoir Committee
Payment of Claims	Joe Trapasso	Authority Board & Reservoir Committee
Action Items		
Real Estate Actions	Jerry Brown	Authority Board & Reservoir Committee
Approve 2023 Authority Board and Reservoir Committee Meeting Calendar	Jerry Brown	Authority Board & Reservoir Committee
Discussion and Informational Items		
Placeholder - Water Rights - Protests Status Update Briefing (May move to November as we will want to have this after the protest period closes)	aforsythe@sitesproject.org	Reservoir Committee
Placeholder: Status Update - Draft 2023 Expense/Revenue Budget, Cash Flow, Unrestricted Reserve, consultant amendments	Joe Trapasso, Marcus Maltby	Joint Authority Board & Reservoir Committee
Monthly Reporting (Monthly Status Report, Work Plan, Action Items)	All	Authority Board & Reservoir Committee
Closed Session		
Committees/Workgroups		
Payment of Claims	Joe Trapasso	Joint Budget & Finance Committee
Amendment 3 Update and Changes - Engineering and Geotech	Henry Luu, JP Robinette, Marcus Maltby	Reservoir Operations & Engineering Workgroup
Recommending a Project Baseline Schedule	Henry Luu, JP Robinette, Marcus Maltby	Reservoir Operations & Engineering Workgroup
Placeholder: Status Update - Draft 2023 Expense/Revenue Budget, Cash Flow, Unrestricted Reserve	Joe Trapasso, Marcus Maltby	Joint Budget & Finance Committee
Water Rights - Protests Status Update Briefing (May move to November as we will want to have this after the protest period closes)	Ali Forsythe, John Spranza	Environmental Planning & Permitting Workgroup
Dead Pool Environmental Considerations - Requested by Rob Kunde	Ali Forsythe, John Spranza	Environmental Planning & Permitting Workgroup
Discuss updates to financing tracks	Cheyanne Harris, JP Robinette	Joint WIFIA Subcommittee & Budget/Finance
Recommend draft reserve policy	Cheyanne Harris, JP Robinette	Joint WIFIA Subcommittee & Budget/Finance
Recommend draft debt management policy	Cheyanne Harris, JP Robinette	Joint WIFIA Subcommittee & Budget/Finance
Review Credit Summary Memo ("front-end" for indicative rating)	Cheyanne Harris, JP Robinette	Joint WIFIA Committee
Placeholder: Plan of Finance Credit and Reserves Workshop	**Cheyanne Harris, JP Robinette**	Joint Authority Board & Reservoir Committee

Operations & Engineering Workgroup

August 10, 2022

Sites

Agenda

- Action items from July 12, 2022 meeting
  - Future topic to discuss status of power and system impact study
  - Future topic to discuss reservoir management as it approaches deadpool
  - Future topic to discuss recreation considerations in reservoir operations management
- 1.1 Approach to implementing the Amendment 3 "rolling" cost estimate
- 1.2 Assumptions used in development of a master schedule through project completion

Material Change Categories for Today's Topics (Bylaws)

Approach to implementing the Amendment 3 "rolling" cost estimate

✓Direct Construction Cost

Assumptions used in development of a master schedule through project completion

✓Construction Schedule

✓Direct Construction Cost

Mention TRR siting discussion

Agenda Item 1.1

Approach to implementing the Amendment 3 “rolling” cost estimate

JP Robinette

Sites

Why a "rolling" cost estimate?

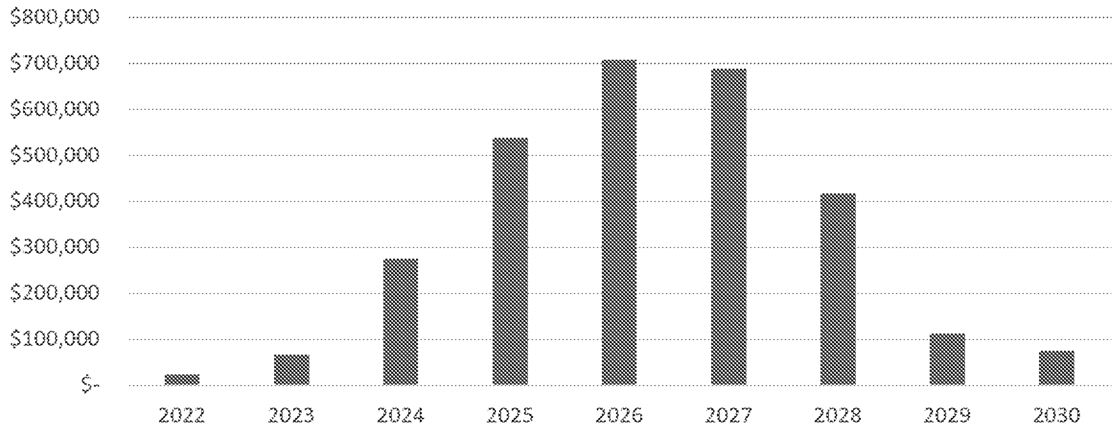
- The Feasibility Project Cost Estimate was approved by the Board in June 2021
  - Based on limited mapping and geotech data in development of the feasibility design
- Preliminary Engineering to be completed in 2024
  - Supported by additional survey/mapping and geotech data
- A "rolling" cost estimate may inform decision making and/or policy guidance required before 2024
  - Plan of Finance September Workshop

Plan of Finance September Workshop
Preliminary Agenda topics

- ❑Amendment 3 “Rolling” Cost Estimate Approach
- ❑Value Engineering Opportunities
- ❑Market Conditions (construction, finance, water)
- ❑Project Schedule and Delivery Methods

Our delivery decisions and pace move the needle (July 2021 Plan of Finance Workshop)

PARTICIPANT SHARE CONSTRUCTION COSTS ($1,000s, 2021$)



Delivery considerations (assumes financing participants):

- Timing of locking interest rates ± 10%
- Increased construction cost escalation by 0.5% increases annual costs by 3.5%
- Each additional $100M in construction costs increases annual costs by 3.4%

Cost Drivers

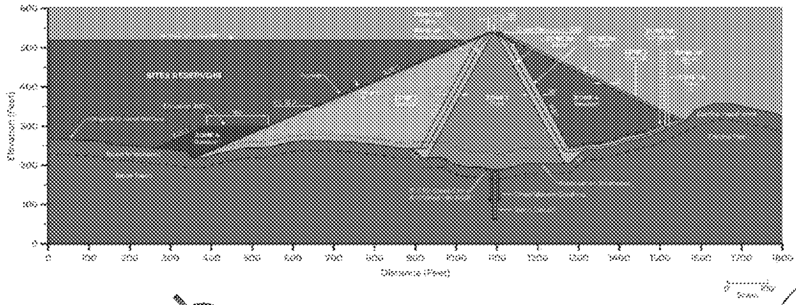
Advancing Design
- Foundation Designs
- Value Engineering
- Power & System Impact Study

Material Availability
- Location
- Quality
- Quantity

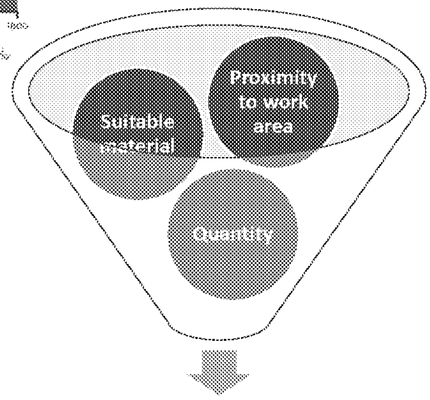
Mitigation
- Biological Survey
- Cultural Survey
- Mitigation Banking & Habitat Creation

Schedule
- Market Conditions
- Project Completion

Moving the Needle: Advancing Design

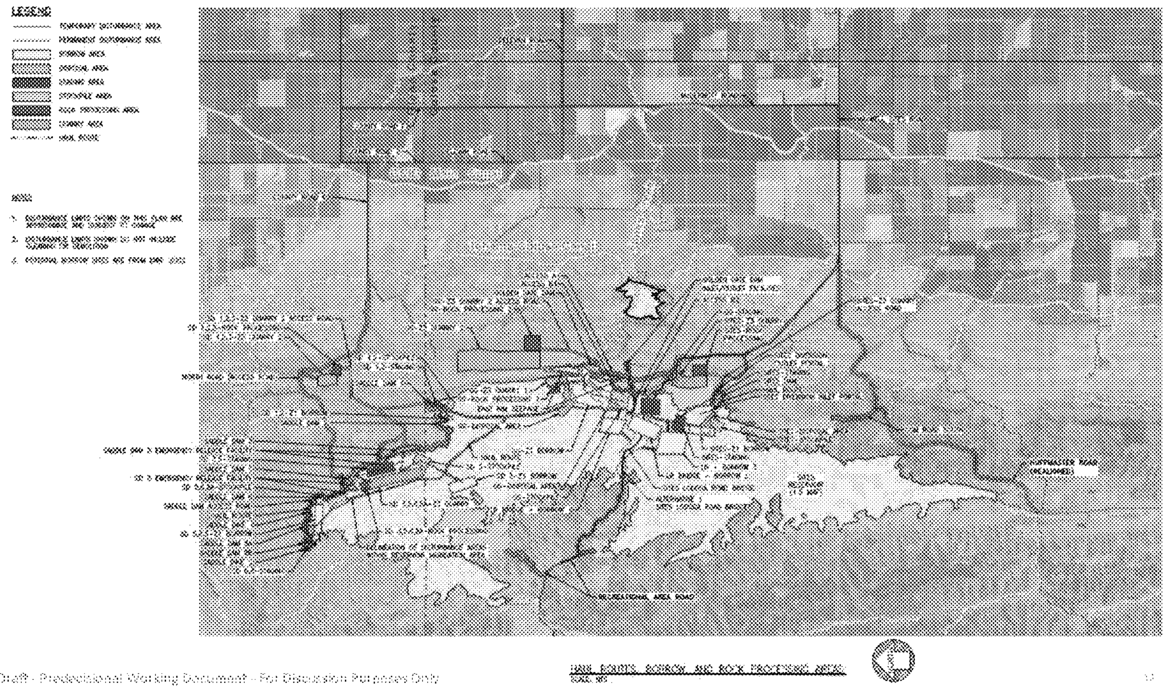


- Dam Zone 1: Core
- Dam Zone 2: Filter & Drain
- Dam Zone 3: Rock
- Dam Zone 4: Random Fill
- Roads: Aggregate Base

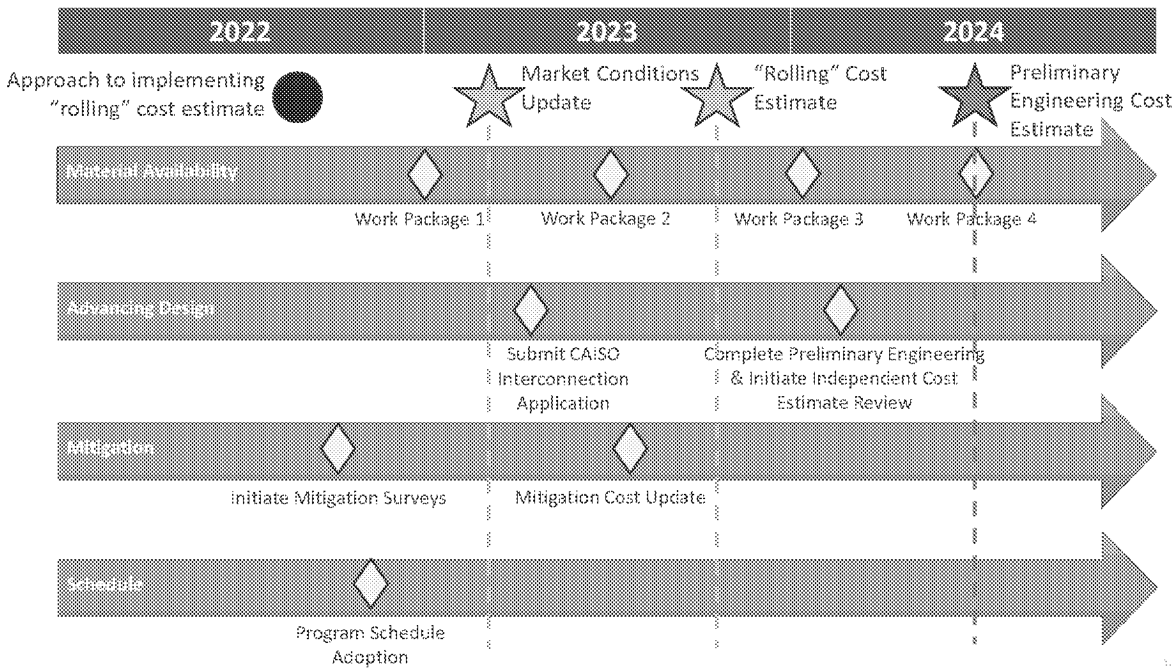


Material Cost Driver

Moving the needle: Material Availability



Amendment 3 “rolling” Cost Estimate Milestones



Questions?

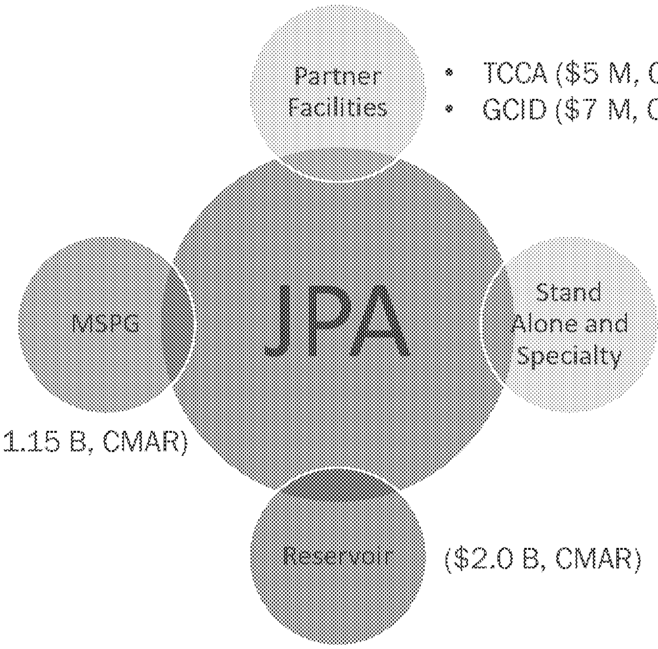
Sites

Agenda Item 1.2:
Assumptions used in the development of a master schedule through project completion

JP Robinette

Sites

Alignment with Contract Strategy



- TCCA ($5 M, Owner Agreements)
- GCID ($7 M, Owner Agreements)

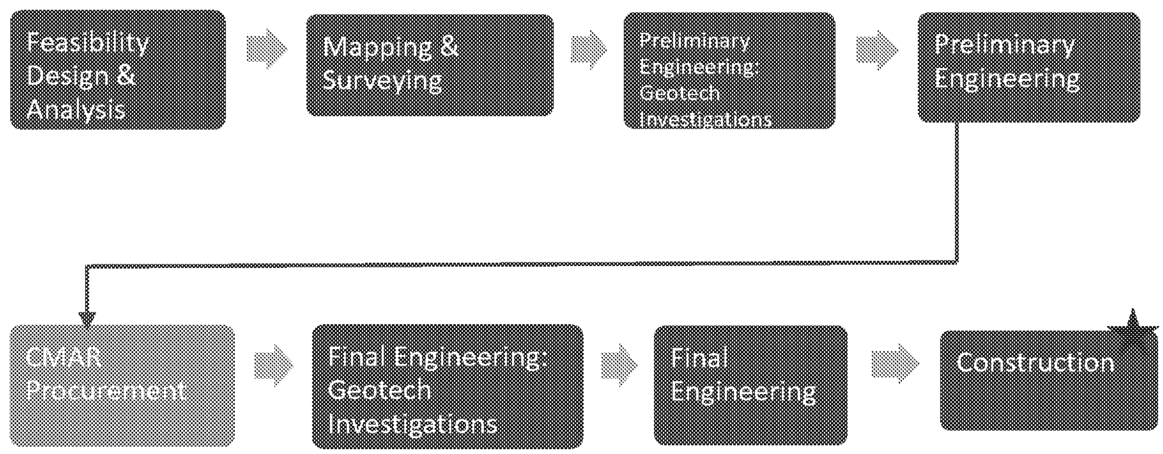
- Dunnigan Pipeline ($100 M, DBB)
- Huffmaster Road ($50 M, DBB)
- Reservoir Clearing ($35 M, DBB)
- Mitigation ($600 M, various)
- Recreation ($35 M, DBB or DBO)

($1.15 B, CMAR)

($2.0 B, CMAR)

Advancing Engineering & Construction

overview



Advancing Engineering & Construction
steps 1 and 2

Feasibility Design & Analysis
- COMPLETE

Mapping & Surveying
- Req. ROW access

Advancing Engineering & Construction
steps 3 and 4

Preliminary Engineering: Geotech Investigations

- Req ROW access and environmental permits to execute geotech activities

Preliminary Engineering

- Preliminary Engineering Design & Coordination
- Agency Reviews: Federal, State, County, and facility owners

Advancing Engineering & Construction
steps 5 and 6

CMAR Procurement

- Req. Authority guidance and approval to implement contract and procurement policies
- Typically occurs after Preliminary Engineering and before Completion of Final Engineering

Final Engineering: Geotech Investigations

- Req ROW access and environmental permits to execute geotech activities

Advancing Engineering & Construction

steps 7 and 8

Final Engineering

- Final Engineering Design and Construction Contract Documents
- Agency Reviews and Approvals: Federal, State, County, and facility owners

Construction

- Req. completion of property acquisition
- Req. completion of environmental surveys
- Req. completion of mitigation actions
- Req. approval of construction and environmental permits

Policy Questions for Development of the Master Schedule

- **Contracting and Procurement** – what are the assurances required to initiate CMAR procurement?
  - Assuming execution after investor commitment
- **Construction Phasing** – should construction packages be scheduled independently to be completed as quickly as possible, or resource balanced based on the critical path construction package?
  - Assuming resource balance based on the critical path construction package

WSIP Benefits and 2030 Timeframe

- The WSIP Application used the State provided hydrology data that shows benefits beginning in 2030
- Recognizing project benefits by 2030 is **<u>not</u>** a statutory requirement

However, time is of the essence.

Next Steps

- Coordinate with real estate and permitting teams in preparation of the Master Schedule update
- Focus on managing costs and risk, while remaining aggressive with overall schedule
- Identify required work plan update(s) based on adopted Program Schedule (October 2022)
- Recommend work plan update(s) for RC/AB approval (November 2022)
- Implement work plan update and execute Task Order amendments as needed (December 2022)

Questions?

Sites

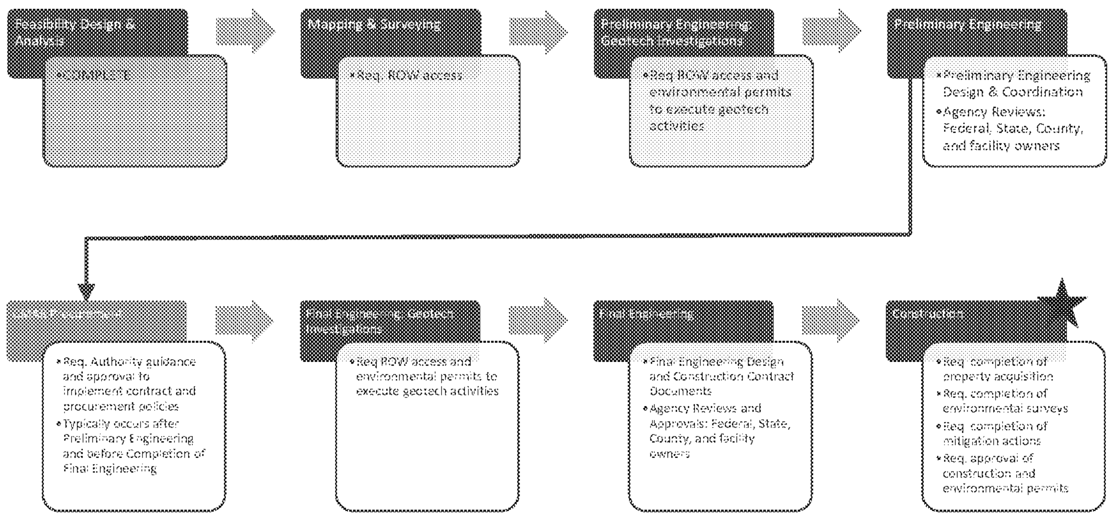
Thank you!

Next Meeting: Wednesday, October 12, 2022 (1:30 pm – 3:30 pm)

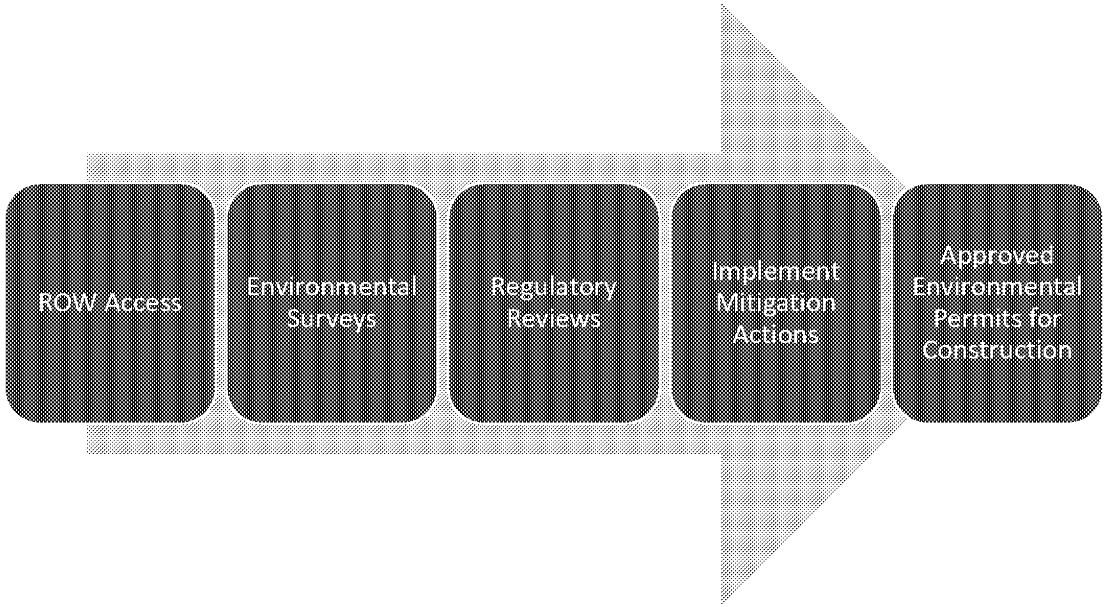
Sites

Bullpen

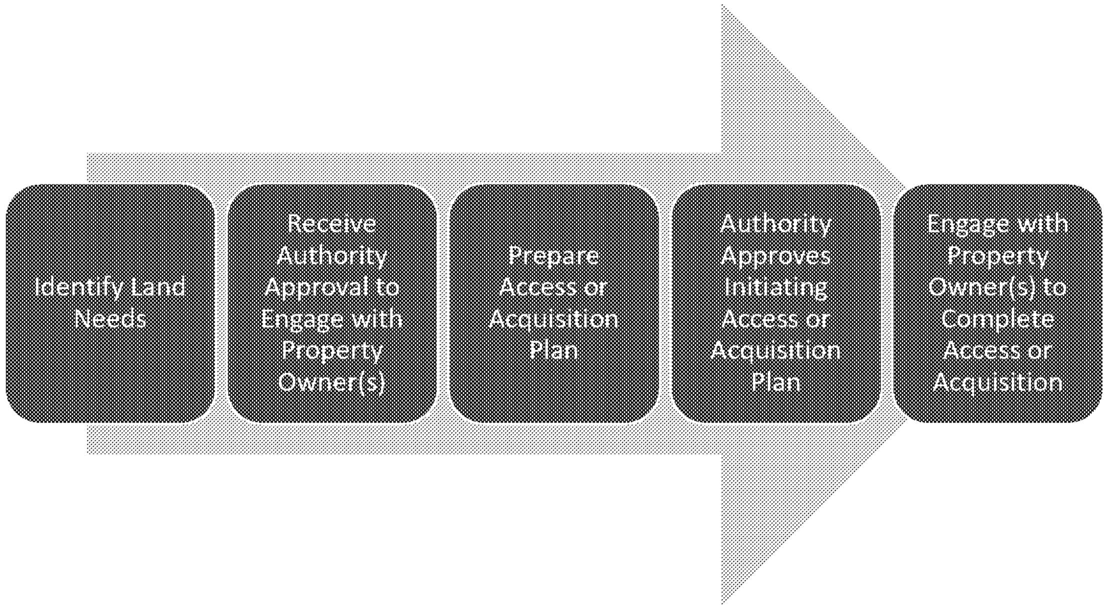
Advancing Engineering & Construction



Environmental Permitting & Mitigation Requirements for Construction



Real Estate Requirements for getting to Construction



Summary Level and Preliminary Analysis of Sites EWM Considerations Related to the DOW/Barry Nelson EWM Building Blocks White Paper Questions
August 16, 2022

<u>Equity and Representation</u>

- The Prop 1 solicitation, feasibility review, and final award processes provide for ample public review and input.
- All of the Sites Authority considerations and actions comply with Brown Act public meeting rules and requirements.
- Development of a Sites EWM approach is being done jointly between the Sites Authority, TNC, and EDF.

<u>Environmental Goals and Geographic Scope</u>

- The CDFW/Sites Authority Public Benefit Agreement (PBA) will need to allow for any of the Prop 1 environmental objectives to be met with the State's Sites water.
- The Sites water place of use map proposes a large area across the entire state overlapping with a large portion of the CVP and SWP place of use.

<u>Program Term</u>

- With the current level of Prop 1 funding conditionally awarded to the Sites Project, there is anticipated to be 244,000af of storage space (out of 1.5MAF less deadpool) dedicated to EWM and 17% of the diverted water being available to store within this space.

<u>Relationship to Legal Obligations</u>

- CDFW/Sites EWM will control its share of the storage space and stored water – uses and scheduling are coordinated among all of the participants and other parties through the Sites Authority operations planning.
- The PBA is expected to stipulate the benefits and obligations of CDFW and the Sites Authority. Similar agreements will be reached with all of the other Sites participants.

<u>Water Volume and Source</u>

- The Prop 1 water would be subject to all of the same conditions as any water diverted or released with the Sites Reservoir. The storage space and proportionate share of diverted water would remain unchanged.

<u>Accounting and Baseline</u>

- The Prop 1 water would be accounted for in the same manner as all storage accounts in the reservoir with clear and transparent reporting made available to the public.

- All of the Sites participants, including CDFW would be subject to any changes in the laws, rules or regulations that could affect the operations of the project.

Accountability

- The PBA must include monitoring, reporting to comply with the Prop 1 statute.
- It is envisioned that CDFW could delegate its authorities to a Sites EWM who would either recommend or make operating decisions for uses of the Prop 1 water.
- The agreements with the other participants will include sufficient protections should individual participants fail to meet their obligations.

Governance and Adaptive Management

- The role of CDFW/Sites EWM in the governance and decision making of the project needs to be further developed.
- The PBA must include an adaptive management program to comply with the Prop 1 statute.

Operational Considerations

- The Sites Authority expects to have agreements the DWR and Reclamation that will provide for the coordination of the operations of Sites Reservoir in a manner that does not interfere with them meeting their obligations. The projects are envisioned to be coordinate, but independent.
- Exchanging Sites water with the state and federal operations to achieve shared interests is envisioned to the extent that mutual agreement is reached.
- Facility use agreements will be developed between the Sites Authority and operators of facilities needed to pump and convey Sites water to participants and will include provisions for the Prop 1 water as well.

Funding

- Sites is a beneficiary pays project – each participant pays for its share of the cost in proportion to its share of the non public benefit.
- Prop 1 pays for capital cost only of public benefits.
- The Sites Prop 1 application contemplated generating revenue to pay for Prop 1 O&M through water transfers.
- Opportunities that generate funds to cover the O&M costs need to be explored.

Legislation and Litigation

- Currently there is no mechanism for CDFW to delegate its authority to manage the Prop 1 storage public benefits.

Areas for further development by the steering committee

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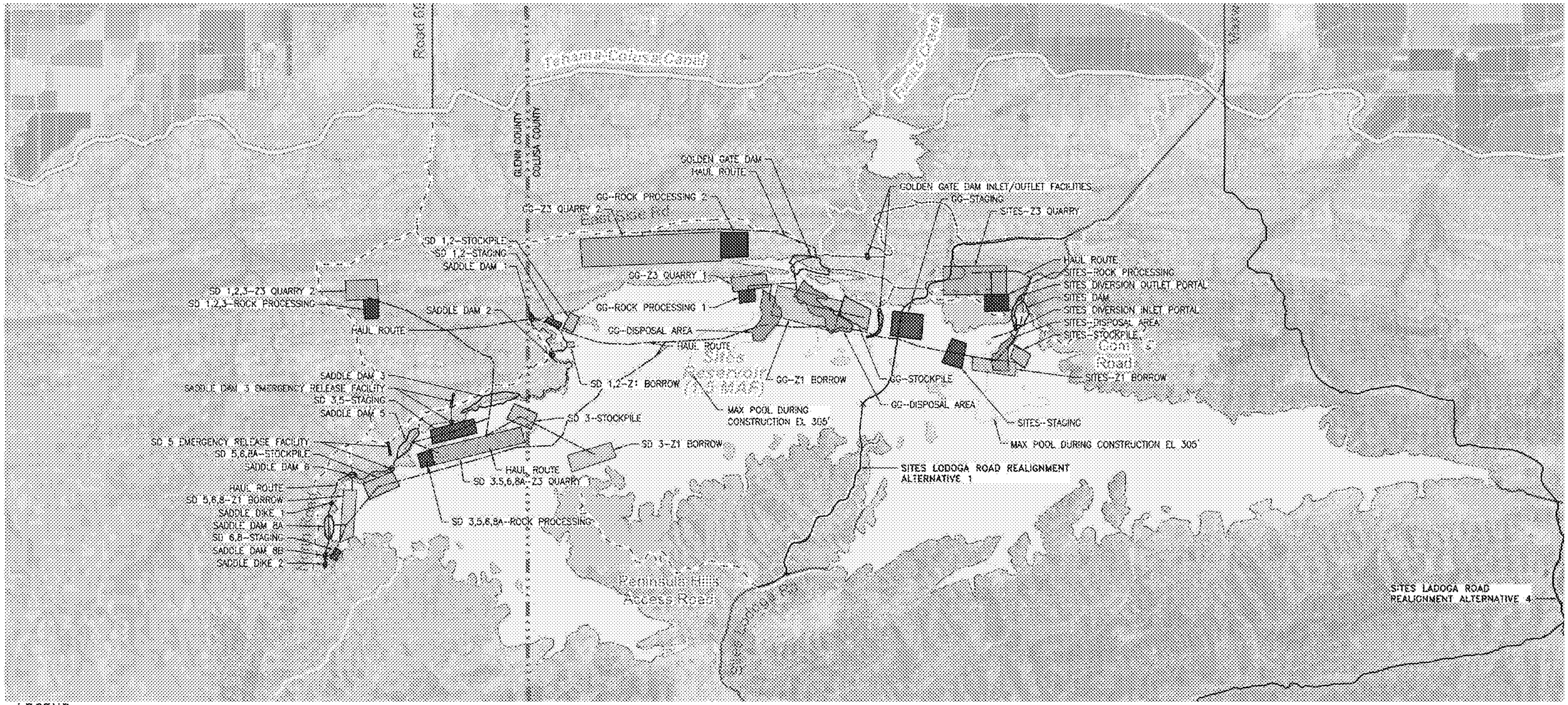

LEGEND

- BORROW AREA
- DISPOSAL AREA
- STAGING AREA
- STOCKPILE AREA
- ROCK PROCESSING AREA
- QUARRY AREA
- HAUL ROUTE

NOTES

1. FOR OFFSITE BORROW AREA SEE DRAWING STS-315-C-2002
2. FOR EXPANDED VIEW SEE DRAWING STS-315-C-2004
3. POTENTIAL BORROW SITES ARE FROM DWR, 2002

HAUL ROUTES, BORROW, DISPOSAL, STOCKPILE, STAGING, AND ROCK PROCESSING AREAS
SCALE: 1" = NTS

NORTH

Source: AECOM, 2020
Drawing No. STS-315-C-2003

Figure 3-3
Onsite Borrow Area Details

From: Alicia Forsythe [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A6CDF06A7E904B65BAA21702A82AD329-AFORSYTHE]
Sent: 8/18/2022 5:50:44 PM
To: Laurie Warner Herson [laurie.warner.herson@phenixenv.com]; Janis Offermann (Janis@Horizonh2o.com) [janis@horizonh2o.com]; Kevin Spesert [kspesert@sitesproject.org]; Risse, Danielle [Danielle.Risse@hdrinc.com]
Subject: FW: Highway 20 Tule Elk Crossing Project

I just thought about this – I noticed that Caltrans named this project with Cortina in it and used their language for Elk Crossing. This indicates to me that Cortina might be interested in elk in the project area and thinking more about what we might do for elk and ensuring elk crossings/passage might be important to them. We do have wildlife crossings as part of our mitigation requirements, but haven't framed up what those look like yet.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Alicia Forsythe
Sent: Thursday, August 18, 2022 5:32 PM
To: Spranza, John <John.Spranza@hdrinc.com>; Poopatanapong, Amy <Amy.Poopatanapong@icf.com>; Briard, Monique <monique.briard@icf.com>; Arsenijevic, Jelica <jelica.arsenijevic@hdrinc.com>; Newens, Richard <Richard.Newens@hdrinc.com>; Smith, Kristin <Kristin.Smith@hdrinc.com>; Berryman, Ellen (Ellen.Berryman@icf.com) <ellen.berryman@icf.com>; Luu, Henry <Henry.Luu@hdrinc.com>
Cc: Kevin Spesert <kspesert@sitesproject.org>
Subject: RE: Highway 20 Tule Elk Crossing Project

Thanks John. My computer says the link you sent is from a malicious site. ;-0

But, I found it on CEQA net here: CORTINA RIDGE SAWATO KAMITLITARRO (ELK CROSSING) PROJECT (ca.gov)

This is in the same ridge line as Sites and really not that far from the reservoir. I do wonder if elk will travel under our bridge. And how much room there would be for them to travel between the water and bridge abutments.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Thursday, August 18, 2022 10:03 AM

To: Alicia Forsythe <aforsythe@sitesproject.org>; Poopatanapong, Amy <Amy.Poopatanapong@icf.com>; Briard, Monique <monique.briard@icf.com>; Arsenijevic, Jelica <jelica.arsenijevic@hdrinc.com>; Newens, Richard <Richard.Newens@hdrinc.com>; Smith, Kristin <Kristin.Smith@hdrinc.com>; Berryman, Ellen (Ellen.Berryman@icf.com) <ellen.berryman@icf.com>
Cc: Kevin Spesert <kspesert@sitesproject.org>
Subject: FW: Highway 20 Tule Elk Crossing Project

Hi Folks,
I just learned of this project today, they are building a wildlife overpass for tule elk over Highway 20. We may need to look at this as this is not too far from the project and I am not sue where the corridor is. There is a meeting this week on the project.

https://darik.news/california/lake-county-news-calif-caltrans-solicits-community-response-over-highway-20-wildlife-crossing-in-colusa-county/682465.html

John Spranza

D 916.679.8858 M 818.640.2487

Shared via the Google app

John
818-640-2487
Sent from my iPhone

Reservoir Committee Meeting

Agenda Item 3.2: Final EIR/EIS Update

August 19, 2022

Sites

Roles

- Authority Lead Agency under CEQA
  - Takes first CEQA action
  - Members making decision in the context of the Authority's decision (not their own agency's decision)
- Each Reservoir Committee Member is a Responsible Agency under CEQA
  - Takes follow on CEQA action prior to final decision to invest in Project
  - Important that each Member Agency can make this decision based on the Authority's Final EIR/EIS

Speaker: Laurie

Draft - Predecisional Working Document - For Discussion Purposes Only

Final EIR/EIS Development

- RDEIR/SDEIS released November 12, 2021
- Close of public review January 28, 2022
- Ongoing efforts since January:
  - Coordination with Reclamation and legal counsel on approach to Final EIR/EIS, including format, key comments and additional technical analysis
  - Identification of any changes to the Project, both facilities and operations
  - Incorporating revised diversion criteria and revised modeling results
  - Continuing AB 52 consultation and other public outreach
  - Developing master and individual responses to comments

Speaker: Laurie

Draft - Predecisional Working Document - For Discussion Purposes Only

Final EIR/EIS Format

- Volume 1 – Chapters
  - Include all chapters from RDEIR/SDEIS that need to be revised
- Volume 2 – Appendices
  - Include all appendices from RDEIR/SDEIS that need to be revised
- Volume 3 – Responses to Comments on RDEIR/SDEIS
  - Master responses and individual responses to all comments received

Speaker: Laurie

Key Changes To Date

- Changes between RDEIR/SDEIS and Final EIR/EIS to date:
  - Minor changes in facilities due to design refinements
  - Revisions to Diversion Criteria
  - Corrections or clarifications needed in response to comments
- No new or substantial greater impacts identified that would require recirculation

Speaker: Laurie

CEQA Decision Process (In Order)

1. Certification of the Final EIR completed in compliance with CEQA and reflects agency's independent judgment
2. Adopt CEQA Findings and Statement of Overriding Considerations
   - Significant Impact – Written findings accompanied by a brief explanation of the rationale
   - Significant and Unavoidable Impacts – Statement of Overriding Considerations
     - Balance, as applicable, the economic, legal, social, technological, or other benefits, including region-wide or statewide environmental benefits, of a proposed project against its unavoidable environmental risks
     - Water Quality, Vegetation and Wildlife, Agriculture, Air Quality, Cultural Resources, Tribal Cultural Resources
   - Adopt Mitigation Monitoring and Reporting Plan
3. Decide whether to approve the Project

Speaker: Ali

Draft - Predecisional Working Document - For Discussion Purposes Only

Next Steps

- Completion of Administrative Final EIR/EIS in October and concurrent review by Reclamation, legal counsel and responsible and cooperating agencies
- Preparation of the complete Final EIR/EIS in early 2023
- Federal review and approval for publication
- Preparation of CEQA Findings, MMRP and Statement of Overriding Considerations
- Authority Board public meeting to decide to adopt CEQA document, make findings and approve project

Speaker: Ali

Draft - Predecisional Working Document - For Discussion Purposes Only

Questions?

Sites

Sites

Draft
HR Design Team Memorandum

To:	Sites Project Authority
CC:	JP Robinette, PE
Date:	August 18, 2022
From:	Mike Smith, P.E., G.E. (AECOM)
Quality Review:	Ben Aldridge, P.E. (AECOM)
Subject:	Task Order No. 3 Geotechnical Exploration Schedule for County Roads

I appreciated our conversation yesterday clarifying the schedule of the county roads geotechnical investigation. Based on our conversation, I understand that the initial investigation will be limited to core holes on approximately one-mile spacing due to permitting constraints. The data from these core holes will be used to perform preliminary design of the county road improvements. The remaining cores recommended by AECOM (cores at 1,000 foot spacing) will be done later to support the 60 percent design. The county road improvements are part of the Contract Work Package 1 and are early in that schedule as they precede the dam construction.

As discussed, the limitation of having data at one mile spacing for preliminary design results in some risk to the Authority, which includes:

- Once the final data set is collected, the design may change. The change would pertain to the pavement section, which impacts the grading volumes and imported material volumes. This would require some effort to make these changes, and additional design budget and schedule would be required for this work. We will try to mitigate this impact to some extent by making conservative assumptions.
- The construction cost estimate for this element may also change if the final data set changes the design. Again, we will try to mitigate this by making conservative assumptions during preliminary design.

Thank you for clarifying the schedule of the county roads geotechnical investigation and sharing the permitting constraints. Please me know if you have any questions or comments.

From: Arsenijevic, Jelica [Jelica.Arsenijevic@hdrinc.com]
Sent: 8/19/2022 12:32:28 PM
To: Brian Grubbs [grubbs@montaguederose.com]; Heydinger, Erin [erin.heydinger@hdrinc.com]
CC: Doug Montague [montague@montaguederose.com]; Cheyanne Harris [charris@brwncald.com]; Luu, Henry [henry.luu@hdrinc.com]; Spranza, John [john.spranza@hdrinc.com]; JP Robinette [jrobinette@sitesproject.org]; Angela Bezzone [bezzone@mbkengineers.com]
Subject: RE: Sites: 404(b)(1) cost information

Thank you both
The main purpose of the table (and overall memo) is to convince the Corps that a 1.3 MAF reservoir is not the least environmentally damaging practicable alternative (LEDPA). WE are trying to provide justification (biological, cultural, cost, feasibility, etc.) that the 1.5 MAF is our LEDPA. Whatever we use, just needs to be consistent, and we note our sources of info.

Jelica Arsenijevic
Environmental Project Manager

HDR
2379 Gateway Oaks Drive, Suite 200
Sacramento, CA 95833
D 916-679-8854
M 209-329-6897

Jelica.Arsenijevic@hdrinc.com

hdrinc.com/follow-us

From: Brian Grubbs <grubbs@montaguederose.com>
Sent: Friday, August 19, 2022 10:38 AM
To: Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Arsenijevic, Jelica <jelica.arsenijevic@hdrinc.com>
Cc: Doug Montague <montague@montaguederose.com>; Cheyanne Harris <charris@brwncald.com>; Luu, Henry <henry.luu@hdrinc.com>; Spranza, John <John.Spranza@hdrinc.com>; JP Robinette <jrobinette@sitesproject.org>; Angela Bezzone <bezzone@mbkengineers.com>
Subject: RE: Sites: 404(b)(1) cost information

Erin,
What your saying makes sense, but I'll wait for those who are more knowledgeable of the full report being prepared.

That said I think we'll need the water yield breakout by Fed/State/Participants. If you have the participant numbers by NOD/SOD that would be great as well. Can you send that when you're able?

Brian Grubbs | Managing Director
Montague DeRose and Associates
916-712-1747

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Friday, August 19, 2022 10:27 AM
To: Brian Grubbs <grubbs@montaguederose.com>; Arsenijevic, Jelica <jelica.arsenijevic@hdrinc.com>

Cc: Doug Montague <montague@montaguederose.com>; Cheyanne Harris <charris@brwncald.com>; Luu, Henry <henry.luu@hdrinc.com>; Spranza, John <John.Spranza@hdrinc.com>; JP Robinette <jrobinette@sitesproject.org>; Angela Bezzone <bezzone@mbkengineers.com>
Subject: RE: Sites: 404(b)(1) cost information

Just chiming in here.

I agree and am wondering if that row should be with and without WIFIA funding? That is normally what we have shown in that row. I also think we could just assume WIFIA funding at this point and remove that row altogether.

The numbers I provided are TOTAL project releases. I can provide other data as needed.

FYI for Brian and JP – these are the release numbers from the Final EIR/EIS using the historic hydrology (no climate change).

Also cc'ing Angela – she will be able to help you pull in this type of info in the future with my departure on Monday.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

hdrinc.com/follow-us

From: Brian Grubbs <grubbs@montaguederose.com>
Sent: Friday, August 19, 2022 10:06 AM
To: Arsenijevic, Jelica <Jelica.Arsenijevic@hdrinc.com>
Cc: Doug Montague <montague@montaguederose.com>; Cheyanne Harris <charris@brwncald.com>; Luu, Henry <henry.luu@hdrinc.com>; Spranza, John <John.Spranza@hdrinc.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; JP Robinette <jrobinette@sitesproject.org>
Subject: RE: Sites: 404(b)(1) cost information

Jelica,
1. For the first question, can you verify the WIIN Act Funding percentages desired for each Alternative. I thought Alt 2 was zero WIIN Act funding, but there is a spot for Alt 2 with WIIN Act funding.

2. For Alt 4. This is the 1.8MAF reservoir…I think I can, let me spend some time to make sure the numbers are consistent for the other Alternatives.

A question for you: Are the Estimated Deliveries in your table below Total Deliveries=FED+State+Participants, or just deliveries to Participants? This is important as the cost I've been provided is just for participants.

Brian Grubbs | Managing Director
Montague DeRose and Associates
916-712-1747

From: Arsenijevic, Jelica <Jelica.Arsenijevic@hdrinc.com>
Sent: Friday, August 19, 2022 9:12 AM

To: Brian Grubbs <grubbs@montaguederose.com>
Cc: Doug Montague <montague@montaguederose.com>; Cheyanne Harris <charris@brwncald.com>; Luu, Henry <henry.luu@hdrinc.com>; Spranza, John <John.Spranza@hdrinc.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; JP Robinette <jrobinette@sitesproject.org>
Subject: RE: Sites: 404(b)(1) cost information

Good morning Brian
Thanks so much for helping ! Much appreciated.

We coordinated with Erin this morning and have the table information updated with estimated deliverables. Using the info provided (from the final EIR/EIS modeling/no historic climate change included), can you provide the estimate cost per acre-foot?

For Onsite Alternative 4 – since we haven't modeled anything since 2019....I'll work with the internal team to get estimated deliveries from the value planning report. Once we get that, are you able to figure out cost by escalating to 2021 dollars?

TABLE 16. ONSITE ALTERNATIVES - ESTIMATED CONSTRUCTION AND REPAYMENT COSTS

Alternative[1]	**Onsite Alternative 1**	**Onsite Alternative 2**	**Onsite Alternative 3 (Project)**	**Onsite Alternative 4**
Project Parameters				
Reservoir Size	1.5 MAF	1.3 MAF	1.5 MAF	1.8 MAF
Delivery Pipeline Release Capacity (cfs)[2]	1,000	1,000	Same as onsite Alternative 1	1,500
Estimated Deliveries (releases to Funks) (Long-Term Average in TAF)	206-220 (option 1A and 1B) – from final EIR/EIS modeling , no historic climate change included	203 – final EIR/EIS modeling, no historic climate change included.	255 – final EIR/EIS modeling, no historic climate change included.	XX – needs to come from value planning report (ask Trishna for help).
Estimated Cost per Acre-Foot with WIIN Act Funding (2020)	$611	$621	XX	XX
Estimated Cost per Acre-Foot without WIIN Act Funding (2020)	$661	$674	XX	XX
Direct Construction Costs[3]	$4,494,389 (2021 dollars)	$4,423,074 (2021 dollars)	Same as onsite Alternative 1	$3,752,000,000 (2019 dollars)

Jelica Arsenijevic
Environmental Project Manager

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Sacramento, CA 95833
D 916-679-8854
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Jelica.Arsenijevic@hdrinc.com

hdrinc.com/follow-us

From: Brian Grubbs <grubbs@montaguederose.com>
Sent: Thursday, August 18, 2022 1:22 PM
To: JP Robinette <jrobinette@sitesproject.org>
Cc: Doug Montague <montague@montaguederose.com>; Cheyanne Harris <charris@brwncald.com>; Arsenijevic, Jelica <Jelica.Arsenijevic@hdrinc.com>; Luu, Henry <henry.luu@hdrinc.com>; Spranza, John <john.spranza@hdrinc.com>
Subject: RE: Sites: 404(b)(1) cost information

No problem JP. Revised file. Let me know if additional items need changing.

From: JP Robinette <jrobinette@sitesproject.org>
Sent: Thursday, August 18, 2022 12:28 PM
To: Brian Grubbs <grubbs@montaguederose.com>
Cc: Doug Montague <montague@montaguederose.com>; Cheyanne Harris <charris@brwncald.com>; Arsenijevic, Jelica <Jelica.Arsenijevic@hdrinc.com>; Luu, Henry <henry.luu@hdrinc.com>; Spranza, John <john.spranza@hdrinc.com>
Subject: Re: Sites: 404(b)(1) cost information

Brian, sorry for the confusion, that is the right estimate for alt 2, but that cost is only applicable for FM20.

FM19 and FM21 both use the $3,934,200.

Get Outlook for iOS

From: Brian Grubbs <grubbs@montaguederose.com>
Sent: Thursday, August 18, 2022 10:08:13 AM
To: JP Robinette <jrobinette@sitesproject.org>
Cc: Doug Montague <montague@montaguederose.com>; Cheyanne Harris <charris@brwncald.com>; Arsenijevic, Jelica <Jelica.Arsenijevic@hdrinc.com>; Luu, Henry <henry.luu@hdrinc.com>; Spranza, John <john.spranza@hdrinc.com>
Subject: RE: Sites: 404(b)(1) cost information

JP, and Henry,
I think I found the Alt 2 estimate in my files, $3,874,400,000. Let me know if I should be using a different number. The attached results are for Alt 2.
Brian

Brian Grubbs | Managing Director
Montague DeRose and Associates
916-712-1747

From: Brian Grubbs <grubbs@montaguederose.com>
Sent: Thursday, August 18, 2022 9:11 AM
To: 'Luu, Henry' <henry.luu@hdrinc.com>
Cc: Doug Montague <montague@montaguederose.com>; 'Cheyanne Harris' <charris@brwncald.com>; 'Arsenijevic, Jelica' <Jelica.Arsenijevic@hdrinc.com>; 'Spranza, John' <john.spranza@hdrinc.com>; 'JP Robinette' <jrobinette@sitesproject.org>
Subject: RE: Sites: 404(b)(1) cost information

Henry,
Can you provide the exact estimate. If not I'll just scale the Alt 1 estimate down to $3,870,000,000

Brian Grubbs | Managing Director
Montague DeRose and Associates
916-712-1747

From: JP Robinette <jrobinette@sitesproject.org>
Sent: Wednesday, August 17, 2022 3:20 PM
To: Brian Grubbs <grubbs@montaguederose.com>
Cc: Doug Montague <montague@montaguederose.com>; Cheyanne Harris <charris@brwncald.com>; Luu, Henry <henry.luu@hdrinc.com>; Arsenijevic, Jelica <Jelica.Arsenijevic@hdrinc.com>; Spranza, John <john.spranza@hdrinc.com>
Subject: Re: Sites: 404(b)(1) cost information

Brian, this looks like a good template to use. One thing, we need to use the construction cost from alternative 2, which was developed in the adopted 2021 cost estimate of $3.87B (very small difference, I know).

Location of number:

	POF Case 1	POF Case 6	- (FM 19)--ArmyCorp Alt 1	- (FM 20)--ArmyCorp Alt 2	- (FM 21)--ArmyCorp Alt 3
	(2021$)	(2021$)	(2021$)	(2021$)	(2021$)
	($000s)	($000s)	($000s)	($000s)	($000s)
Annual Debt Service	137,150	108,839	139,008	152,358	105,188
Annual Fixed Costs	12,644	12,644	12,657	15,054	7,446
Annual Variable Costs	2,049	2,049	2,049	2,049	2,049
Total Fixed and Variable Costs	14,693	14,693	14,706	17,103	9,495
Annual Total Costs	151,842	121,332	153,714	169,462	114,683
WSIP$ ($000s)	836,409	836,409	836,409	836,409	836,409
FED%	7.0%	7.0%	7.0%	0.0%	25.0%
Fed$ ($000s)	316,405	316,405	314,607	-	1,123,597
USDA$ ($000s)	439,559	439,559	-	-	-
WIFIA$ ($000s)	-	2,202,251	-	-	-
Participant Cash ($000s)	67,048	67,048	67,048	67,048	67,048
Revenue Bonds ($000s)	2,831,000	664,000	3,271,000	3,585,000	2,472,000
Total	4,490,421	4,525,672	4,489,065	4,488,457	4,499,055
diff from future$ cost	(3,967)	31,283	(5,324)	(5,931)	4,666
% diff from future$ cost	-0.09%	0.70%	-0.12%	-0.13%	0.10%
Total Const Cost ($000s), (2021$)	3,934,200	3,934,200	3,934,200	3,934,200	3,934,200
Total Const Cost ($000s), (future$)	4,494,389	4,494,389	4,494,389	4,494,389	4,494,389

From the presentation in June 2021:

Feasibility Cost Estimate

1. Provides a higher level of accuracy (AACE Class 4)
   a) Considered results from Feasibility Design
   b) Bottom-up approach
2. Provides investors with a higher degree of certainty in project affordability
3. About a 30% cost increase compared to Value Planning estimates (AACE Class 4 vs. Class 5 cost estimates)
   a) Alternative 1: **$3.93 billion** (2021 dollars)
   b) Alternative 2: **$3.87 billion** (2021 dollars)

From: Brian Grubbs <grubbs@montaguederose.com>
Sent: Wednesday, August 17, 2022 2:36 PM
To: JP Robinette <jrobinette@sitesproject.org>
Cc: Doug Montague <montague@montaguederose.com>; Cheyanne Harris <charris@brwncald.com>; Luu, Henry <henry.luu@hdrinc.com>; Arsenijevic, Jelica <Jelica.Arsenijevic@hdrinc.com>; Spranza, John <john.spranza@hdrinc.com>
Subject: RE: Sites: 404(b)(1) cost information

JP,

The attached shows the DS cost as well as Total fixed and variable costs. These use the same methodology as the Oct-2021 Plan of Finance tables.

the numbers you're looking for are in F11:H11. I've included the POF Case 1 and 6 along with some other inputs to provide context and for some QA on the inputs I used.

Brian

Brian Grubbs | Managing Director

Montague DeRose and Associates

916-712-1747

From: JP Robinette <jrobinette@sitesproject.org>
Sent: Friday, August 12, 2022 8:54 AM
To: Brian Grubbs <grubbs@montaguederose.com>
Cc: Doug Montague <montague@montaguederose.com>; Cheyanne Harris <charris@brwncald.com>; Luu, Henry <henry.luu@hdrinc.com>; Arsenijevic, Jelica <Jelica.Arsenijevic@hdrinc.com>; Spranza, John

<john.spranza@hdrinc.com>
Subject: Fw: Sites: 404(b)(1) cost information

Brian,

We have a need for a stand-alone analysis in support of the Army Corps 404.b.1 memo. I need annual costs for participants for alternative 1, 2, and 3. A few assumptions:

- All financing is bonds at historic rates, don't assume any USDA or WIFIA
- Reclamation levels:
    - Alt 1: 7%
    - Alt 2: 0%
    - Alt 3: 25%

We will then take this annual cost and divide it by the long-term average deliveries that are being run.

Do you have time to do this early next week?

Thanks,
JP

From: Arsenijevic, Jelica <Jelica.Arsenijevic@hdrinc.com>
Sent: Thursday, August 11, 2022 5:12 PM
To: JP Robinette <jrobinette@sitesproject.org>
Cc: Smith, Kristin <Kristin.Smith@hdrinc.com>; Spranza, John <john.spranza@hdrinc.com>; Markham, John <John.Markham@icf.com>; Vondergeest, Michael <Michael.Vondergeest@icf.com>
Subject: RE: Sites: 404(b)(1) cost information

JP
As a reminder, tomorrow mornings call is in regards to the cost-related info in the attached draft 404(b)(1) memo tables 2 and 16. On the former, we are requesting confirmation of the existing values (e.g., annual cost/acre foot, annualized deliveries) and populating data for the "XX" placeholders, and on the latter we are requesting data for the "XX" placeholders in cost screening metrics 3 and 4 and logistics metric 4. As a next step, references and brief technical justification would be needed as support.

Looking forward to the call.
Jelica

Many thanks to ICF for leading tomorrows call!

Jelica Arsenijevic
Environmental Project Manager

2379 Gateway Oaks Drive, Suite 200
Sacramento, CA 95833
D 916-679-8854
M 209-329-6897

Jelica.Arsenijevic@hdrinc.com

-----Original Appointment-----
From: Arsenijevic, Jelica
Sent: Thursday, August 4, 2022 10:44 AM
To: Arsenijevic, Jelica; Spranza, John; Markham, John; Vondergeest, Michael; JP Robinette
Cc: Smith, Kristin
Subject: Sites: 404(b)(1) cost information
When: Friday, August 12, 2022 8:00 AM-9:00 AM (UTC-08:00) Pacific Time (US & Canada).
Where: Microsoft Teams Meeting

Meeting to discuss the attached with JP...table 16 from the 404(b)(1) memo. Unfortunately Erin is not available as she is on PTO but we can follow up with her when she returns (if needed).

Microsoft Teams meeting

Join on your computer or mobile app
Click here to join the meeting

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Passcode: tY75ck
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(833) 255-2803,,138158539# United States (Toll-free)
Phone Conference ID: 138 158 539#
Find a local number | Reset PIN

Learn More | Meeting options

From: Janis Offermann [janis@horizonh2o.com]
Sent: 8/19/2022 12:41:52 PM
To: Risse, Danielle [Danielle.Risse@hdrinc.com]
CC: Alicia Forsythe [aforsythe@sitesproject.org]; Laurie Warner Herson [laurie.warner.herson@phenixenv.com]; Kevin Spesert [kspesert@sitesproject.org]
Subject: Re: [EXTERNAL] RE: Highway 20 Tule Elk Crossing Project

What a cool project. It seems like wildlife enhancement could be a subject for the working group. Looking at the IS, I see that YD is the only tribe who has requested consultation, even though the Cortina reservation is right around the corner. Still, it might be a way to get Cortina's attention.

On Fri, Aug 19, 2022 at 9:20 AM Risse, Danielle <Danielle.Risse@hdrinc.com> wrote:

> Would wildlife crossings be an appropriate topic for the tribal government working group? And maybe a hook for Cortina to participate.
>
> **Danielle Risse,** M.A.
> **Office** 916-679-8796 **Mobile** 707-372-5007
>
> hdrinc.com/follow-us
>
> ---
>
> **From:** Alicia Forsythe <aforsythe@sitesproject.org>
> **Sent:** Thursday, August 18, 2022 5:51 PM
> **To:** Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Janis Offermann (Janis@Horizonh2o.com) <janis@horizonh2o.com>; Kevin Spesert <kspesert@sitesproject.org>; Risse, Danielle <Danielle.Risse@hdrinc.com>
> **Subject:** FW: Highway 20 Tule Elk Crossing Project
>
> CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.
>
> I just thought about this – I noticed that Caltrans named this project with Cortina in it and used their language for Elk Crossing. This indicates to me that Cortina might be interested in elk in the project area and thinking more about what we might do for elk and ensuring elk crossings/passage might be important to them. We do have wildlife crossings as part of our mitigation requirements, but haven't framed up what those look like yet.
>
> Ali
>
> ----------------------
> Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org
>
>

From: Alicia Forsythe
Sent: Thursday, August 18, 2022 5:32 PM
To: Spranza, John <John.Spranza@hdrinc.com>; Poopatanapong, Amy <Amy.Poopatanapong@icf.com>; Briard, Monique <monique.briard@icf.com>; Arsenijevic, Jelica <jelica.arsenijevic@hdrinc.com>; Newens, Richard <Richard.Newens@hdrinc.com>; Smith, Kristin <Kristin.Smith@hdrinc.com>; Berryman, Ellen (Ellen.Berryman@icf.com) <ellen.berryman@icf.com>; Luu, Henry <Henry.Luu@hdrinc.com>
Cc: Kevin Spesert <kspesert@sitesproject.org>
Subject: RE: Highway 20 Tule Elk Crossing Project

Thanks John. My computer says the link you sent is from a malicious site. ;-0

But, I found it on CEQA net here: CORTINA RIDGE SAWATO KAMITLITARRO (ELK CROSSING) PROJECT (ca.gov)

This is in the same ridge line as Sites and really not that far from the reservoir. I do wonder if elk will travel under our bridge. And how much room there would be for them to travel between the water and bridge abutments.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Thursday, August 18, 2022 10:03 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Poopatanapong, Amy <Amy.Poopatanapong@icf.com>; Briard, Monique <monique.briard@icf.com>; Arsenijevic, Jelica <jelica.arsenijevic@hdrinc.com>; Newens, Richard <Richard.Newens@hdrinc.com>; Smith, Kristin <Kristin.Smith@hdrinc.com>; Berryman, Ellen (Ellen.Berryman@icf.com) <ellen.berryman@icf.com>
Cc: Kevin Spesert <kspesert@sitesproject.org>
Subject: FW: Highway 20 Tule Elk Crossing Project

Hi Folks,

I just learned of this project today, they are building a wildlife overpass for tule elk over Highway 20. We may need to look at this as this is not too far from the project and I am not sue where the corridor is. There is a meeting this week on the project.

https://darik.news/california/lake-county-news-calif-caltrans-solicits-community-response-over-highway-20-wildlife-crossing-in-colusa-county/682465.html

John Spranza

D 916.679.8858 M 818.640.2487

Shared via the Google app

John
818-640-2487
Sent from my iPhone

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Memorandum

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Project Name	Sites Reservoir Project	
Subject	SALMOD Model Results to Support the 2022 Final EIR/EIS: No Action Alternative, Alternative 1A, Alternative 1B, Alternative 2, and Alternative 3	
Attention	Ali Forsythe/Sites Project Authority	Monique Briard/ICF
	Erin Heydinger/HDR	Mike Hendrick /ICF
	Laurie Warner Herson/Phenix	Nicole Williams/ICF
	Lyna Black/Jacobs	Anne Huber/ICF
	Angela Bezzone/MBK	
From	Robert Leaf/JACOBS	Steve Micko/JACOBS
	Reed Thayer/JACOBS	Samaneh Saadat/JACOBS
Date	August 19, 2022	

1. Introduction

The Sites Reservoir Project team has developed model simulations to support quantitative analysis of Sites long-term operations as part of developing a Final Environmental Document, for completion in 2022.

The results of these model simulations are provided for informational and review purposes. If there are any questions regarding the results of these simulations, please contact the modeling team.

2. Modeled Scenarios

Model results are provided for the alternatives tabulated below.

Model Name	Label Name (as seen in spreadsheet)	Description
No Action Alternative 051422	NAA 051422	Baseline simulation (Reclamation 2021 Benchmark)
Alternative 1A 051722	ALT 1A 051722	1.5 MAF Reservoir
Alternative 1B 051722	ALT 1B 051722	1.5 MAF Reservoir with 101 TAF of Reclamation Investment
Alternative 2 051722	ALT 2 051722	1.27 MAF Reservoir
Alternative 3 051722	ALT 3 051722	1.5 MAF Reservoir with 360 TAF of

		Reclamation Investment

The SALMOD model was used to simulate annual production potential for juvenile fall, late-fall, winter, and spring runs of Chinook salmon in the Sacramento River from Keswick Dam to the Red Bluff Diversion Dam.

3. Model Simulations for Modeled Scenarios

3.1 SALMOD Models

Two pdf reports, NODOS_FEIRS2022_SALMOD_Ann_Assessment_Plots_20220804.pdf and NODOS_FEIRS2022_SALMOD_Ann_Mortality_Production Summary_All_Runs_20220804.pdf, are provided.

Figure B-a-1. Annual Potential Production for Winter-Run Chinook Salmon

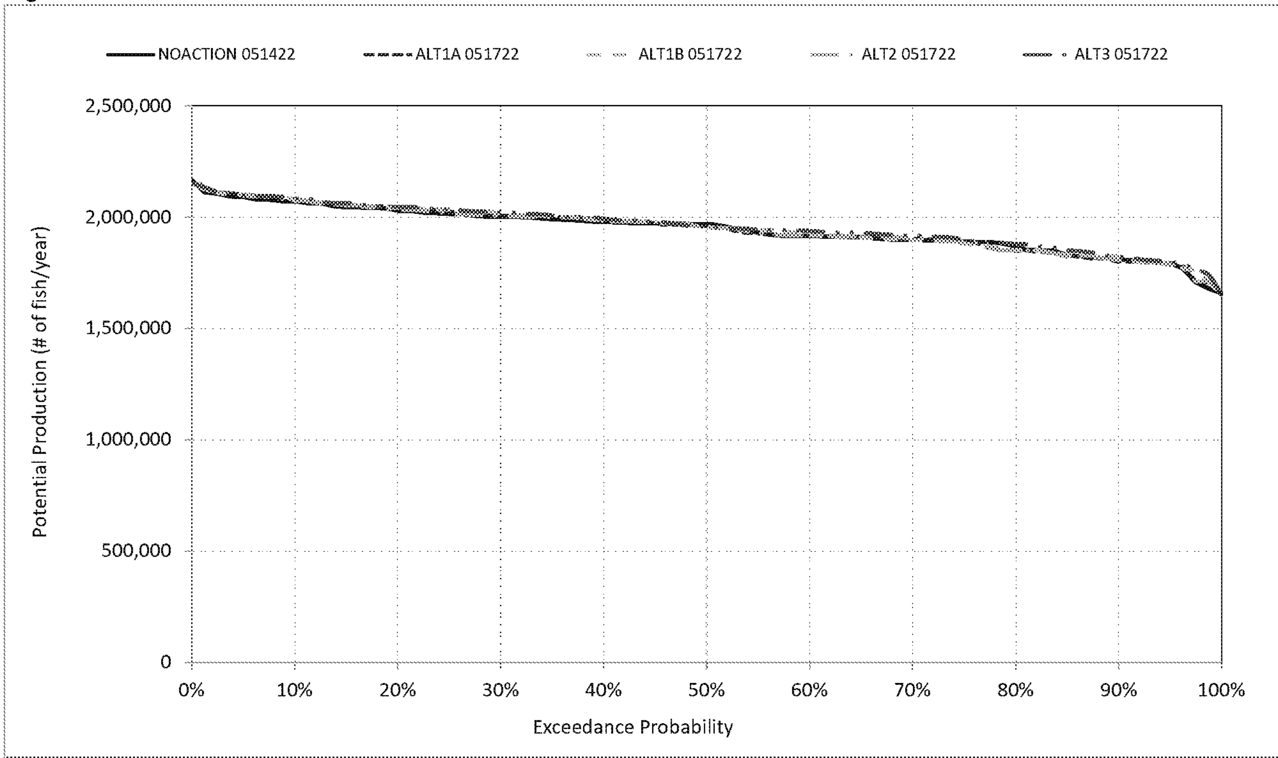


Figure B-a-2. Annual Mortality for Winter-Run Chinook Salmon - Eggs

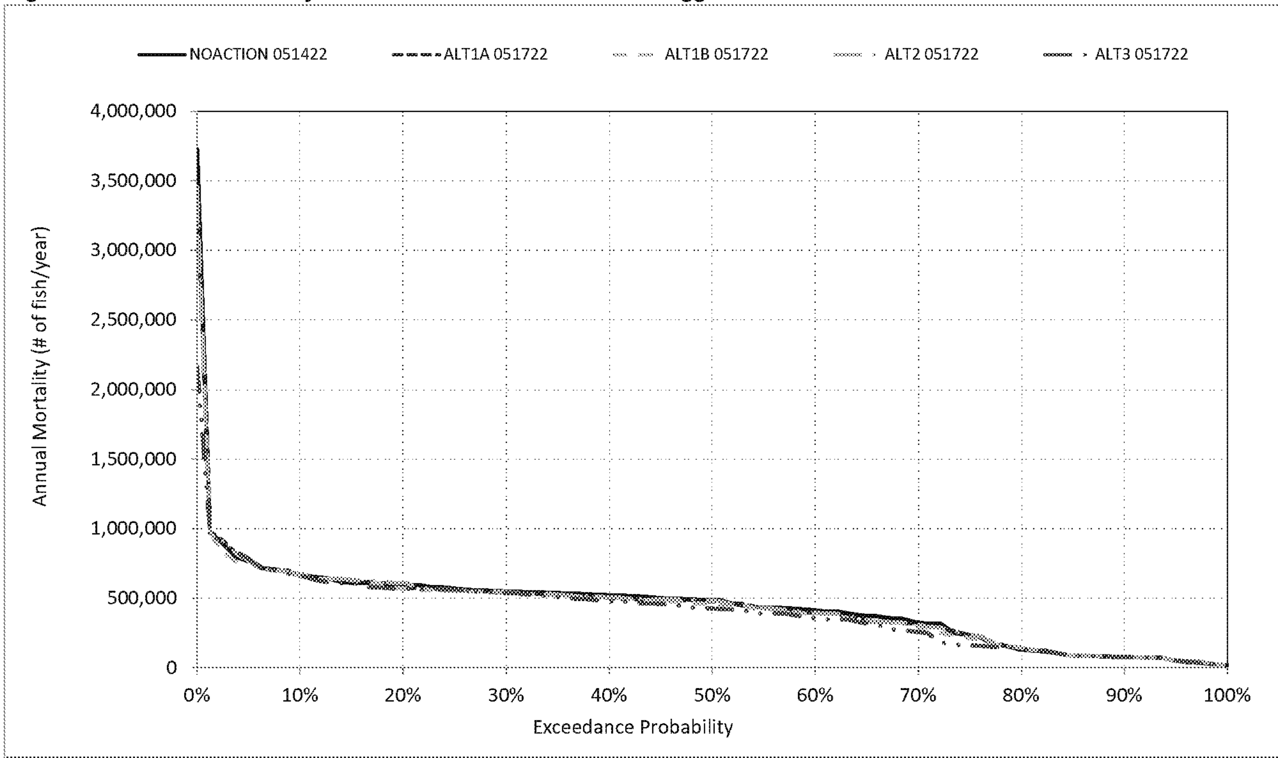


Figure B-a-3. Annual Mortality for Winter-Run Chinook Salmon - Fry

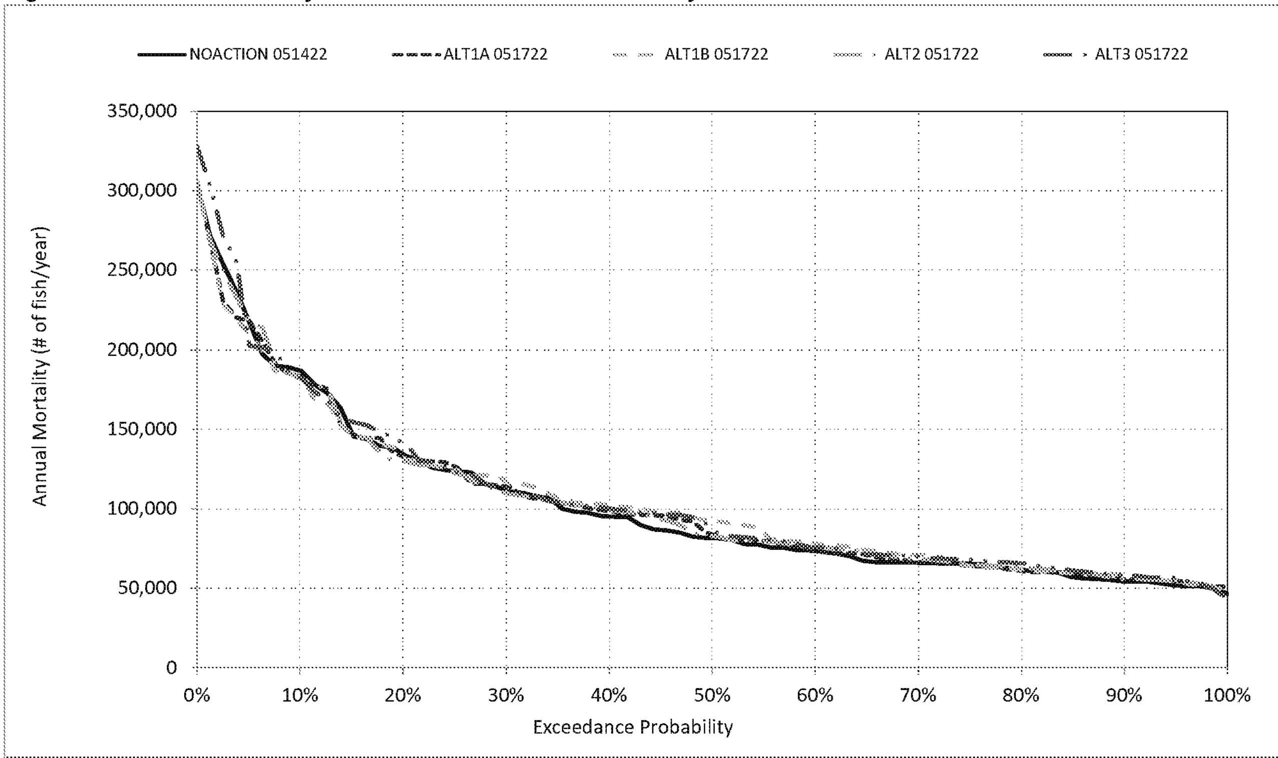


Figure B-a-4. Annual Mortality for Winter-Run Chinook Salmon - Pre-Smolt

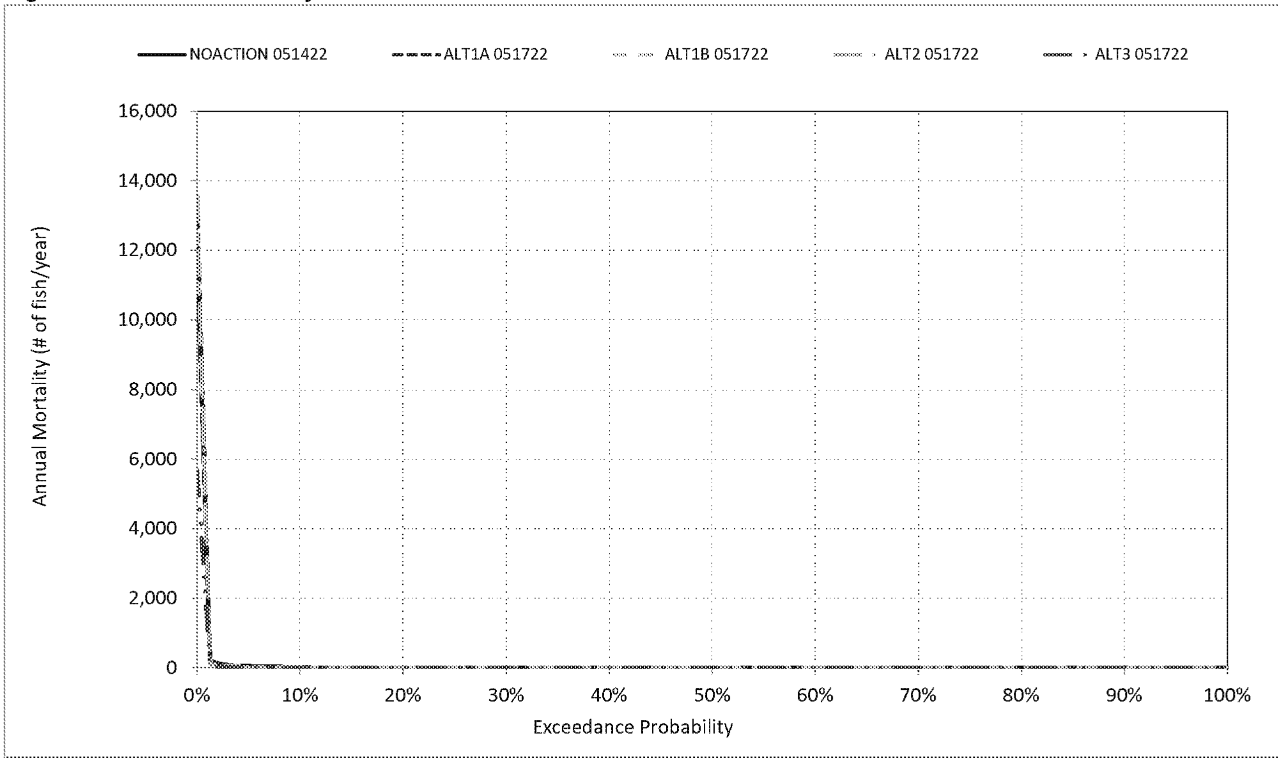


Figure B-a-5. Annual Mortality for Winter-Run Chinook Salmon - Immature Smolt

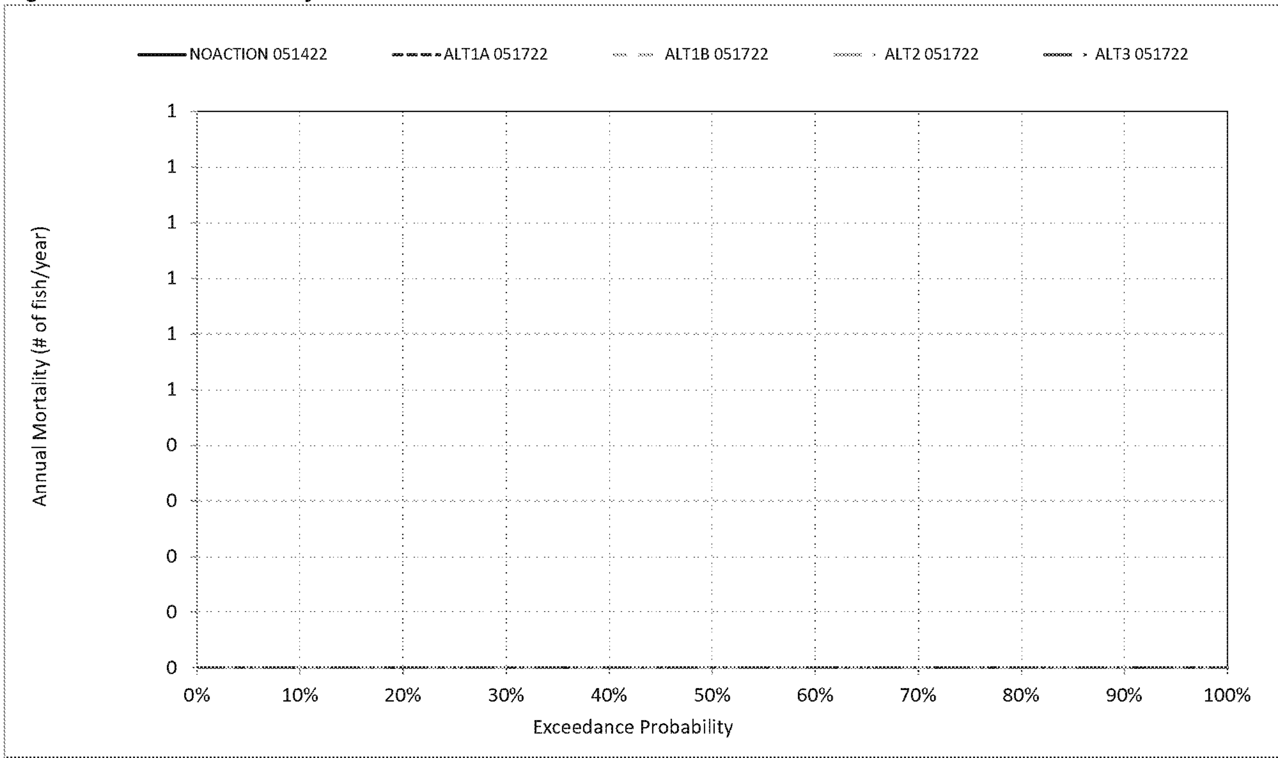


Figure B-a-6. Annual Mortality for Winter-Run Chinook Salmon - Pre- & Immature Smolts

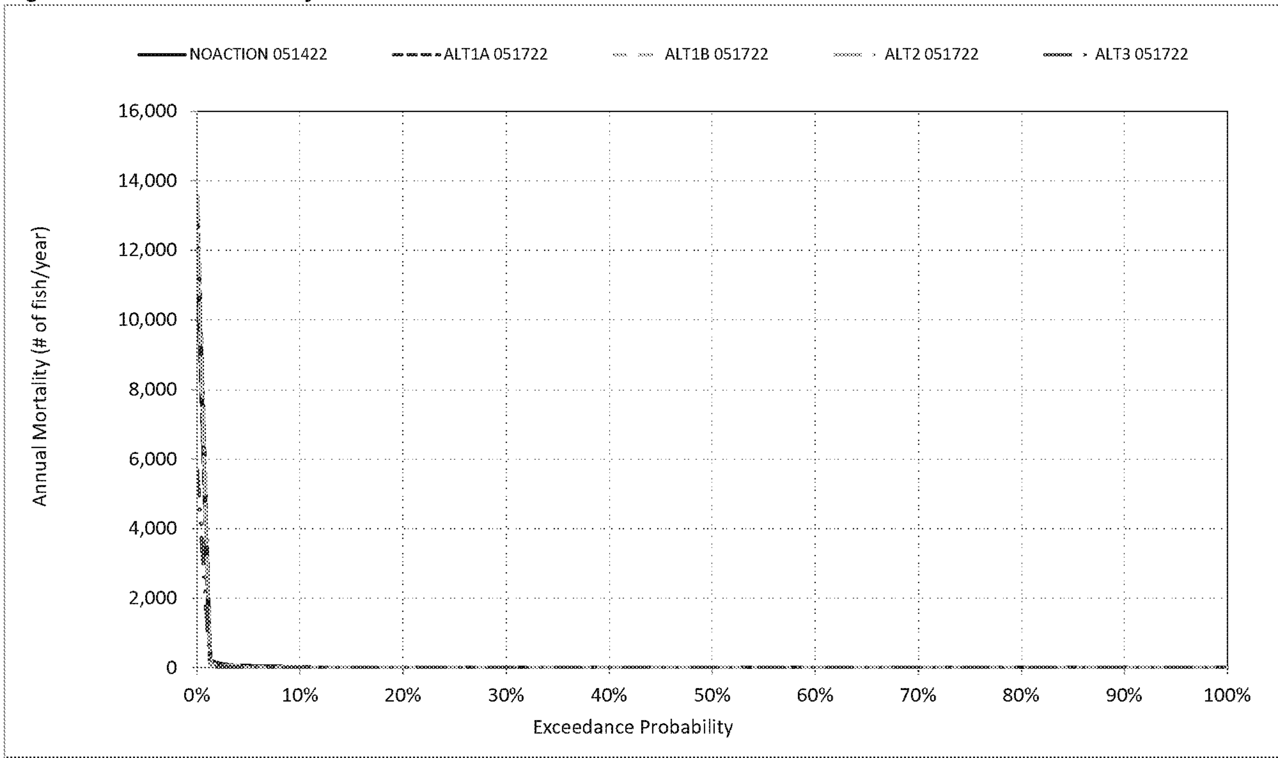


Figure B-a-7. Annual Mortality for Winter-Run Chinook Salmon - All Lifestages

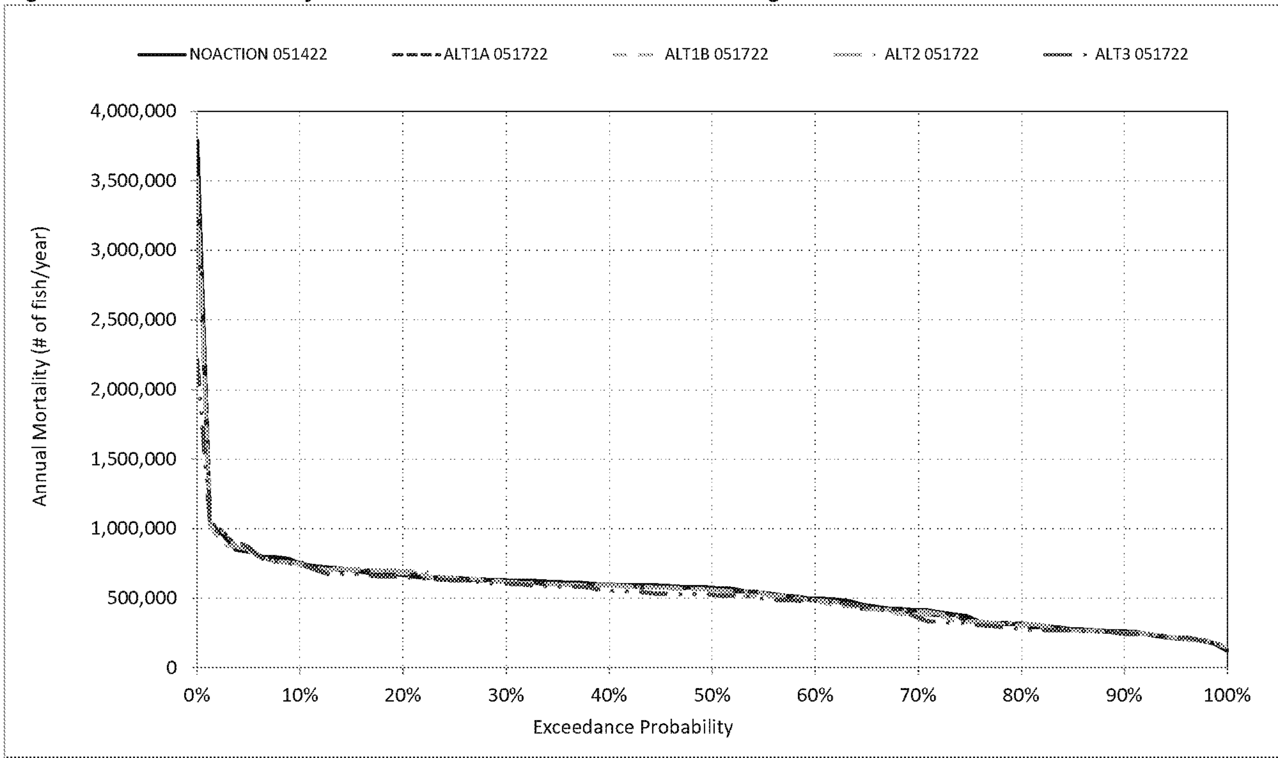


Figure B-a-8. Incubation - Habitat based Annual Mortality for Winter-Run Chinook Salmon

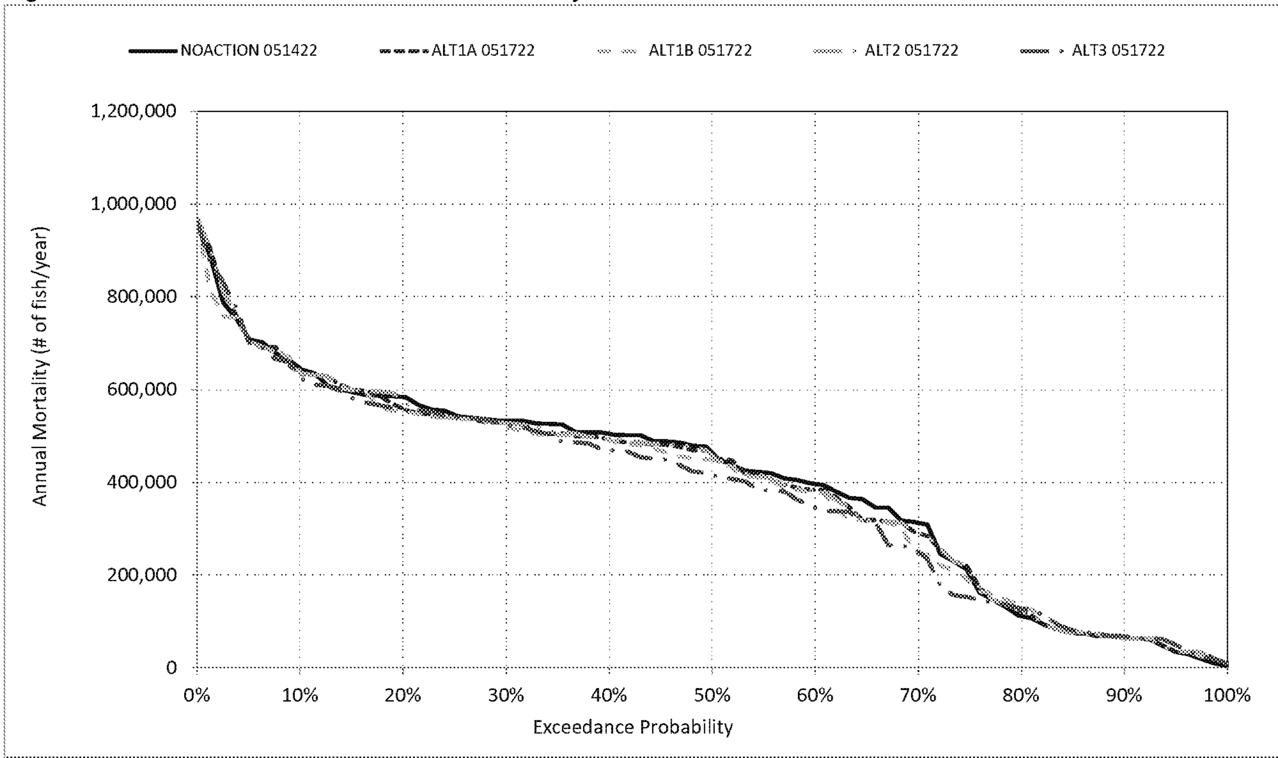


Figure B-a-9. Super-imposition - Habitat based Annual Mortality for Winter-Run Chinook Salmon

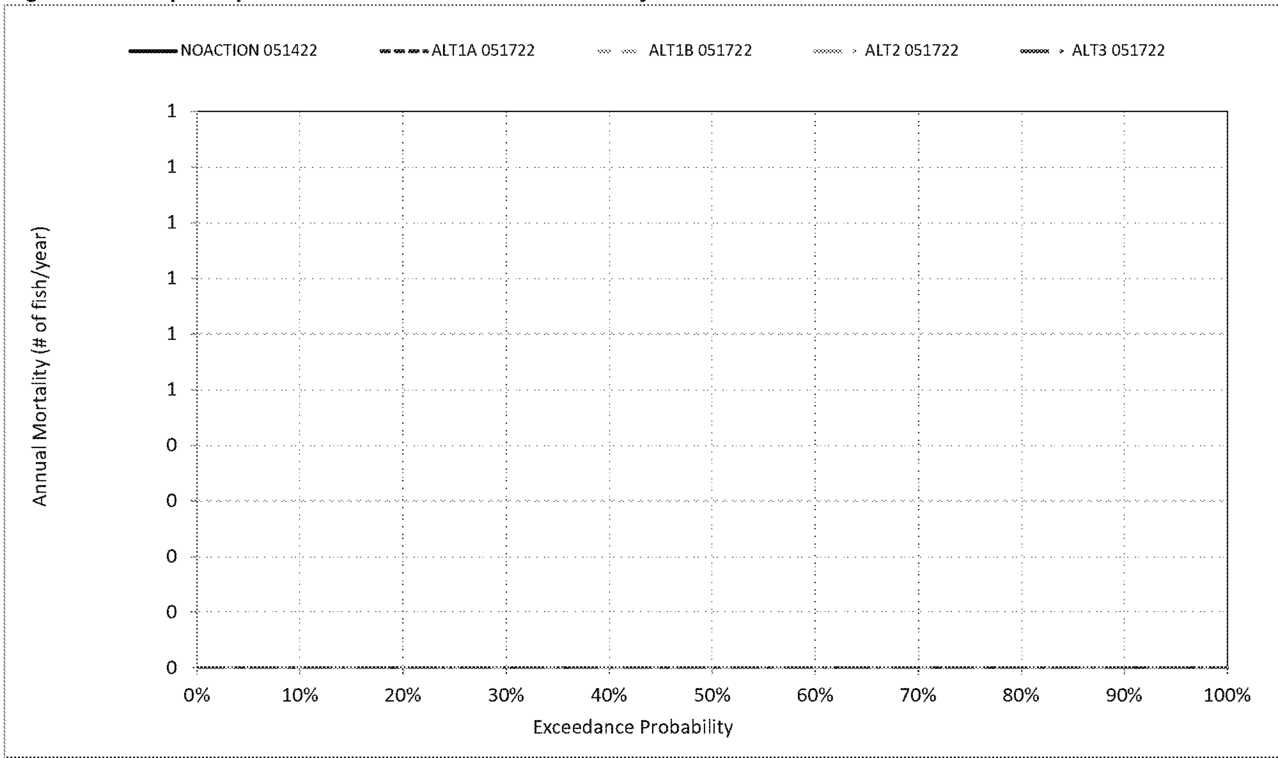


Figure B-a-10. Fry - Habitat based Annual Mortality for Winter-Run Chinook Salmon

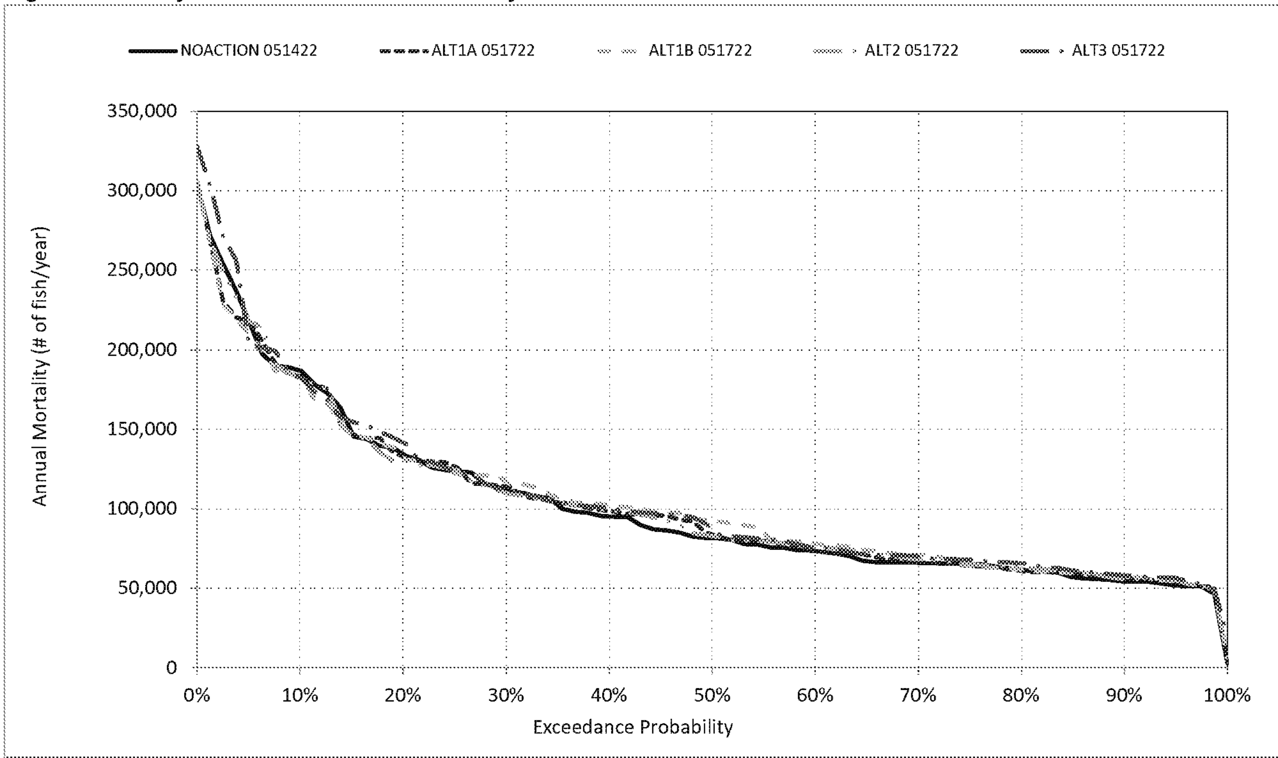


Figure B-a-11. Pre-smolt - Habitat based Annual Mortality for Winter-Run Chinook Salmon

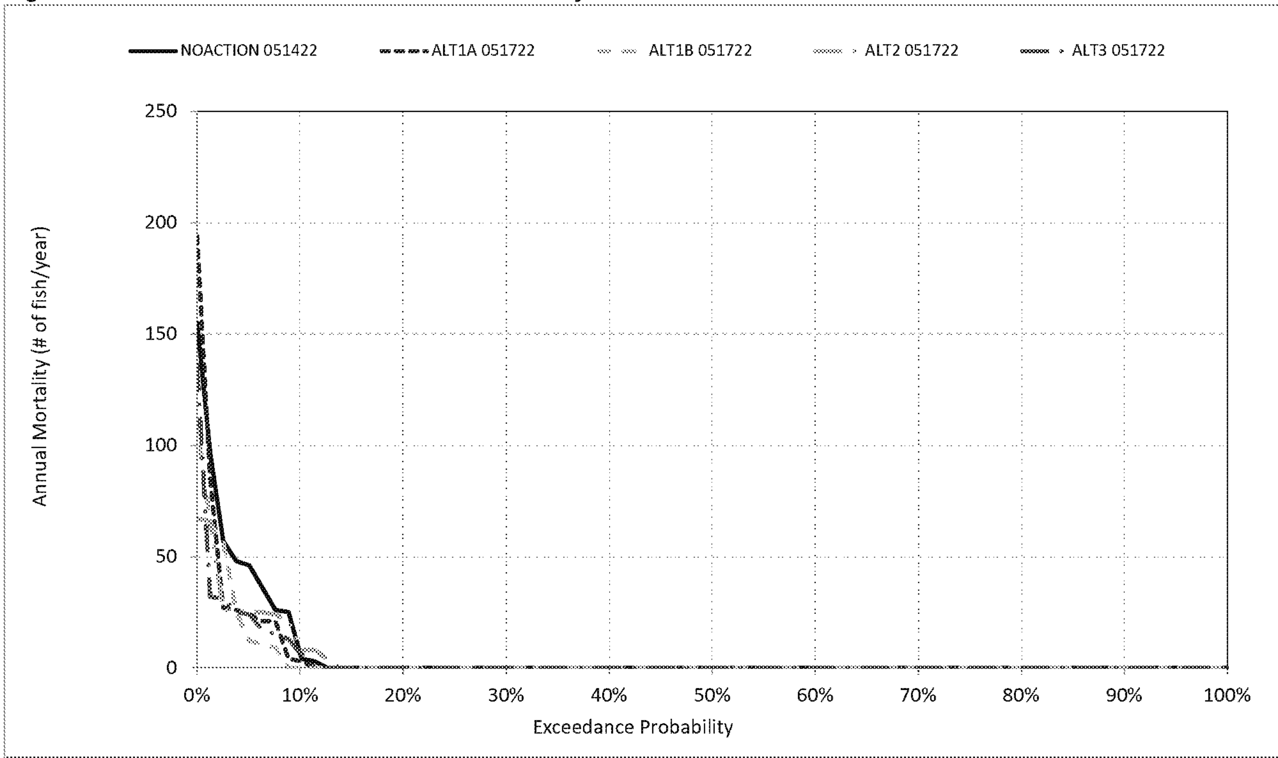


Figure B-a-12. Immature Smolt - Habitat based Annual Mortality for Winter-Run Chinook Salmon

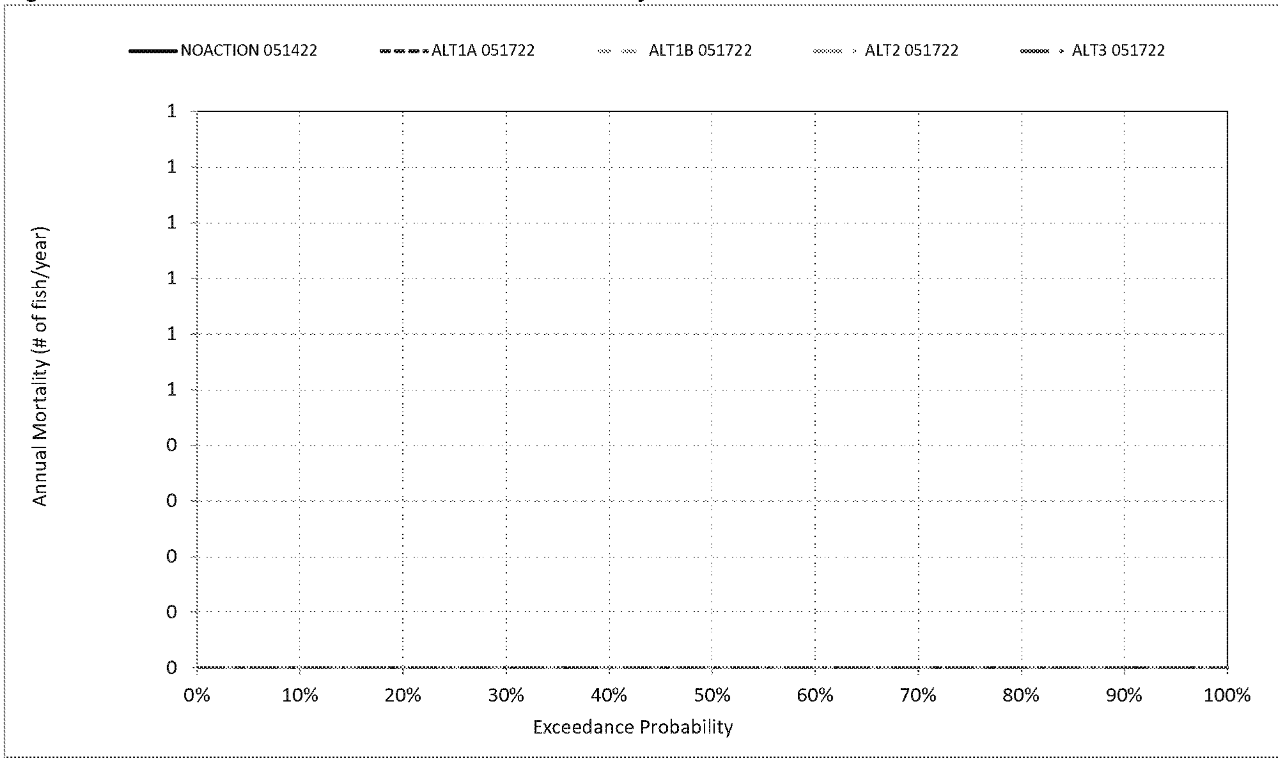


Figure B-a-13. Total Habitat based Annual Mortality for Winter-Run Chinook Salmon

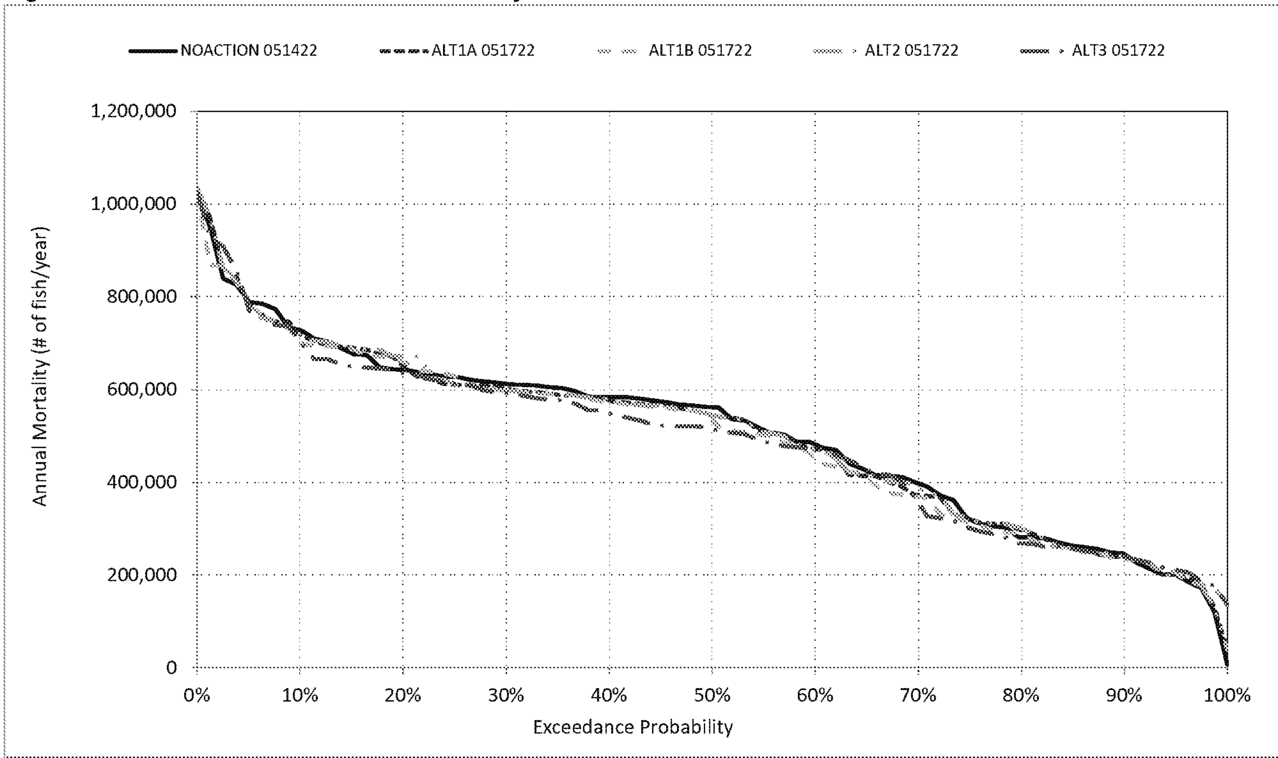


Figure B-a-14. Pre-Spawn Mortality - Temperature based Annual Mortality for Winter-Run Chinook Salmon

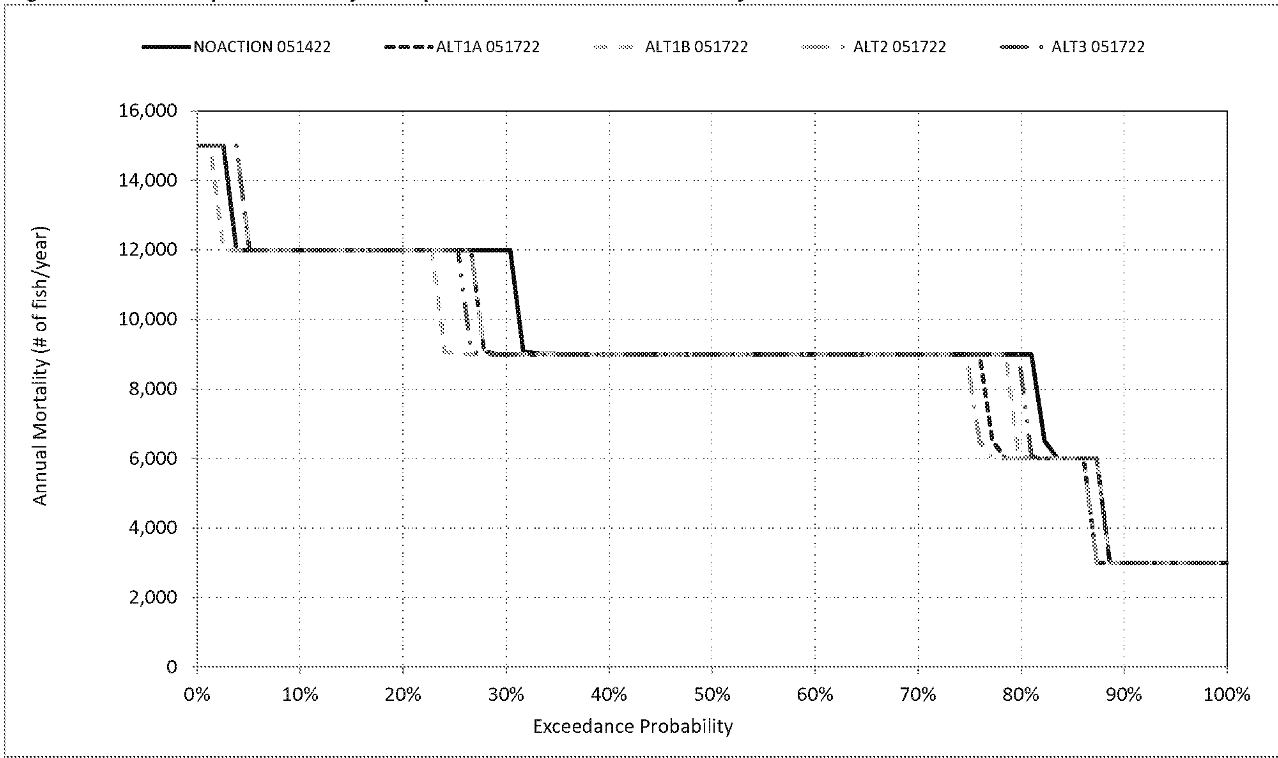


Figure B-a-15. Eggs - Temperature based Annual Mortality for Winter-Run Chinook Salmon

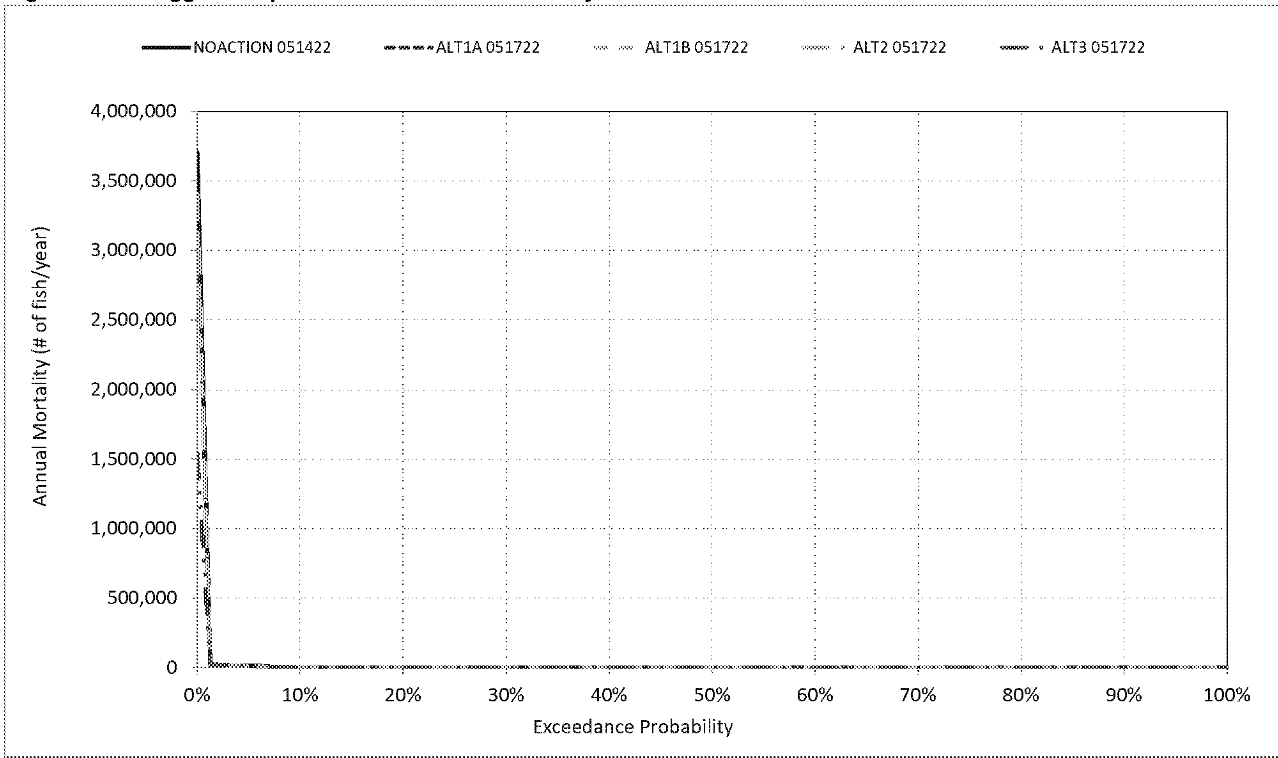


Figure B-a-16. Fry - Temperature based Annual Mortality for Winter-Run Chinook Salmon

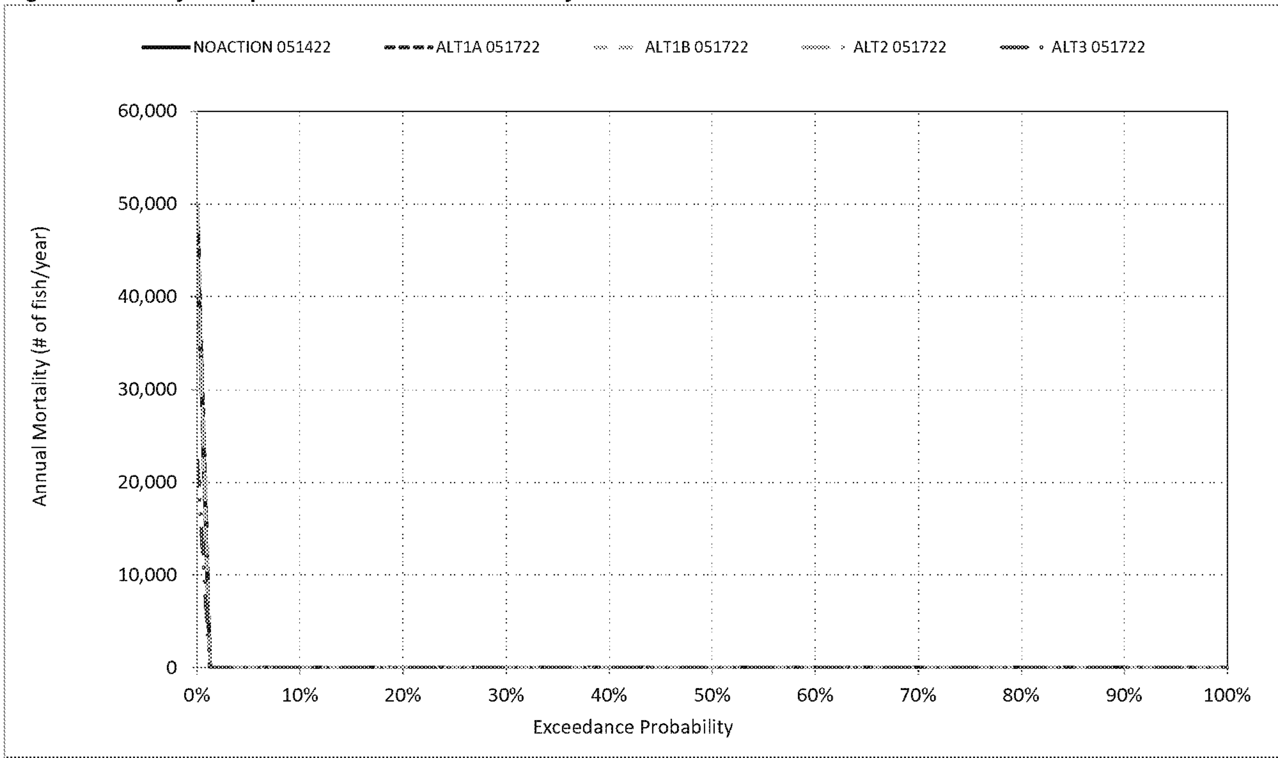


Figure B-a-17. Pre-smolt - Temperature based Annual Mortality for Winter-Run Chinook Salmon

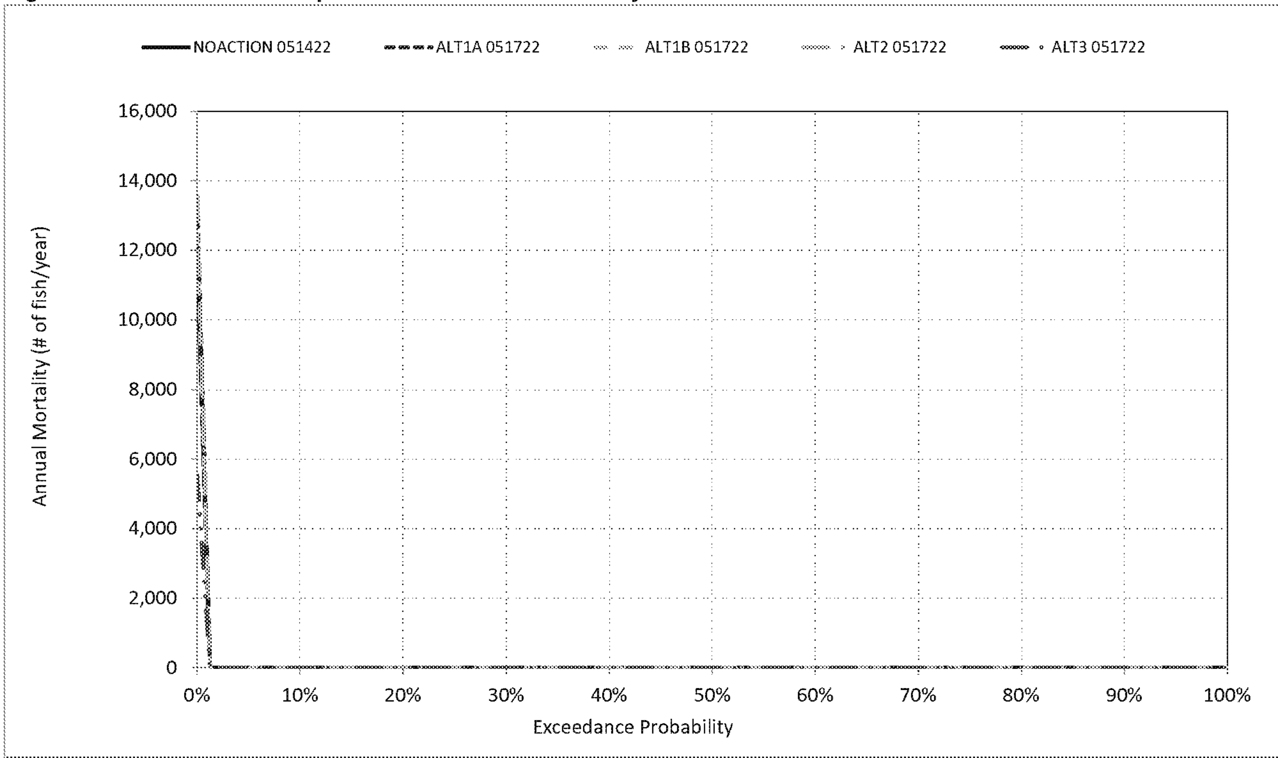


Figure B-a-18. Immature Smolt - Temperature based Annual Mortality for Winter-Run Chinook Salmon

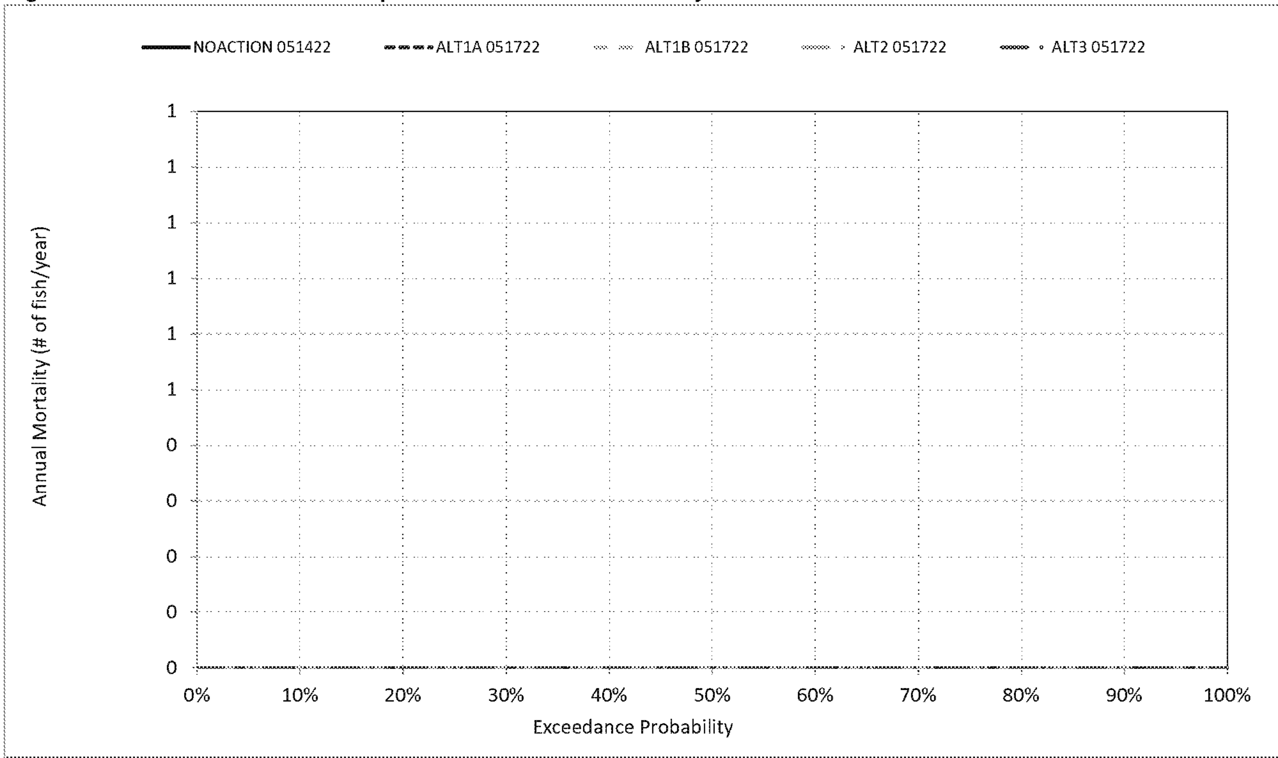


Figure B-a-19. Total Temperature based Annual Mortality for Winter-Run Chinook Salmon

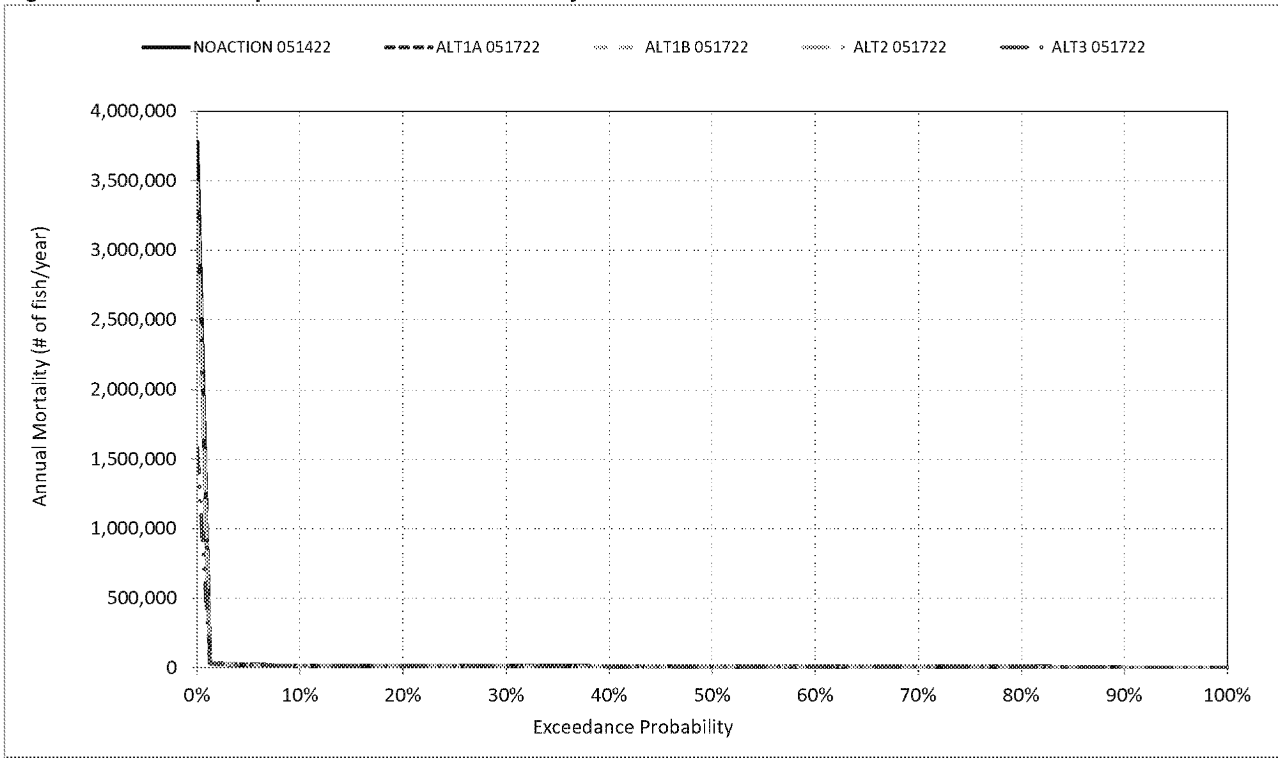


Figure B-b-1. Annual Potential Production for Spring-Run Chinook Salmon

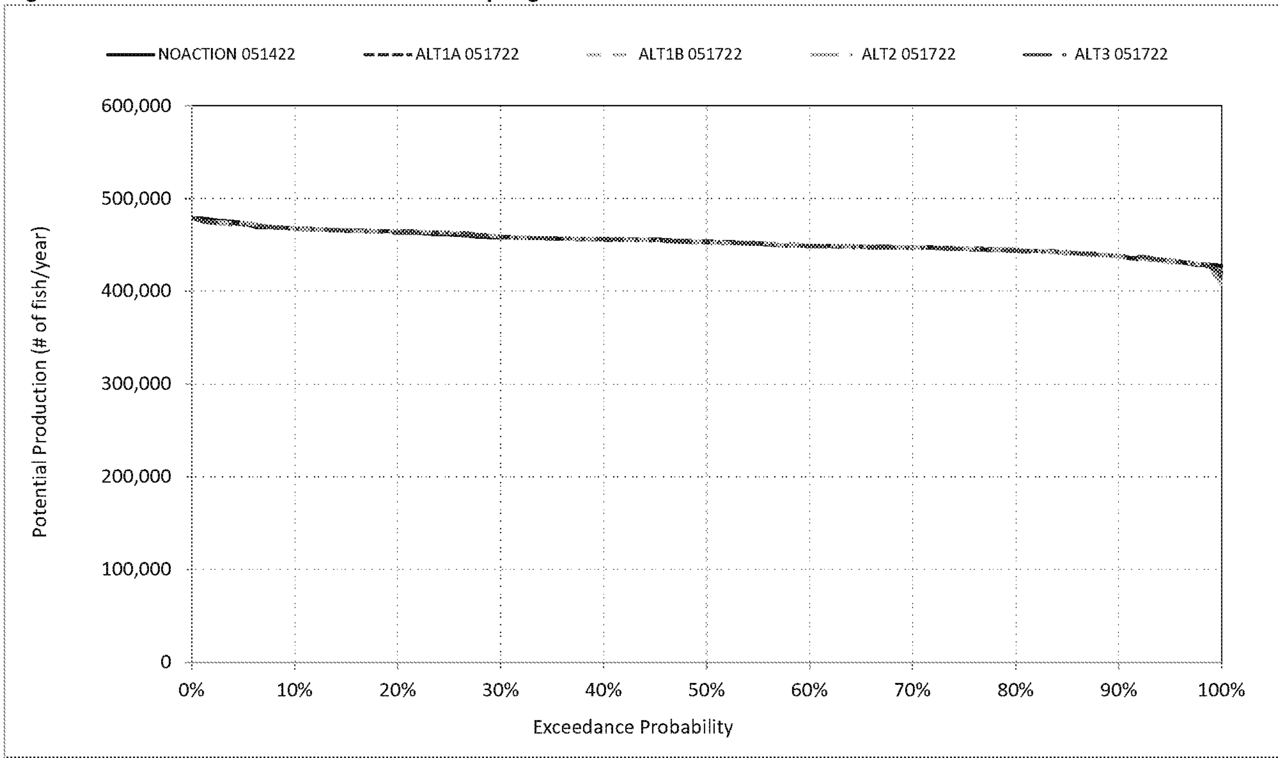


Figure B-b-2. Annual Mortality for Spring-Run Chinook Salmon - Eggs

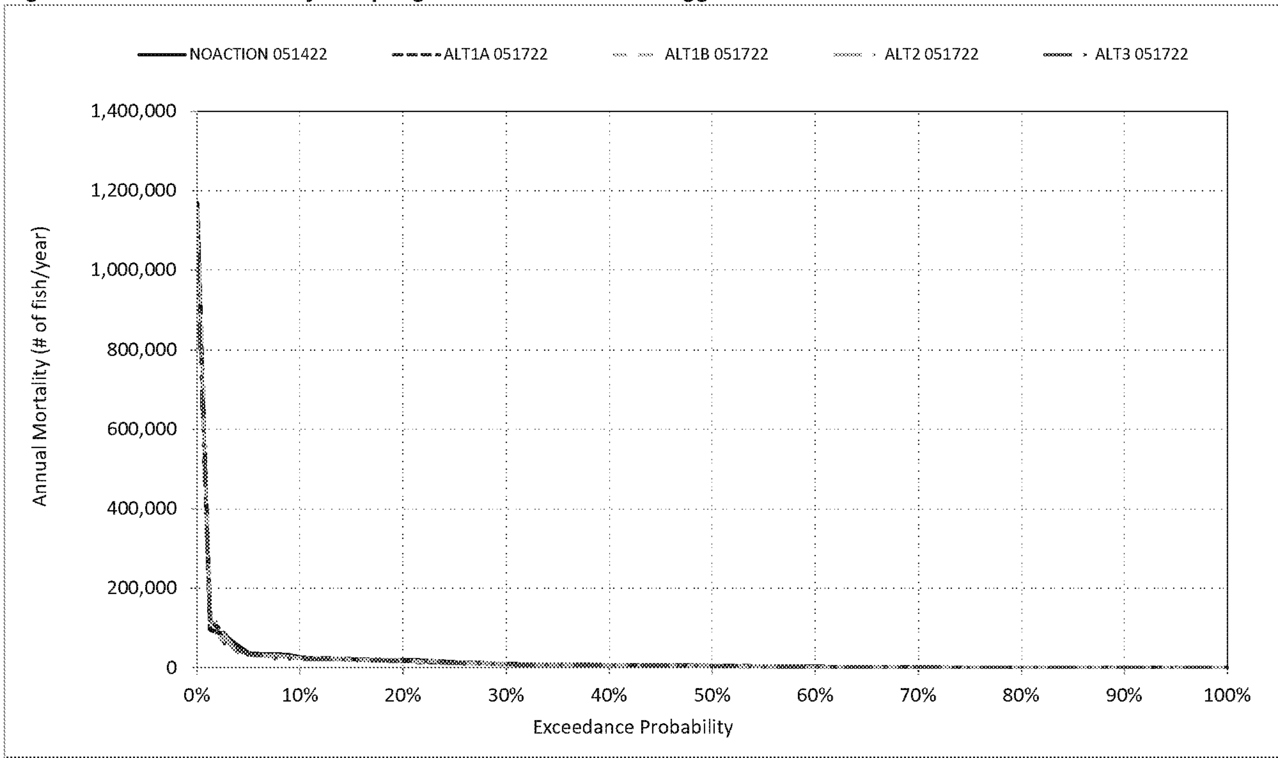


Figure B-b-3. Annual Mortality for Spring-Run Chinook Salmon - Fry

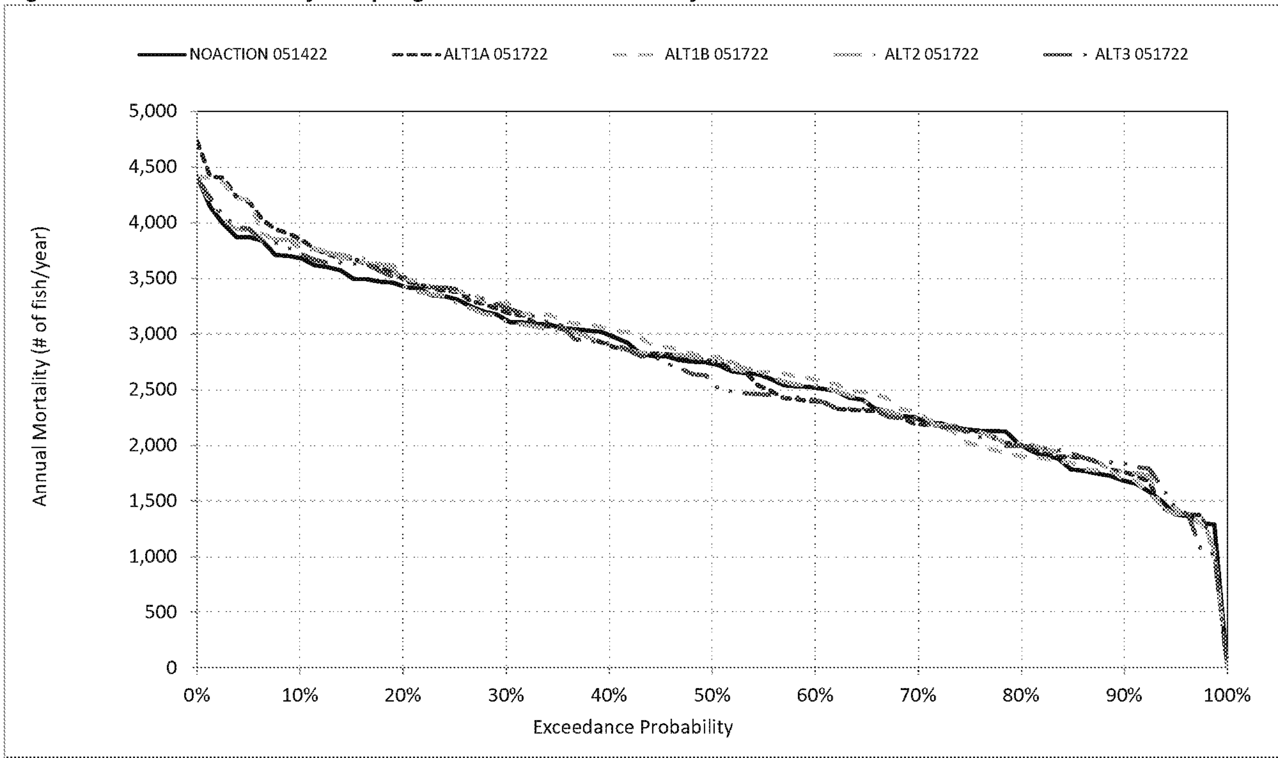


Figure B-b-4. Annual Mortality for Spring-Run Chinook Salmon - Pre-Smolt

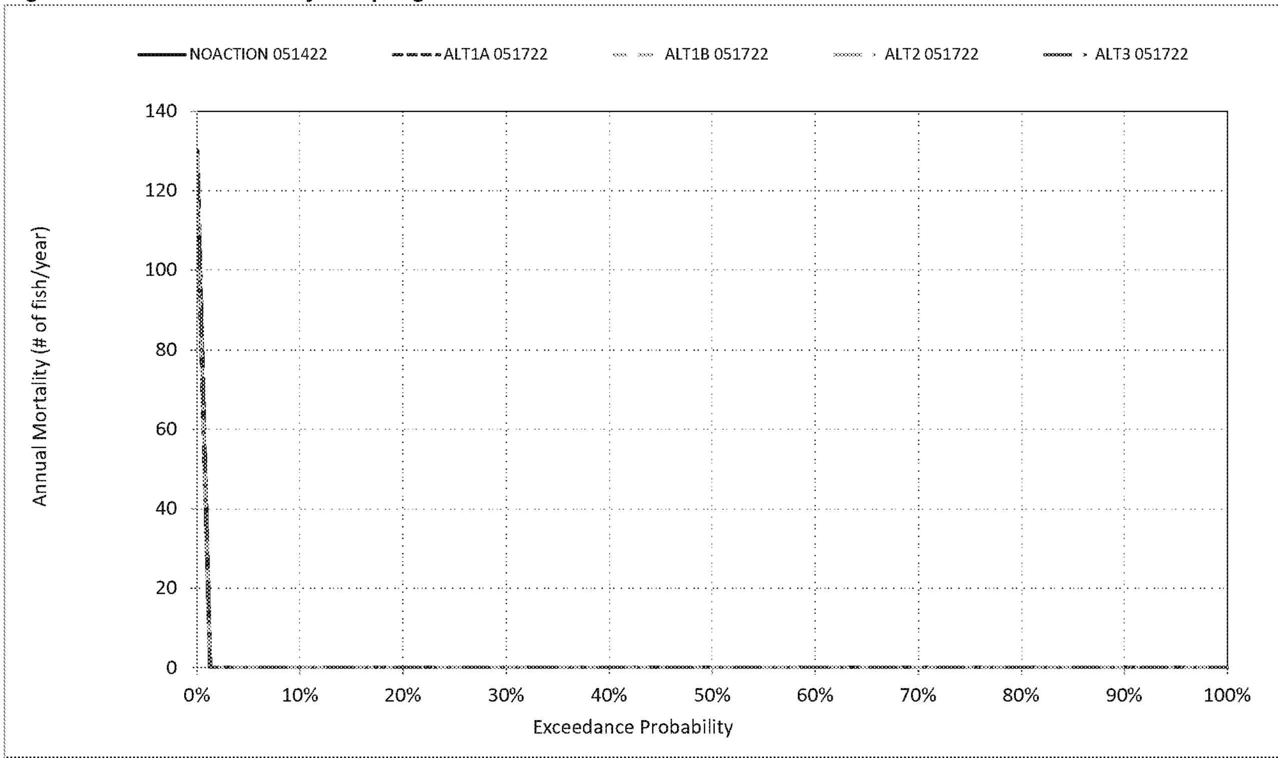


Figure B-b-5. Annual Mortality for Spring-Run Chinook Salmon - Immature Smolt

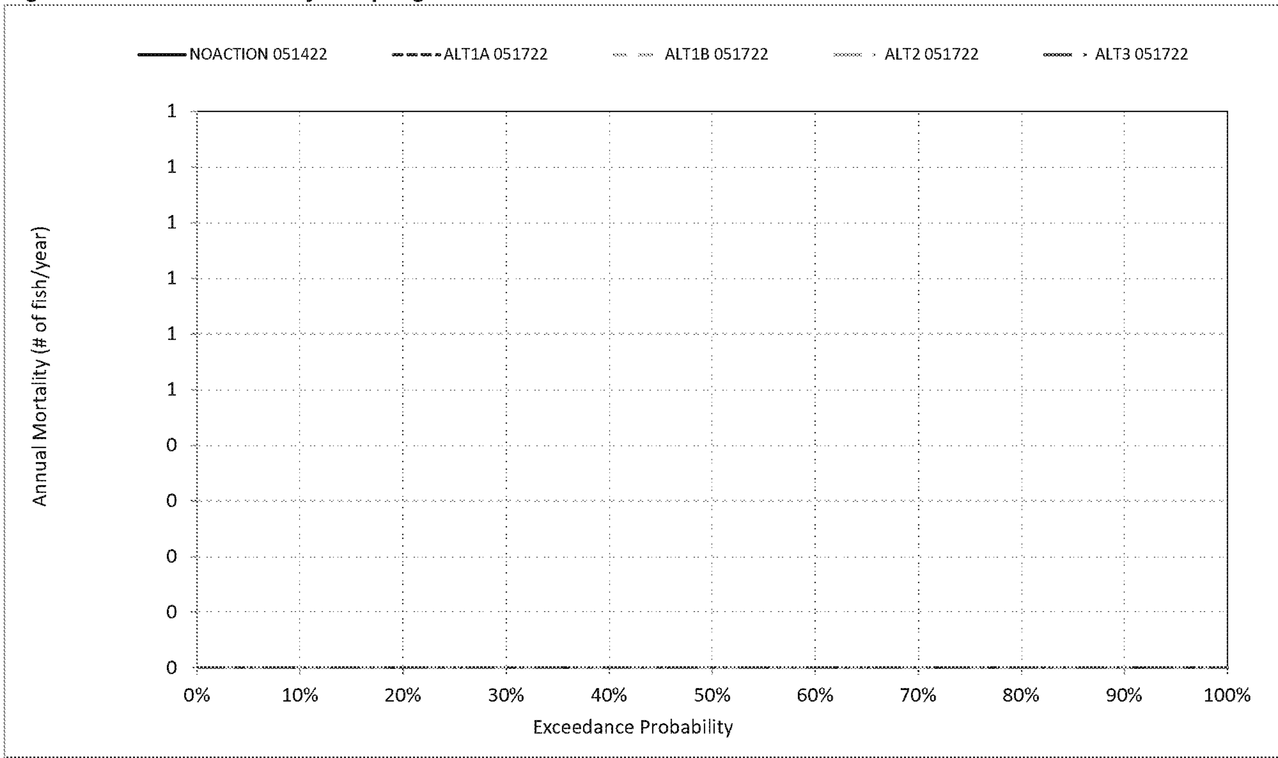


Figure B-b-6. Annual Mortality for Spring-Run Chinook Salmon - Pre- & Immature Smolts

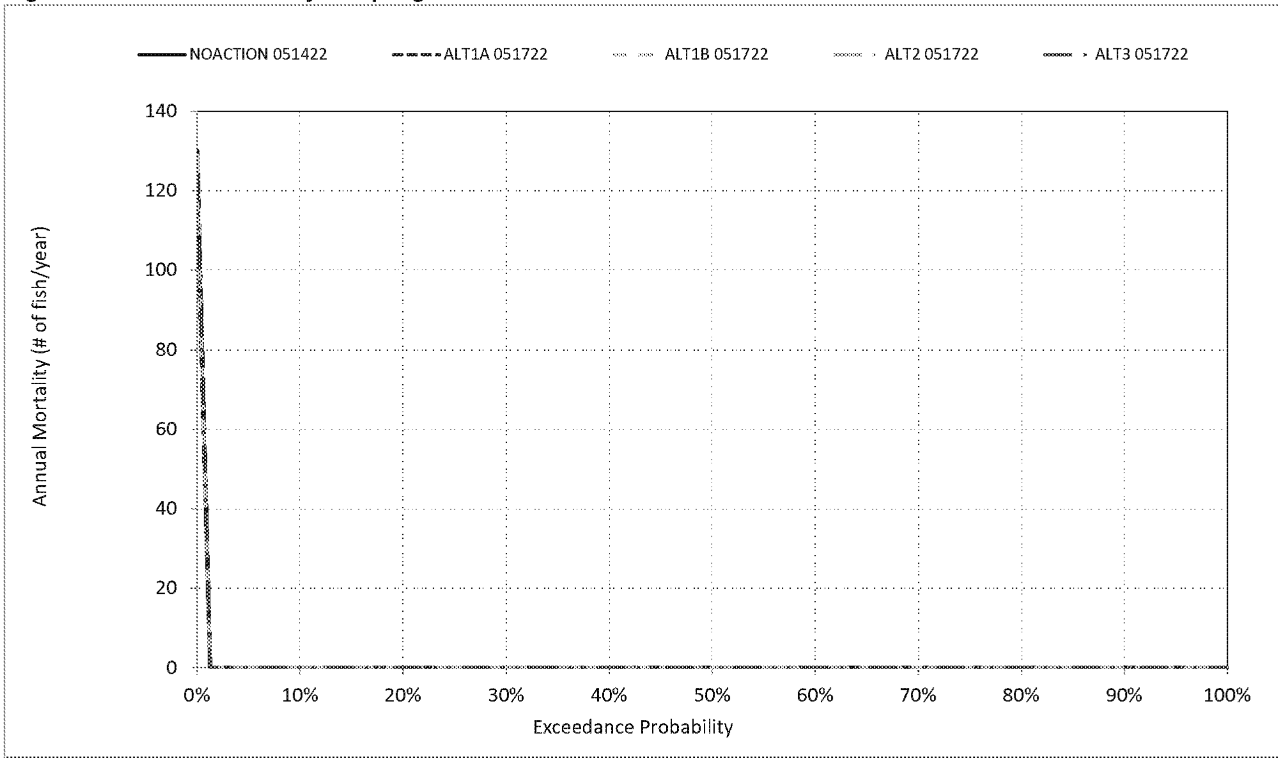


Figure B-b-7. Annual Mortality for Spring-Run Chinook Salmon - All Lifestages

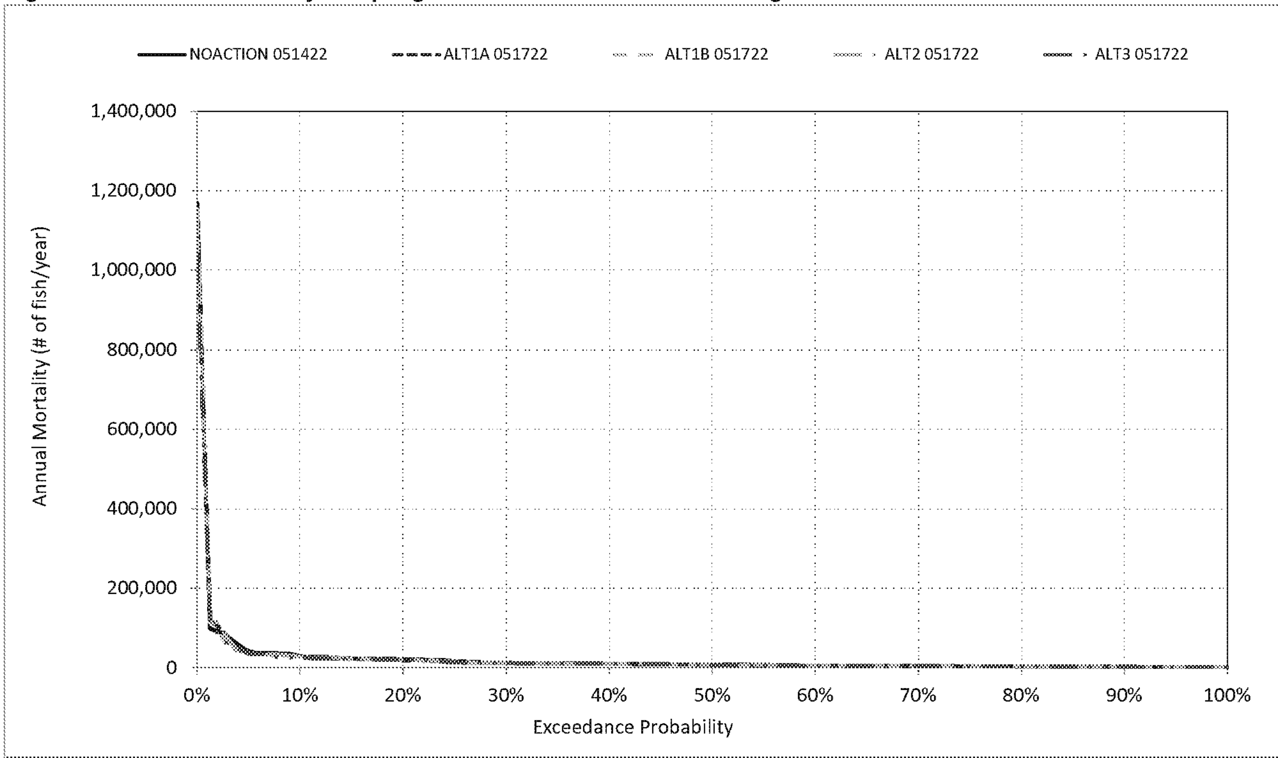


Figure B-b-8. Incubation - Habitat based Annual Mortality for Spring-Run Chinook Salmon

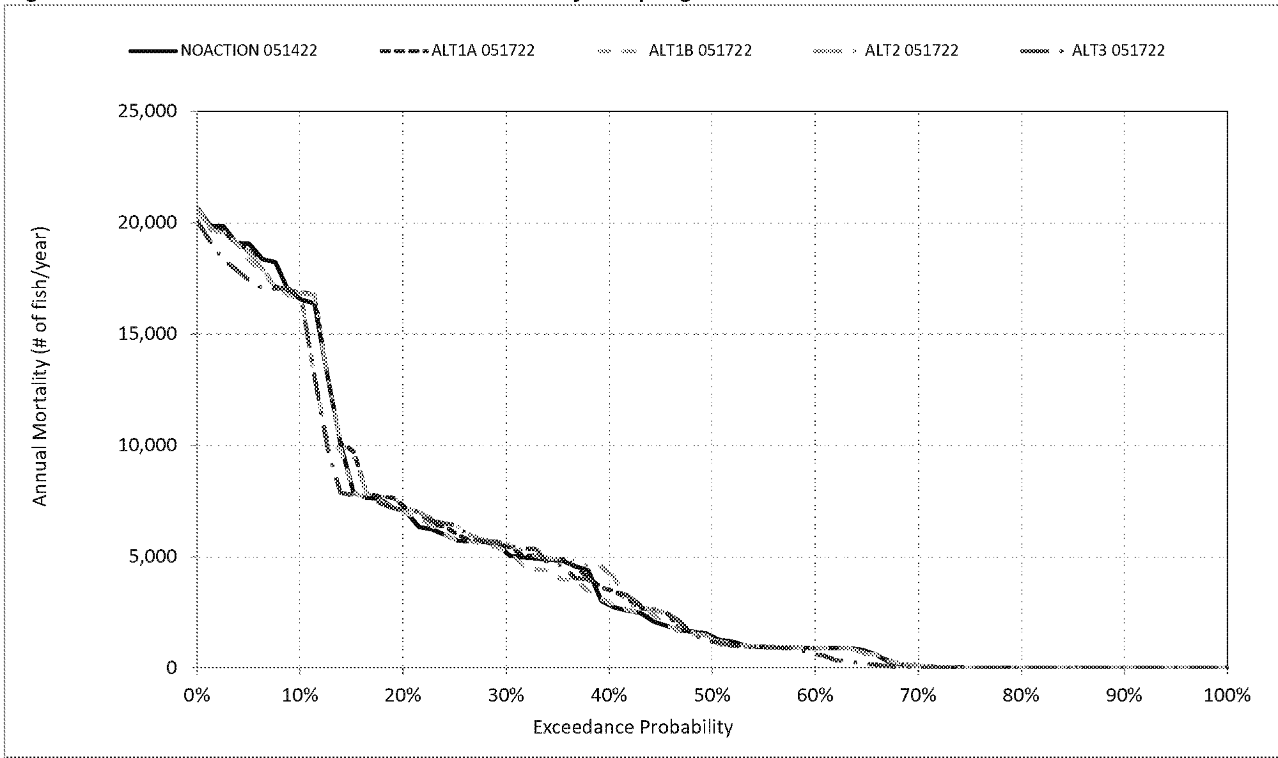


Figure B-b-9. Super-imposition - Habitat based Annual Mortality for Spring-Run Chinook Salmon

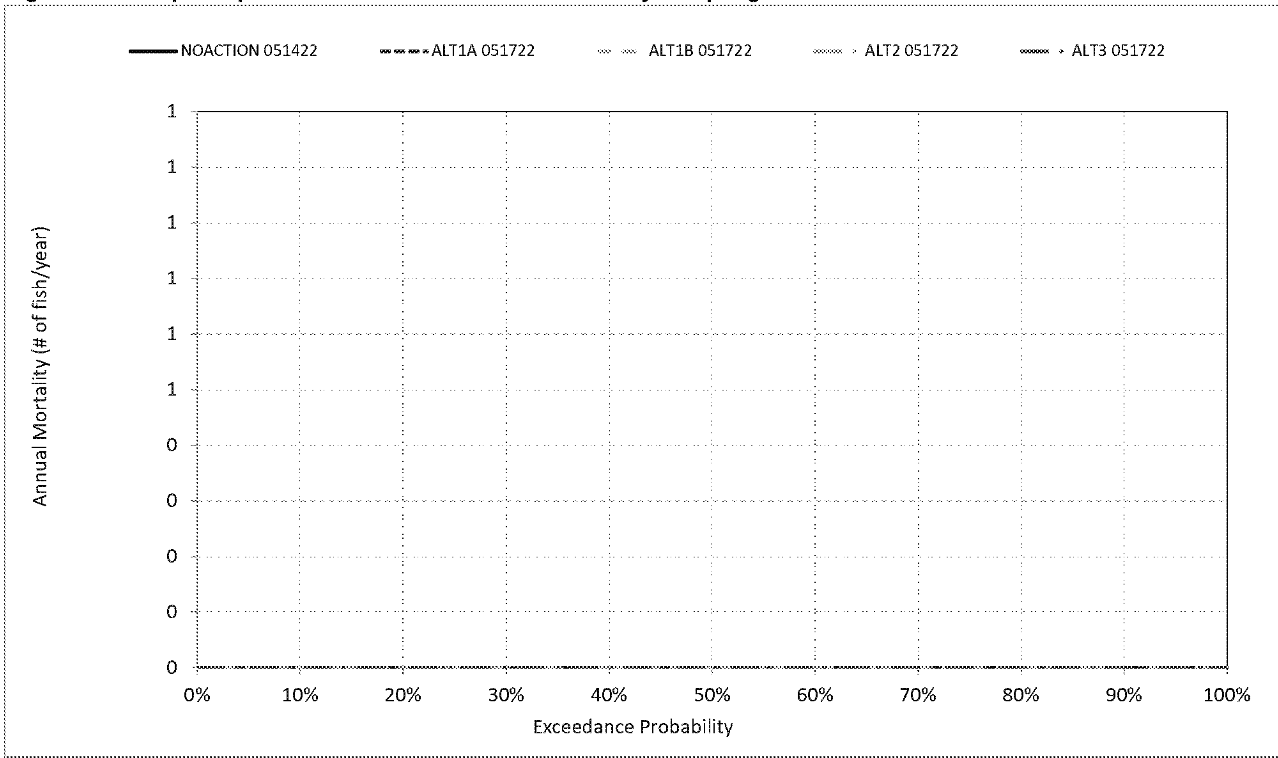


Figure B-b-10. Fry - Habitat based Annual Mortality for Spring-Run Chinook Salmon

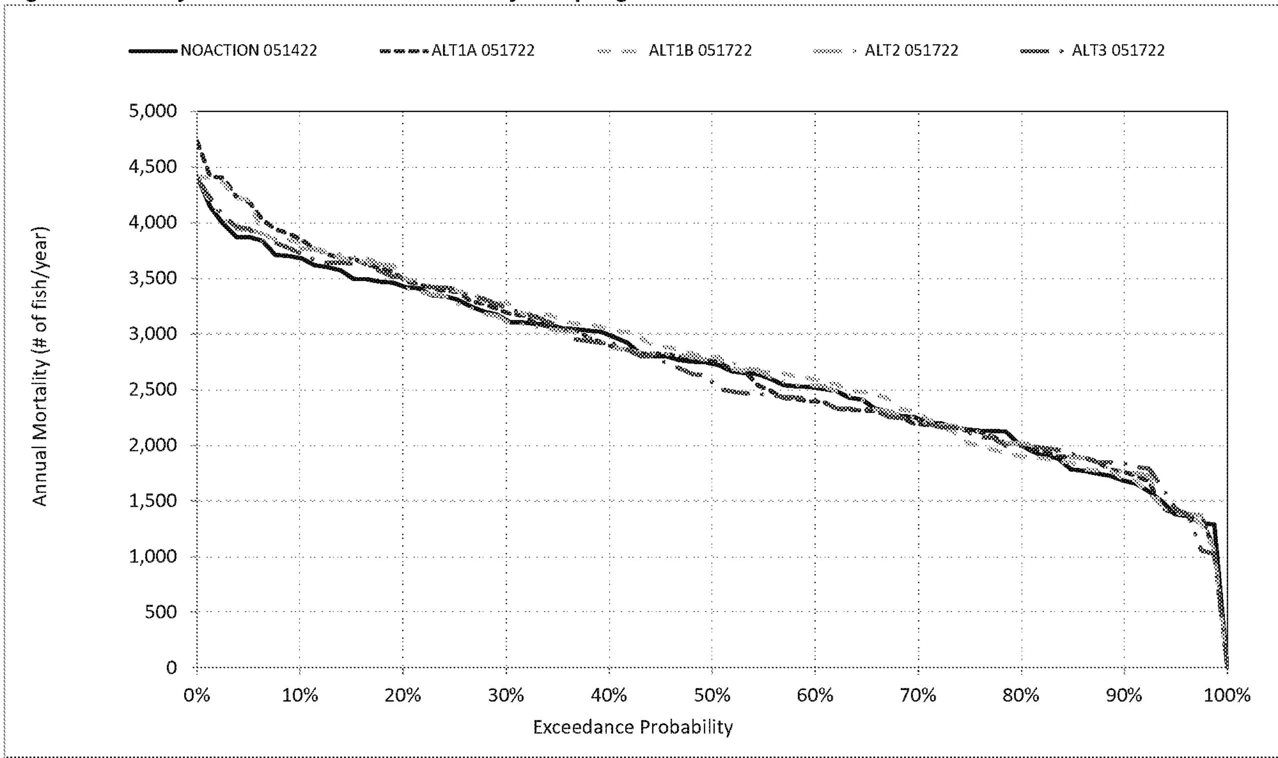


Figure B-b-11. Pre-smolt - Habitat based Annual Mortality for Spring-Run Chinook Salmon

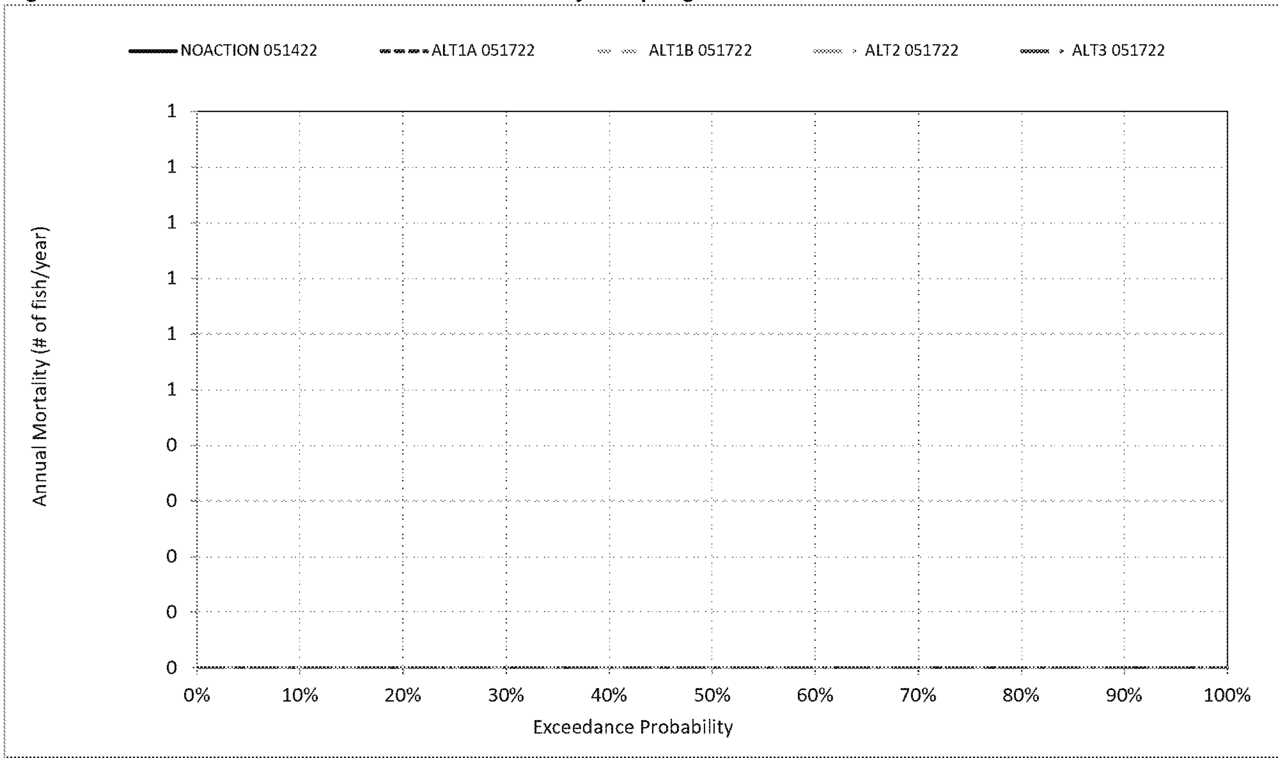


Figure B-b-12. Immature Smolt - Habitat based Annual Mortality for Spring-Run Chinook Salmon

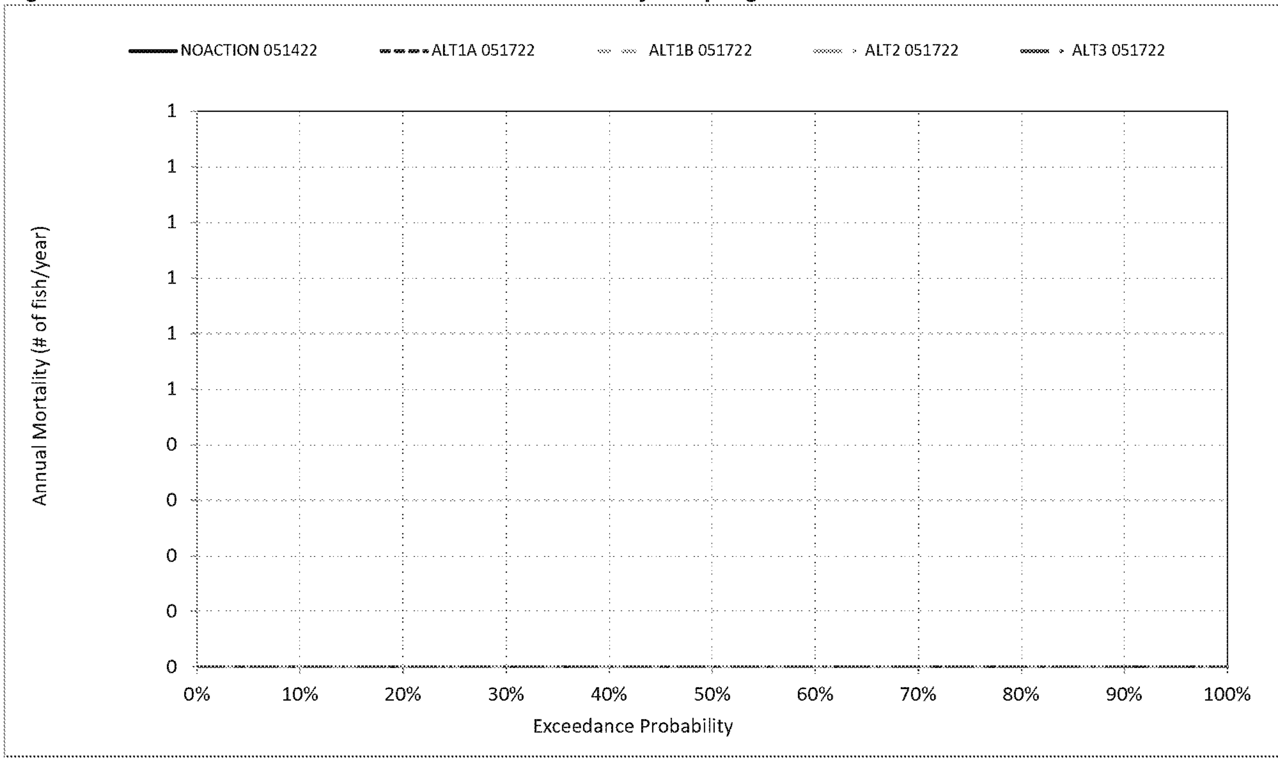


Figure B-b-13. Total Habitat based Annual Mortality for Spring-Run Chinook Salmon

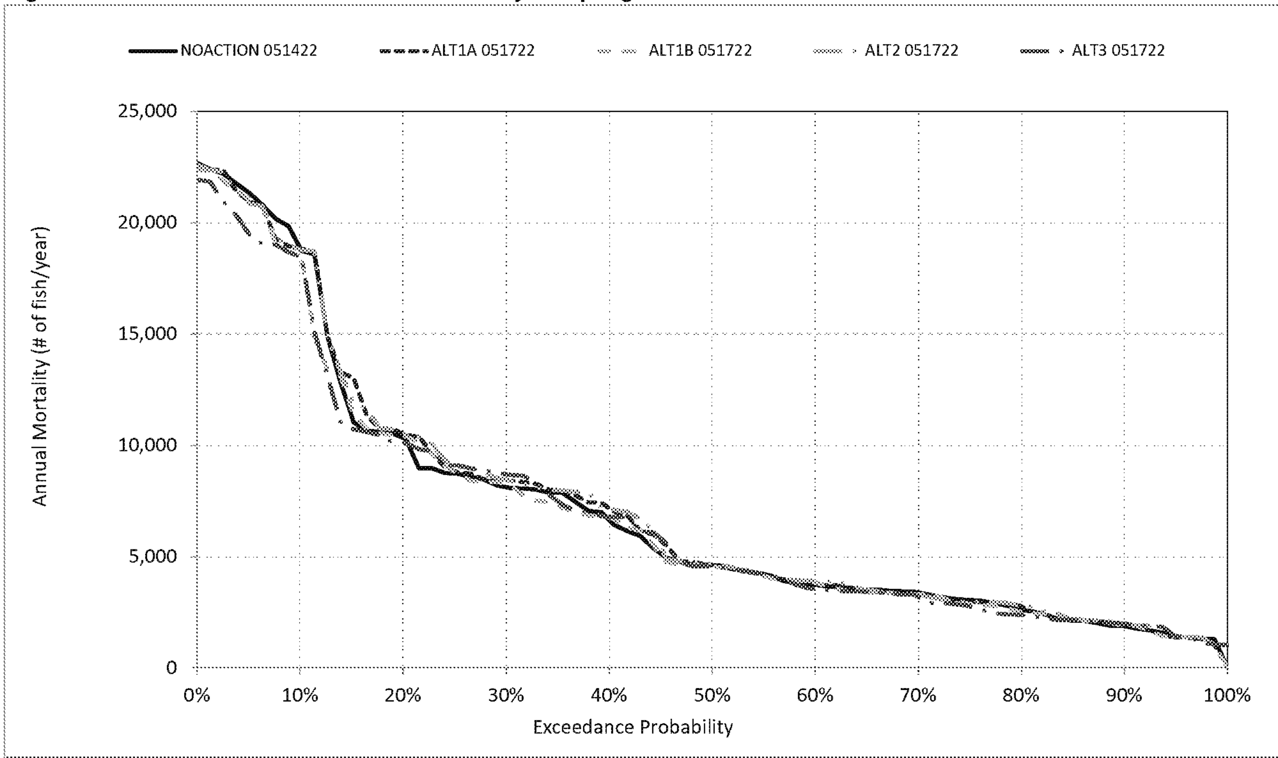


Figure B-b-14. Pre-Spawn Mortality - Temperature based Annual Mortality for Spring-Run Chinook Salmon

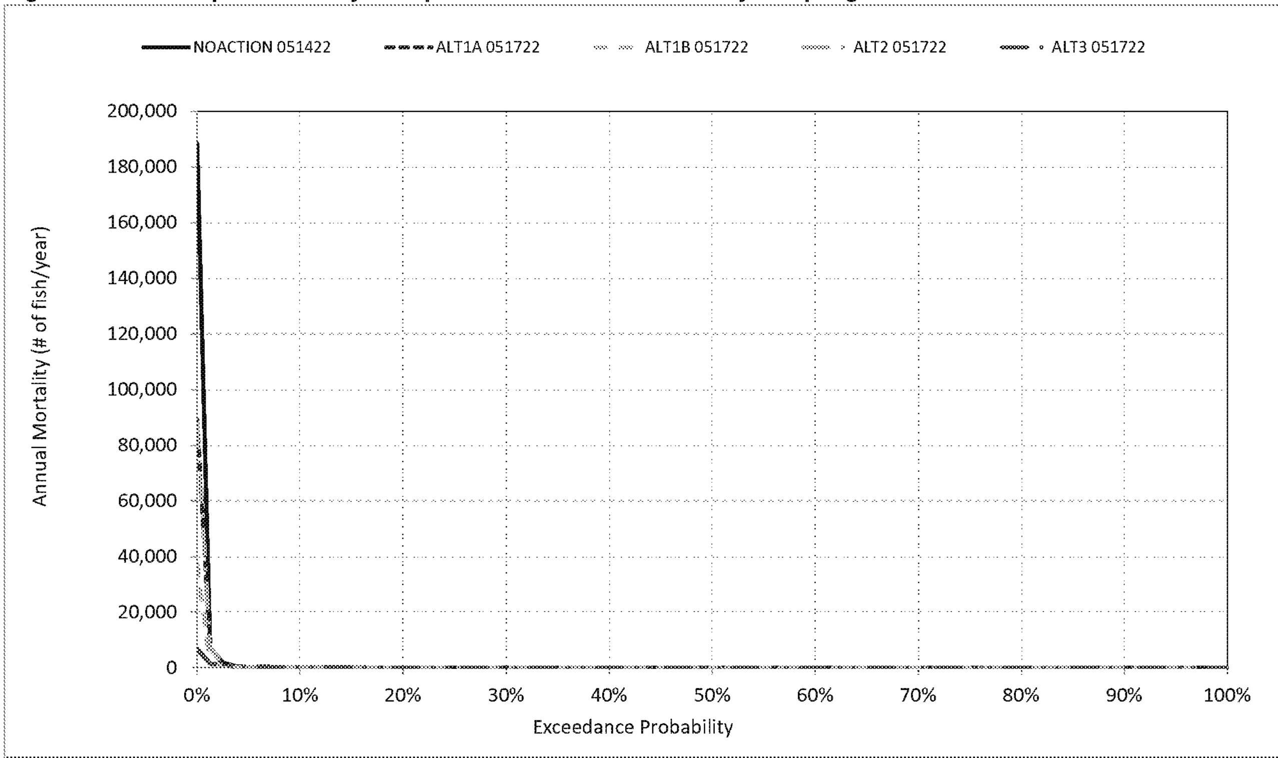


Figure B-b-15. Eggs - Temperature based Annual Mortality for Spring-Run Chinook Salmon

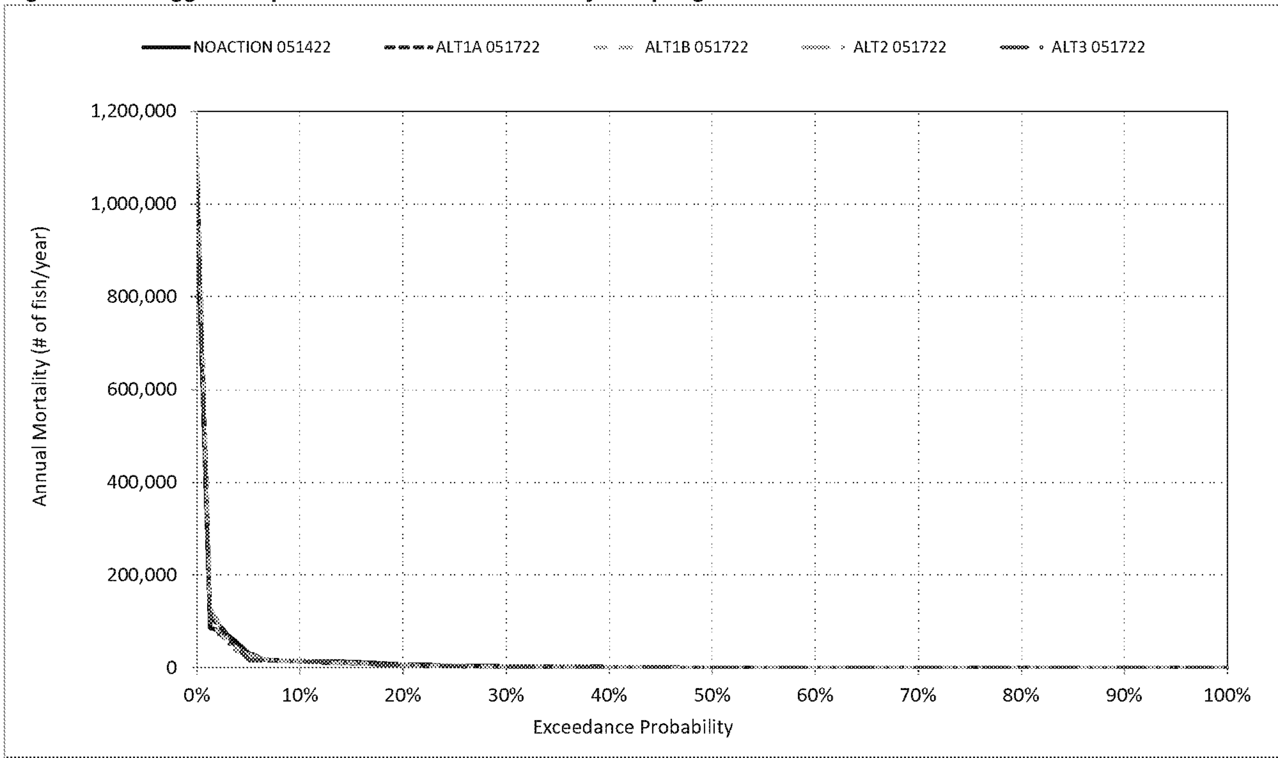


Figure B-b-16. Fry - Temperature based Annual Mortality for Spring-Run Chinook Salmon

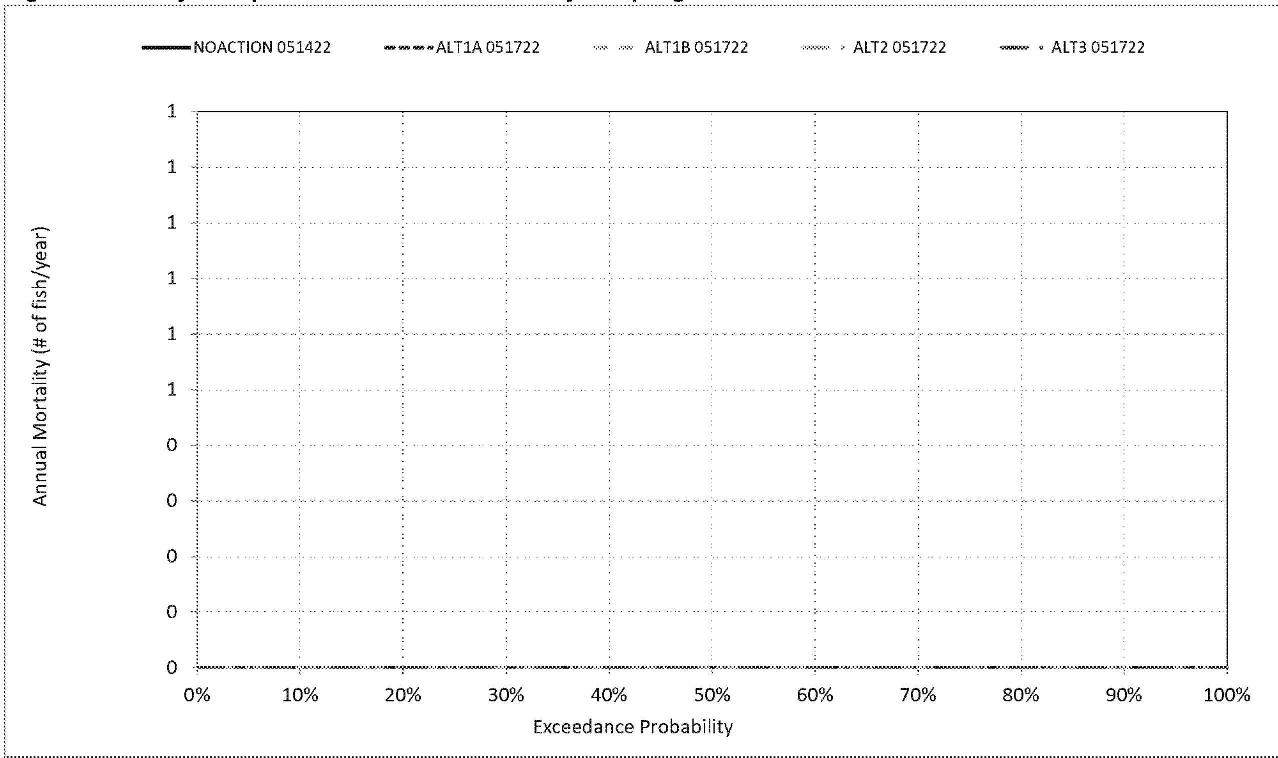


Figure B-b-17. Pre-smolt - Temperature based Annual Mortality for Spring-Run Chinook Salmon

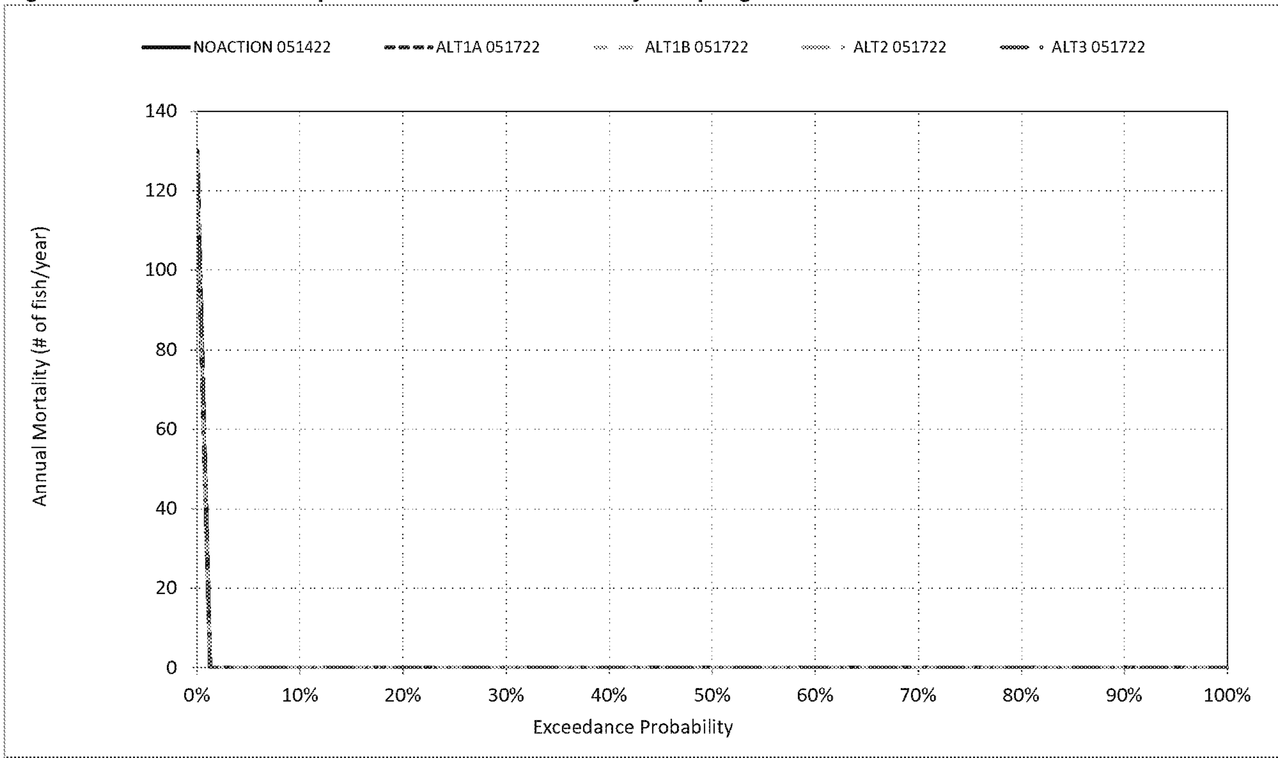


Figure B-b-18. Immature Smolt - Temperature based Annual Mortality for Spring-Run Chinook Salmon

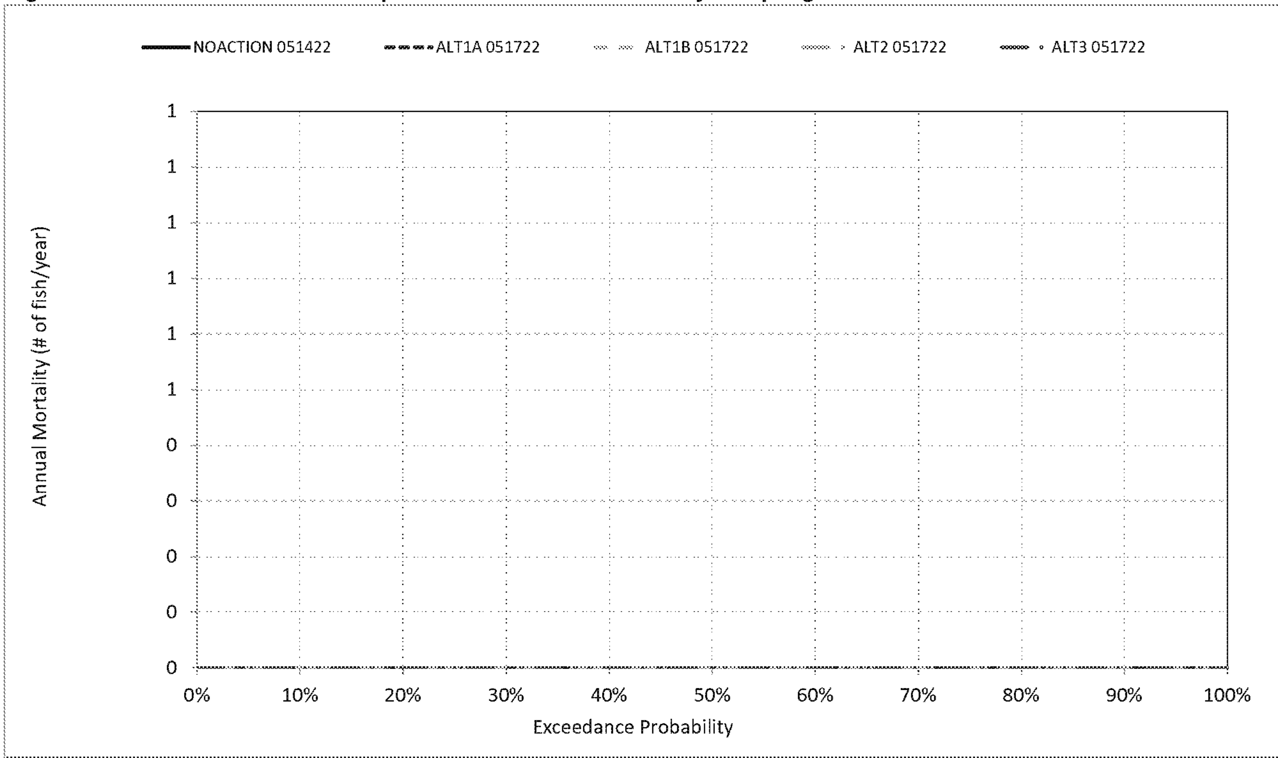


Figure B-b-19. Total Temperature based Annual Mortality for Spring-Run Chinook Salmon

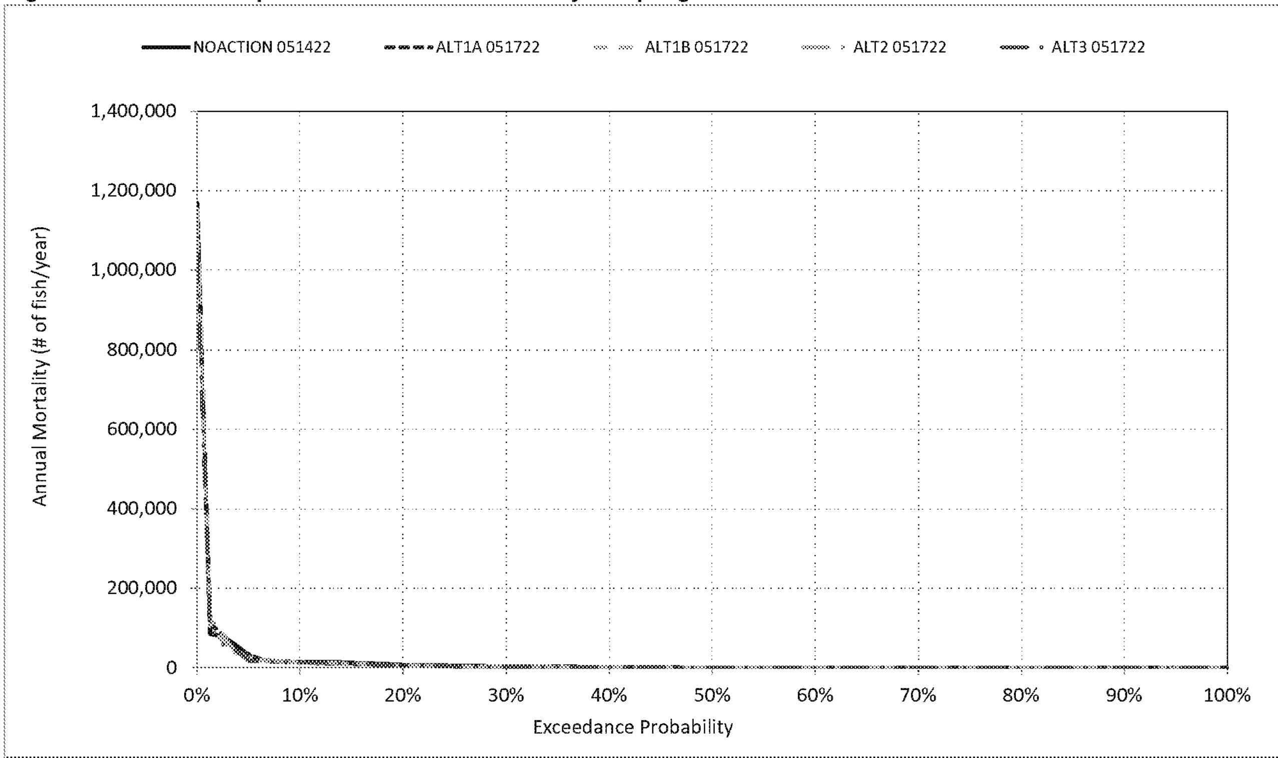


Figure B-c-1. Annual Potential Production for Fall-Run Chinook Salmon

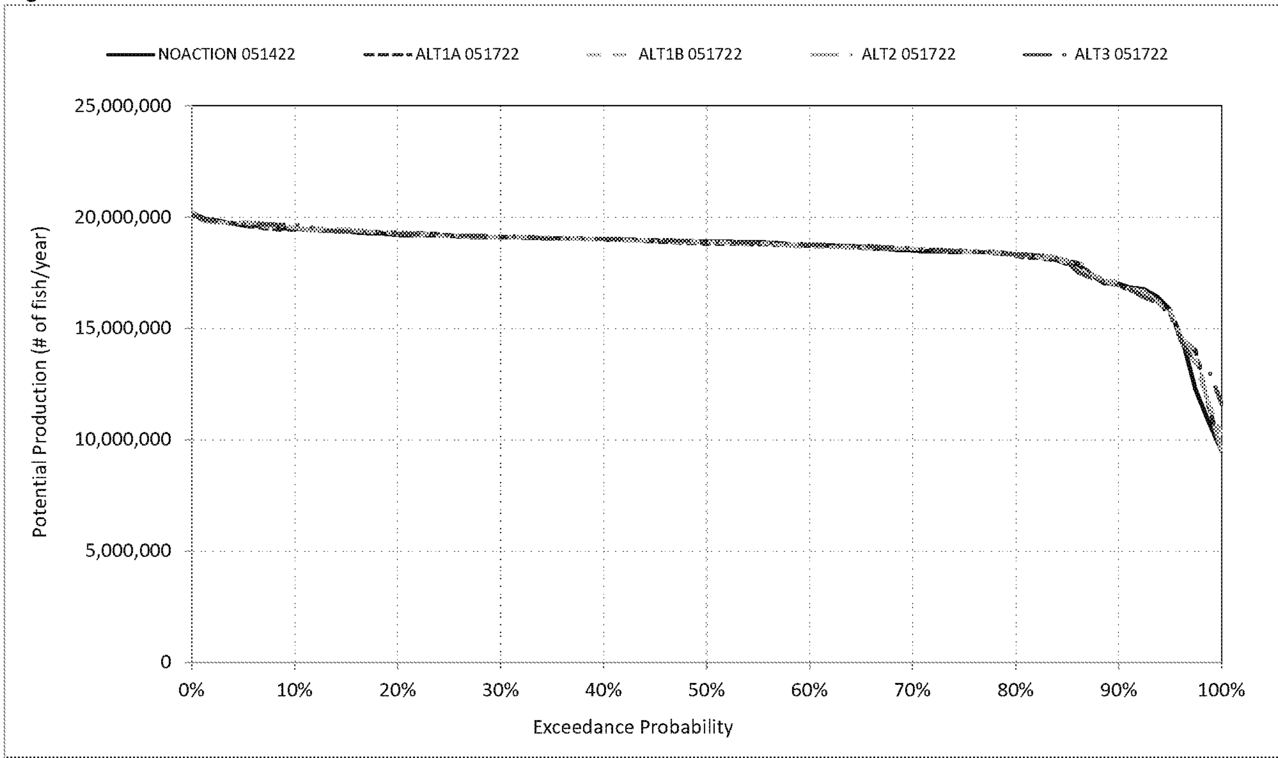


Figure B-c-2. Annual Mortality for Fall-Run Chinook Salmon - Eggs

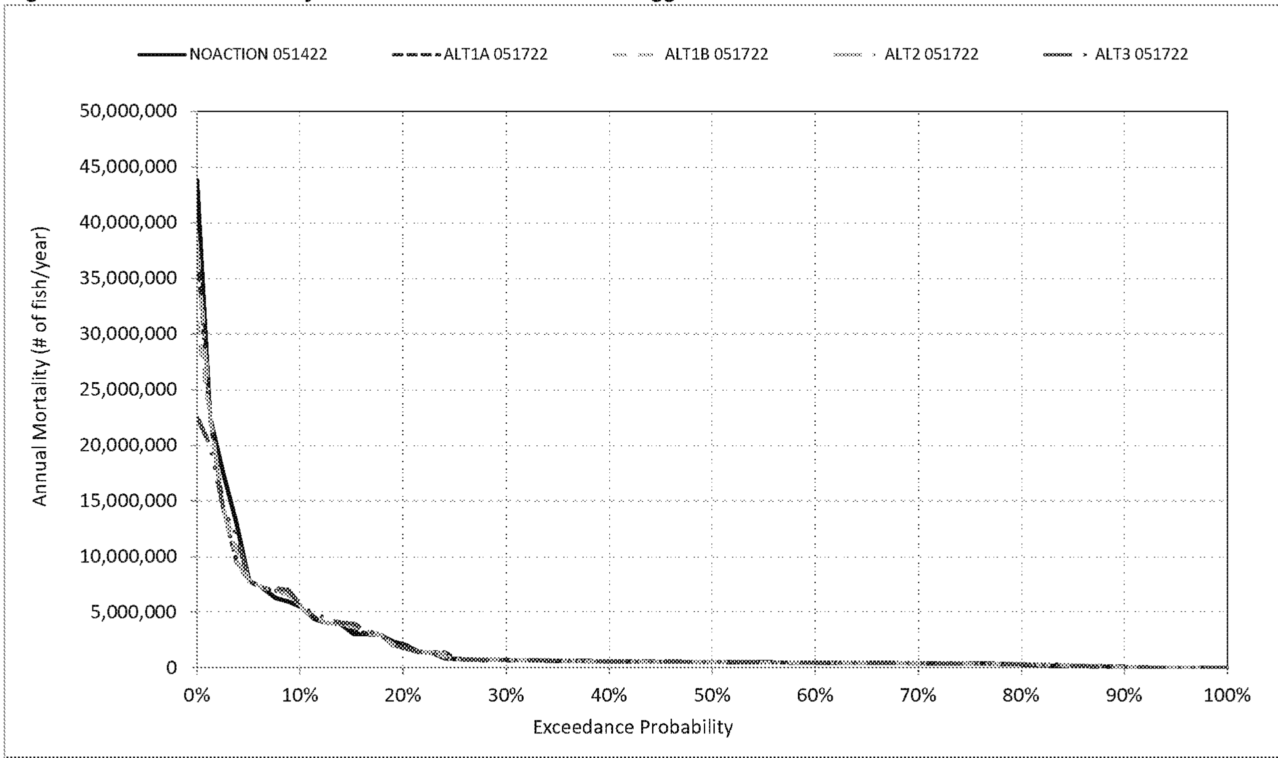


Figure B-c-3. Annual Mortality for Fall-Run Chinook Salmon - Fry

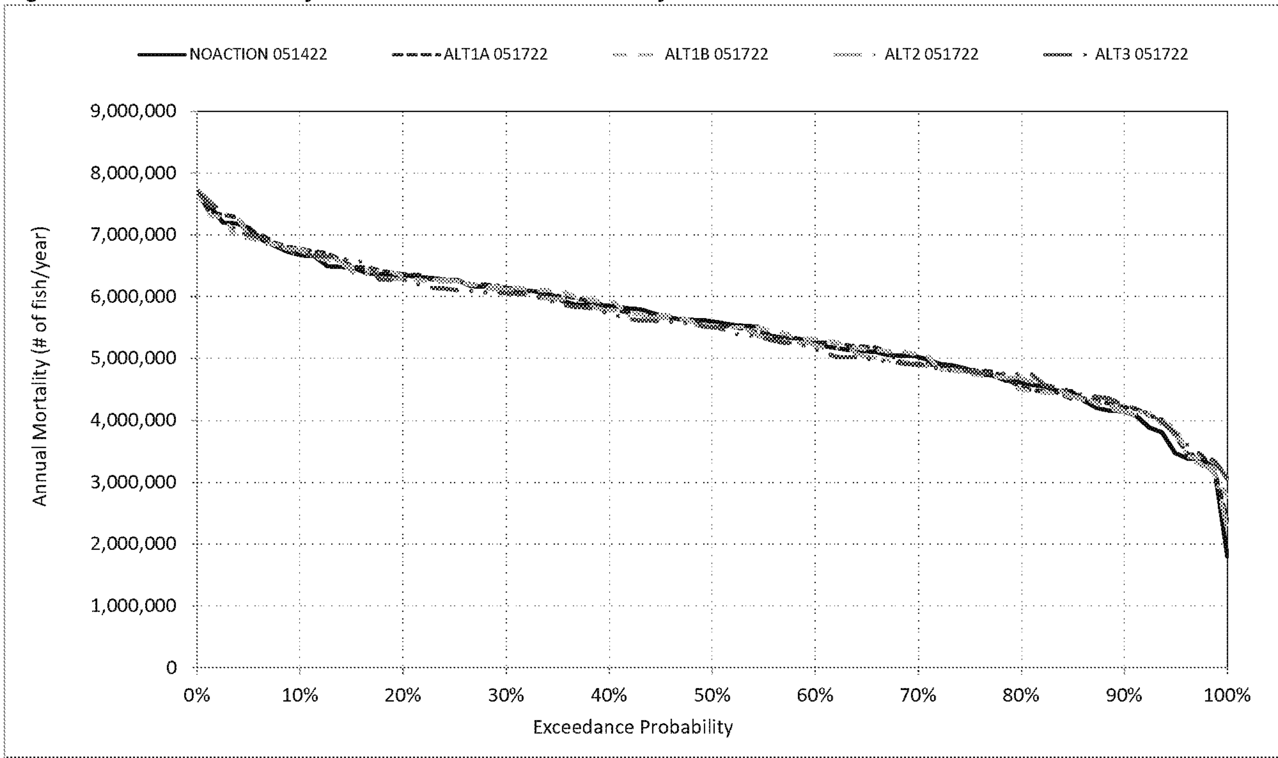


Figure B-c-4. Annual Mortality for Fall-Run Chinook Salmon - Pre-Smolt

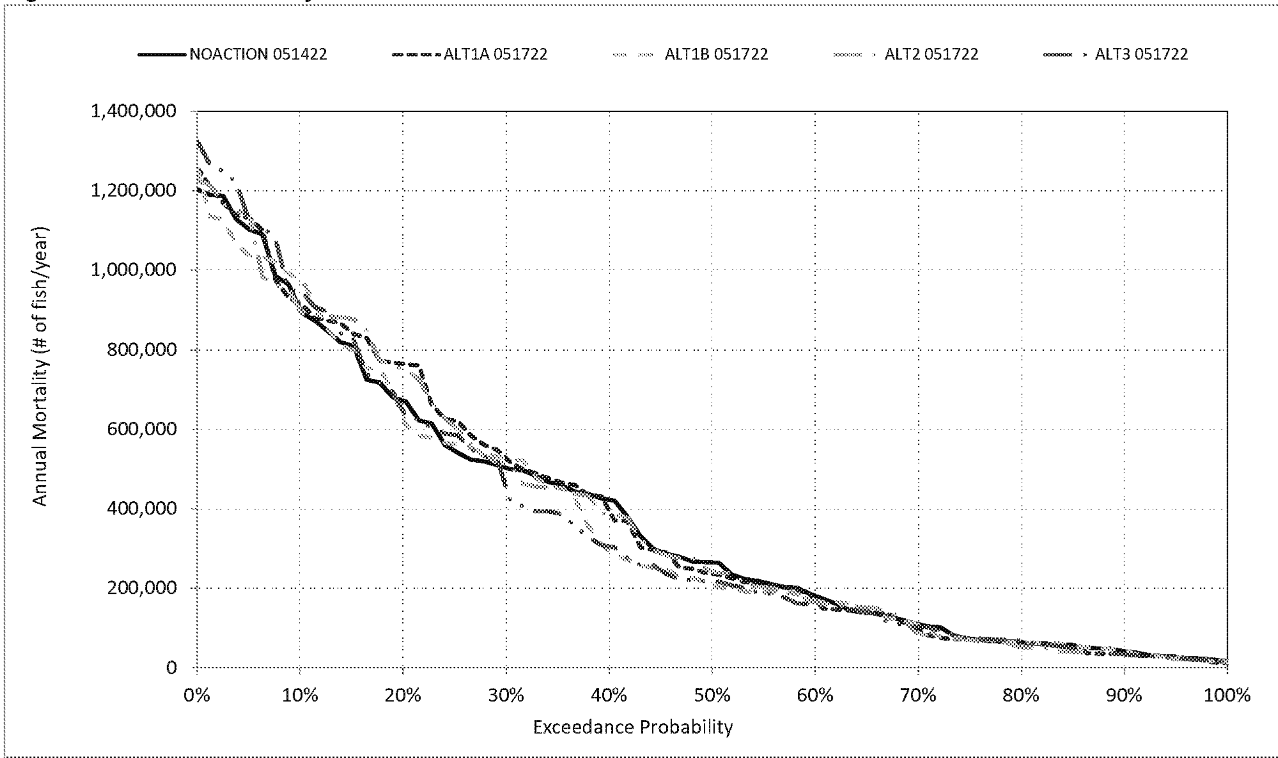


Figure B-c-5. Annual Mortality for Fall-Run Chinook Salmon - Immature Smolt

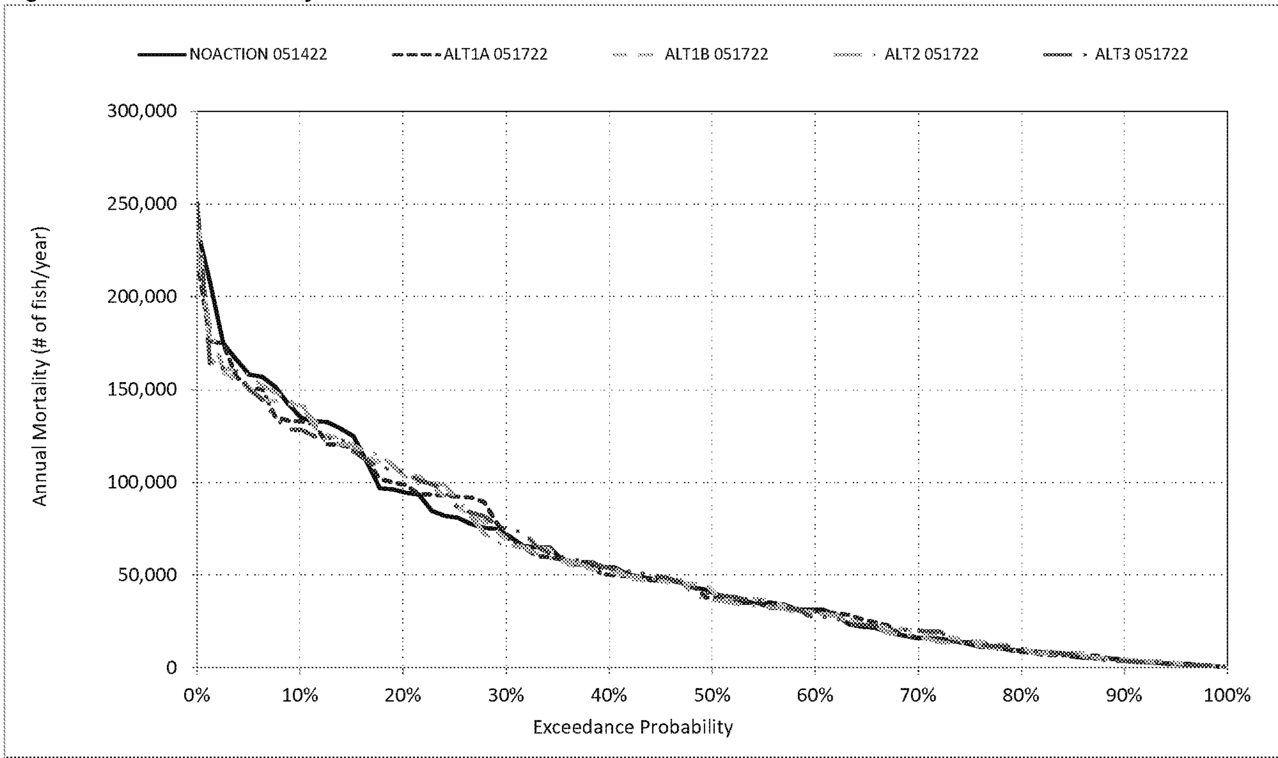


Figure B-c-6. Annual Mortality for Fall-Run Chinook Salmon - Pre- & Immature Smolts

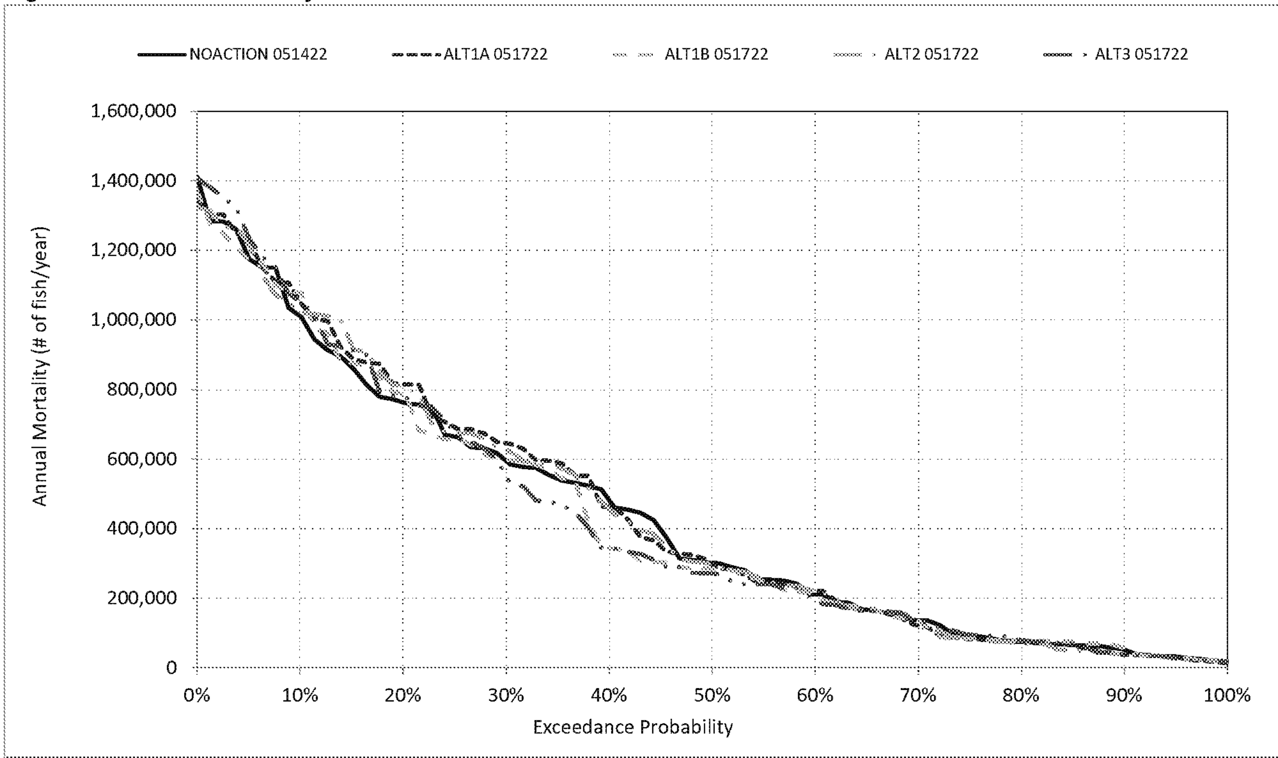


Figure B-c-7. Annual Mortality for Fall-Run Chinook Salmon - All Lifestages

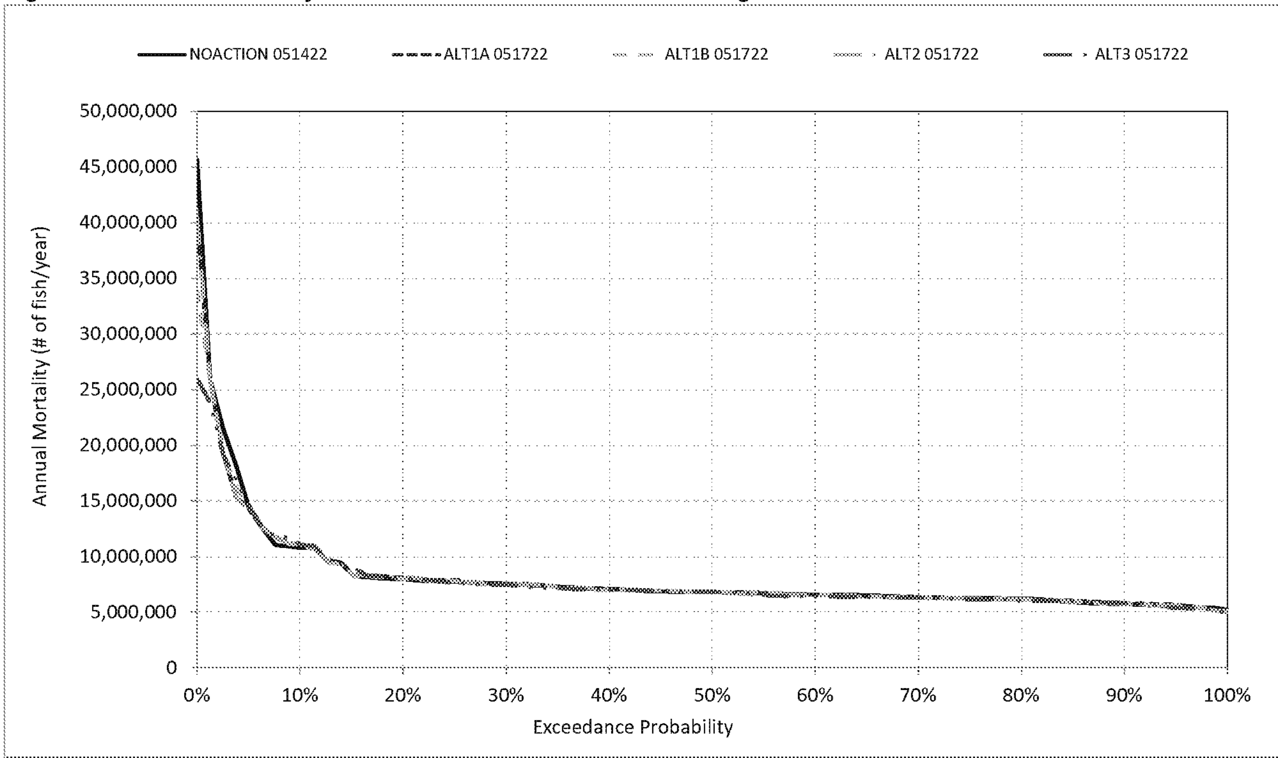


Figure B-c-8. Incubation - Habitat based Annual Mortality for Fall-Run Chinook Salmon

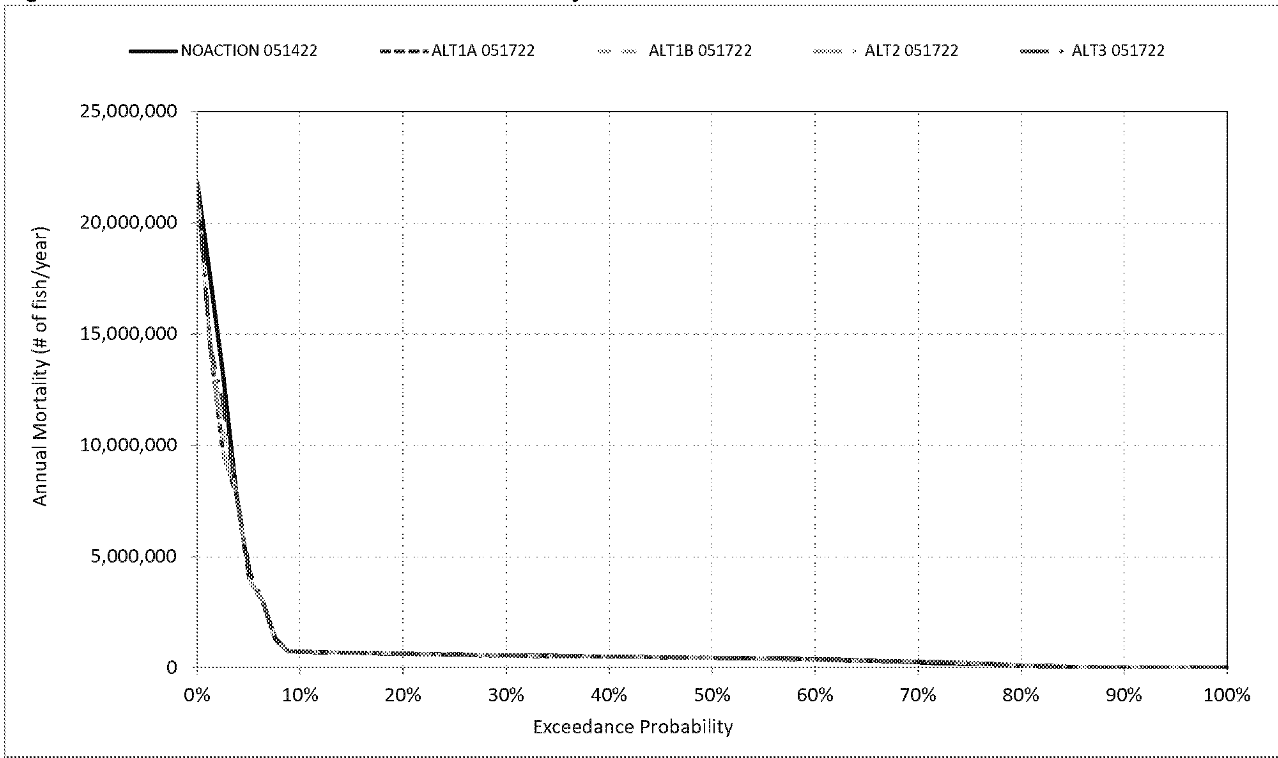


Figure B-c-9. Super-imposition - Habitat based Annual Mortality for Fall-Run Chinook Salmon

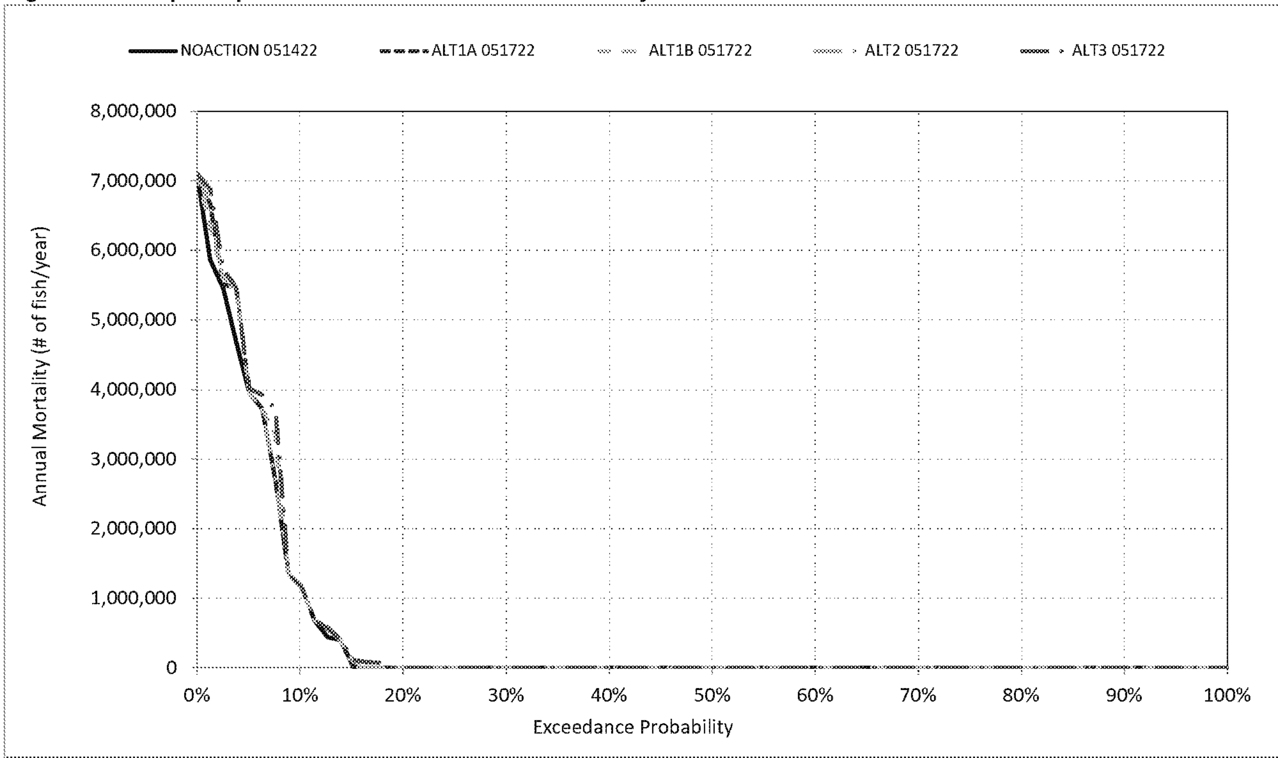


Figure B-c-10. Fry - Habitat based Annual Mortality for Fall-Run Chinook Salmon

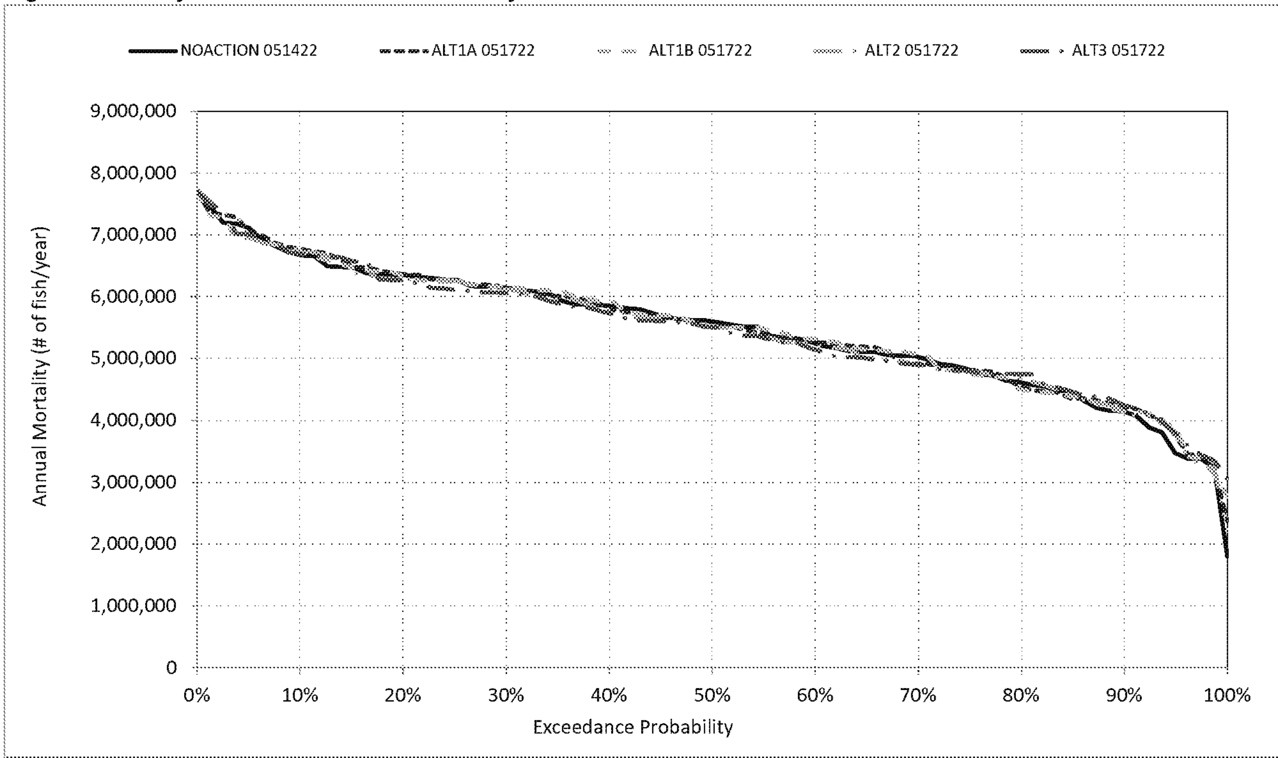


Figure B-c-11. Pre-smolt - Habitat based Annual Mortality for Fall-Run Chinook Salmon

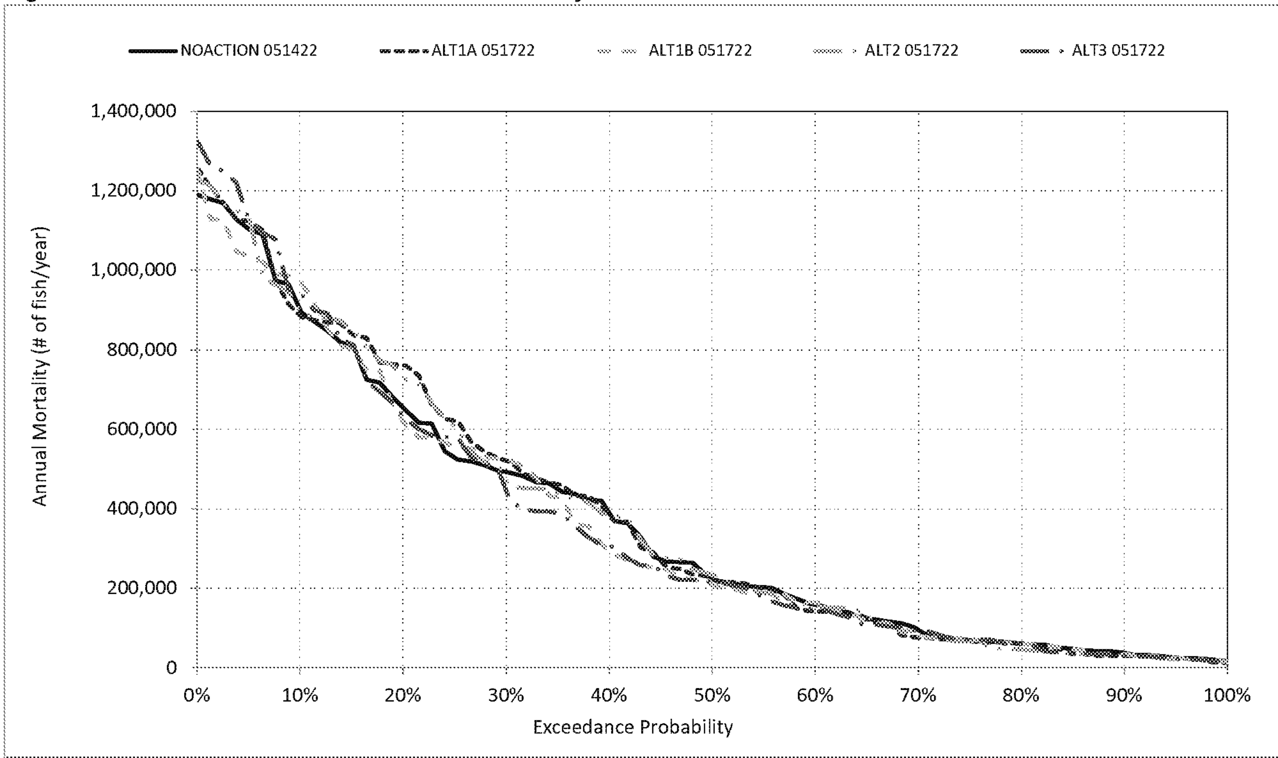


Figure B-c-12. Immature Smolt - Habitat based Annual Mortality for Fall-Run Chinook Salmon

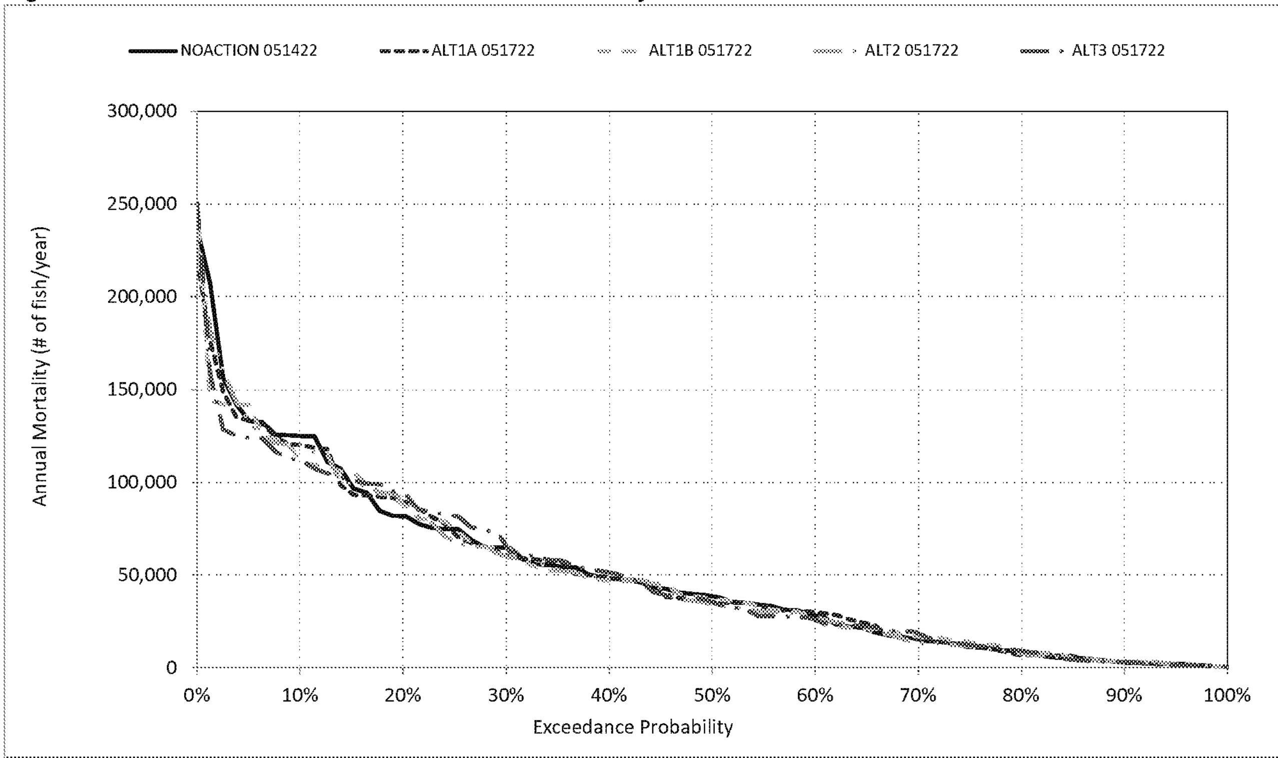


Figure B-c-13. Total Habitat based Annual Mortality for Fall-Run Chinook Salmon

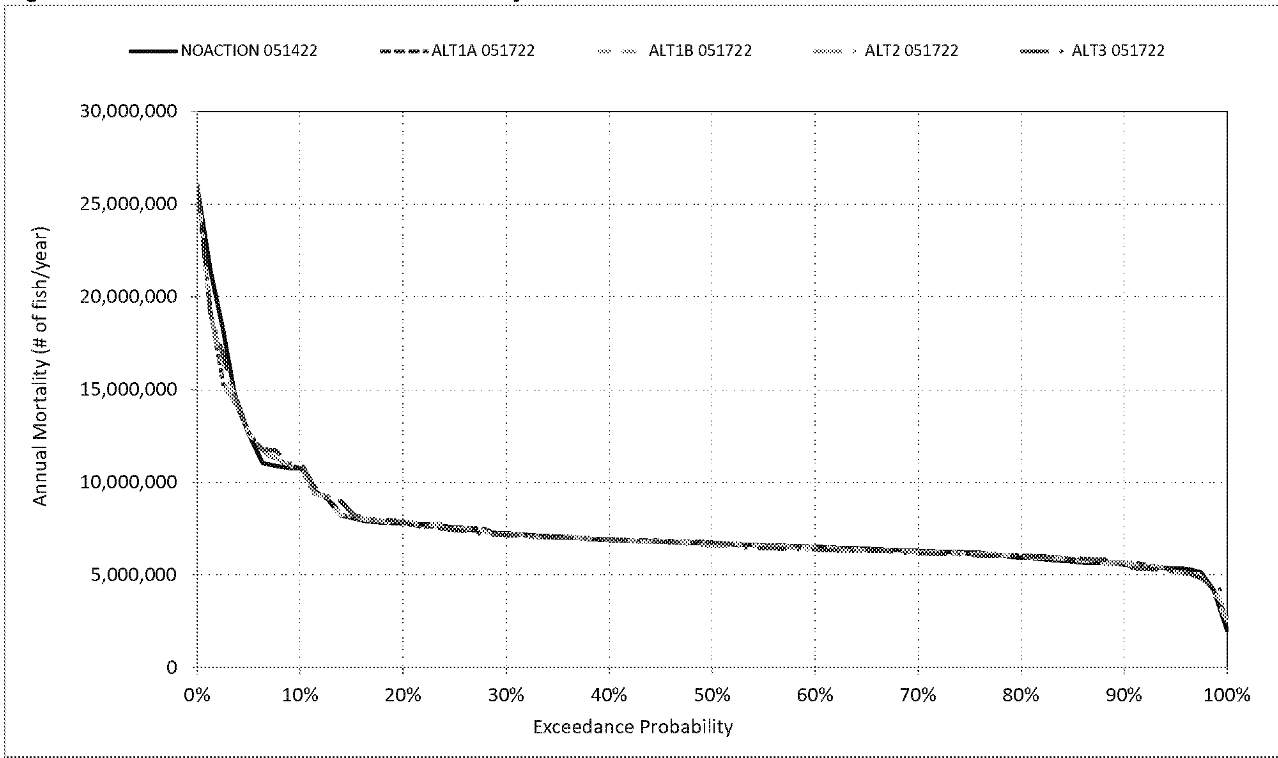


Figure B-c-14. Pre-Spawn Mortality - Temperature based Annual Mortality for Fall-Run Chinook Salmon

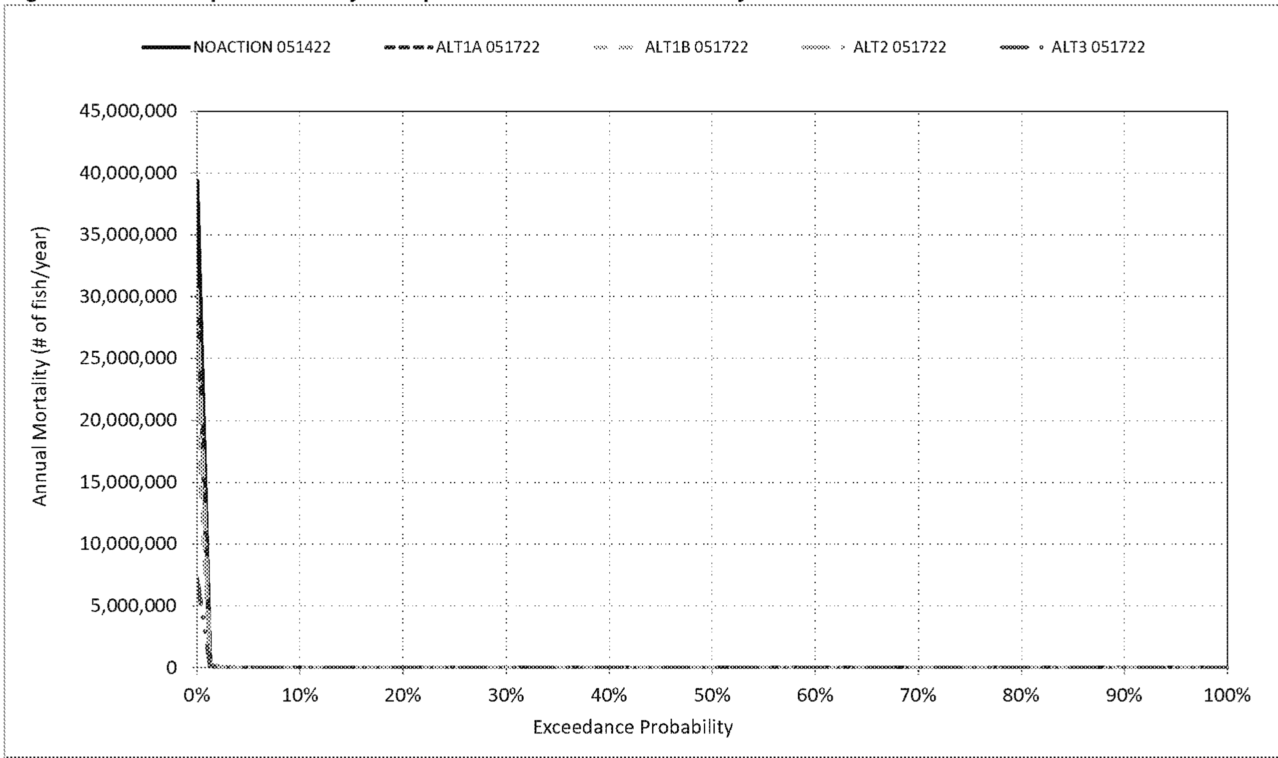


Figure B-c-15. Eggs - Temperature based Annual Mortality for Fall-Run Chinook Salmon

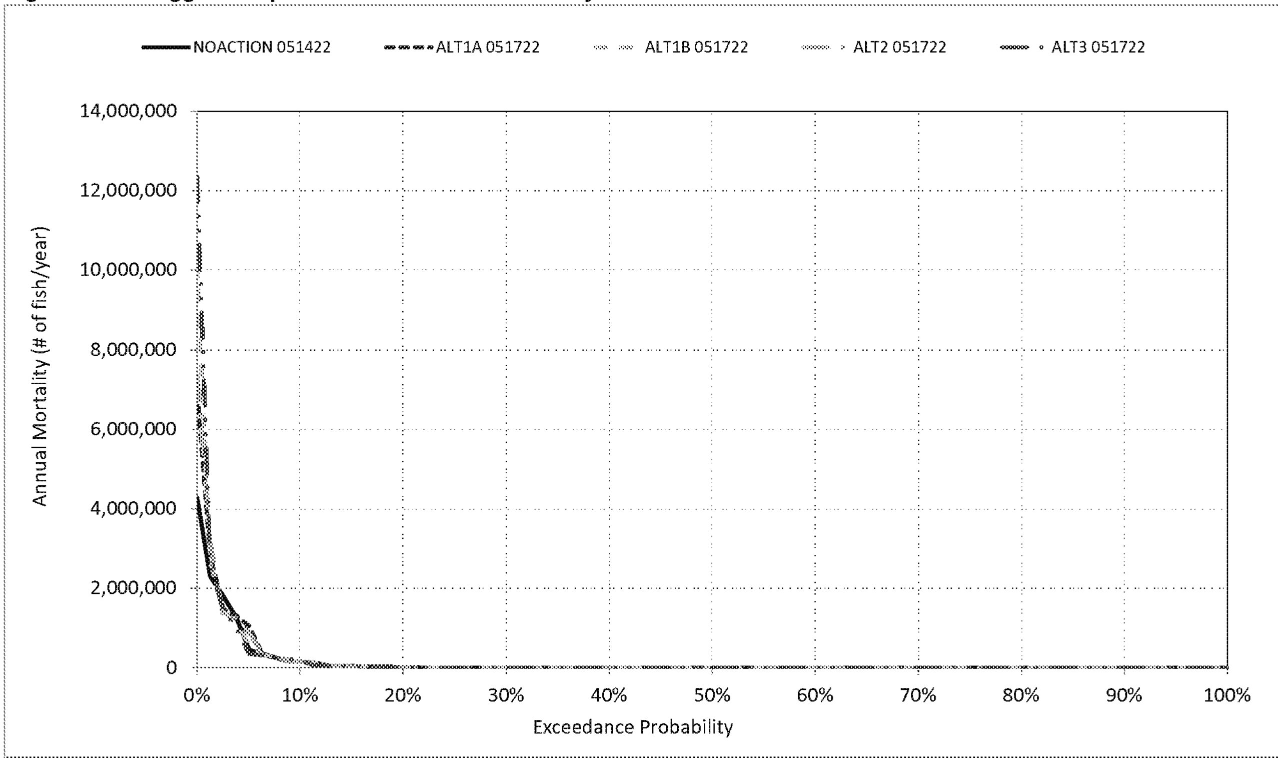


Figure B-c-16. Fry - Temperature based Annual Mortality for Fall-Run Chinook Salmon

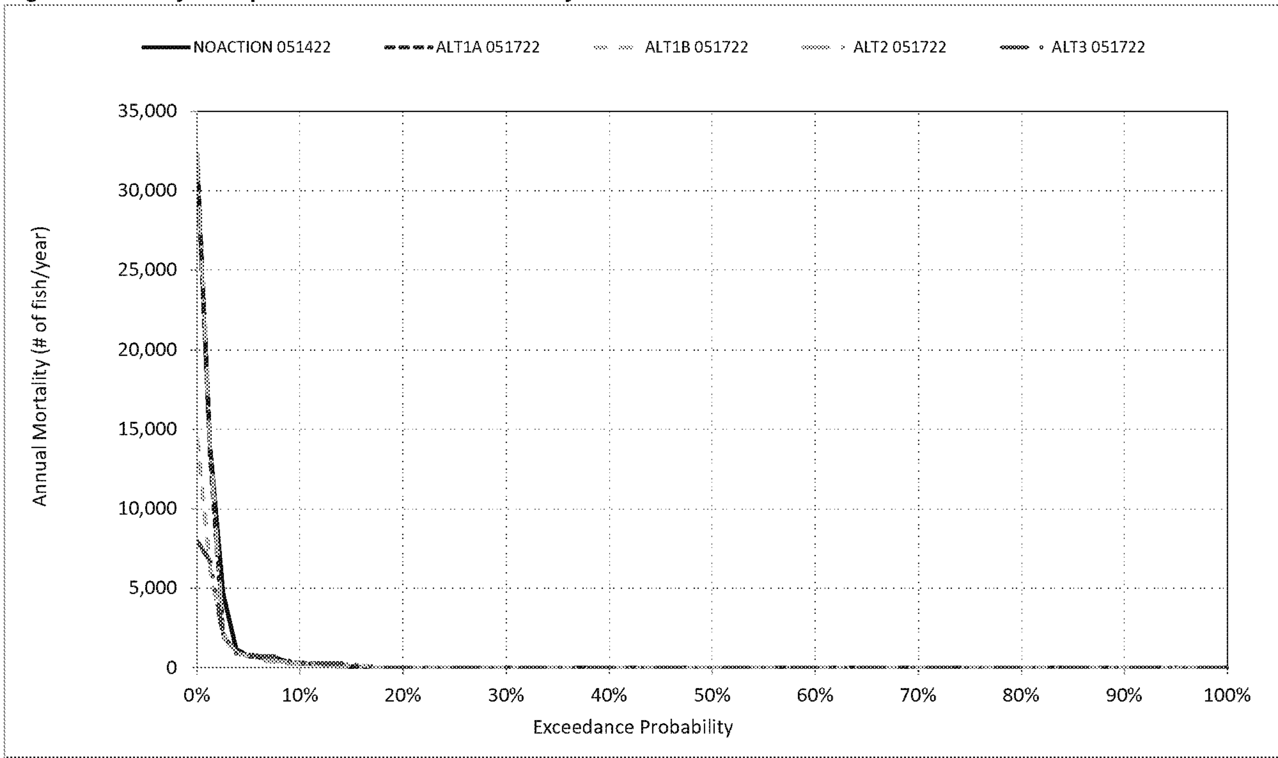


Figure B-c-17. Pre-smolt - Temperature based Annual Mortality for Fall-Run Chinook Salmon

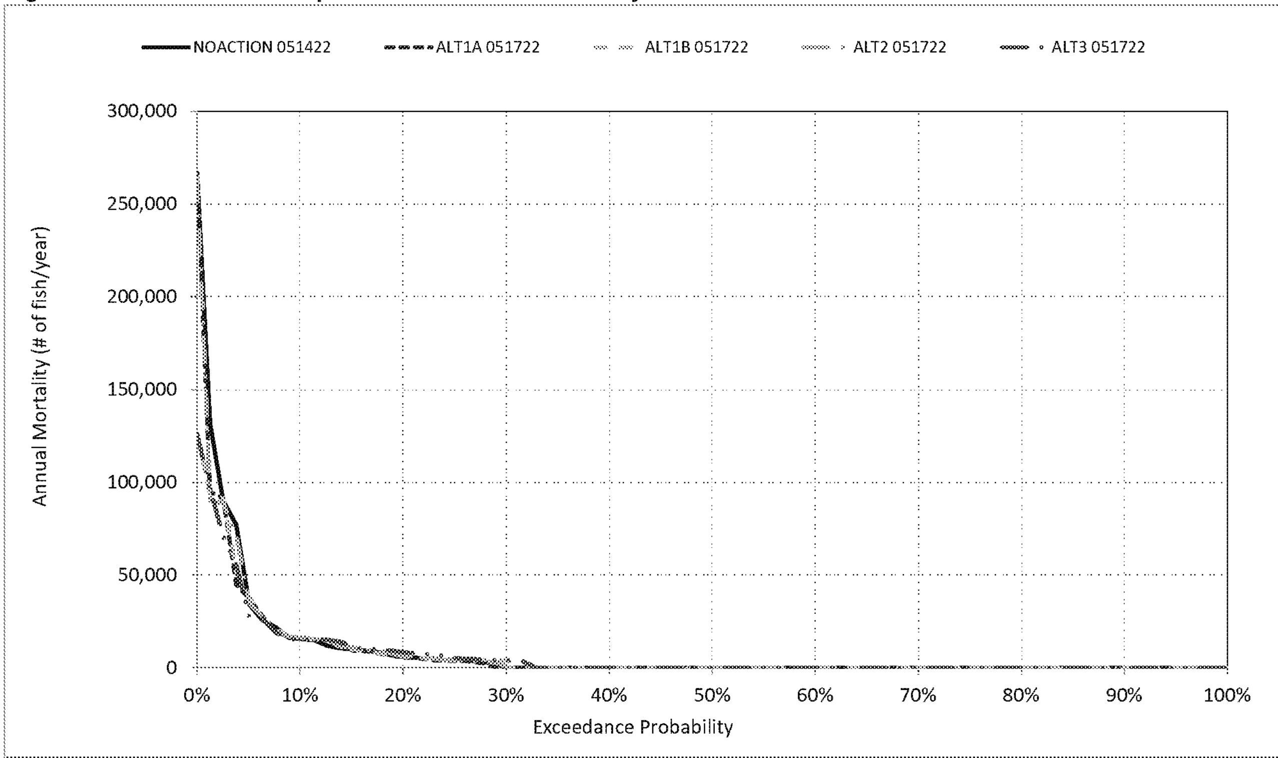


Figure B-c-18. Immature Smolt - Temperature based Annual Mortality for Fall-Run Chinook Salmon

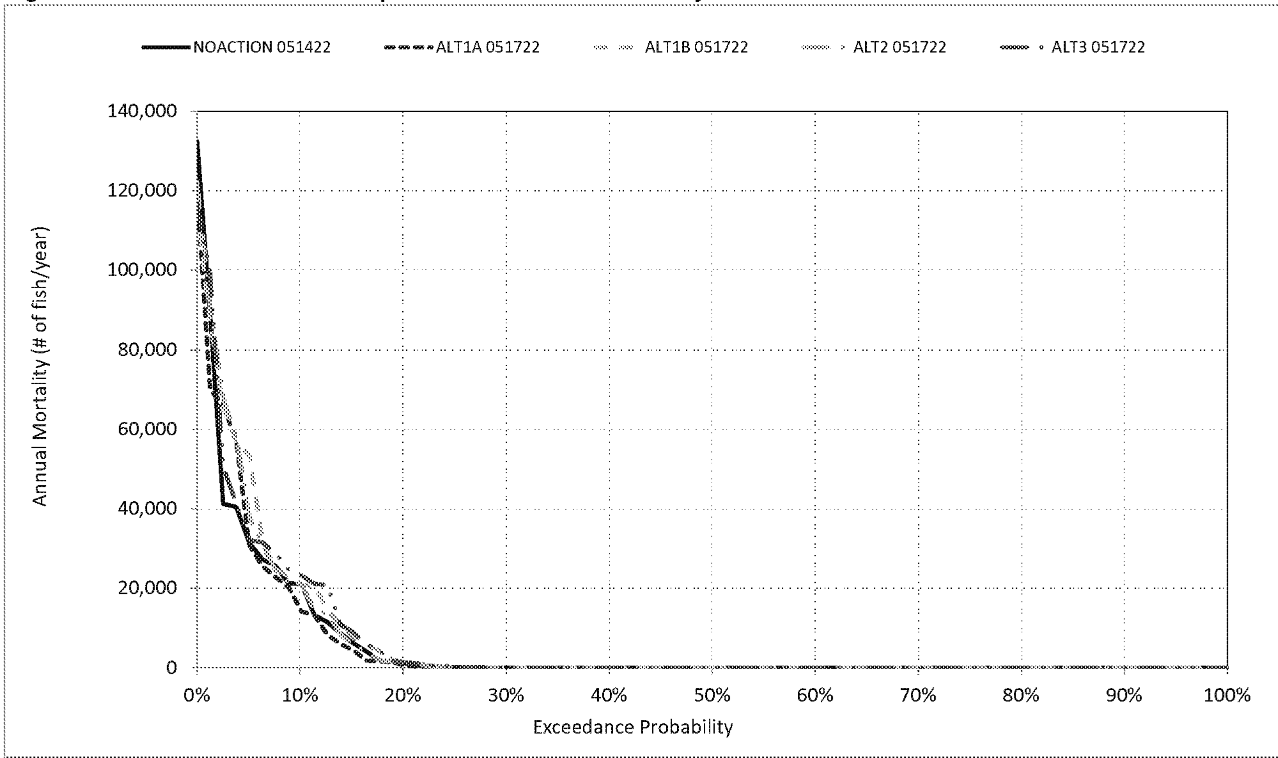


Figure B-c-19. Total Temperature based Annual Mortality for Fall-Run Chinook Salmon

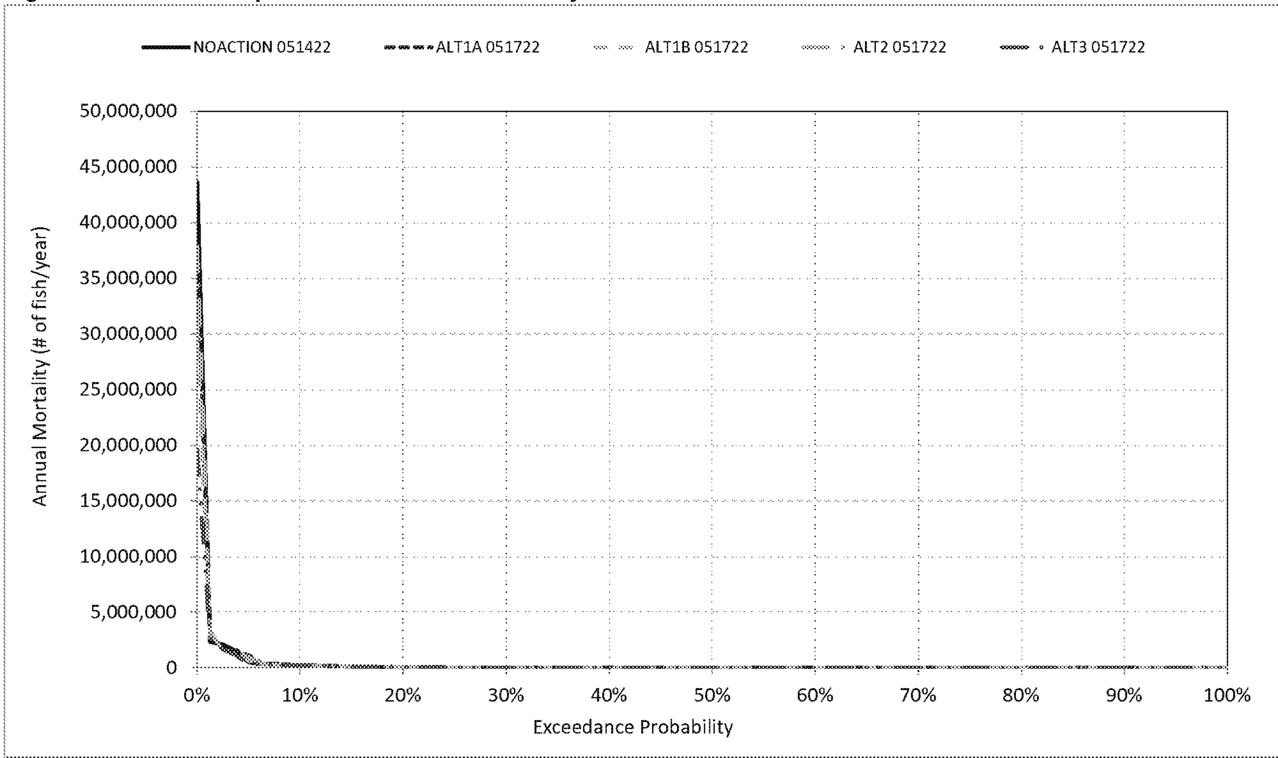


Figure B-d-1. Annual Potential Production for LateFall-Run Chinook Salmon

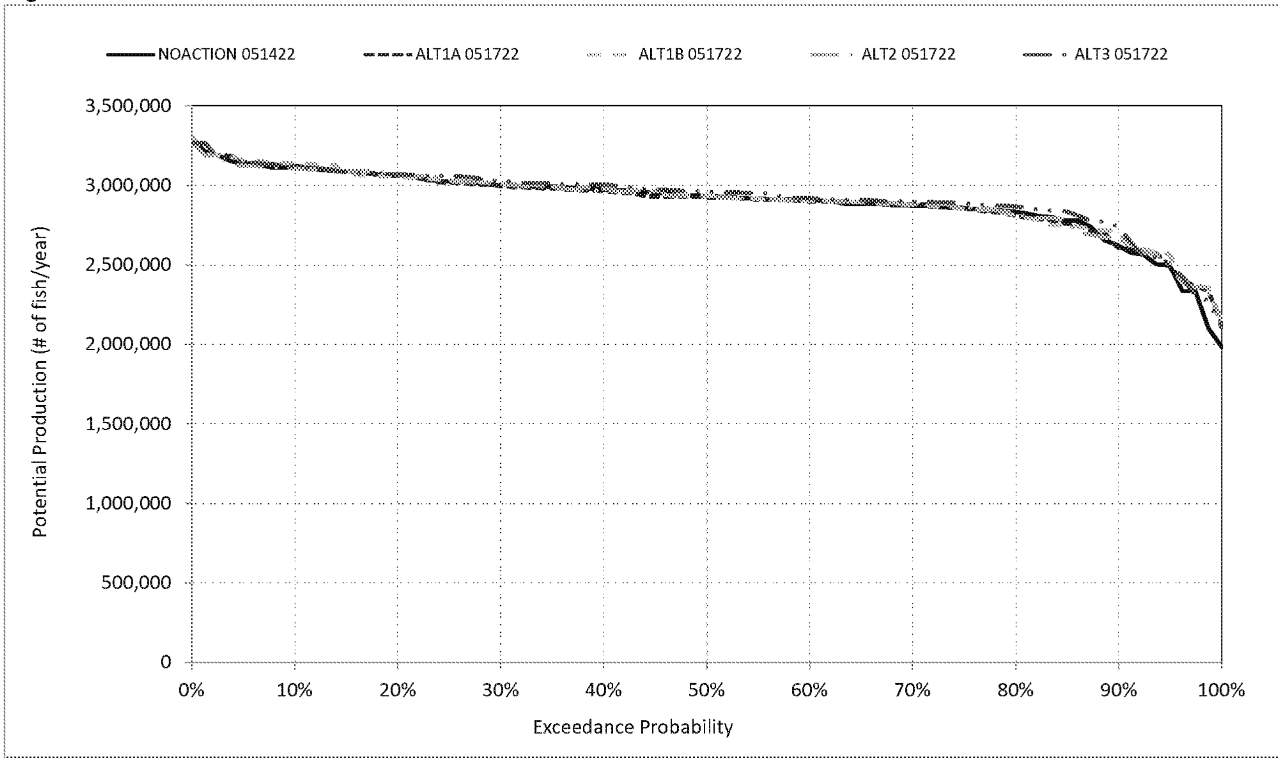


Figure B-d-2. Annual Mortality for LateFall-Run Chinook Salmon - Eggs

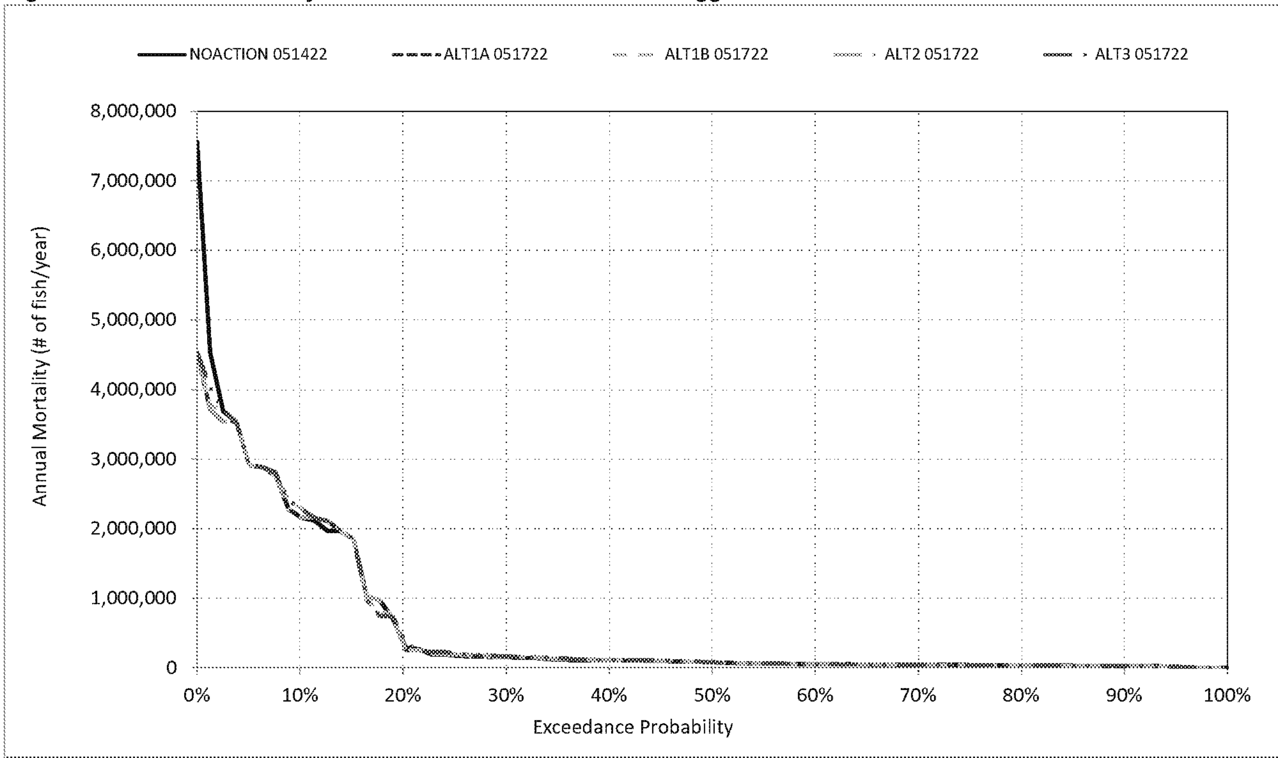


Figure B-d-3. Annual Mortality for LateFall-Run Chinook Salmon - Fry

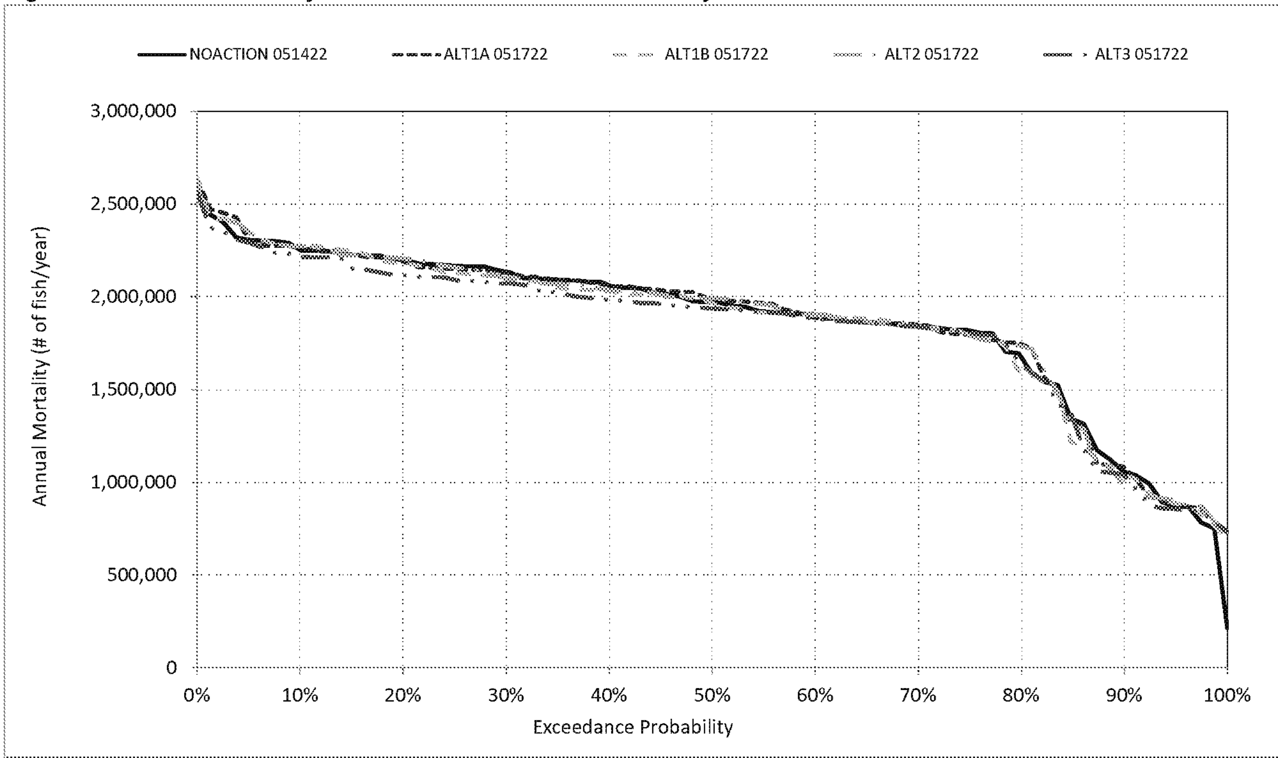


Figure B-d-4. Annual Mortality for LateFall-Run Chinook Salmon - Pre-Smolt

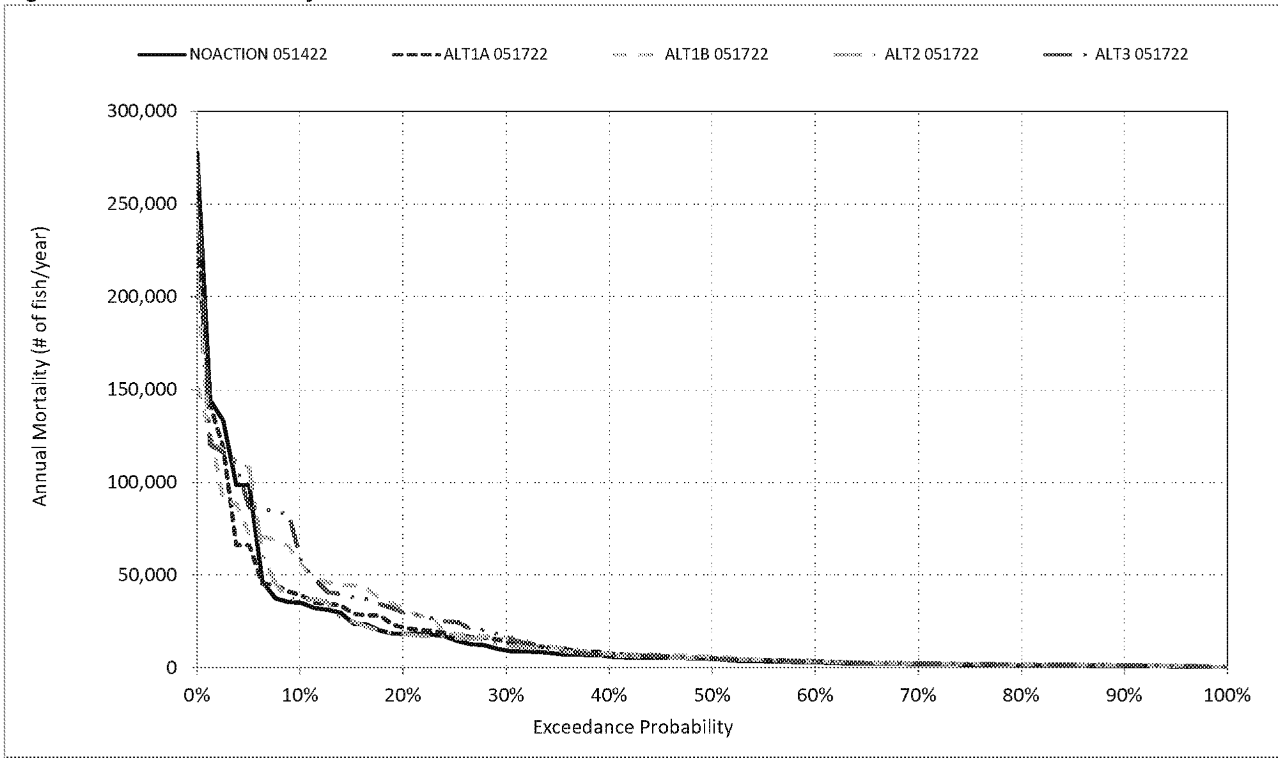


Figure B-d-5. Annual Mortality for LateFall-Run Chinook Salmon - Immature Smolt

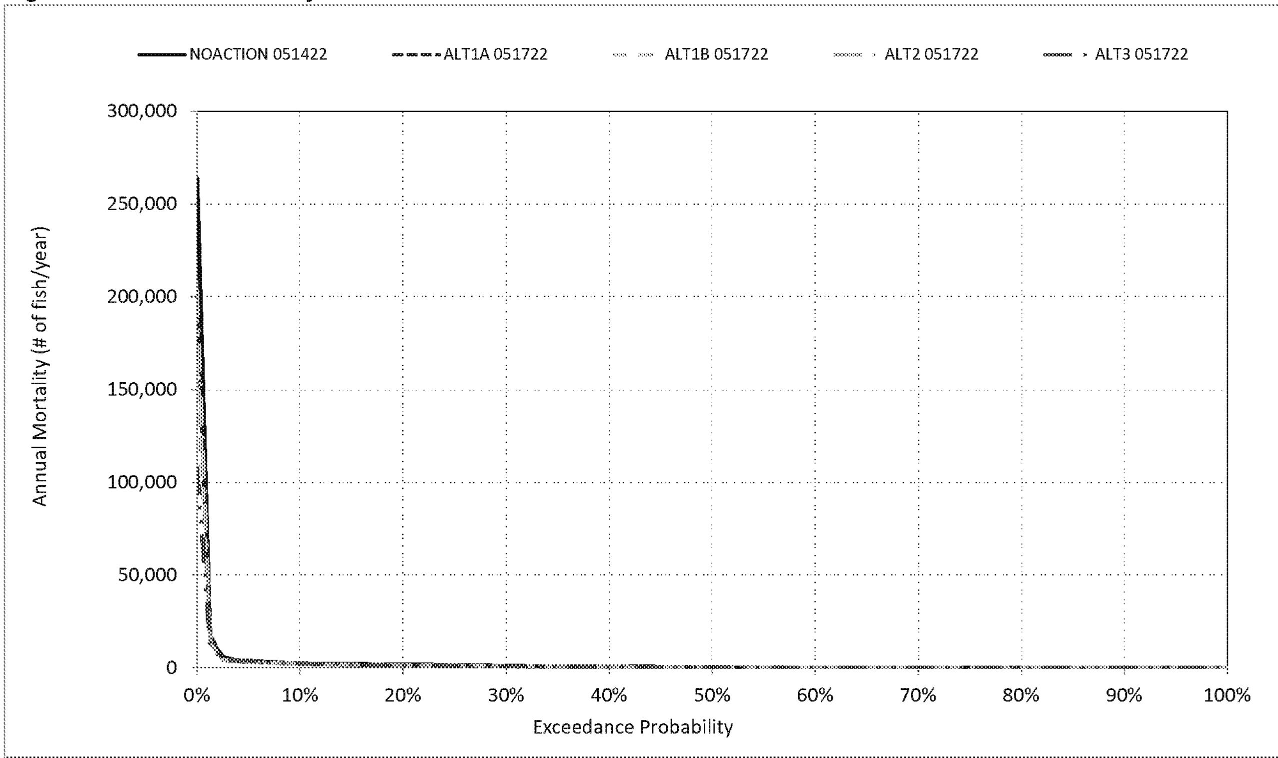


Figure B-d-6. Annual Mortality for LateFall-Run Chinook Salmon - Pre- & Immature Smolts

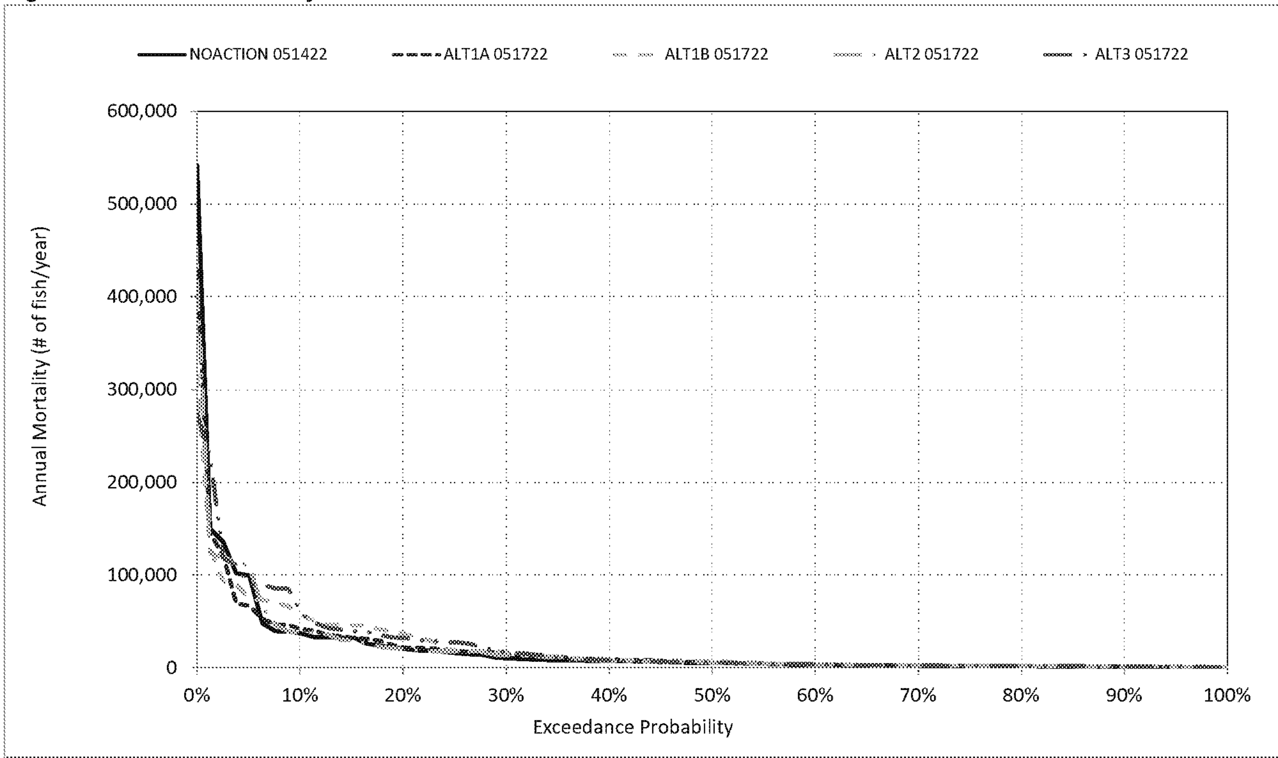


Figure B-d-7. Annual Mortality for LateFall-Run Chinook Salmon - All Lifestages

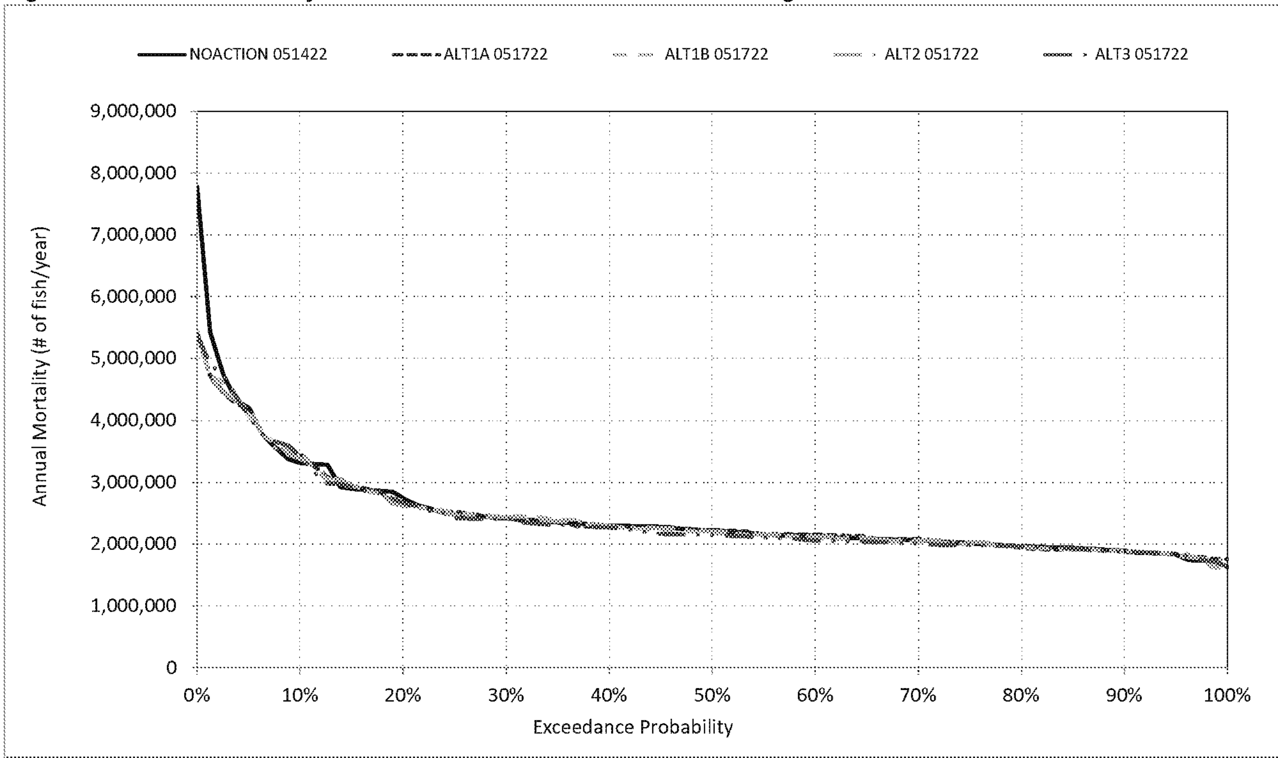


Figure B-d-8. Incubation - Habitat based Annual Mortality for LateFall-Run Chinook Salmon

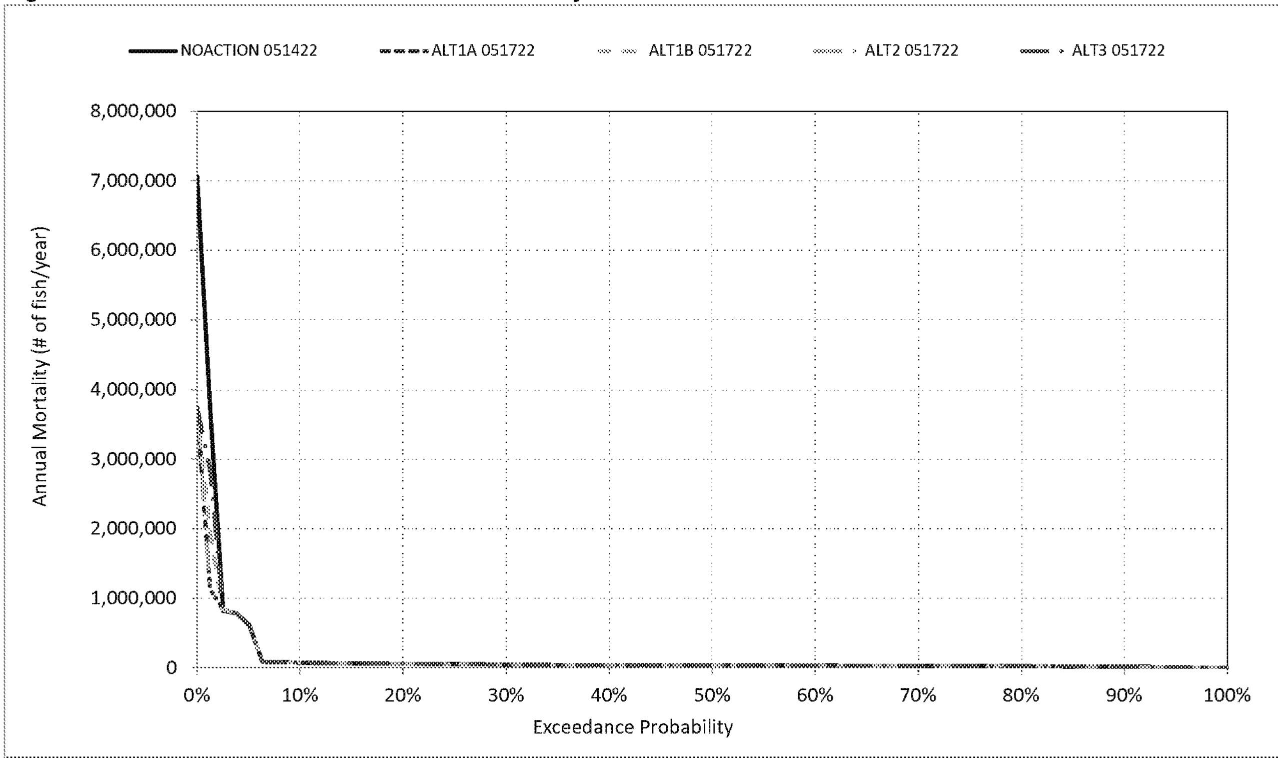


Figure B-d-9. Super-imposition - Habitat based Annual Mortality for LateFall-Run Chinook Salmon

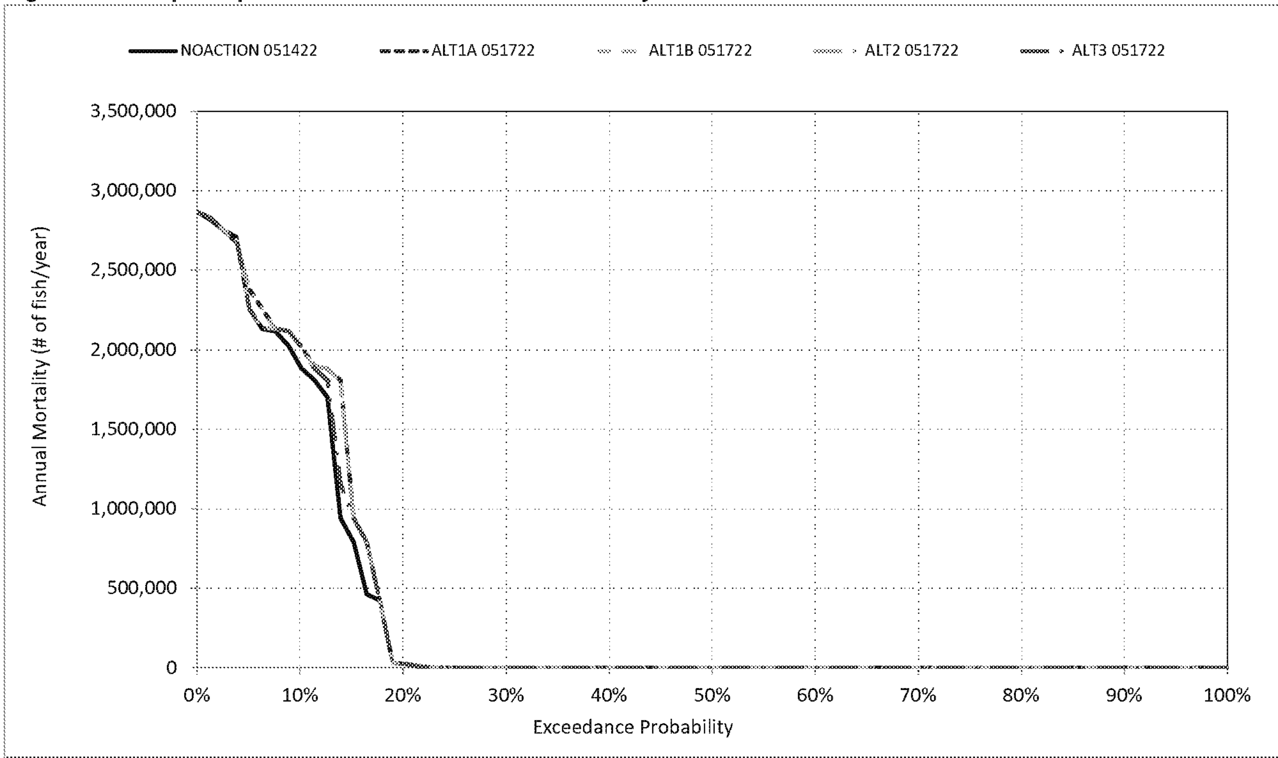


Figure B-d-10. Fry - Habitat based Annual Mortality for LateFall-Run Chinook Salmon

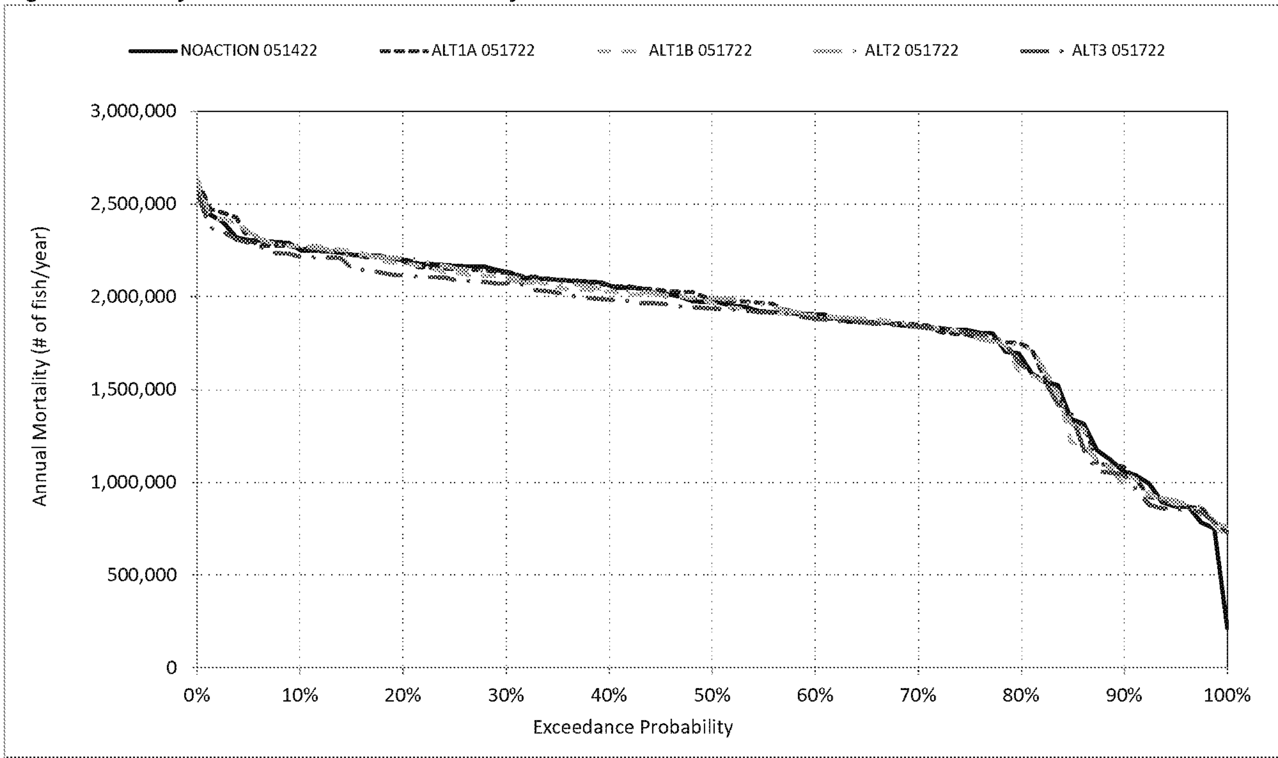


Figure B-d-11. Pre-smolt - Habitat based Annual Mortality for LateFall-Run Chinook Salmon

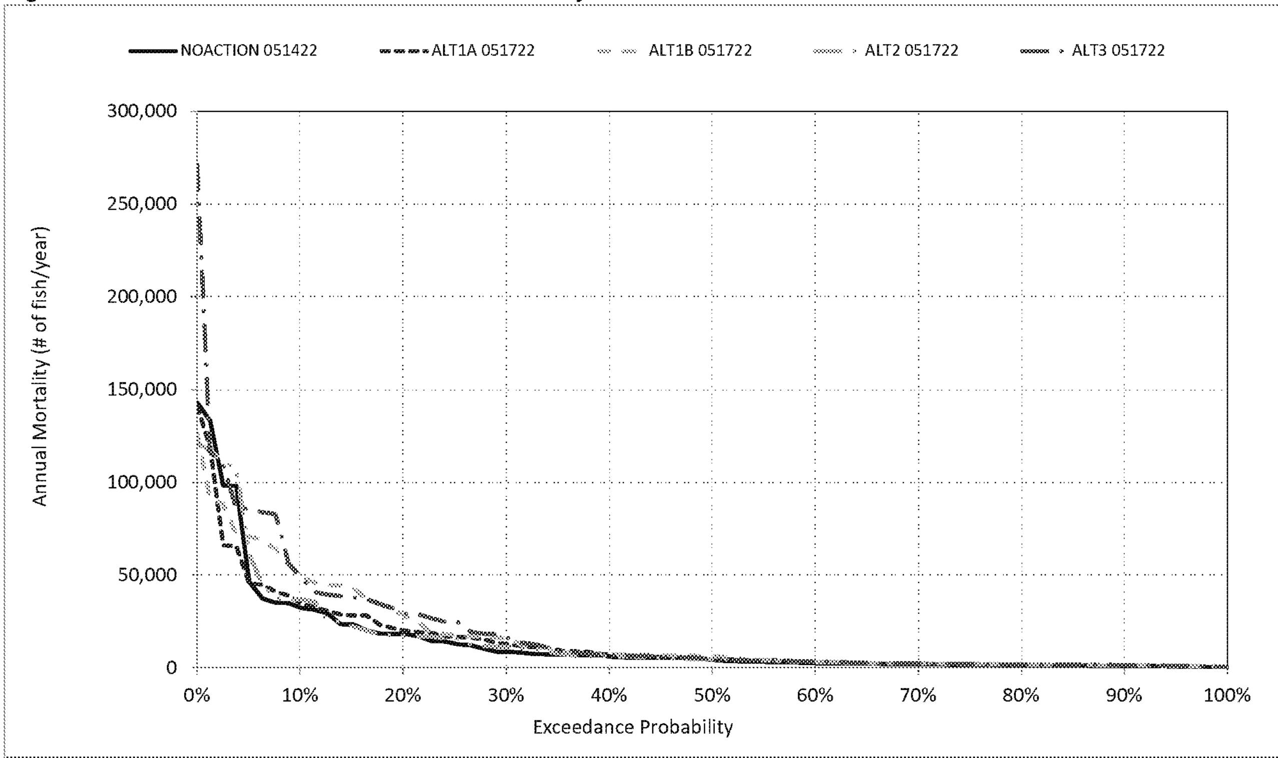


Figure B-d-12. Immature Smolt - Habitat based Annual Mortality for LateFall-Run Chinook Salmon

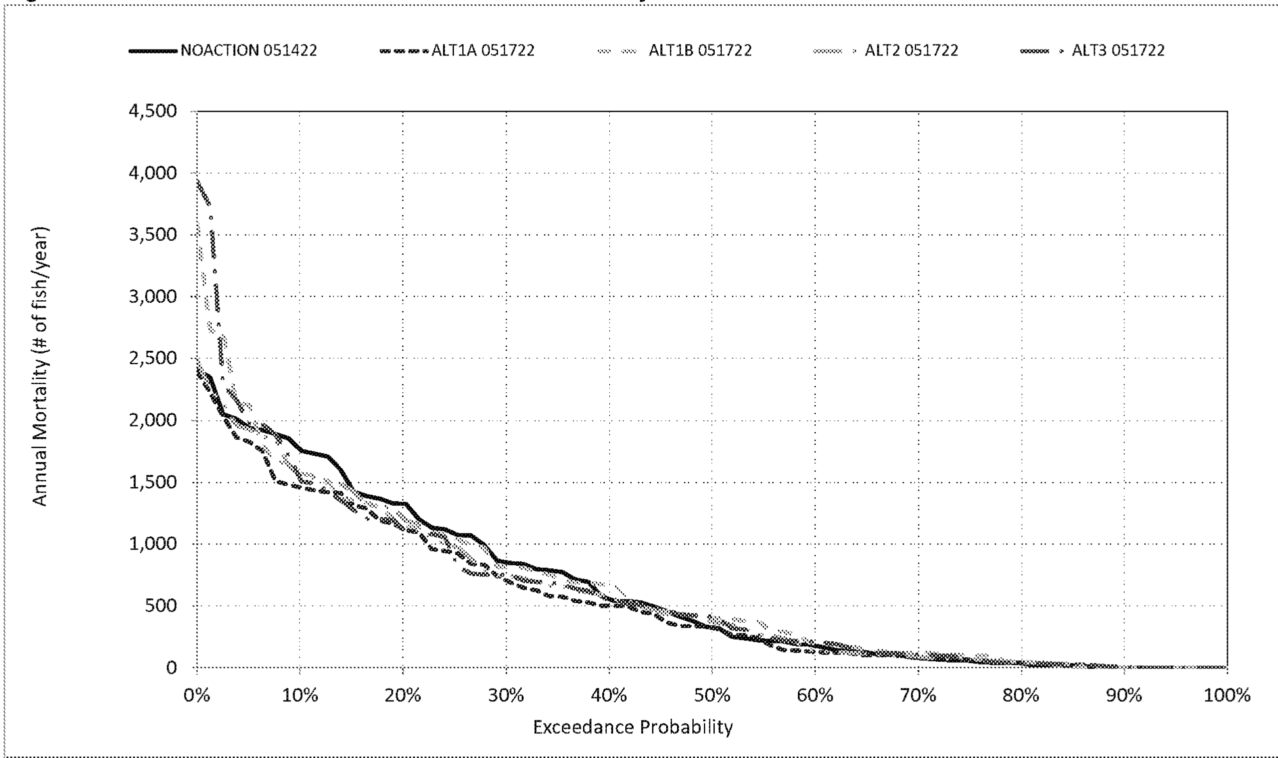


Figure B-d-13. Total Habitat based Annual Mortality for LateFall-Run Chinook Salmon

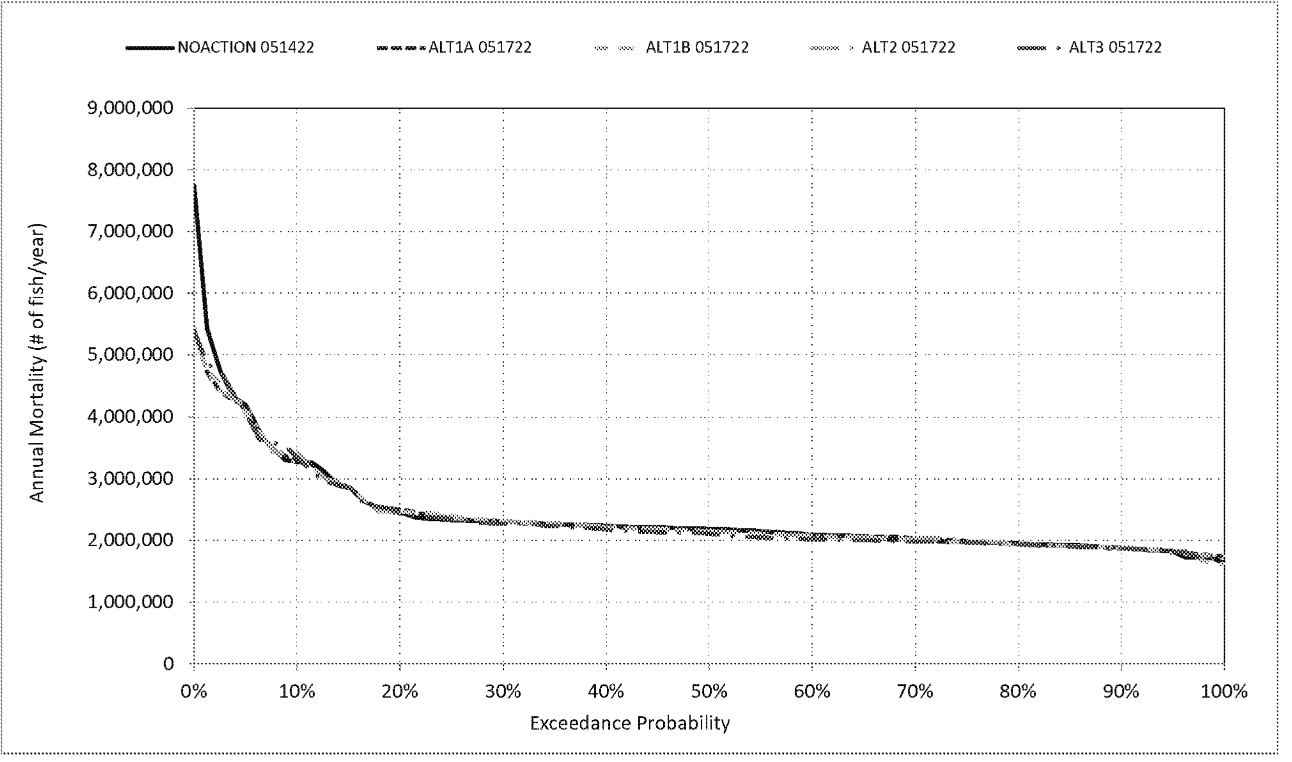


Figure B-d-14. Pre-Spawn Mortality - Temperature based Annual Mortality for LateFall-Run Chinook Salmon

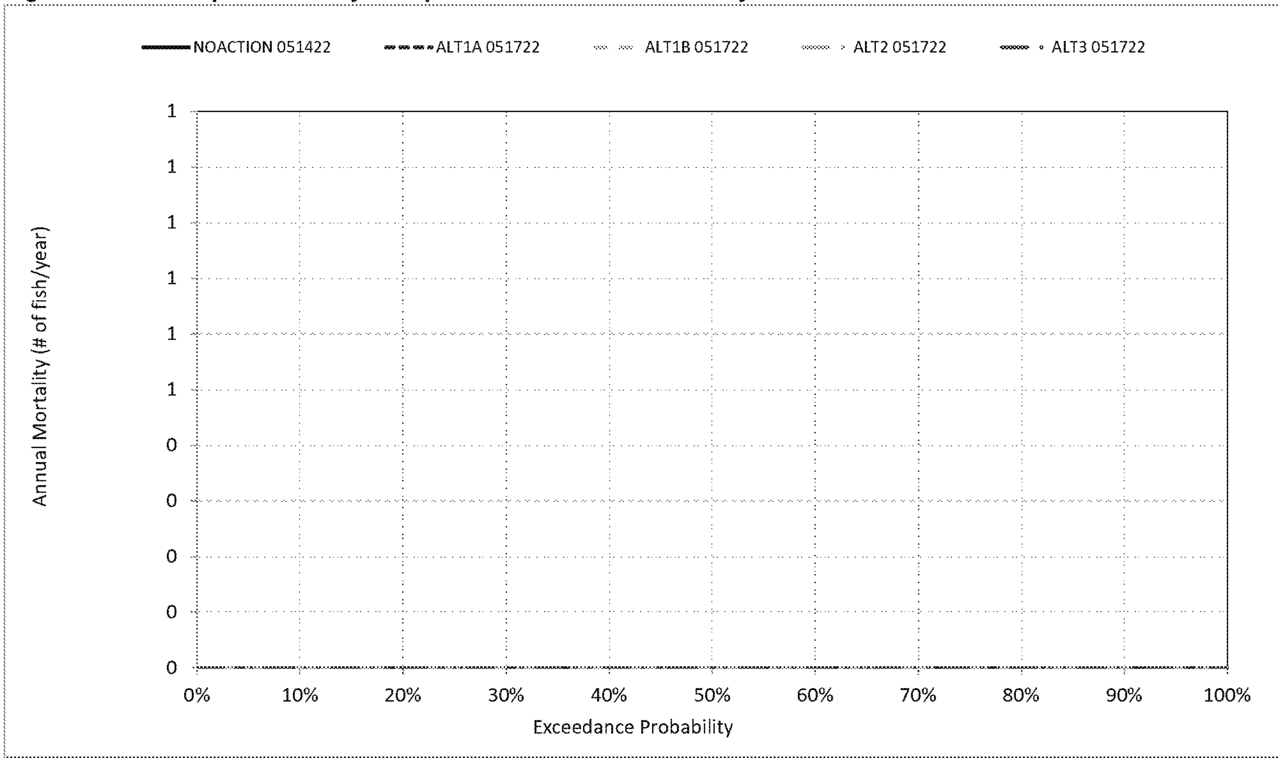


Figure B-d-15. Eggs - Temperature based Annual Mortality for LateFall-Run Chinook Salmon

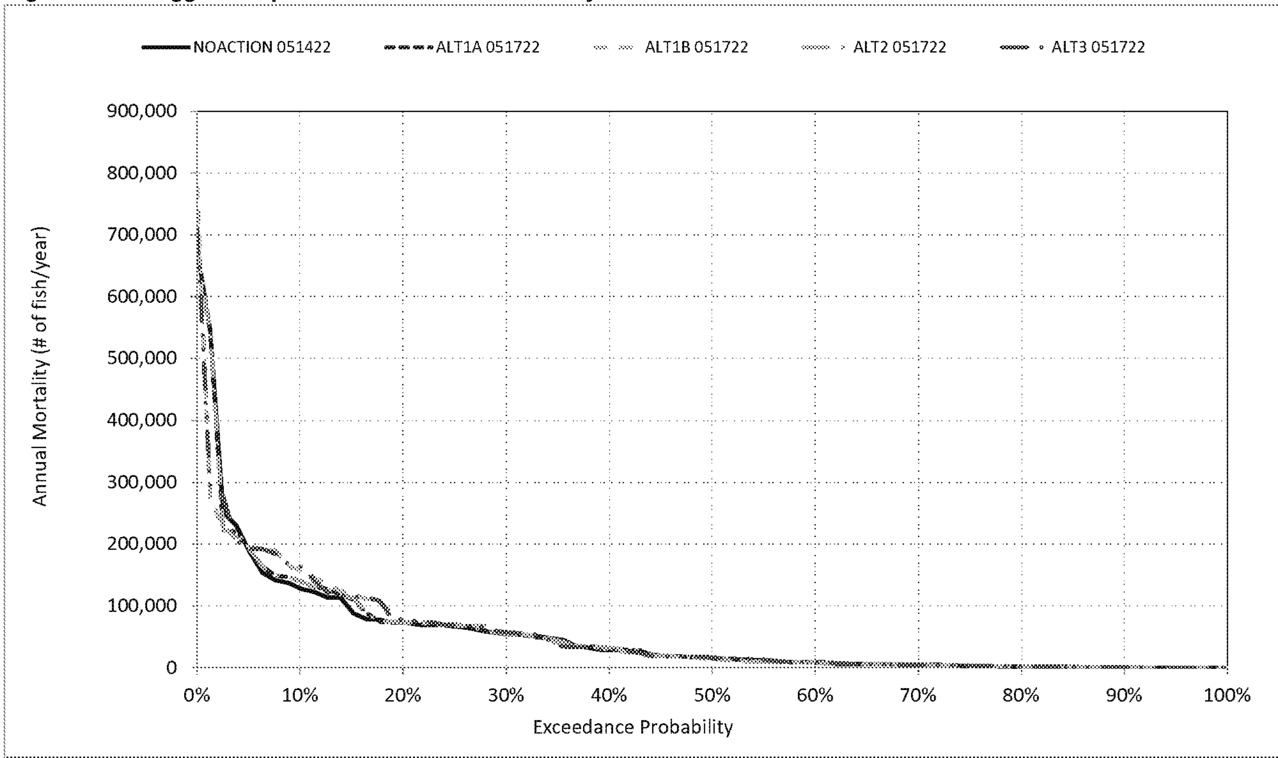


Figure B-d-16. Fry - Temperature based Annual Mortality for LateFall-Run Chinook Salmon

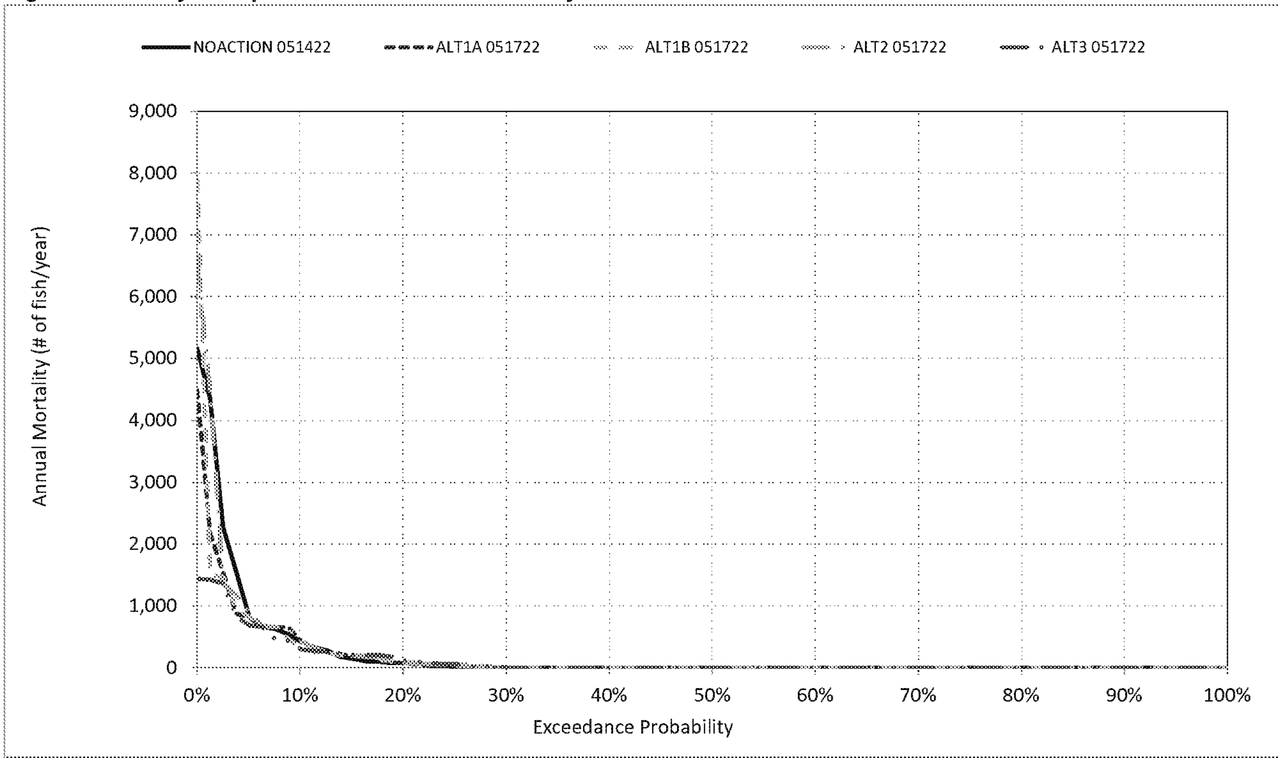


Figure B-d-17. Pre-smolt - Temperature based Annual Mortality for LateFall-Run Chinook Salmon

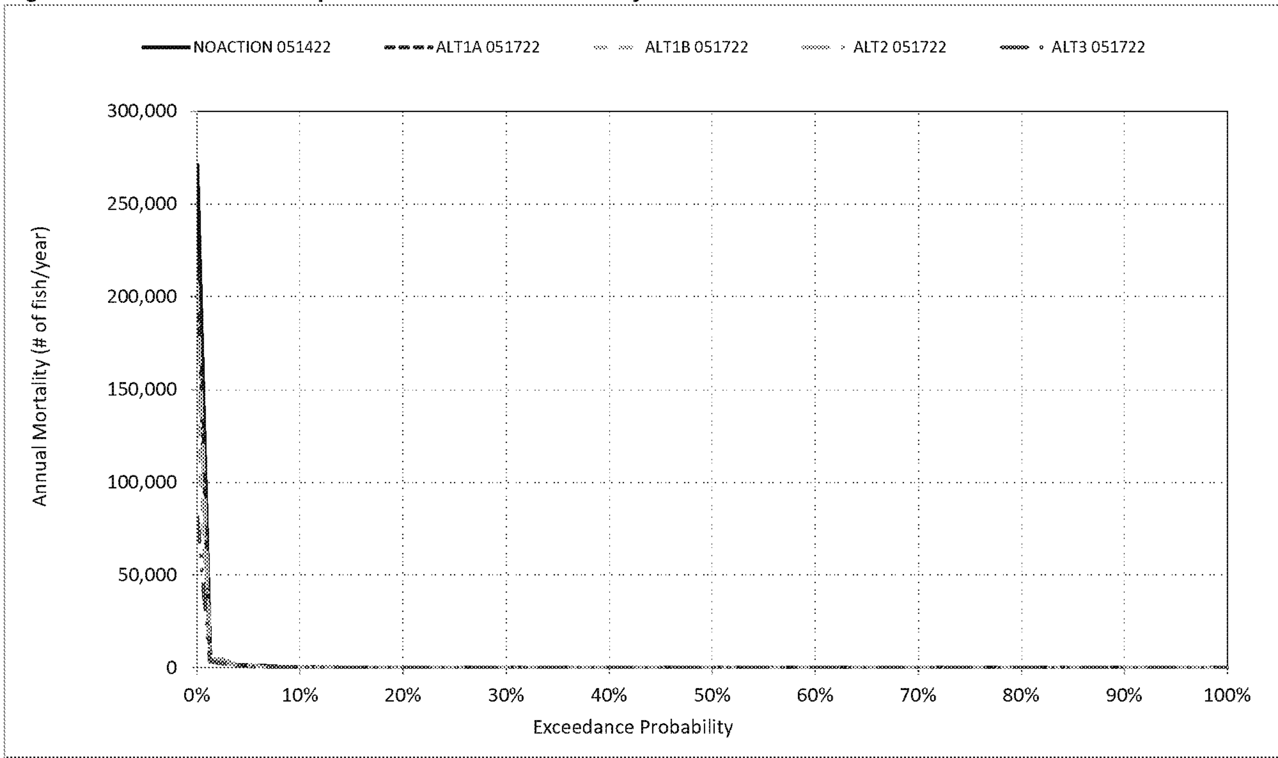


Figure B-d-18. Immature Smolt - Temperature based Annual Mortality for LateFall-Run Chinook Salmon

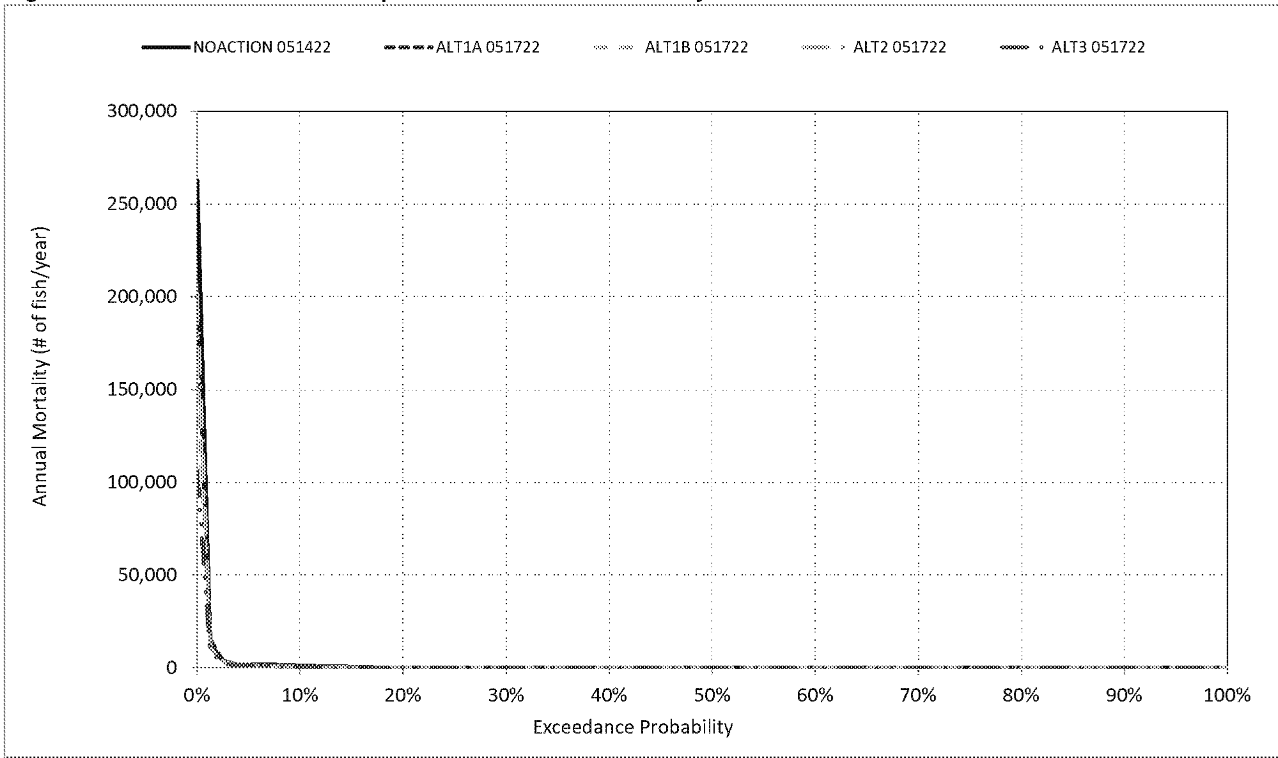


Figure B-d-19. Total Temperature based Annual Mortality for LateFall-Run Chinook Salmon

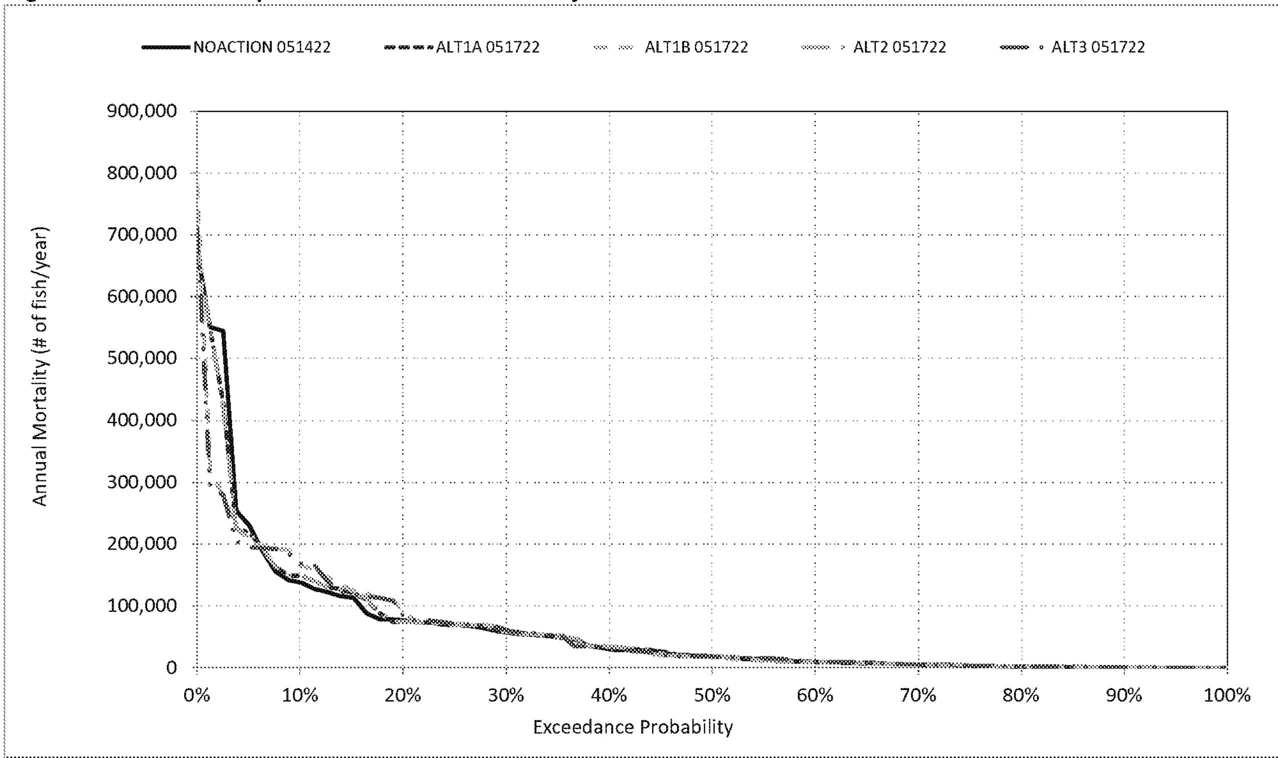


Table 1a-1 Mortality of Winter-Run Chinook Salmon by Life-stage and Source
NOACTION 051422 vs. ALT1A 051722

Analysis Period	Pre-Spawn Mortality	Eggs Flow	Eggs - Temperature	Fry - Temperature	Fry - Habitat	Juvenile Temperature	Juvenile Habitat	Total
Long-term Average and Average by Water Year Type Annual Mortality								
	Annual Mortality[4] (# of Fish/year)							
Long-term								
Full Simulation Period[1]								
NOACTION 051422	9,120	401,649	47,782	585	101,914	149	6	561,206
ALT1A 051722	8,820	396,862	44,005	622	102,810	166	5	553,291
Difference	-300	-4,786	-3,777	37	896	17	-1	-7,915
Percent Difference[3]	-3	-1	-8	6	1	11	-19	-1
Water Year Types[2]								
Wet (31.7%)								
NOACTION 051422	9,023	377,196	454	0	132,085	0	4	518,761
ALT1A 051722	8,907	374,480	439	0	131,045	0	2	514,874
Difference	-115	-2,716	-15	0	-1,040	0	-2	-3,887
Percent Difference	-1	-1	-3	0	-1	0	-43	-1
Above Normal (14.6%)								
NOACTION 051422	10,200	300,781	370,997	4,683	104,907	1,195	3	792,764
ALT1A 051722	10,200	299,873	340,818	4,977	107,885	1,330	0	765,083
Difference	0	-908	-30,179	294	2,978	135	-3	-27,682
Percent Difference	0	0	-8	6	3	11	-100	-3
Below Normal (17.1%)								
NOACTION 051422	7,929	383,693	1,423	0	88,278	0	1	481,322
ALT1A 051722	7,286	389,095	1,963	0	92,240	0	1	490,584
Difference	-643	5,402	540	0	3,963	0	0	9,262
Percent Difference	-8	1	38	0	4	0	0	2
Dry (22%)								
NOACTION 051422	9,168	473,699	1,334	0	87,013	0	11	571,226
ALT1A 051722	8,501	457,788	1,275	0	85,003	0	6	552,572
Difference	-668	-15,911	-60	0	-2,010	0	-5	-18,654
Percent Difference	-7	-3	-4	0	-2	0	-48	-3
Critical (14.6%)								
NOACTION 051422	9,751	451,558	4,739	0	72,310	0	14	538,371
ALT1A 051722	9,750	443,853	4,198	1	76,446	1	20	534,269
Difference	-1	-7,704	-540	1	4,137	1	6	-4,102
Percent Difference	0	-2	-11	0	6	0	41	-1

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

[4] Mortality values do not include base mortality

Table 1a-2 Mortality of Winter-Run Chinook Salmon by Life-stage and Source
NOACTION 051422 vs. ALT1B 051722

Analysis Period	Pre-Spawn Mortality	Eggs Flow	Eggs - Temperature	Fry - Temperature	Fry - Habitat	Juvenile Temperature	Juvenile Habitat	Total
Long-term Average and Average by Water Year Type Annual Mortality								
	Annual Mortality[4] (# of Fish/year)							
Long-term								
Full Simulation Period[1]								
NOACTION 051422	9,120	401,649	47,782	585	101,914	149	6	561,206
ALT1B 051722	8,777	390,400	40,259	551	104,381	156	4	544,529
Difference	-343	-11,249	-7,523	-34	2,468	7	-3	-16,677
Percent Difference[3]	-4	-3	-16	-6	2	5	-42	-3
Water Year Types[2]								
Wet (31.7%)								
NOACTION 051422	9,023	377,196	454	0	132,085	0	4	518,761
ALT1B 051722	9,121	356,560	430	0	132,567	0	1	498,680
Difference	99	-20,636	-24	0	483	0	-3	-20,081
Percent Difference	1	-5	-5	0	0	0	-73	-4
Above Normal (14.6%)								
NOACTION 051422	10,200	300,781	370,997	4,683	104,907	1,195	3	792,764
ALT1B 051722	9,300	309,289	311,151	4,407	105,187	1,250	0	740,584
Difference	-900	8,508	-59,846	-275	280	56	-3	-52,180
Percent Difference	-9	3	-16	-6	0	5	-100	-7
Below Normal (17.1%)								
NOACTION 051422	7,929	383,693	1,423	0	88,278	0	1	481,322
ALT1B 051722	7,500	383,375	1,788	0	97,074	0	6	489,742
Difference	-429	-318	365	0	8,796	0	5	8,420
Percent Difference	-5	0	26	0	10	0	1,014	2
Dry (22%)								
NOACTION 051422	9,168	473,699	1,334	0	87,013	0	11	571,226
ALT1B 051722	8,667	449,489	1,294	0	87,508	0	4	546,962
Difference	-501	-24,211	-40	0	495	0	-8	-24,265
Percent Difference	-5	-5	-3	0	1	0	-68	-4
Critical (14.6%)								
NOACTION 051422	9,751	451,558	4,739	0	72,310	0	14	538,371
ALT1B 051722	9,250	450,875	4,143	0	76,477	0	10	540,755
Difference	-501	-683	-596	0	4,167	0	-4	2,384
Percent Difference	-5	0	-13	0	6	0	-28	0

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

[4] Mortality values do not include base mortality

Table 1a-3 Mortality of Winter-Run Chinook Salmon by Life-stage and Source
NOACTION 051422 vs. ALT2 051722

Long-term Average and Average by Water Year Type Annual Mortality								
	Annual Mortality[4] (# of Fish/year)							
Analysis Period	Pre-Spawn Mortality	Eggs Flow	Eggs - Temperature	Fry - Temperature	Fry - Habitat	Juvenile Temperature	Juvenile Habitat	Total
Long-term								
Full Simulation Period[1]								
NOACTION 051422	9,120	401,649	47,782	585	101,914	149	6	561,206
ALT2 051722	8,820	397,728	44,029	621	103,260	169	4	554,631
Difference	-300	-3,921	-3,754	36	1,346	20	-2	-6,575
Percent Difference[3]	-3	-1	-8	6	1	13	-40	-1
Water Year Types[2]								
Wet (32.9%)								
NOACTION 051422	9,022	374,656	439	0	129,154	0	3	513,274
ALT2 051722	8,912	371,732	425	0	128,840	0	2	509,910
Difference	-110	-2,924	-14	0	-314	0	-2	-3,364
Percent Difference	-1	-1	-3	0	0	0	-44	-1
Above Normal (12.2%)								
NOACTION 051422	10,125	327,975	463,701	5,854	108,781	1,494	3	917,932
ALT2 051722	10,125	325,252	425,955	6,215	113,607	1,693	1	882,848
Difference	0	-2,724	-37,746	361	4,827	200	-2	-35,084
Percent Difference	0	-1	-8	6	4	13	-68	-4
Below Normal (18.3%)								
NOACTION 051422	8,200	363,139	1,349	0	90,784	0	0	463,472
ALT2 051722	7,400	367,258	2,000	0	95,982	0	2	472,643
Difference	-800	4,119	652	0	5,198	0	2	9,170
Percent Difference	-10	1	48	0	6	0	429	2
Dry (22%)								
NOACTION 051422	9,168	473,699	1,334	0	87,013	0	11	571,226
ALT2 051722	8,501	457,607	1,206	0	85,434	0	5	552,752
Difference	-668	-16,093	-129	0	-1,579	0	-6	-18,475
Percent Difference	-7	-3	-10	0	-2	0	-55	-3
Critical (14.6%)								
NOACTION 051422	9,751	451,558	4,739	0	72,310	0	14	538,371
ALT2 051722	10,000	452,803	4,290	0	74,643	0	9	541,745
Difference	249	1,246	-449	0	2,333	0	-5	3,374
Percent Difference	3	0	-9	0	3	0	-34	1

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

[4] Mortality values do not include base mortality

Table 1a-4 Mortality of Winter-Run Chinook Salmon by Life-stage and Source
NOACTION 051422 vs. ALT3 051722

Long-term Average and Average by Water Year Type Annual Mortality								
	Annual Mortality[4] (# of Fish/year)							
Analysis Period	Pre-Spawn Mortality	Eggs Flow	Eggs - Temperature	Fry - Temperature	Fry - Habitat	Juvenile Temperature	Juvenile Habitat	Total
Long-term								
Full Simulation Period[1]								
NOACTION 051422	9,120	401,649	47,782	585	101,914	149	6	561,206
ALT3 051722	8,964	382,397	20,712	279	106,313	69	4	518,739
Difference	-156	-19,252	-27,070	-306	4,399	-80	-2	-42,467
Percent Difference[3]	-2	-5	-57	-52	4	-54	-40	-8
Water Year Types[2]								
Wet (31.7%)								
NOACTION 051422	9,023	377,196	454	0	132,085	0	4	518,761
ALT3 051722	9,121	340,558	480	0	138,378	0	1	488,538
Difference	98	-36,638	26	0	6,293	0	-3	-30,223
Percent Difference	1	-10	6	0	5	0	-73	-6
Above Normal (14.6%)								
NOACTION 051422	10,200	300,781	370,997	4,683	104,907	1,195	3	792,764
ALT3 051722	9,900	355,945	154,291	2,234	103,504	554	14	626,443
Difference	-300	55,164	-216,705	-2,448	-1,403	-641	11	-166,322
Percent Difference	-3	18	-58	-52	-1	-54	444	-21
Below Normal (17.1%)								
NOACTION 051422	7,929	383,693	1,423	0	88,278	0	1	481,322
ALT3 051722	7,500	364,684	1,866	0	95,332	0	4	469,386
Difference	-429	-19,008	443	0	7,054	0	4	-11,936
Percent Difference	-5	-5	31	0	8	0	771	-2
Dry (22%)								
NOACTION 051422	9,168	473,699	1,334	0	87,013	0	11	571,226
ALT3 051722	8,833	430,375	1,196	0	87,815	0	3	528,223
Difference	-335	-43,325	-138	0	802	0	-8	-43,004
Percent Difference	-4	-9	-10	0	1	0	-73	-8
Critical (14.6%)								
NOACTION 051422	9,751	451,558	4,739	0	72,310	0	14	538,371
ALT3 051722	9,750	443,786	4,496	0	79,740	0	2	537,773
Difference	-1	-7,772	-243	0	7,430	0	-12	-598
Percent Difference	0	-2	-5	0	10	0	-86	0

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

[4] Mortality values do not include base mortality

Table 1b-1 Mortality of Spring-Run Chinook Salmon by Life-stage and Source
NOACTION 051422 vs. ALT1A 051722

Analysis Period	Pre-Spawn Mortality	Eggs Flow	Eggs - Temperature	Fry - Temperature	Fry - Habitat	Juvenile Temperature	Juvenile Habitat	Total
Long-term Average and Average by Water Year Type Annual Mortality								
	Annual Mortality[4] (# of Fish/year)							
Long-term								
Full Simulation Period[1]								
NOACTION 051422	2,508	4,406	18,248	0	2,686	2	0	27,849
ALT1A 051722	1,258	4,483	19,198	0	2,722	1	0	27,663
Difference	-1,249	77	949	0	37	0	0	-186
Percent Difference[3]	-50	2	5	0	1	-9	0	-1
Water Year Types[2]								
Wet (31.7%)								
NOACTION 051422	327	5,568	2,453	0	2,219	0	0	10,567
ALT1A 051722	328	5,416	2,461	0	2,185	0	0	10,390
Difference	1	-152	8	0	-34	0	0	-178
Percent Difference	0	-3	0	0	-2	0	0	-2
Above Normal (14.6%)								
NOACTION 051422	18,877	1,261	102,250	0	2,362	0	0	124,750
ALT1A 051722	8,952	1,095	110,961	0	2,587	0	0	123,595
Difference	-9,925	-166	8,711	0	225	0	0	-1,155
Percent Difference	-53	-13	9	0	10	0	0	-1
Below Normal (17.1%)								
NOACTION 051422	19	3,508	7,373	0	2,903	0	0	13,803
ALT1A 051722	21	4,081	9,137	0	2,859	0	0	16,098
Difference	2	573	1,764	0	-44	0	0	2,295
Percent Difference	12	16	24	0	-2	0	0	17
Dry (22%)								
NOACTION 051422	18	5,123	6,308	0	3,098	0	0	14,547
ALT1A 051722	27	5,487	4,689	0	3,163	0	0	13,367
Difference	9	365	-1,619	0	65	0	0	-1,181
Percent Difference	52	7	-26	0	2	0	0	-8
Critical (14.6%)								
NOACTION 051422	230	4,478	13,066	0	3,095	11	0	20,880
ALT1A 051722	154	4,246	12,491	0	3,180	10	0	20,081
Difference	-76	-232	-575	0	85	-1	0	-799
Percent Difference	-33	-5	-4	0	3	-9	0	-4

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

[4] Mortality values do not include base mortality

Table 1b-2 Mortality of Spring-Run Chinook Salmon by Life-stage and Source
NOACTION 051422 vs. ALT1B 051722

Long-term Average and Average by Water Year Type Annual Mortality								
	Annual Mortality[4] (# of Fish/year)							
Analysis Period	Pre-Spawn Mortality	Eggs Flow	Eggs - Temperature	Fry - Temperature	Fry - Habitat	Juvenile Temperature	Juvenile Habitat	Total
Long-term								
Full Simulation Period[1]								
NOACTION 051422	2,508	4,406	18,248	0	2,686	2	0	27,849
ALT1B 051722	545	4,244	19,148	0	2,749	1	0	26,688
Difference	-1,963	-161	900	0	63	0	0	-1,161
Percent Difference[3]	-78	-4	5	0	2	-8	0	-4
Water Year Types[2]								
Wet (31.7%)								
NOACTION 051422	327	5,568	2,453	0	2,219	0	0	10,567
ALT1B 051722	126	5,405	2,326	0	2,148	0	0	10,005
Difference	-202	-163	-127	0	-71	0	0	-563
Percent Difference	-62	-3	-5	0	-3	0	0	-5
Above Normal (14.6%)								
NOACTION 051422	18,877	1,261	102,250	0	2,362	0	0	124,750
ALT1B 051722	3,757	1,105	113,591	0	2,482	0	0	120,935
Difference	-15,120	-156	11,341	0	120	0	0	-3,815
Percent Difference	-80	-12	11	0	5	0	0	-3
Below Normal (17.1%)								
NOACTION 051422	19	3,508	7,373	0	2,903	0	0	13,803
ALT1B 051722	22	4,052	8,579	0	3,104	0	0	15,756
Difference	4	544	1,206	0	200	0	0	1,953
Percent Difference	20	15	16	0	7	0	0	14
Dry (22%)								
NOACTION 051422	18	5,123	6,308	0	3,098	0	0	14,547
ALT1B 051722	25	4,407	4,530	0	3,256	0	0	12,217
Difference	7	-716	-1,779	0	158	0	0	-2,330
Percent Difference	40	-14	-28	0	5	0	0	-16
Critical (14.6%)								
NOACTION 051422	230	4,478	13,066	0	3,095	11	0	20,880
ALT1B 051722	168	4,326	11,149	0	3,099	10	0	18,752
Difference	-61	-152	-1,917	0	4	-1	0	-2,128
Percent Difference	-27	-3	-15	0	0	-8	0	-10

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

[4] Mortality values do not include base mortality

Table 1b-3 Mortality of Spring-Run Chinook Salmon by Life-stage and Source
NOACTION 051422 vs. ALT2 051722

Analysis Period	Pre-Spawn Mortality	Eggs Flow	Eggs - Temperature	Fry - Temperature	Fry - Habitat	Juvenile Temperature	Juvenile Habitat	Total
Long-term Average and Average by Water Year Type Annual Mortality								
	Annual Mortality[4] (# of Fish/year)							
Long-term								
Full Simulation Period[1]								
NOACTION 051422	2,508	4,406	18,248	0	2,686	2	0	27,849
ALT2 051722	1,251	4,527	19,357	0	2,713	2	0	27,849
Difference	-1,257	121	1,109	0	27	0	0	0
Percent Difference[3]	-50	3	6	0	1	-1	0	0
Water Year Types[2]								
Wet (32.9%)								
NOACTION 051422	315	5,362	2,395	0	2,207	0	0	10,279
ALT2 051722	316	5,218	2,412	0	2,227	0	0	10,172
Difference	1	-143	16	0	20	0	0	-107
Percent Difference	0	-3	1	0	1	0	0	-1
Above Normal (12.2%)								
NOACTION 051422	23,579	1,465	127,701	0	2,415	0	0	155,160
ALT2 051722	11,051	1,266	138,087	0	2,555	0	0	152,959
Difference	-12,528	-200	10,386	0	140	0	0	-2,201
Percent Difference	-53	-14	8	0	6	0	0	-1
Below Normal (18.3%)								
NOACTION 051422	26	3,333	6,882	0	2,870	0	0	13,112
ALT2 051722	29	3,850	9,593	0	2,820	0	0	16,291
Difference	2	516	2,712	0	-51	0	0	3,180
Percent Difference	8	15	39	0	-2	0	0	24
Dry (22%)								
NOACTION 051422	18	5,123	6,308	0	3,098	0	0	14,547
ALT2 051722	27	5,569	4,253	0	3,111	0	0	12,959
Difference	9	446	-2,056	0	13	0	0	-1,588
Percent Difference	52	9	-33	0	0	0	0	-11
Critical (14.6%)								
NOACTION 051422	230	4,478	13,066	0	3,095	11	0	20,880
ALT2 051722	184	4,426	13,193	0	3,180	11	0	20,994
Difference	-46	-52	127	0	85	0	0	114
Percent Difference	-20	-1	1	0	3	-1	0	1

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

[4] Mortality values do not include base mortality

Table 1b-4 Mortality of Spring-Run Chinook Salmon by Life-stage and Source
NOACTION 051422 vs. ALT3 051722

Analysis Period	Pre-Spawn Mortality	Eggs Flow	Eggs - Temperature	Fry - Temperature	Fry - Habitat	Juvenile Temperature	Juvenile Habitat	Total
Long-term Average and Average by Water Year Type Annual Mortality								
	Annual Mortality[4] (# of Fish/year)							
Long-term								
Full Simulation Period[1]								
NOACTION 051422	2,508	4,406	18,248	0	2,686	2	0	27,849
ALT3 051722	176	4,219	18,129	0	2,686	2	0	25,212
Difference	-2,332	-187	-119	0	0	0	0	-2,637
Percent Difference[3]	-93	-4	-1	0	0	-5	0	-9
Water Year Types[2]								
Wet (31.7%)								
NOACTION 051422	327	5,568	2,453	0	2,219	0	0	10,567
ALT3 051722	124	4,628	2,401	0	2,204	0	0	9,357
Difference	-203	-940	-52	0	-15	0	0	-1,211
Percent Difference	-62	-17	-2	0	-1	0	0	-11
Above Normal (14.6%)								
NOACTION 051422	18,877	1,261	102,250	0	2,362	0	0	124,750
ALT3 051722	723	763	105,526	0	2,526	0	0	109,538
Difference	-18,154	-498	3,276	0	163	0	0	-15,213
Percent Difference	-96	-39	3	0	7	0	0	-12
Below Normal (17.1%)								
NOACTION 051422	19	3,508	7,373	0	2,903	0	0	13,803
ALT3 051722	22	3,543	8,618	0	2,926	0	0	15,110
Difference	4	35	1,245	0	23	0	0	1,307
Percent Difference	20	1	17	0	1	0	0	9
Dry (22%)								
NOACTION 051422	18	5,123	6,308	0	3,098	0	0	14,547
ALT3 051722	37	5,712	4,541	0	3,101	0	0	13,391
Difference	19	589	-1,768	0	3	0	0	-1,156
Percent Difference	107	12	-28	0	0	0	0	-8
Critical (14.6%)								
NOACTION 051422	230	4,478	13,066	0	3,095	11	0	20,880
ALT3 051722	220	4,759	10,856	0	2,964	10	0	18,809
Difference	-10	281	-2,210	0	-131	-1	0	-2,071
Percent Difference	-4	6	-17	0	-4	-5	0	-10

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

[4] Mortality values do not include base mortality

Table 1c-1 Mortality of Fall-Run Chinook Salmon by Life-stage and Source
NOACTION 051422 vs. ALT1A 051722

Long-term Average and Average by Water Year Type Annual Mortality

Analysis Period	Pre-Spawn Mortality	Eggs Flow	Eggs - Temperature	Fry - Temperature	Fry - Habitat	Juvenile Temperature	Juvenile Habitat	Total
	Annual Mortality[4] (# of Fish/year)							
Long-term								
Full Simulation Period[1]								
NOACTION 051422	497,434	1,651,820	143,906	689	5,465,904	15,797	417,534	8,193,084
ALT1A 051722	389,735	1,589,755	186,726	642	5,495,135	14,770	425,982	8,102,744
Difference	-107,699	-62,066	42,820	-47	29,231	-1,027	8,448	-90,340
Percent Difference[3]	-22	-4	30	-7	1	-7	2	-1
Water Year Types[2]								
Wet (31.7%)								
NOACTION 051422	1,921	4,051,801	21,126	1,271	5,808,613	14,752	114,399	10,013,883
ALT1A 051722	2,043	3,851,525	20,364	1,263	5,876,323	14,666	111,534	9,877,717
Difference	122	-200,276	-762	-8	67,710	-86	-2,865	-136,166
Percent Difference	6	-5	-4	-1	1	-1	-3	-1
Above Normal (14.6%)								
NOACTION 051422	3,939,410	242,496	476,096	99	5,932,379	3,322	209,590	10,803,391
ALT1A 051722	3,077,895	252,747	802,069	93	6,034,781	3,305	194,892	10,365,782
Difference	-861,516	10,251	325,974	-6	102,403	-17	-14,698	-437,609
Percent Difference	-22	4	68	-6	2	0	-7	-4
Below Normal (17.1%)								
NOACTION 051422	613	602,561	188,224	39	5,509,567	3,724	359,991	6,664,719
ALT1A 051722	377	606,425	226,175	44	5,422,670	3,848	379,927	6,639,466
Difference	-236	3,864	37,951	5	-86,897	125	19,936	-25,253
Percent Difference	-38	1	20	12	-2	3	6	0
Dry (22%)								
NOACTION 051422	1,666	539,057	111,750	369	5,107,225	17,010	733,103	6,510,180
ALT1A 051722	603	534,996	92,272	208	5,122,835	13,231	734,886	6,499,030
Difference	-1,063	-4,060	-19,479	-161	15,611	-3,780	1,783	-11,150
Percent Difference	-64	-1	-17	-44	0	-22	0	0
Critical (14.6%)								
NOACTION 051422	26,006	519,581	129,632	1,160	4,821,716	40,726	841,391	6,380,214
ALT1A 051722	27,549	532,782	130,047	1,104	4,862,514	39,603	890,237	6,483,835
Difference	1,543	13,201	414	-56	40,798	-1,123	48,845	103,621
Percent Difference	6	3	0	-5	1	-3	6	2

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

[4] Mortality values do not include base mortality

Table 1c-2 Mortality of Fall-Run Chinook Salmon by Life-stage and Source
NOACTION 051422 vs. ALT1B 051722

Long-term Average and Average by Water Year Type Annual Mortality								
	Annual Mortality[4] (# of Fish/year)							
Analysis Period	Pre-Spawn Mortality	Eggs Flow	Eggs - Temperature	Fry - Temperature	Fry - Habitat	Juvenile Temperature	Juvenile Habitat	Total
Long-term								
Full Simulation Period[1]								
NOACTION 051422	497,434	1,651,820	143,906	689	5,465,904	15,797	417,534	8,193,084
ALT1B 051722	262,007	1,611,523	216,317	332	5,492,836	14,378	406,415	8,003,809
Difference	-235,427	-40,298	72,412	-357	26,932	-1,419	-11,119	-189,276
Percent Difference[3]	-47	-2	50	-52	0	-9	-3	-2
Water Year Types[2]								
Wet (31.7%)								
NOACTION 051422	1,921	4,051,801	21,126	1,271	5,808,613	14,752	114,399	10,013,883
ALT1B 051722	1,252	3,913,715	21,887	259	5,825,243	9,214	121,883	9,893,452
Difference	-669	-138,086	762	-1,012	16,630	-5,538	7,483	-120,431
Percent Difference	-35	-3	4	-80	0	-38	7	-1
Above Normal (14.6%)								
NOACTION 051422	3,939,410	242,496	476,096	99	5,932,379	3,322	209,590	10,803,391
ALT1B 051722	2,068,804	261,161	1,076,438	127	6,035,919	4,779	191,121	9,638,349
Difference	-1,870,606	18,666	600,342	28	103,540	1,457	-18,469	-1,165,042
Percent Difference	-47	8	126	28	2	44	-9	-11
Below Normal (17.1%)								
NOACTION 051422	613	602,561	188,224	39	5,509,567	3,724	359,991	6,664,719
ALT1B 051722	377	608,305	211,766	58	5,438,074	4,056	351,515	6,614,151
Difference	-236	5,743	23,542	19	-71,493	333	-8,476	-50,568
Percent Difference	-38	1	13	50	-1	9	-2	-1
Dry (22%)								
NOACTION 051422	1,666	539,057	111,750	369	5,107,225	17,010	733,103	6,510,180
ALT1B 051722	251	535,314	91,563	186	5,154,985	13,001	704,044	6,499,344
Difference	-1,415	-3,743	-20,187	-183	47,760	-4,010	-29,059	-10,836
Percent Difference	-85	-1	-18	-49	1	-24	-4	0
Critical (14.6%)								
NOACTION 051422	26,006	519,581	129,632	1,160	4,821,716	40,726	841,391	6,380,214
ALT1B 051722	19,180	533,476	113,256	1,200	4,890,719	47,677	819,920	6,425,427
Difference	-6,826	13,894	-16,376	40	69,002	6,950	-21,471	45,214
Percent Difference	-26	3	-13	3	1	17	-3	1

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

[4] Mortality values do not include base mortality

Table 1c-3 Mortality of Fall-Run Chinook Salmon by Life-stage and Source
NOACTION 051422 vs. ALT2 051722

Long-term Average and Average by Water Year Type Annual Mortality								
	Annual Mortality[4] (# of Fish/year)							
Analysis Period	Pre-Spawn Mortality	Eggs Flow	Eggs - Temperature	Fry - Temperature	Fry - Habitat	Juvenile Temperature	Juvenile Habitat	Total
Long-term								
Full Simulation Period[1]								
NOACTION 051422	497,434	1,651,820	143,906	689	5,465,904	15,797	417,534	8,193,084
ALT2 051722	386,659	1,590,137	191,716	656	5,461,528	15,909	421,222	8,067,826
Difference	-110,775	-61,683	47,810	-33	-4,376	112	3,688	-125,258
Percent Difference[3]	-22	-4	33	-5	0	1	1	-2
Water Year Types[2]								
Wet (32.9%)								
NOACTION 051422	1,850	3,916,421	20,348	1,224	5,783,118	14,205	112,146	9,849,312
ALT2 051722	1,967	3,724,595	19,931	1,236	5,808,467	14,025	111,017	9,681,238
Difference	117	-191,826	-416	12	25,348	-180	-1,129	-168,074
Percent Difference	6	-5	-2	1	0	-1	-1	-2
Above Normal (12.2%)								
NOACTION 051422	4,924,263	185,048	595,073	124	5,941,447	4,152	235,806	11,885,913
ALT2 051722	3,818,953	197,791	1,033,156	124	5,943,916	4,137	225,898	11,223,976
Difference	-1,105,309	12,744	438,083	0	2,469	-15	-9,908	-661,937
Percent Difference	-22	7	74	0	0	0	-4	-6
Below Normal (18.3%)								
NOACTION 051422	572	598,927	175,692	36	5,587,059	3,475	346,384	6,712,147
ALT2 051722	719	603,569	233,756	48	5,540,102	3,563	363,801	6,745,557
Difference	147	4,642	58,064	12	-46,958	87	17,416	33,410
Percent Difference	26	1	33	32	-1	3	5	0
Dry (22%)								
NOACTION 051422	1,666	539,057	111,750	369	5,107,225	17,010	733,103	6,510,180
ALT2 051722	603	535,866	79,883	185	5,113,056	13,055	735,712	6,478,360
Difference	-1,063	-3,191	-31,868	-184	5,832	-3,956	2,609	-31,820
Percent Difference	-64	-1	-29	-50	0	-23	0	0
Critical (14.6%)								
NOACTION 051422	26,006	519,581	129,632	1,160	4,821,716	40,726	841,391	6,380,214
ALT2 051722	25,527	530,454	132,469	1,172	4,783,814	47,712	849,439	6,370,587
Difference	-478	10,872	2,837	12	-37,902	6,986	8,047	-9,626
Percent Difference	-2	2	2	1	-1	17	1	0

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

[4] Mortality values do not include base mortality

Table 1c-4 Mortality of Fall-Run Chinook Salmon by Life-stage and Source
NOACTION 051422 vs. ALT3 051722

Analysis Period	Pre-Spawn Mortality	Eggs Flow	Eggs - Temperature	Fry - Temperature	Fry - Habitat	Juvenile Temperature	Juvenile Habitat	Total
Long-term Average and Average by Water Year Type Annual Mortality								
	Annual Mortality[4] (# of Fish/year)							
Long-term								
Full Simulation Period[1]								
NOACTION 051422	497,434	1,651,820	143,906	689	5,465,904	15,797	417,534	8,193,084
ALT3 051722	93,833	1,654,323	238,638	274	5,461,567	13,988	408,216	7,870,839
Difference	-403,601	2,502	94,733	-415	-4,336	-1,810	-9,318	-322,245
Percent Difference[3]	-81	0	66	-60	0	-11	-2	-4
Water Year Types[2]								
Wet (31.7%)								
NOACTION 051422	1,921	4,051,801	21,126	1,271	5,808,613	14,752	114,399	10,013,883
ALT3 051722	1,252	4,021,688	26,560	280	5,806,905	9,211	115,002	9,980,897
Difference	-669	-30,113	5,434	-991	-1,708	-5,541	603	-32,986
Percent Difference	-35	-1	26	-78	0	-38	1	0
Above Normal (14.6%)								
NOACTION 051422	3,939,410	242,496	476,096	99	5,932,379	3,322	209,590	10,803,391
ALT3 051722	723,700	275,724	1,259,588	115	6,042,798	4,887	212,434	8,519,246
Difference	-3,215,711	33,228	783,493	16	110,419	1,566	2,844	-2,284,145
Percent Difference	-82	14	165	16	2	47	1	-21
Below Normal (17.1%)								
NOACTION 051422	613	602,561	188,224	39	5,509,567	3,724	359,991	6,664,719
ALT3 051722	377	628,037	209,316	98	5,307,294	4,884	392,160	6,542,165
Difference	-236	25,475	21,092	59	-202,273	1,160	32,168	-122,554
Percent Difference	-38	4	11	150	-4	31	9	-2
Dry (22%)								
NOACTION 051422	1,666	539,057	111,750	369	5,107,225	17,010	733,103	6,510,180
ALT3 051722	1,670	550,209	86,978	230	5,120,782	13,714	700,448	6,474,031
Difference	4	11,152	-24,772	-139	13,558	-3,296	-32,655	-36,149
Percent Difference	0	2	-22	-38	0	-19	-4	-1
Critical (14.6%)								
NOACTION 051422	26,006	519,581	129,632	1,160	4,821,716	40,726	841,391	6,380,214
ALT3 051722	16,813	527,368	109,050	665	4,920,140	42,953	787,049	6,404,039
Difference	-9,193	7,787	-20,582	-495	98,423	2,227	-54,342	23,825
Percent Difference	-35	1	-16	-43	2	5	-6	0

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

[4] Mortality values do not include base mortality

Table 1d-1 Mortality of LateFall-Run Chinook Salmon by Life-stage and Source
NOACTION 051422 vs. ALT1A 051722

Long-term Average and Average by Water Year Type Annual Mortality								
	Annual Mortality[4] (# of Fish/year)							
Analysis Period	Pre-Spawn Mortality	Eggs Flow	Eggs - Temperature	Fry - Temperature	Fry - Habitat	Juvenile Temperature	Juvenile Habitat	Total
Long-term								
Full Simulation Period[1]								
NOACTION 051422	0	544,474	54,398	223	1,860,533	7,208	14,439	2,481,275
ALT1A 051722	0	495,938	55,427	174	1,871,383	5,765	14,746	2,443,433
Difference	0	-48,536	1,029	-49	10,851	-1,443	307	-37,841
Percent Difference[3]	0	-9	2	-22	1	-20	2	-2
Water Year Types[2]								
Wet (31.7%)								
NOACTION 051422	0	1,371,512	39,694	196	1,532,623	8	6,715	2,950,748
ALT1A 051722	0	1,216,151	40,066	211	1,556,055	16	6,040	2,818,539
Difference	0	-155,362	372	14	23,432	9	-675	-132,209
Percent Difference	0	-11	1	7	2	116	-10	-4
Above Normal (14.6%)								
NOACTION 051422	0	630,715	37,375	53	1,735,050	8	1,884	2,405,084
ALT1A 051722	0	649,298	38,251	68	1,755,411	8	2,630	2,445,667
Difference	0	18,583	876	16	20,362	0	746	40,583
Percent Difference	0	3	2	30	1	0	40	2
Below Normal (17.1%)								
NOACTION 051422	0	42,536	50,331	123	2,054,343	2	10,142	2,157,476
ALT1A 051722	0	41,973	50,776	116	2,065,948	0	12,100	2,170,912
Difference	0	-562	445	-8	11,605	-2	1,957	13,435
Percent Difference	0	-1	1	-6	1	-100	19	1
Dry (22%)								
NOACTION 051422	0	33,139	78,665	155	2,161,854	675	14,644	2,289,131
ALT1A 051722	0	31,663	81,497	107	2,150,193	786	16,382	2,280,626
Difference	0	-1,476	2,832	-48	-11,661	111	1,738	-8,505
Percent Difference	0	-4	4	-31	-1	17	12	0
Critical (14.6%)								
NOACTION 051422	0	33,285	68,787	644	1,997,481	47,015	46,343	2,193,555
ALT1A 051722	0	33,714	69,345	355	2,006,032	37,211	44,339	2,190,996
Difference	0	429	558	-289	8,552	-9,805	-2,003	-2,558
Percent Difference	0	1	1	-45	0	-21	-4	0

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

[4] Mortality values do not include base mortality

Table 1d-2 Mortality of LateFall-Run Chinook Salmon by Life-stage and Source
NOACTION 051422 vs. ALT1B 051722

Long-term Average and Average by Water Year Type Annual Mortality

Analysis Period	Pre-Spawn Mortality	Eggs Flow	Eggs - Temperature	Fry - Temperature	Fry - Habitat	Juvenile Temperature	Juvenile Habitat	Total
	Annual Mortality[4] (# of Fish/year)							
Long-term								
Full Simulation Period[1]								
NOACTION 051422	0	544,474	54,398	223	1,860,533	7,208	14,439	2,481,275
ALT1B 051722	0	501,787	55,792	207	1,854,857	4,245	17,561	2,434,450
Difference	0	-42,686	1,394	-16	-5,676	-2,963	3,122	-46,825
Percent Difference[3]	0	-8	3	-7	0	-41	22	-2
Water Year Types[2]								
Wet (31.7%)								
NOACTION 051422	0	1,371,512	39,694	196	1,532,623	8	6,715	2,950,748
ALT1B 051722	0	1,224,823	29,460	85	1,549,680	19	5,921	2,809,988
Difference	0	-146,689	-10,234	-111	17,057	11	-793	-140,760
Percent Difference	0	-11	-26	-57	1	147	-12	-5
Above Normal (14.6%)								
NOACTION 051422	0	630,715	37,375	53	1,735,050	8	1,884	2,405,084
ALT1B 051722	0	673,359	38,056	78	1,689,414	29	3,327	2,404,263
Difference	0	42,644	681	26	-45,636	21	1,443	-821
Percent Difference	0	7	2	49	-3	248	77	0
Below Normal (17.1%)								
NOACTION 051422	0	42,536	50,331	123	2,054,343	2	10,142	2,157,476
ALT1B 051722	0	42,084	56,064	120	2,046,223	0	15,607	2,160,098
Difference	0	-451	5,734	-3	-8,120	-2	5,464	2,622
Percent Difference	0	-1	11	-2	0	-100	54	0
Dry (22%)								
NOACTION 051422	0	33,139	78,665	155	2,161,854	675	14,644	2,289,131
ALT1B 051722	0	31,878	89,001	96	2,155,157	627	26,532	2,303,291
Difference	0	-1,261	10,336	-59	-6,697	-47	11,888	14,160
Percent Difference	0	-4	13	-38	0	-7	81	1
Critical (14.6%)								
NOACTION 051422	0	33,285	68,787	644	1,997,481	47,015	46,343	2,193,555
ALT1B 051722	0	33,418	77,496	846	1,980,233	27,296	43,463	2,162,752
Difference	0	133	8,709	202	-17,247	-19,720	-2,879	-30,803
Percent Difference	0	0	13	31	-1	-42	-6	-1

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

[4] Mortality values do not include base mortality

Table 1d-3 Mortality of LateFall-Run Chinook Salmon by Life-stage and Source
NOACTION 051422 vs. ALT2 051722

Analysis Period	Pre-Spawn Mortality	Eggs Flow	Eggs - Temperature	Fry - Temperature	Fry - Habitat	Juvenile Temperature	Juvenile Habitat	Total
Long-term Average and Average by Water Year Type Annual Mortality								
	Annual Mortality[4] (# of Fish/year)							
Long-term								
Full Simulation Period[1]								
NOACTION 051422	0	544,474	54,398	223	1,860,533	7,208	14,439	2,481,275
ALT2 051722	0	495,877	55,480	233	1,866,048	5,582	15,041	2,438,261
Difference	0	-48,597	1,082	10	5,515	-1,626	602	-43,014
Percent Difference[3]	0	-9	2	4	0	-23	4	-2
Water Year Types[2]								
Wet (32.9%)								
NOACTION 051422	0	1,321,658	38,401	189	1,555,997	7	6,533	2,922,786
ALT2 051722	0	1,172,037	38,823	203	1,568,338	16	7,116	2,786,532
Difference	0	-149,621	422	14	12,341	9	583	-136,253
Percent Difference	0	-11	1	7	1	116	9	-5
Above Normal (12.2%)								
NOACTION 051422	0	778,818	44,954	66	1,638,187	11	1,935	2,463,970
ALT2 051722	0	802,188	46,059	85	1,626,096	11	2,790	2,477,228
Difference	0	23,370	1,105	20	-12,092	0	855	13,258
Percent Difference	0	3	2	30	-1	0	44	1
Below Normal (18.3%)								
NOACTION 051422	0	43,110	47,597	115	2,056,138	2	9,571	2,156,532
ALT2 051722	0	42,378	48,215	106	2,054,393	2	11,731	2,156,825
Difference	0	-732	619	-9	-1,745	0	2,161	293
Percent Difference	0	-2	1	-8	0	0	23	0
Dry (22%)								
NOACTION 051422	0	33,139	78,665	155	2,161,854	675	14,644	2,289,131
ALT2 051722	0	31,770	81,254	87	2,145,877	809	16,526	2,276,323
Difference	0	-1,369	2,589	-68	-15,977	135	1,882	-12,809
Percent Difference	0	-4	3	-44	-1	20	13	-1
Critical (14.6%)								
NOACTION 051422	0	33,285	68,787	644	1,997,481	47,015	46,343	2,193,555
ALT2 051722	0	33,343	69,660	777	2,040,690	35,954	42,949	2,223,374
Difference	0	58	873	134	43,210	-11,061	-3,394	29,819
Percent Difference	0	0	1	21	2	-24	-7	1

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

[4] Mortality values do not include base mortality

Table 1d-4 Mortality of LateFall-Run Chinook Salmon by Life-stage and Source
NOACTION 051422 vs. ALT3 051722

Long-term Average and Average by Water Year Type Annual Mortality								
	Annual Mortality[4] (# of Fish/year)							
Analysis Period	Pre-Spawn Mortality	Eggs Flow	Eggs - Temperature	Fry - Temperature	Fry - Habitat	Juvenile Temperature	Juvenile Habitat	Total
Long-term								
Full Simulation Period[1]								
NOACTION 051422	0	544,474	54,398	223	1,860,533	7,208	14,439	2,481,275
ALT3 051722	0	506,870	55,587	121	1,826,658	2,717	20,809	2,412,760
Difference	0	-37,604	1,189	-103	-33,875	-4,491	6,370	-68,514
Percent Difference[3]	0	-7	2	-46	-2	-62	44	-3
Water Year Types[2]								
Wet (31.7%)								
NOACTION 051422	0	1,371,512	39,694	196	1,532,623	8	6,715	2,950,748
ALT3 051722	0	1,238,007	30,872	80	1,554,237	20	4,639	2,827,855
Difference	0	-133,506	-8,822	-116	21,615	12	-2,076	-122,893
Percent Difference	0	-10	-22	-59	1	160	-31	-4
Above Normal (14.6%)								
NOACTION 051422	0	630,715	37,375	53	1,735,050	8	1,884	2,405,084
ALT3 051722	0	677,610	37,184	73	1,642,988	30	7,587	2,365,473
Difference	0	46,895	-190	21	-92,062	22	5,703	-39,611
Percent Difference	0	7	-1	39	-5	257	303	-2
Below Normal (17.1%)								
NOACTION 051422	0	42,536	50,331	123	2,054,343	2	10,142	2,157,476
ALT3 051722	0	44,100	63,215	147	2,014,947	3	15,842	2,138,254
Difference	0	1,564	12,884	24	-39,395	2	5,700	-19,222
Percent Difference	0	4	26	19	-2	88	56	-1
Dry (22%)								
NOACTION 051422	0	33,139	78,665	155	2,161,854	675	14,644	2,289,131
ALT3 051722	0	31,490	84,225	114	2,081,608	590	28,841	2,226,868
Difference	0	-1,649	5,560	-41	-80,246	-84	14,197	-62,263
Percent Difference	0	-5	7	-26	-4	-12	97	-3
Critical (14.6%)								
NOACTION 051422	0	33,285	68,787	644	1,997,481	47,015	46,343	2,193,555
ALT3 051722	0	33,423	72,614	228	1,967,863	17,157	60,608	2,151,891
Difference	0	137	3,826	-416	-29,618	-29,859	14,266	-41,663
Percent Difference	0	0	6	-65	-1	-64	31	-2

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

[4] Mortality values do not include base mortality

Table 2a-1 Annual Potential Production for Winter-Run Chinook Salmon, NOACTION 051422 vs. ALT1A 051722

Long-term Average and Average by Water Year Type Annual Production

Analysis Period	Annual Potential Production (# of Fish/year)
Long-term	
Full Simulation Period[1]	
NOACTION 051422	1,924,118
ALT1A 051722	1,928,154
Difference	4,036
Percent Difference[3]	0.2
Water Year Types[2]	
Wet (31.7%)	
NOACTION 051422	1,916,299
ALT1A 051722	1,920,957
Difference	4,658
Percent Difference	0.2
Above Normal (14.6%)	
NOACTION 051422	1,796,579
ALT1A 051722	1,811,282
Difference	14,703
Percent Difference	0.8
Below Normal (17.1%)	
NOACTION 051422	1,969,819
ALT1A 051722	1,964,382
Difference	-5,437
Percent Difference	-0.3
Dry (22%)	
NOACTION 051422	1,927,433
ALT1A 051722	1,935,654
Difference	8,221
Percent Difference	0.4
Critical (14.6%)	
NOACTION 051422	1,989,049
ALT1A 051722	1,987,626
Difference	-1,424
Percent Difference	-0.1

1 Based on the 80-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

3 Relative difference of the annual average

Table 2a-2 Annual Potential Production for Winter-Run Chinook Salmon, NOACTION 051422 vs. ALT1B 051722

Long-term Average and Average by Water Year Type Annual Production

Analysis Period	Annual Potential Production (# of Fish/year)
Long-term	
Full Simulation Period[1]	
NOACTION 051422	1,924,118
ALT1B 051722	1,931,855
Difference	7,737
Percent Difference[3]	0.4
Water Year Types[2]	
Wet (31.7%)	
NOACTION 051422	1,916,299
ALT1B 051722	1,928,114
Difference	11,815
Percent Difference	0.6
Above Normal (14.6%)	
NOACTION 051422	1,796,579
ALT1B 051722	1,822,054
Difference	25,475
Percent Difference	1.4
Below Normal (17.1%)	
NOACTION 051422	1,969,819
ALT1B 051722	1,964,509
Difference	-5,310
Percent Difference	-0.3
Dry (22%)	
NOACTION 051422	1,927,433
ALT1B 051722	1,938,852
Difference	11,419
Percent Difference	0.6
Critical (14.6%)	
NOACTION 051422	1,989,049
ALT1B 051722	1,982,871
Difference	-6,179
Percent Difference	-0.3

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

Table 2a-3 Annual Potential Production for Winter-Run Chinook Salmon, NOACTION 041222 vs. ALT2 051722

Long-term Average and Average by Water Year Type Annual Production

Analysis Period	Annual Potential Production (# of Fish/year)
Long-term	
Full Simulation Period[1]	
NOACTION 041222	1,924,118
ALT2 051722	1,927,532
Difference	3,414
Percent Difference[3]	0.2
Water Year Types[2]	
Wet (32.9%)	
NOACTION 041222	1,920,944
ALT2 051722	1,925,910
Difference	4,965
Percent Difference	0.3
Above Normal (12.2%)	
NOACTION 041222	1,730,693
ALT2 051722	1,747,690
Difference	16,997
Percent Difference	1.0
Below Normal (18.3%)	
NOACTION 041222	1,977,067
ALT2 051722	1,971,991
Difference	-5,075
Percent Difference	-0.3
Dry (22%)	
NOACTION 041222	1,927,433
ALT2 051722	1,935,650
Difference	8,217
Percent Difference	0.4
Critical (14.6%)	
NOACTION 041222	1,989,049
ALT2 051722	1,983,324
Difference	-5,726
Percent Difference	-0.3

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

Table 2a-4 Annual Potential Production for Winter-Run Chinook Salmon, NOACTION 051422 vs. ALT3 051722

Long-term Average and Average by Water Year Type Annual Production

Analysis Period	Annual Potential Production (# of Fish/year)
Long-term	
Full Simulation Period[1]	
NOACTION 051422	1,924,118
ALT3 051722	1,948,791
Difference	24,673
Percent Difference[3]	1.3
Water Year Types[2]	
Wet (31.7%)	
NOACTION 051422	1,916,299
ALT3 051722	1,940,462
Difference	24,163
Percent Difference	1.3
Above Normal (14.6%)	
NOACTION 051422	1,796,579
ALT3 051722	1,887,934
Difference	91,356
Percent Difference	5.1
Below Normal (17.1%)	
NOACTION 051422	1,969,819
ALT3 051722	1,974,507
Difference	4,687
Percent Difference	0.2
Dry (22%)	
NOACTION 051422	1,927,433
ALT3 051722	1,949,610
Difference	22,177
Percent Difference	1.2
Critical (14.6%)	
NOACTION 051422	1,989,049
ALT3 051722	1,986,321
Difference	-2,728
Percent Difference	-0.1

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

Table 2b-1 Annual Potential Production for Spring-Run Chinook Salmon, NOACTION 051422 vs. ALT1A 051722

Long-term Average and Average by Water Year Type Annual Production

Analysis Period	Annual Potential Production (# of Fish/year)
Long-term	
Full Simulation Period[1]	
NOACTION 051422	447,691
ALT1A 051722	447,484
Difference	-207
Percent Difference[3]	0.0
Water Year Types[2]	
Wet (31.7%)	
NOACTION 051422	446,752
ALT1A 051722	446,886
Difference	134
Percent Difference	0.0
Above Normal (14.6%)	
NOACTION 051422	408,772
ALT1A 051722	408,592
Difference	-180
Percent Difference	0.0
Below Normal (17.1%)	
NOACTION 051422	451,037
ALT1A 051722	449,946
Difference	-1,091
Percent Difference	-0.2
Dry (22%)	
NOACTION 051422	458,353
ALT1A 051722	458,107
Difference	-245
Percent Difference	-0.1
Critical (14.6%)	
NOACTION 051422	462,262
ALT1A 051722	462,383
Difference	120
Percent Difference	0.0

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

Table 2b-2 Annual Potential Production for Spring-Run Chinook Salmon, NOACTION 051422 vs. ALT1B 051722

Long-term Average and Average by Water Year Type Annual Production	
Analysis Period	**Annual Potential Production (# of Fish/year)**
Long-term	
Full Simulation Period[1]	
NOACTION 051422	447,691
ALT1B 051722	447,779
Difference	88
Percent Difference[3]	0.0
Water Year Types[2]	
Wet (31.7%)	
NOACTION 051422	446,752
ALT1B 051722	446,766
Difference	13
Percent Difference	0.0
Above Normal (14.6%)	
NOACTION 051422	408,772
ALT1B 051722	409,165
Difference	392
Percent Difference	0.1
Below Normal (17.1%)	
NOACTION 051422	451,037
ALT1B 051722	449,815
Difference	-1,222
Percent Difference	-0.3
Dry (22%)	
NOACTION 051422	458,353
ALT1B 051722	458,636
Difference	283
Percent Difference	0.1
Critical (14.6%)	
NOACTION 051422	462,262
ALT1B 051722	463,490
Difference	1,228
Percent Difference	0.3

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

Table 2b-3 Annual Potential Production for Spring-Run Chinook Salmon, NOACTION 041222 vs. ALT2 051722

Long-term Average and Average by Water Year Type Annual Production

Analysis Period	Annual Potential Production (# of Fish/year)
Long-term	
Full Simulation Period[1]	
NOACTION 041222	447,691
ALT2 051722	447,445
Difference	-246
Percent Difference[3]	-0.1
Water Year Types[2]	
Wet (32.9%)	
NOACTION 041222	446,788
ALT2 051722	446,823
Difference	35
Percent Difference	0.0
Above Normal (12.2%)	
NOACTION 041222	398,361
ALT2 051722	398,279
Difference	-82
Percent Difference	0.0
Below Normal (18.3%)	
NOACTION 041222	451,177
ALT2 051722	449,810
Difference	-1,367
Percent Difference	-0.3
Dry (22%)	
NOACTION 041222	458,353
ALT2 051722	458,299
Difference	-53
Percent Difference	0.0
Critical (14.6%)	
NOACTION 041222	462,262
ALT2 051722	462,387
Difference	124
Percent Difference	0.0

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

Table 2b-4 Annual Potential Production for Spring-Run Chinook Salmon, NOACTION 051422 vs. ALT3 051722

Long-term Average and Average by Water Year Type Annual Production

Analysis Period	Annual Potential Production (# of Fish/year)
Long-term	
Full Simulation Period[1]	
NOACTION 051422	447,691
ALT3 051722	447,648
Difference	-44
Percent Difference[3]	0.0
Water Year Types[2]	
Wet (31.7%)	
NOACTION 051422	446,752
ALT3 051722	446,614
Difference	-138
Percent Difference	0.0
Above Normal (14.6%)	
NOACTION 051422	408,772
ALT3 051722	412,041
Difference	3,269
Percent Difference	0.8
Below Normal (17.1%)	
NOACTION 051422	451,037
ALT3 051722	450,037
Difference	-1,000
Percent Difference	-0.2
Dry (22%)	
NOACTION 051422	458,353
ALT3 051722	457,047
Difference	-1,305
Percent Difference	-0.3
Critical (14.6%)	
NOACTION 051422	462,262
ALT3 051722	462,672
Difference	409
Percent Difference	0.1

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

Table 2c-1 Annual Potential Production for Fall-Run Chinook Salmon, NOACTION 051422 vs. ALT1A 051722

Long-term Average and Average by Water Year Type Annual Production

Analysis Period	Annual Potential Production (# of Fish/year)
Long-term	
Full Simulation Period[1]	
NOACTION 051422	18,263,699
ALT1A 051722	18,296,526
Difference	32,827
Percent Difference[3]	0.2
Water Year Types[2]	
Wet (31.7%)	
NOACTION 051422	16,995,508
ALT1A 051722	17,061,456
Difference	65,947
Percent Difference	0.4
Above Normal (14.6%)	
NOACTION 051422	17,568,483
ALT1A 051722	17,690,159
Difference	121,677
Percent Difference	0.7
Below Normal (17.1%)	
NOACTION 051422	18,951,450
ALT1A 051722	18,969,950
Difference	18,500
Percent Difference	0.1
Dry (22%)	
NOACTION 051422	19,163,296
ALT1A 051722	19,164,681
Difference	1,385
Percent Difference	0.0
Critical (14.6%)	
NOACTION 051422	19,439,022
ALT1A 051722	19,389,925
Difference	-49,096
Percent Difference	-0.3

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

Table 2c-2 Annual Potential Production for Fall-Run Chinook Salmon, NOACTION 051422 vs. ALT1B 051722

Long-term Average and Average by Water Year Type Annual Production

Analysis Period	Annual Potential Production (# of Fish/year)
Long-term	
Full Simulation Period[1]	
NOACTION 051422	18,263,699
ALT1B 051722	18,335,056
Difference	71,357
Percent Difference[3]	0.4
Water Year Types[2]	
Wet (31.7%)	
NOACTION 051422	16,995,508
ALT1B 051722	17,059,218
Difference	63,709
Percent Difference	0.4
Above Normal (14.6%)	
NOACTION 051422	17,568,483
ALT1B 051722	17,935,121
Difference	366,639
Percent Difference	2.1
Below Normal (17.1%)	
NOACTION 051422	18,951,450
ALT1B 051722	18,984,525
Difference	33,075
Percent Difference	0.2
Dry (22%)	
NOACTION 051422	19,163,296
ALT1B 051722	19,168,045
Difference	4,749
Percent Difference	0.0
Critical (14.6%)	
NOACTION 051422	19,439,022
ALT1B 051722	19,425,453
Difference	-13,569
Percent Difference	-0.1

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

Table 2c-3 Annual Potential Production for Fall-Run Chinook Salmon, NOACTION 041222 vs. ALT2 051722

Long-term Average and Average by Water Year Type Annual Production	
Analysis Period	**Annual Potential Production (# of Fish/year)**
Long-term	
Full Simulation Period[1]	
NOACTION 041222	18,263,699
ALT2 051722	18,319,356
Difference	55,657
Percent Difference[3]	0.3
Water Year Types[2]	
Wet (32.9%)	
NOACTION 041222	17,076,953
ALT2 051722	17,165,801
Difference	88,848
Percent Difference	0.5
Above Normal (12.2%)	
NOACTION 041222	17,214,893
ALT2 051722	17,441,315
Difference	226,422
Percent Difference	1.3
Below Normal (18.3%)	
NOACTION 041222	18,939,431
ALT2 051722	18,927,855
Difference	-11,576
Percent Difference	-0.1
Dry (22%)	
NOACTION 041222	19,163,296
ALT2 051722	19,177,678
Difference	14,383
Percent Difference	0.1
Critical (14.6%)	
NOACTION 041222	19,439,022
ALT2 051722	19,452,110
Difference	13,089
Percent Difference	0.1

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

Table 2c-4 Annual Potential Production for Fall-Run Chinook Salmon, NOACTION 051422 vs. ALT3 051722

Long-term Average and Average by Water Year Type Annual Production

Analysis Period	Annual Potential Production (# of Fish/year)
Long-term	
Full Simulation Period[1]	
NOACTION 051422	18,263,699
ALT3 051722	18,375,634
Difference	111,935
Percent Difference[3]	0.6
Water Year Types[2]	
Wet (31.7%)	
NOACTION 051422	16,995,508
ALT3 051722	17,010,986
Difference	15,478
Percent Difference	0.1
Above Normal (14.6%)	
NOACTION 051422	17,568,483
ALT3 051722	18,307,810
Difference	739,327
Percent Difference	4.2
Below Normal (17.1%)	
NOACTION 051422	18,951,450
ALT3 051722	19,019,147
Difference	67,697
Percent Difference	0.4
Dry (22%)	
NOACTION 051422	19,163,296
ALT3 051722	19,188,603
Difference	25,307
Percent Difference	0.1
Critical (14.6%)	
NOACTION 051422	19,439,022
ALT3 051722	19,418,675
Difference	-20,347
Percent Difference	-0.1

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

Table 2d-1 Annual Potential Production for LateFall-Run Chinook Salmon, NOACTION 051422 vs. ALT1A 051722

Long-term Average and Average by Water Year Type Annual Production

Analysis Period	Annual Potential Production (# of Fish/year)
Long-term	
Full Simulation Period[1]	
NOACTION 051422	2,882,503
ALT1A 051722	2,892,842
Difference	10,340
Percent Difference[3]	0.4
Water Year Types[2]	
Wet (31.7%)	
NOACTION 051422	2,712,099
ALT1A 051722	2,751,456
Difference	39,357
Percent Difference	1.5
Above Normal (14.6%)	
NOACTION 051422	2,908,738
ALT1A 051722	2,889,201
Difference	-19,537
Percent Difference	-0.7
Below Normal (17.1%)	
NOACTION 051422	2,961,976
ALT1A 051722	2,952,556
Difference	-9,420
Percent Difference	-0.3
Dry (22%)	
NOACTION 051422	2,962,271
ALT1A 051722	2,971,241
Difference	8,971
Percent Difference	0.3
Critical (14.6%)	
NOACTION 051422	3,017,477
ALT1A 051722	3,014,950
Difference	-2,527
Percent Difference	-0.1

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

Table 2d-2 Annual Potential Production for LateFall-Run Chinook Salmon, NOACTION 051422 vs. ALT1B 051722

Long-term Average and Average by Water Year Type Annual Production

Analysis Period	Annual Potential Production (# of Fish/year)
Long-term	
Full Simulation Period[1]	
NOACTION 051422	2,882,503
ALT1B 051722	2,901,668
Difference	19,165
Percent Difference[3]	0.7
Water Year Types[2]	
Wet (31.7%)	
NOACTION 051422	2,712,099
ALT1B 051722	2,759,637
Difference	47,537
Percent Difference	1.8
Above Normal (14.6%)	
NOACTION 051422	2,908,738
ALT1B 051722	2,926,362
Difference	17,624
Percent Difference	0.6
Below Normal (17.1%)	
NOACTION 051422	2,961,976
ALT1B 051722	2,962,171
Difference	195
Percent Difference	0.0
Dry (22%)	
NOACTION 051422	2,962,271
ALT1B 051722	2,957,737
Difference	-4,534
Percent Difference	-0.2
Critical (14.6%)	
NOACTION 051422	3,017,477
ALT1B 051722	3,034,134
Difference	16,657
Percent Difference	0.6

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

Table 2d-3 Annual Potential Production for LateFall-Run Chinook Salmon, NOACTION 041222 vs. ALT2 051722

Long-term Average and Average by Water Year Type Annual Production

Analysis Period	Annual Potential Production (# of Fish/year)
Long-term	
Full Simulation Period[1]	
NOACTION 041222	2,882,503
ALT2 051722	2,895,899
Difference	13,396
Percent Difference[3]	0.5
Water Year Types[2]	
Wet (32.9%)	
NOACTION 041222	2,715,611
ALT2 051722	2,758,232
Difference	42,621
Percent Difference	1.6
Above Normal (12.2%)	
NOACTION 041222	2,913,971
ALT2 051722	2,911,041
Difference	-2,930
Percent Difference	-0.1
Below Normal (18.3%)	
NOACTION 041222	2,962,424
ALT2 051722	2,960,500
Difference	-1,924
Percent Difference	-0.1
Dry (22%)	
NOACTION 041222	2,962,271
ALT2 051722	2,974,665
Difference	12,394
Percent Difference	0.4
Critical (14.6%)	
NOACTION 041222	3,017,477
ALT2 051722	2,996,655
Difference	-20,821
Percent Difference	-0.7

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

Table 2d-4 Annual Potential Production for LateFall-Run Chinook Salmon, NOACTION 051422 vs. ALT3 051722

Long-term Average and Average by Water Year Type Annual Production

Analysis Period	Annual Potential Production (# of Fish/year)
Long-term	
Full Simulation Period[1]	
NOACTION 051422	2,882,503
ALT3 051722	2,916,949
Difference	34,447
Percent Difference[3]	1.2
Water Year Types[2]	
Wet (31.7%)	
NOACTION 051422	2,712,099
ALT3 051722	2,753,785
Difference	41,686
Percent Difference	1.5
Above Normal (14.6%)	
NOACTION 051422	2,908,738
ALT3 051722	2,953,077
Difference	44,339
Percent Difference	1.5
Below Normal (17.1%)	
NOACTION 051422	2,961,976
ALT3 051722	2,979,538
Difference	17,561
Percent Difference	0.6
Dry (22%)	
NOACTION 051422	2,962,271
ALT3 051722	3,004,408
Difference	42,137
Percent Difference	1.4
Critical (14.6%)	
NOACTION 051422	3,017,477
ALT3 051722	3,036,159
Difference	18,682
Percent Difference	0.6

[1] Based on the 80-year simulation period

[2] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999). Water years may not correspond to the biological years in SALMOD.

[3] Relative difference of the annual average

Comment:

Will Sites Reservoir operations alter the meander migration potential of the Sacramento River in a manner that could impact bank swallow habitat?

Response to Comment:

Bank swallows nest in raw, steep, eroding river banks, typically located on the outside of meander bends along the Sacramento River. The potential for Sites Reservoir to alter stream flows, which in turn may alter the potential of the channel to continue to develop meander bends at the same frequency, rate, and /or extent as currently happens (without project), was evaluated using the U.S Bureau of Reclamation (USBR) Technical Report No. SRH-2011-21: Sacramento River Migration Analysis of NODOS Alternatives (USBR 2011). The NODOS investigations were a precursor the Sites Reservoir Project. The USBR 2011 report provides results of channel migration from Red Bluff to Colusa. Model simulations for the NODOS ADEIR/S consisted of: Existing Conditions, No Action Alternative, NODOS Alternative A, NODOS Alternative B, NODOS Alternative C. Compared to current alternatives being evaluated for the Sites Reservoir, the NODOS Alternatives divert and release significantly more water from the Sacramento River. For example, long-term average annual diversions range from 483 TAF to 545 TAF in the NODOS ADEIR/S, and from 238 TAF to 277 TAF in the 2021 RDEIR/SDEIS alternatives.

SRH-Meander (Sedimentation and River Hydraulics – Meander, Greimann and Huang, 2007) is a computer model that simulates the bed topography, flow field, and bank erosion rate in curved channel with an erodible bed. In each time step, SRH-Meander first calculates the flow field based on the standard step method, normal depth method, or a user input rating curve. It then computes the channel bank erosion rate. Finally, the channel alignment is updated with the erosion rate, followed by a channel cutoff if needed. The model can be used to predict the channel migration in meandering rivers. More information on SRH-Meander can be found in Greimann and Huang (2007). The model extends 101 miles from Red Bluff (RM 243) to Colusa (RM 142). The period of record used for model calibration was from 10/1/1976 to 9/30/1999. A detailed description of the full analysis, including model calibration and predictions of the future channel alignment in 2030 is available in the Sacramento River Migration Analysis of NODOS Alternatives document (USBR 2011).

The primary conclusion of the meander model comparisons between Existing, No Action, and Alternatives A-C:

> "For the whole reach from Red Bluff to Colusa, no major differences exist between the channel alignments for Existing, No Action, Alt A, Alt B, and Alt C conditions. However, Alt A and Alt C conditions yield slightly more meander tendency than other conditions" (USBR 2011).

Based on this modeling effort, and the fact that the currently proposed Sites Reservoir flow modifications are substantially less than those evaluated for the NODOS project in 2011, we conclude that the Sites Project Alternatives will not significantly impact the potential for meander migration, and the subsequent formation of the steep, raw, eroding banks on the Sacramento River between Red Bluff and Colusa that bank swallows use as nesting habitat.

References:

Greimann, B., Huang. J. 2007. Sediment and River Hydraulics –Meander (SRH-Meander), Version 1.0. Bureau of Reclamation, Reclamation Report.

U.S. Bureau of Reclamation. 2011. Technical Report No. SRH-2011-21: Sacramento River Migration Analysis of NODOS Alternatives NODOS. Mid Pacific Region NODOS Investigation Report. Technical Service Center, Denver, Colorado Sedimentation and River Hydraulics Group, 86-68240. U.S. Dept of the Interior. July 2011.

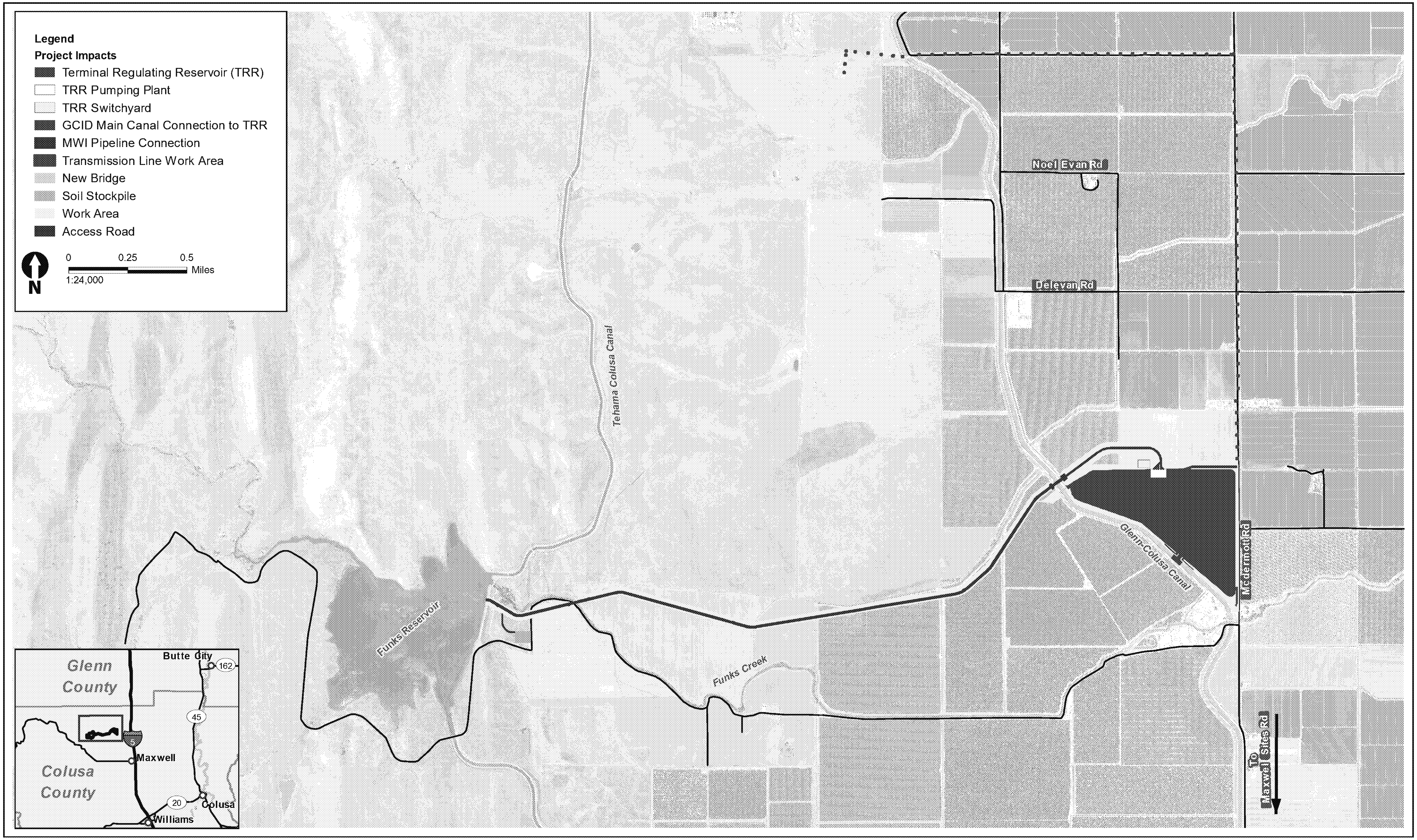
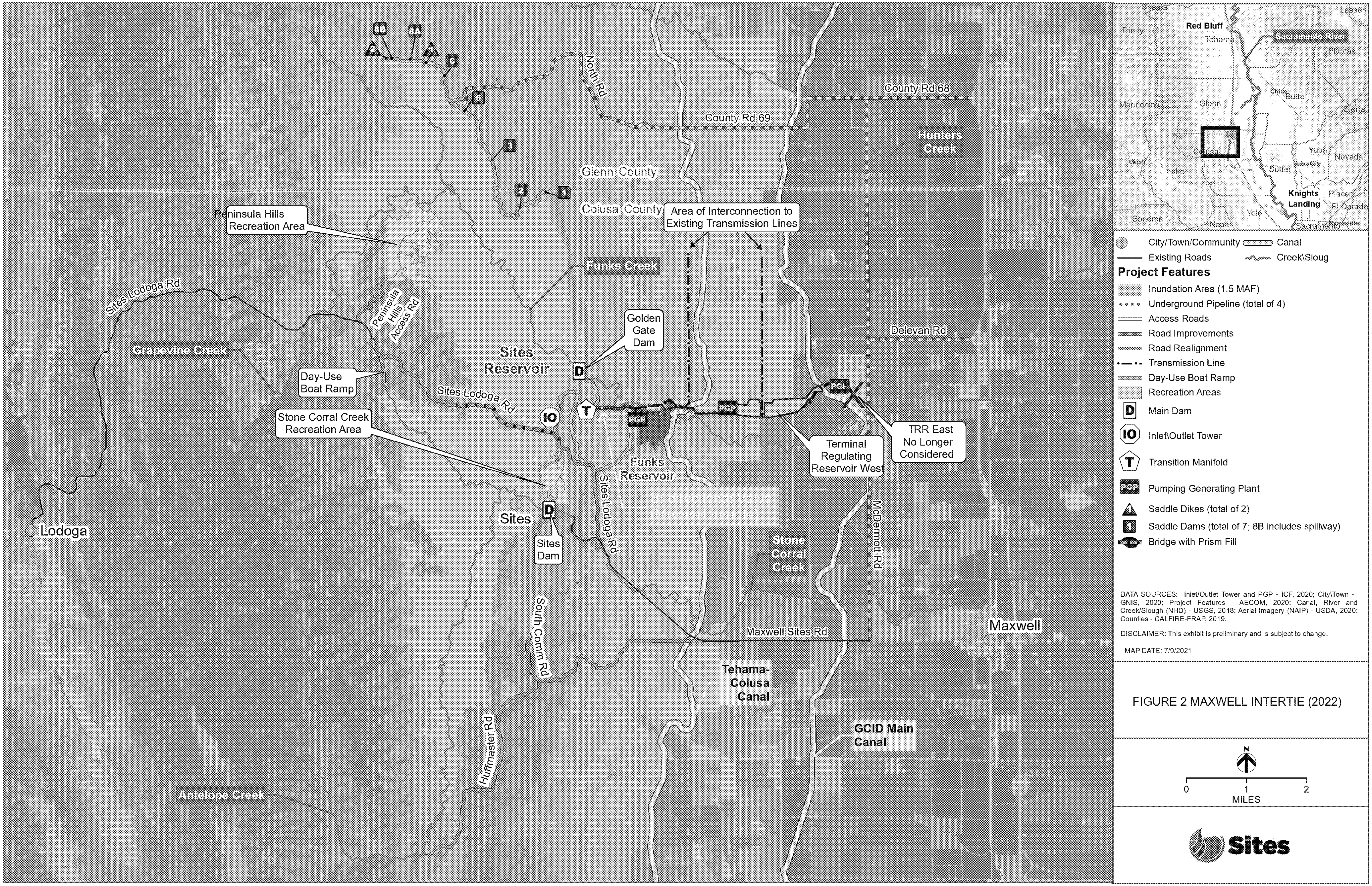


FIGURE 1 MAXWELL INTERTIE (2018)



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Maxwell Intertie Comparison	Construction Cost ($millions)		Storage Volume (acre-feet)		Flow Capacity (cfs)		Diameter (inches)		Length (feet)		Area (acres)	
Features	**2018**	**Current**	**2018**	**Current**	**2018**	**Current**	**2018**	**Current**	**2018**	**Current**	**2018**	**Current**
Terminal Regulating Reservoir (TRR), Complete, with Mobilization	81	212	1,200	600	n/a	n/a	n/a	n/a	n/a	n/a	130	150
TRR Pumping Plant, Complete, with Mobilization	52	113	n/a	n/a	900	1,800	n/a	n/a	n/a	n/a	n/a	n/a
TRR Power Transmission Lines, Substations, Switchyards, Complete with Mobilization	33	157	n/a	n/a	n/a	n/a	n/a	n/a	20,000	21,120	n/a	n/a
Maxwell Intertie Pipeline, Complete with Mobilization	166	105	n/a	n/a	900	1,800	144	144	18,500	18,130	n/a	n/a
Funks Pumping Plant, Complete, with Mobilization	n/a	114	n/a	n/a	n/a	1,800	n/a	n/a	n/a	n/a	n/a	n/a
Land	11	TBD	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Mitigation	29	TBD	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total	**372**	**701**										

Notes:

1. *2018 PER assumes TRR East site; the current project configuration assumes TRR West.*

Sites Modeling Update

Overview of Modeling to Support the Sites Biological Assessment

May 12, 2022

Sites

Agenda

- Introductions
- Background
- Overview of Work Completed and Process
- Modeling Results
- Schedule
- Next Steps

Background

Ali Forsythe

Purpose of Today

- Review revised modeling approach and results proposed for BA and Final EIR/EIS

- Why is this important
  - Need to agree upon direction for operations components of BA and Final EIR/EIS

Background

- **July 2021:** Reclamation voiced concern about adequate anadromous fish benefit to meet NEPA purpose/need and to quantify in Feasibility
- **September 2021:** Collectively agreed to add language to Project Description on expanded exchanges, revise modeling between draft and final EIR/EIS
- **October 2021:** Began developing updated modeling parameters for anadromous fish benefits focusing on three actions
- **End of Oct/Nov/Dec 2021:** Several iterations of "silver bullet" modeling developed and shared with Reclamation
- **December/January:** Multiple meetings with CVO and BDO on initial results
- **February 2022:** Two meetings with CVO, first with specific changes requested, second to review updates after changes were made; final draft model provided
- **March 2022:** Reviewed final model – no further changes requested
- **April 2022:** Reviewed temperature and egg mortality results- no further changes requested
- Sites team continues to progress modeling, results to date are optimistic

Overview of Work Completed

Erin Heydinger & Steve Micko

Sites

Overview – Goals

- Improve anadromous fish benefits, focusing on:
  - Shasta cold water pool
  - Fall Flow Stability
  - Spring Pulse releases
- Commenced modeling effort to incorporate anadromous fish benefits
  - Started with Alternatives 3 and 3BR

Overview

- Conducted sensitivity analyses with CalSim II to assess changes to Sites operations
  - Conducted sensitivity analyses:
    - Focused all operations to improve Shasta cold water pool
    - With focus on cold water pool, layered:
      - Fall Flow Stability action, then
      - Spring Pulse Flow action
  - Additional analyses:
    - CalSim II model with- and without-Shasta exchange
    - CalSim II model with focus towards deliveries
  - Re-evaluated the Shasta temperature exchange operation

Overview – Changes to Modeled Assumptions

- Updated Shasta exchanges for Shasta cold water pool
  - Removed flow and temperature criteria
  - Focused exchanges to years with adverse cold water pool conditions (Tier 3 and 4 years)
- Incorporated exchange operations to support Spring Pulse releases in May of wetter years
- Updated exchange operations and CVP operational flexibility operations to support Fall Flow Stability action

Overview – Final Parameters

- Sites-Shasta Exchanges:
  - Shasta cold water pool management
    - Preserve water in Shasta:
      - April through June
      - Dry or Critical water year
      - Temperature Tier is 3 or 4
      - Delta is in Balanced conditions
  - Fall Flow Stability
    - Release additional Fall Flow Stability water in Oct – Feb:
      - EO May Sites storage is greater than 80% of active capacity
      - Previous month Shasta storage is greater than 3.2 MAF
      - Fall Flow Stability is already active
  - Spring Pulse Flow Actions
    - Release additional Spring pulse in May:
      - EO April Sites storage is greater than 80% of active capacity
      - EO April Shasta storage is greater than 4.1 MAF

Overview – Final Parameters

- CVP Operational Flexibility supports:
  - Preserve Shasta storage through releases of CVP account in Sites during dry conditions
    - Oct – Dec: Shasta storage is less than 2.2 MAF
    - Mar – May: CVP storage is less than 2.8 MAF
  - Release preserved Shasta storage for:
    - Temperature benefits
    - Fall Flow Stability
    - CVP deliveries

Modeling Results

Steve Micko

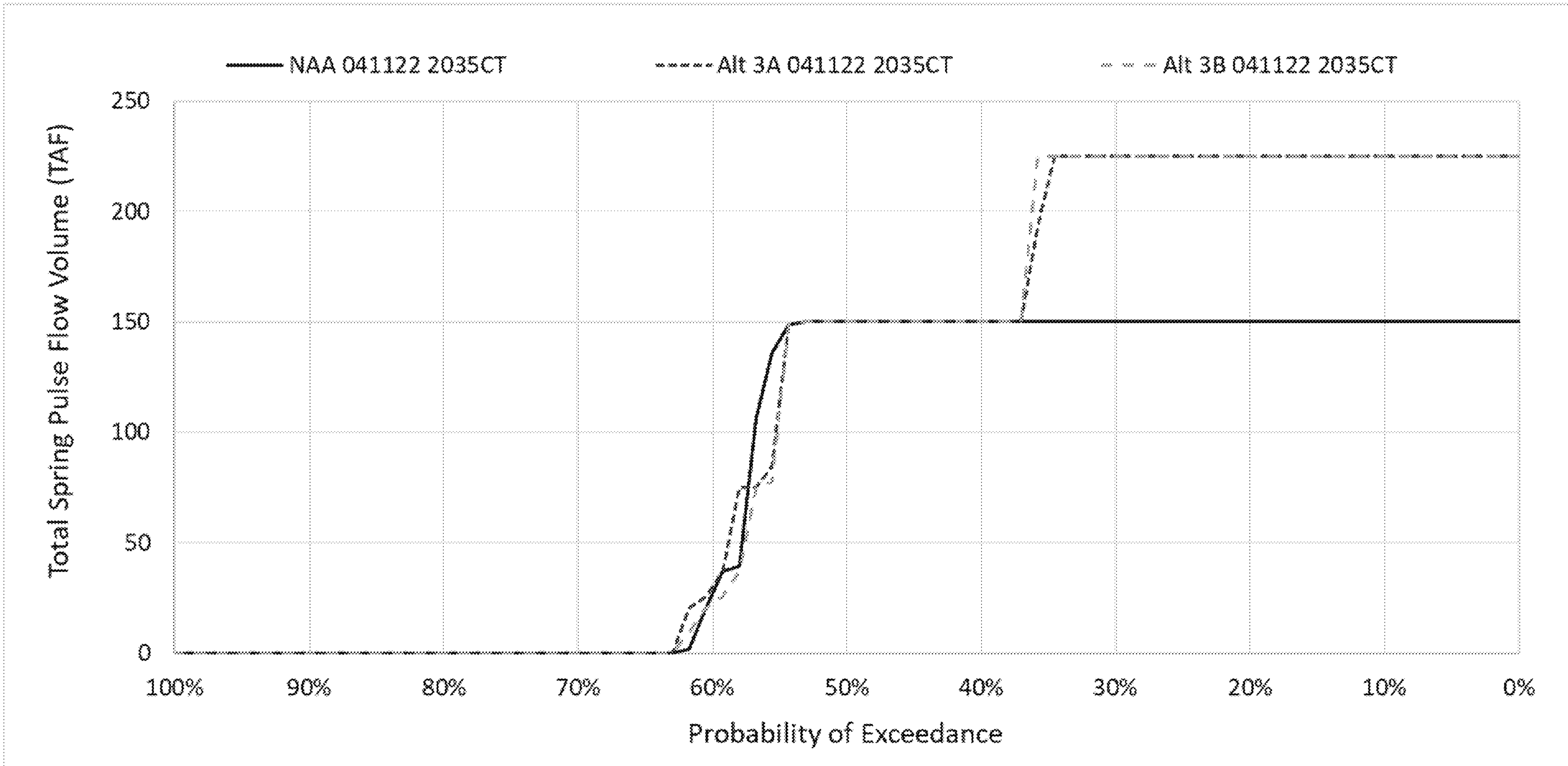
Modeling Results
End of April Shasta Storage

Tier	Count of Years			EO Apr Shasta Storage (TAF)			Difference (TAF)	
	NAA 041122 2035CT	ALT3A 041122 2035CT	ALT3B 041122 2035CT	NAA 041122 2035CT	ALT3A 041122 2035CT	ALT3B 041122 2035CT	ALT3A 041122 2035CT	ALT3B 041122 2035CT
Tier 1	57	59	58	4,408	4,417	4,417	17	12
Tier 2	12	12	13	3,942	3,910	3,906	60	47
Tier 3	8	9	8	3,028	2,914	2,920	192	149
Tier 4	5	2	3	2,290	2,474	2,439	241	193
Long-term Average	-	-	-	4,076	4,130	4,118	54	42

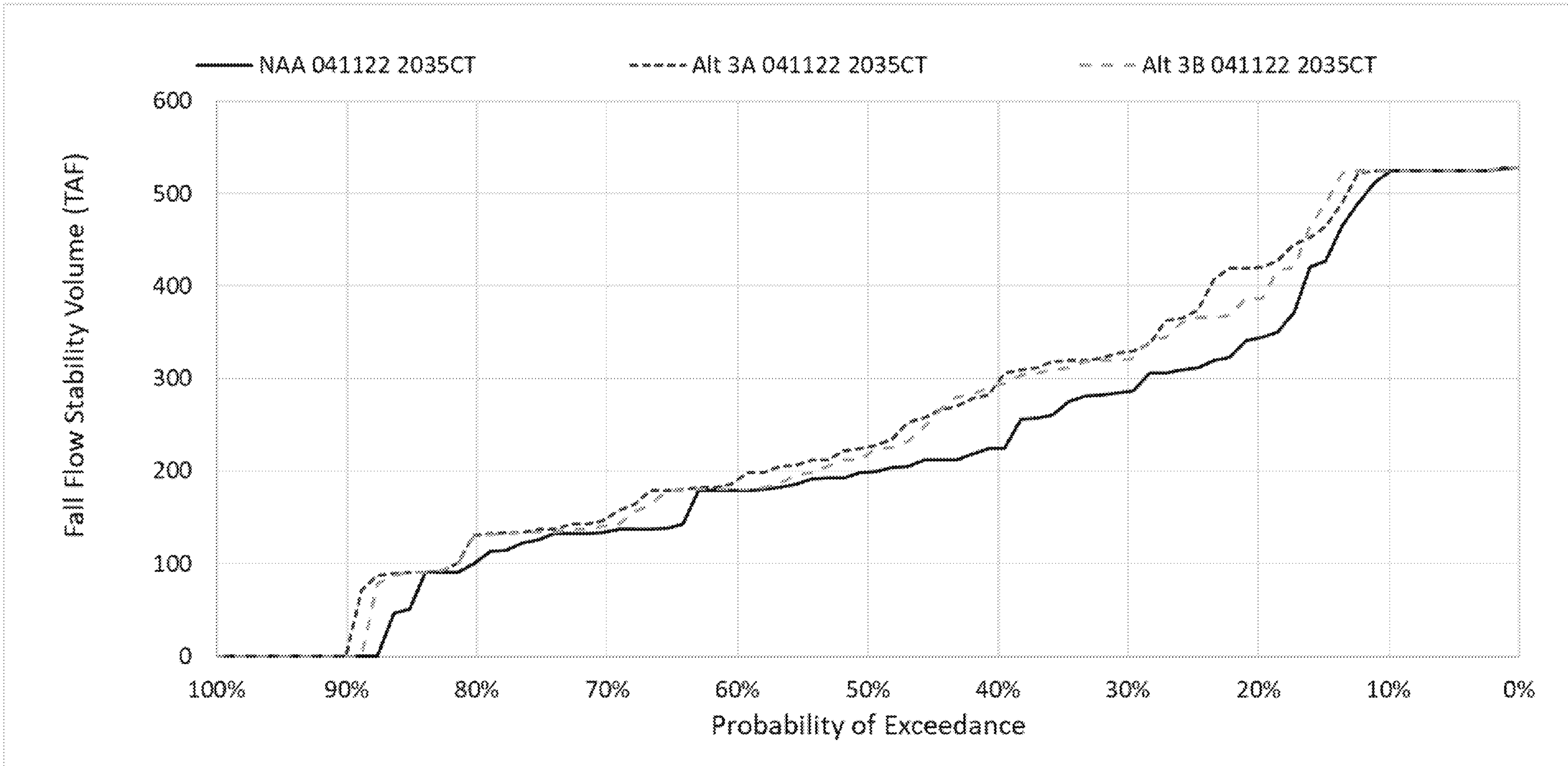
Modeling Results
End of September Shasta Storage

Tier	EO Sep Shasta Storage (TAF)			Difference (TAF)	
	NAA 041122 2035CT	ALT3A 041122 2035CT	ALT3B 041122 2035CT	ALT3A 041122 2035CT	ALT3B 041122 2035CT
Tier 1	2,990	3,075	3,057	94	69
Tier 2	2,743	2,861	2,795	149	105
Tier 3	1,844	1,756	1,786	226	176
Tier 4	1,226	1,437	1,285	242	194
Long-term Average	2,735	2,859	2,827	124	92

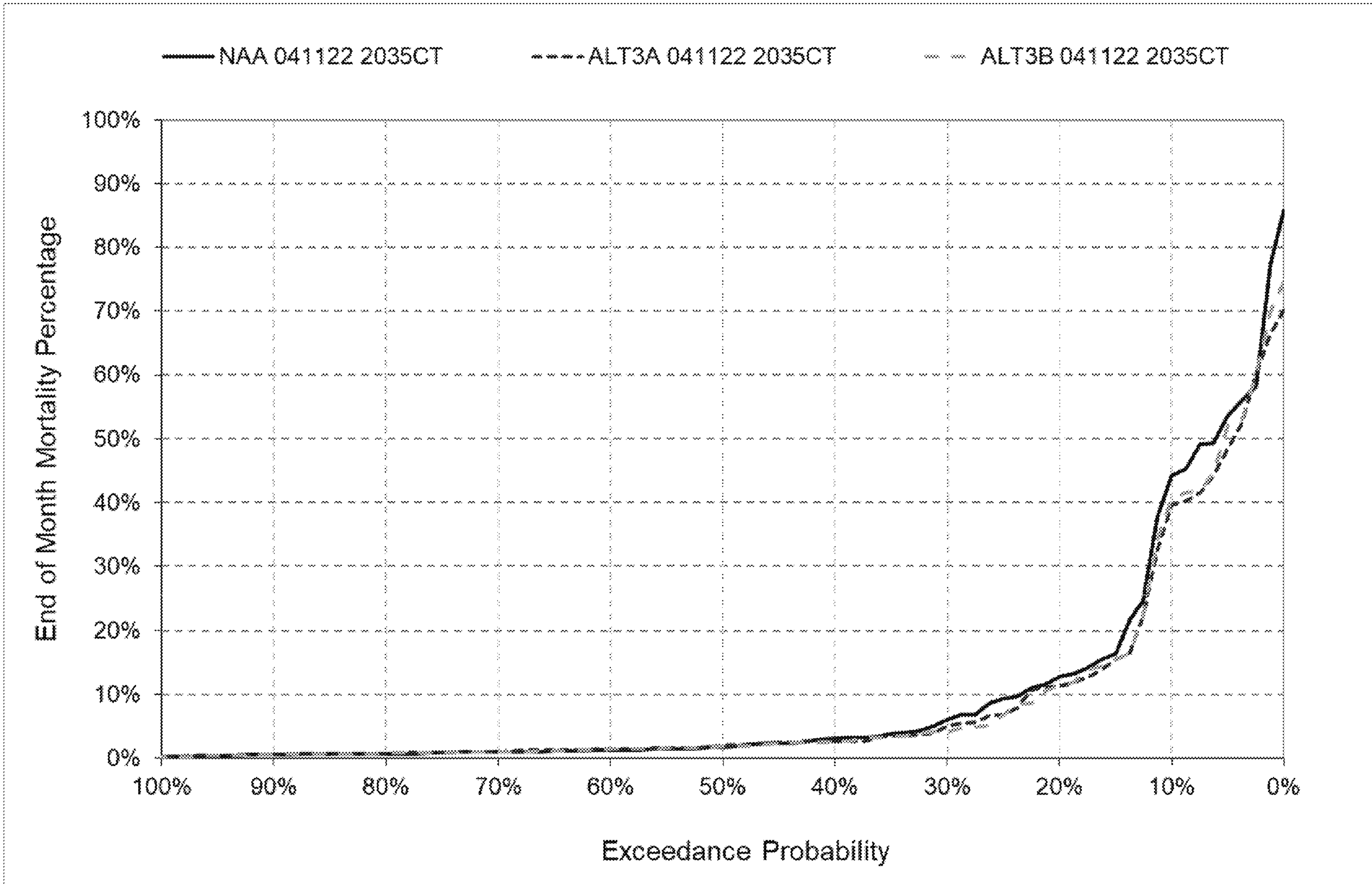
Modeling Results – Spring Pulses



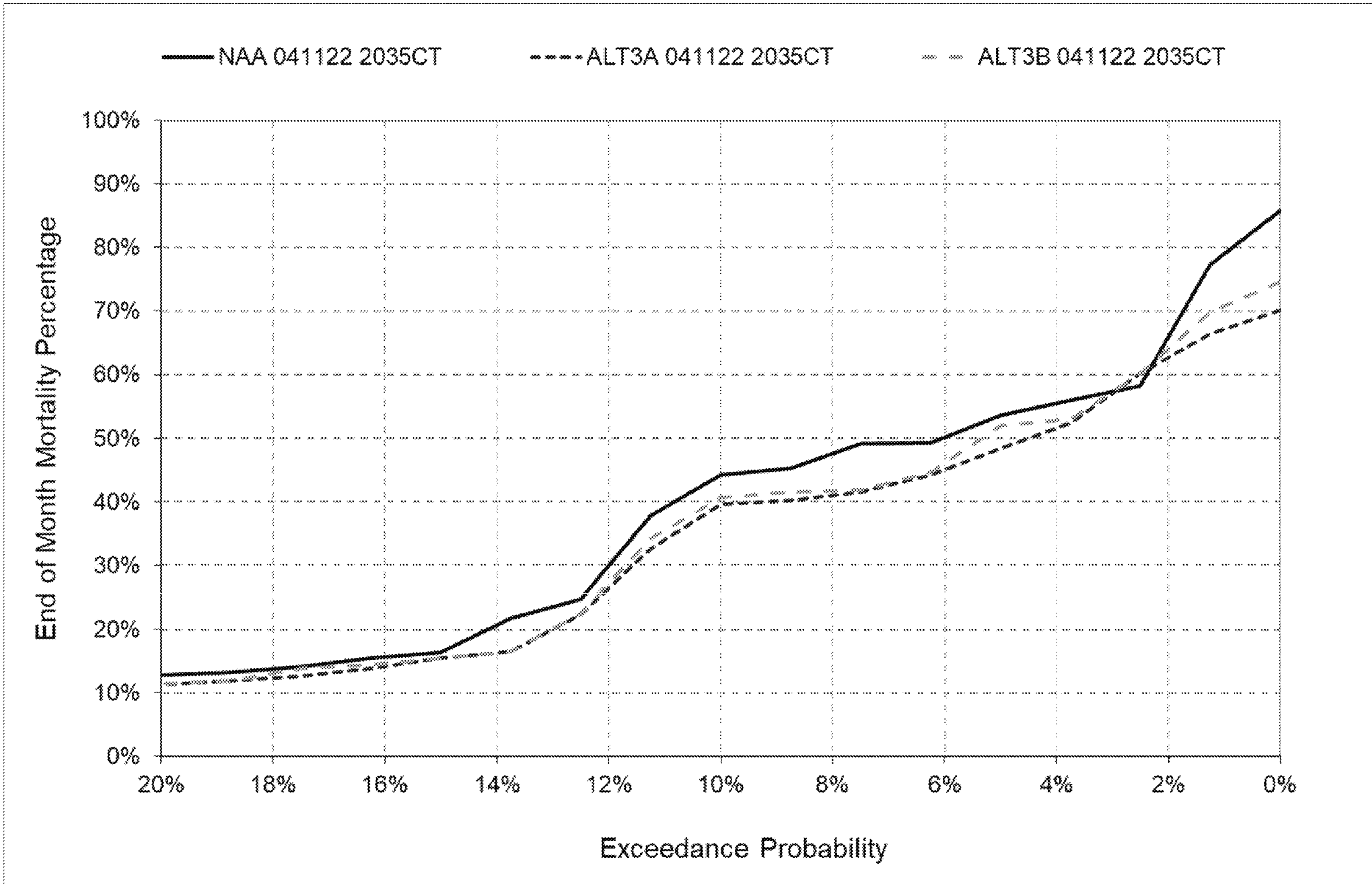
Modeling Results – Fall Flow Stability



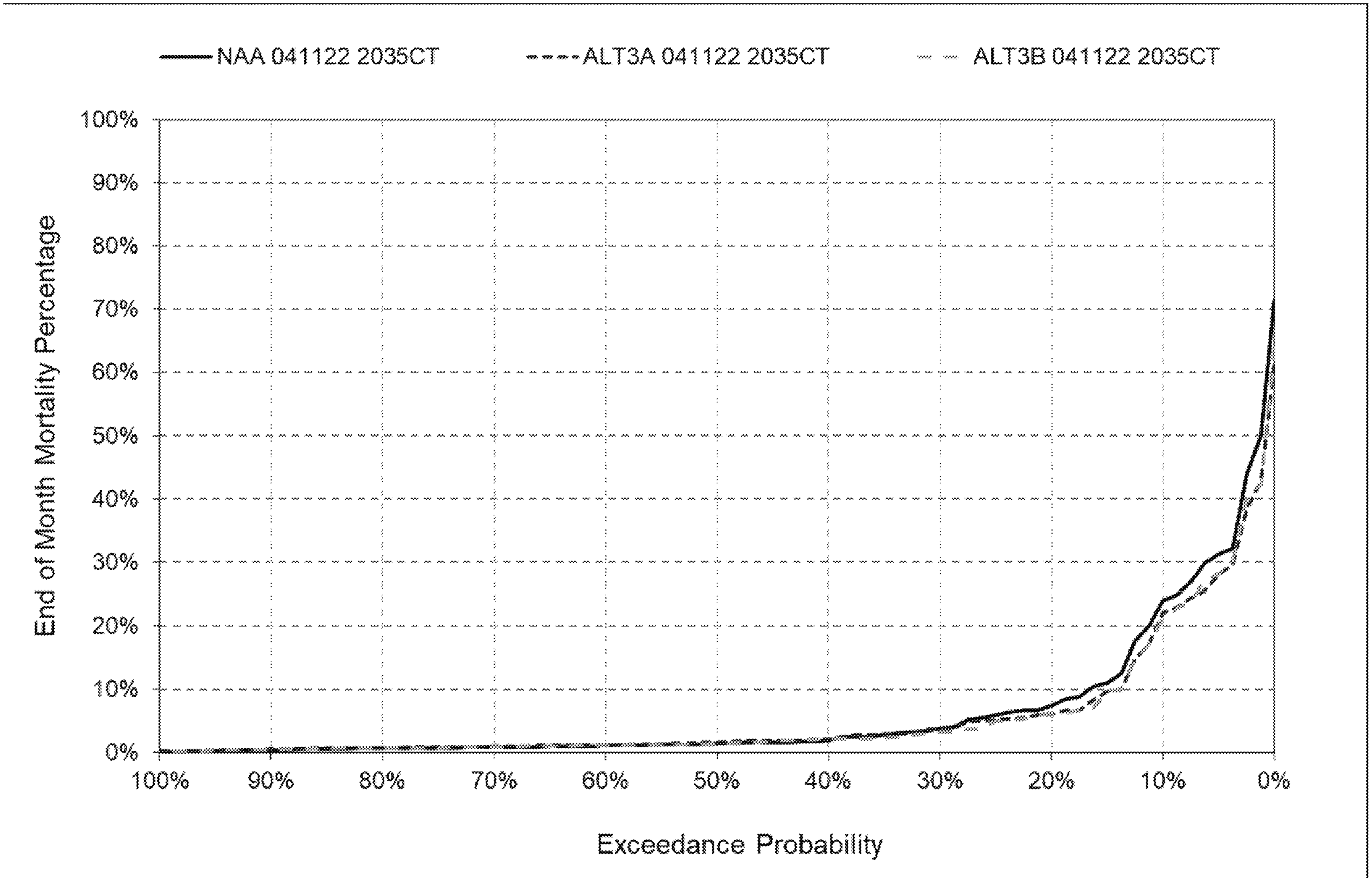
Modeling Results – Martin Model



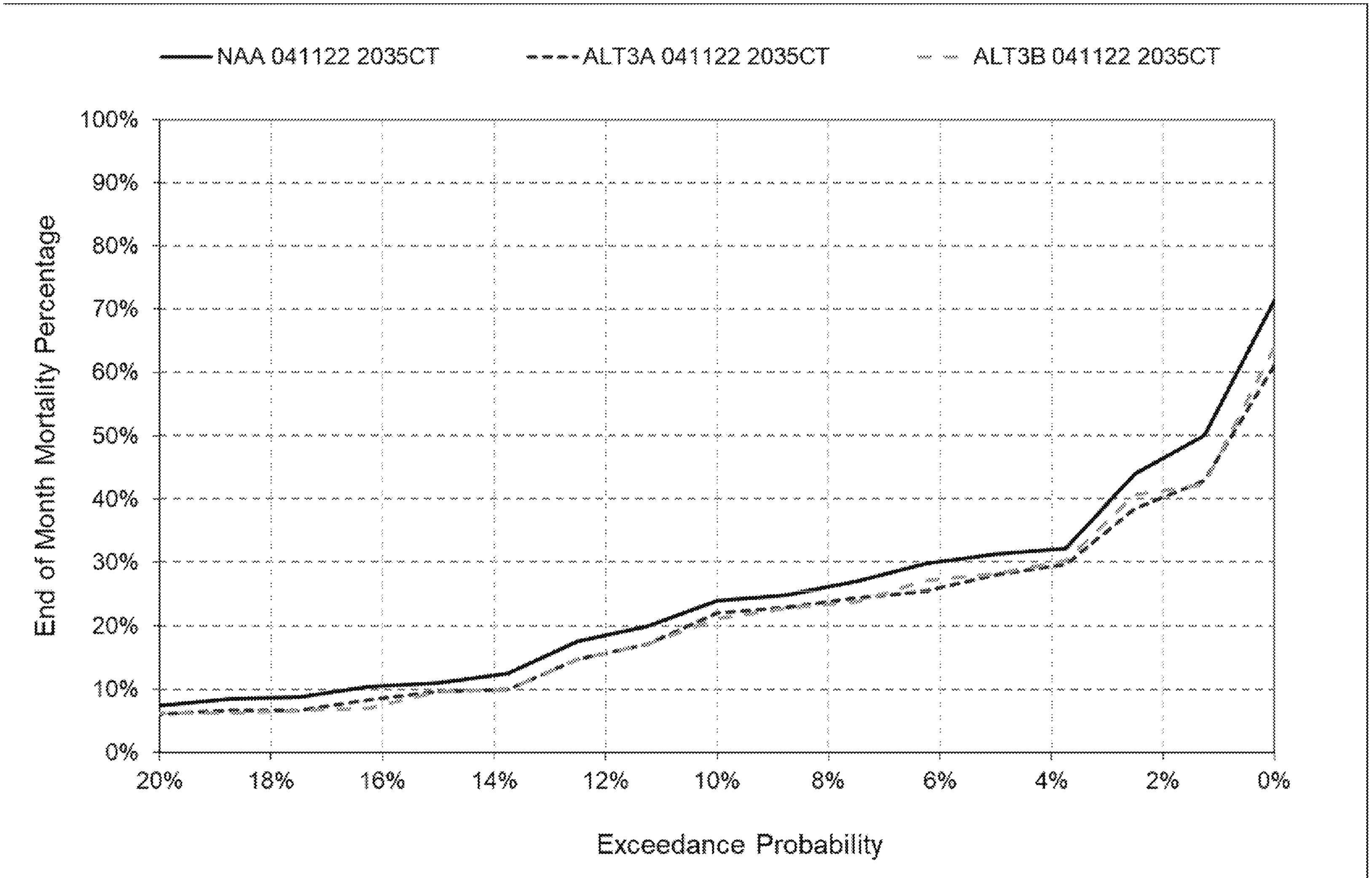
Modeling Results – Martin Model (cont.)



Modeling Results – Anderson Model



Modeling Results – Anderson Model (cont.)



Modeling Results – SALMOD Winter Run Production

Alternative	Annual Production (No. fish per year)	Difference	Percent Change
NAA 011221	1,927,994	--	--
ALT3 020121	1,950,501	22,507	1.2%
ALT3BR 032321	1,947,609	19,615	1.0%
NAA 041122 2035CT	1,921,325	--	--
ALT3A 041122 2035CT	1,966,321	44,996	2.3%
ALT3B 041122 2035CT	1,962,292	40,967	2.1%

Modeling Results – SALMOD Spring Run Production

Alternative	Annual Production (No. fish per year)	Difference	Percent Change
NAA 011221	446,054	--	--
ALT3 020121	445,451	-603	-0.1%
ALT3BR 032321	446,645	591	0.1%
NAA 041122 2035CT	440,285	--	--
ALT3A 041122 2035CT	450,278	9,993	2.3%
ALT3B 041122 2035CT	447,742	7,457	1.7%

Modeling Results – SALMOD
Fall Run Production

Alternative	Annual Production (No. fish per year)	Difference	Percent Change
NAA 011221	18,215,670	--	--
ALT3 020121	18,294,178	78,508	0.4%
ALT3BR 032321	18,284,399	68,729	0.4%
NAA 041122 2035CT	17,867,685	--	--
ALT3A 041122 2035CT	18,150,355	282,670	1.6%
ALT3B 041122 2035CT	18,116,844	249,159	1.4%

Modeling Results – SALMOD Late-Fall Run Production

Alternative	Annual Production (No. fish per year)	Difference	Percent Change
NAA 011221	2,880,539	--	--
ALT3 020121	2,889,112	8,573	0.3%
ALT3BR 032321	2,892,596	12,057	0.4%
NAA 041122 2035CT	2,883,330	--	--
ALT3A 041122 2035CT	2,900,770	17,440	0.6%
ALT3B 041122 2035CT	2,894,730	11,399	0.4%

Modeling Results – SALMOD Long-term Average Mortality

Alternative	Fall	Late-Fall	Spring	Winter
ALT3 020121[1]	-3%	0%	-3%	-8%
ALT3BR 032321[1]	-3%	0%	-12%	-7%
ALT3A 041122 2035CT[2]	-9%	-1%	-40%	-12%
ALT3B 041122 2035CT[2]	-7%	-1%	-31%	-12%

[1]Relative to NAA 011221

[2]Relative to NAA 041122 2035CT

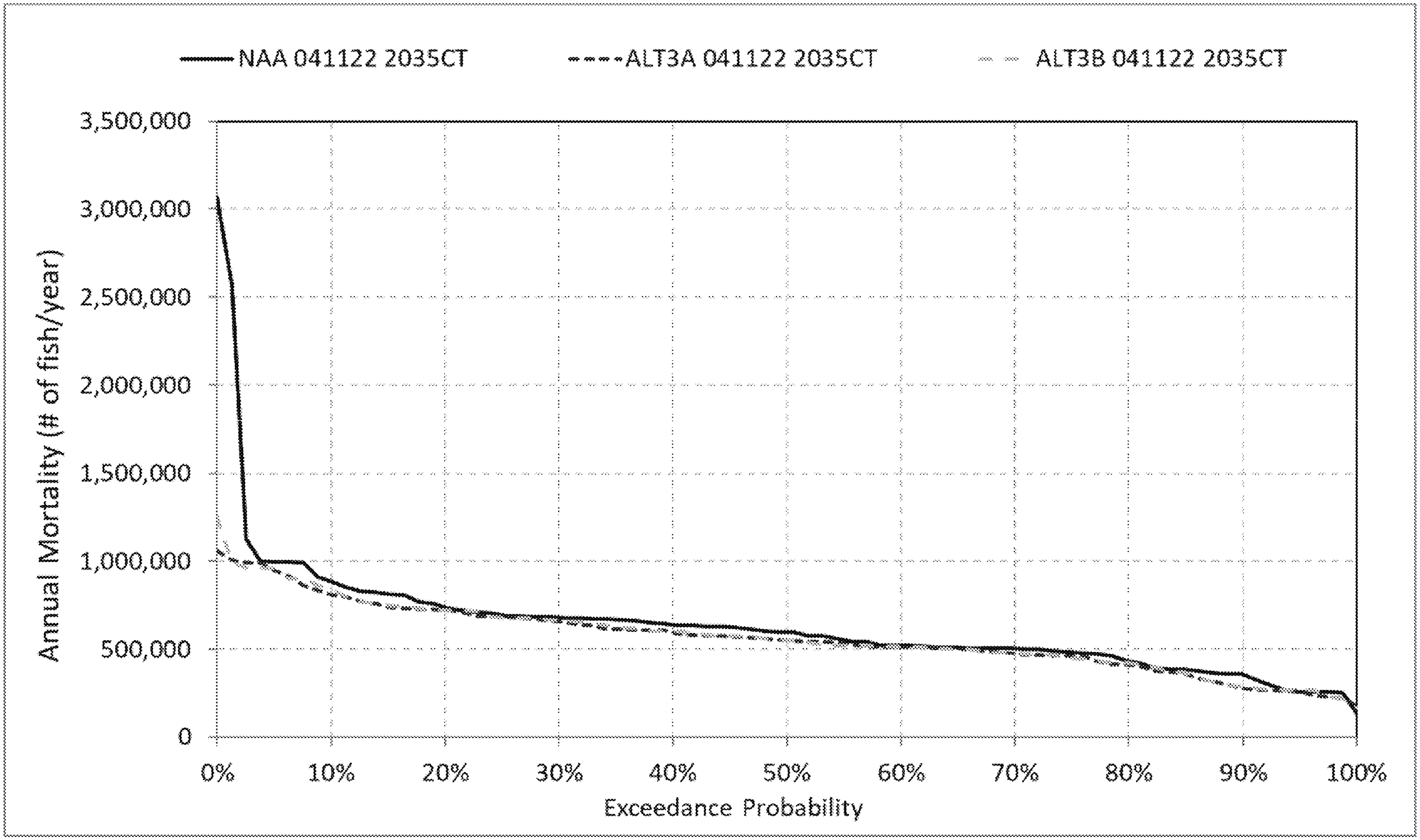
Modeling Results – SALMOD
10 Highest-Mortality Years

Alternative	Fall	Late-Fall	Spring	Winter
ALT3 020121[1]	-8%	2%	-2%	-10%
ALT3BR 032321[1]	-8%	3%	-15%	-10%
ALT3A 041122 2035CT[2]	-23%	-3%	-45%	-31%
ALT3B 041122 2035CT[2]	-20%	-5%	-34%	-30%

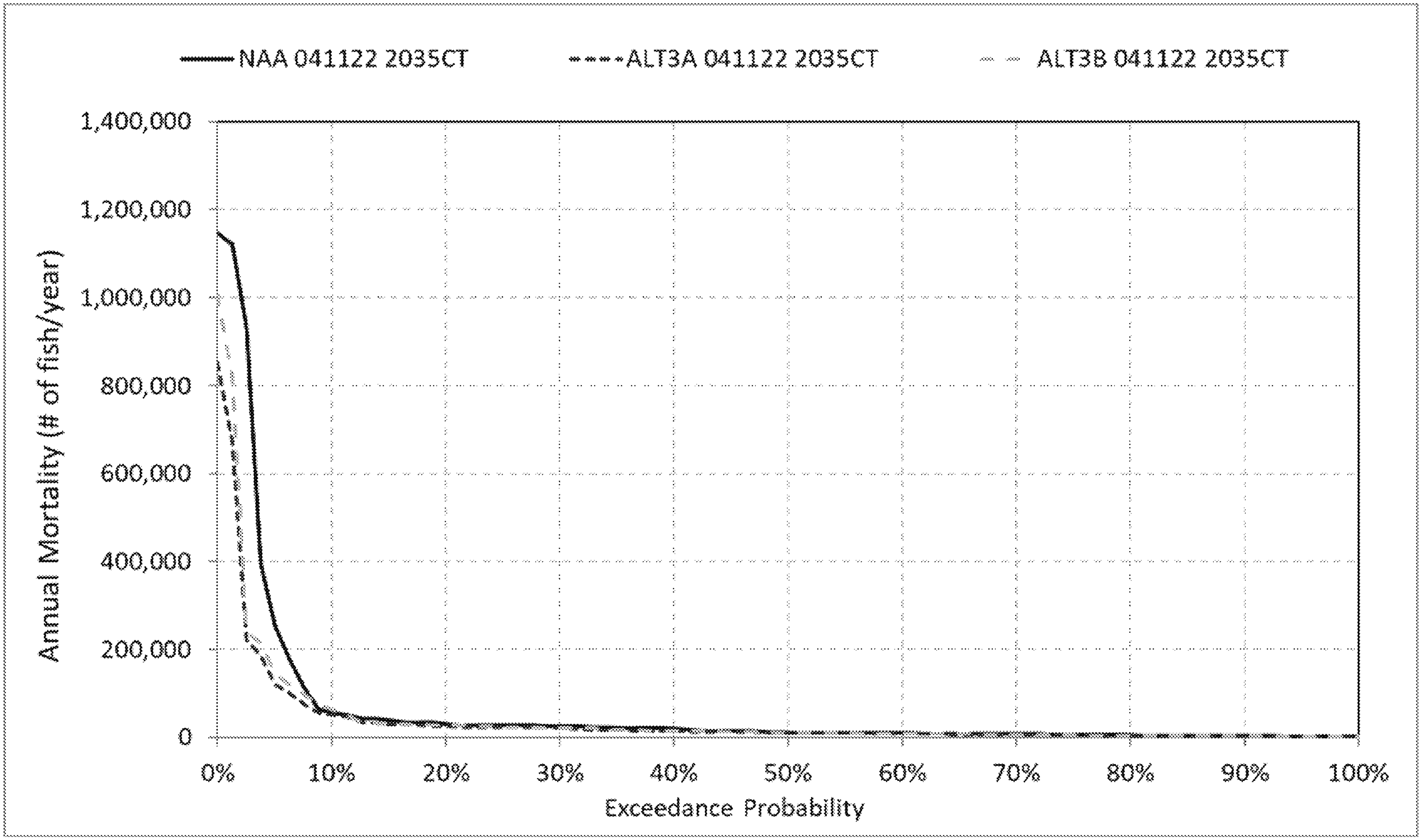
[1]Relative to NAA 011221

[2]Relative to NAA 041122 2035CT

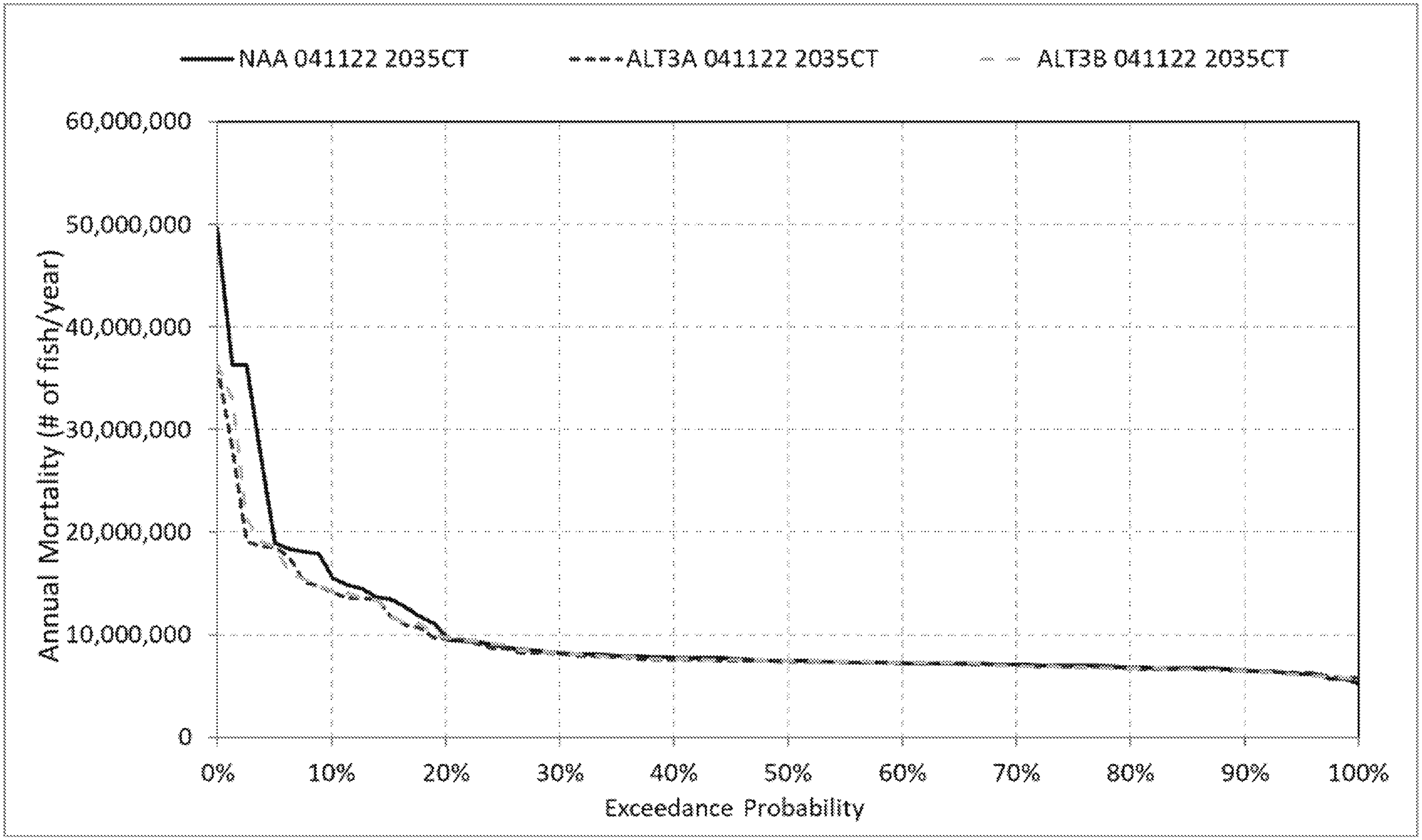
Modeling Results – SALMOD Winter-Run



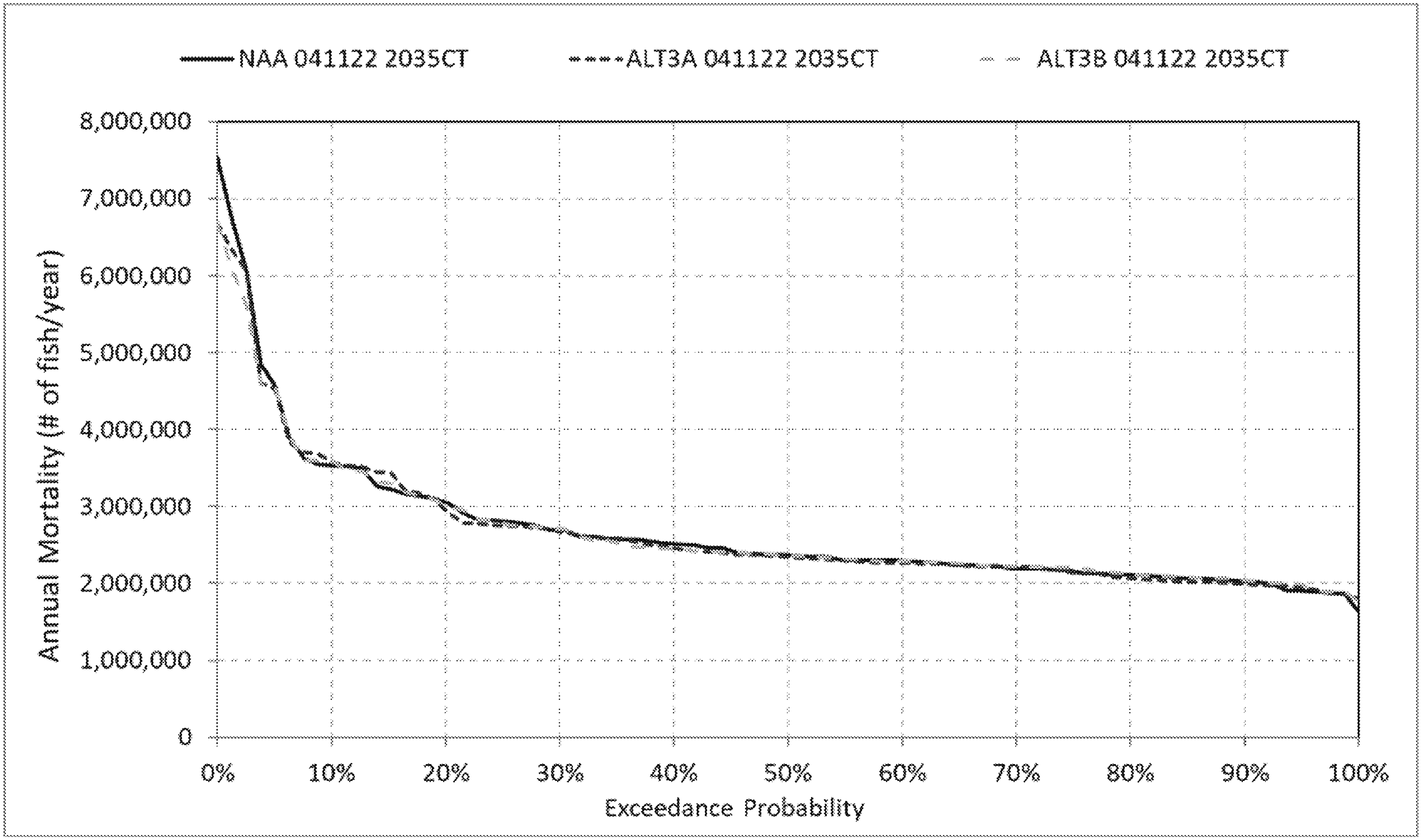
Modeling Results – SALMOD Spring-Run



Modeling Results – SALMOD Fall-Run



Modeling Results – SALMOD Late Fall-Run



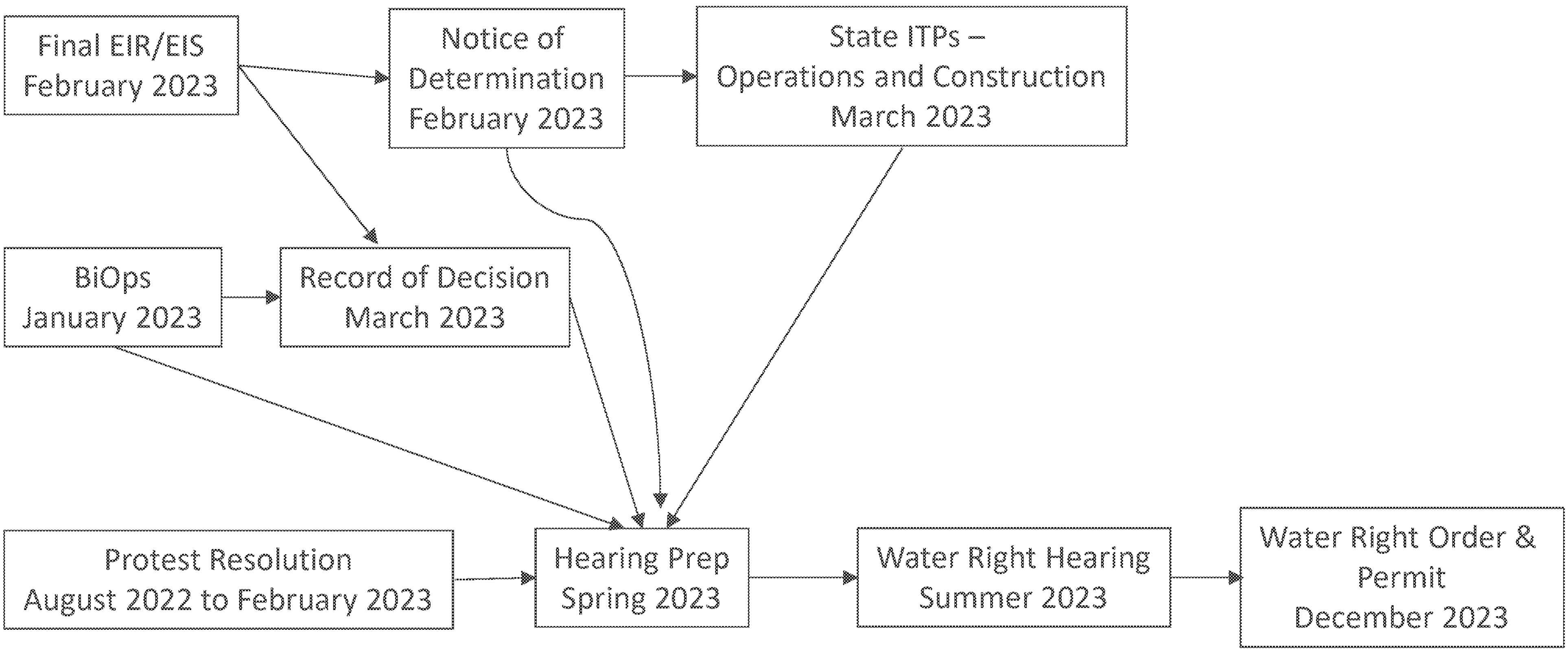
Schedule

Ali Forsythe

Sites

Draft_0019135

Water Right Schedule



Next Steps

Group

Sites

Thank you!

Sites

Sites

Sites Reservoir and Salmon Effects: Thinking Long-term at a Population Level

1. Introductory Paragraphs – ¾ pg
    a. California's climate crisis
        i. California's water resilience goals
        ii. CA 30x30 goals
    b. Problem Statement: The Cost of Doing Nothing for Salmonids –
        i. Explain what effects to salmon are anticipated
            a. Drought is the norm…future is here (graphic and reference)
            b. Variability associated with climate change
                i. Effect to storage and salmon reproduction
                ii. Effect salmon habitat capacity (spawning/rearing)
                iii. Flow survival and floodplain accessibility
            c. Extinction: 2015 water year and WR as example (provide reference)
2. What Sites Means for Salmon– 1 pg
    a. Intro and context– why are we building Sites
        i. Need for storage and flexibility
        ii. Population level thinking
    b. Impacts to salmon
        i. Generalized effects from CEQA – short paragraphs or bullets
            1. Reduction in rearing habitat
            2. Stranding
            3. Migration flow
            4. Floodplain
            5. Water quality
    c. Benefits to salmon – 1 pg
        i. Generalized benefits from CEQA
            1. ? Use FEIR modeling for Alt 1 and 3?
        ii. Specific benefits supported by peer review relationships
            1. Explain what more stored water could help with (supported with refs and graphics)
                a. Cold water storage effect
                b. Spring pulse effect
                c. Fall flow stabilization effect
                d. Outmigration, Pulse protection and access to floodplain (Yolo)
            2. Michel et al 2021 flow relationship
            3. 2017 water year and storage and relate to how it could have been used in 2021-22 (Hassrick et al 2022)
3. General Ending Statement/Conclusion – ¼ pg

8/23/2022

Community Working Group Outline – Purpose and Structure

Purpose

The Community Working Group (CWG) will provide a forum for representatives of local community agencies, associations, businesses, and civic organizations to work collaboratively with the Sites Project Authority to develop creative solutions to issues of local concern and identify opportunities of shared interest between the Authority and the local community through the development of the Sites Reservoir Project.

Desired Outcome

CWG - An engagement process that is collaborative, inclusive and provides a meaningful opportunity for local community leaders to play an active role in the planning and development of the Sites Reservoir Project.

Authority/Project Team - A process that allows the Authority to work in partnership and with a sense of shared purpose with the local community to develop a project that meets the needs of both the Authority and the Community.

Membership

Members will be invited to join the CWG by the Authority. The Project Team will initially identify and invite potential CWG members but will work with the CWG to identify any additional community members that should be added to the working group as the engagement process proceeds.

CWG will represent a broad-cross section of local government agencies, civic organizations, businesses, and community leaders who represent a constituency affected by the project or who have an interest in the planning, construction, and operation of the project.

CGW membership should be geographically inclusive of locations associated with project facilities – Colusa, Glenn & Yolo Counties

A select number AB/RC participants will be invited to attend the CWG meetings in an "observer" role

Meeting Structure

Meetings will be held on a bi-weekly basis (September 2022 – December 2023) – 8 meetings. Meetings are anticipated to be 2 hours and held at the Project Office in Maxwell.

CWG members will be informed of meetings through email or direct mail, depending on preference, at least two weeks prior to the meeting. Notification will include planned agenda and any supplemental material required for the meeting

Meetings are generally "open" to other members of the public and the press – however the meetings will not be advertised outside of the CWG

Meetings would be professionally facilitated by the Sites Communications Team. Staff will keep a record of meeting attendees, key issues raised, and any action items that require follow-up by the Authority

Meeting Topics & Themes

Each meeting will be structured around key project topics topics/themes in an effort to better focus the discussion and drive to collaborative solutions and positive outcomes.

Staff will identify proposed topics/themes – but the list of meetings topics will be refined based on feedback from the CWG. The initial topics/themes and timing is as follows;

- September 2022 - *Working Group Kick-off, General Project Overview*
- November 2022 – *Project Site Tour*
- January 2023 – *Issues of local concern (i.e., traffic, public safety, community)*
- March 2023 – *Workforce Development & Jobs*
- May 2023 - *Recreation*
- July 2023 – *Authority/Community Partnerships*
- September 2023 – *Issues of local concern (i.e., traffic, public safety, community)*
- November 2023 - *Issues of local concern (i.e., traffic, public safety, community)*

Work Group Expectations

The CWG is a forum for the local community to provide vital input and feedback to Authority participants and staff to help inform Project planning and development activities.

Issues discussed with the CWG should be focused on ones where the community can have some meaningful involvement, help to drive to solutions, and can have a positive impact in the development of the project

CWG expectations:

- Provide specific local expertise, including identifying emerging local issues;
- Attend all meetings possible;
- Review all agendas and documents distributed by staff prior to the meetings;
- Relay information to his/her respective constituency after each meeting and gather information/feedback as practicable before each meeting;
- Articulate and reflect the interests that CWG members bring to the table;
- Maintain a focus on suggestions that benefit multiple interests or the overall project area;
- Help create a respectful, collobrative and productive working environment.

Authority expectations:

- Provide CWG members the opportunity to collaborate on input and ideas for the Sites Project Authority to consider;
- Provide technical expertise;
- Brief local decision makers and produce briefing materials and reports;
- Provide early notification of CWG meetings and provide any documents for review at least one week before each meeting;
- Conduct public meetings or workshops if/when necessary to inform and engage the local community;
- Manage logistics for CWG meetings; and
- Provide feedback on how input from the CWG influenced planned project design and construction activities.

JACOBS

Memorandum

2485 Natomas Park Drive, Suite 600
Sacramento, California 95833-2937
United States
T +1.916.920.0300
F +1.916.920.8463
www.jacobs.com

Project Name	Sites Reservoir Project	
Subject	Sites Reservoir Temperature Model Results to Support the 2022 Final EIR/EIS: No Action Alternative, Alternative 1A, Alternative 1B, Alternative 2 and Alternative 3	
Attention	Ali Forsythe/Sites Project Authority	Monique Briard/ICF
	Angela Bezzone/MBK	Mike Hendrick /ICF
	Laurie Warner Herson/Phenix	Nicole Williams/ICF
	Lyna Black/Jacobs	Anne Huber/ICF
From	Robert Leaf/JACOBS	Steve Micko/JACOBS
	Reed Thayer/JACOBS	Samaneh Saadat/JACOBS
Date	August 24, 2022	

1. Introduction

The Sites Reservoir Project team has developed model simulations to support quantitative analysis of Sites long-term operations as part of developing a Final Environmental Document, for completion in 2022.

The results of these model simulations are provided for informational and review purposes. If there are any questions regarding the results of these simulations, please contact the modeling team.

2. Modeled Scenarios

Model results are provided for the alternatives tabulated below.

Model Name	Label Name (as seen in spreadsheet)	Description
No Action Alternative 051422	NAA 051422	Baseline simulation (Reclamation 2021 Benchmark)
Alternative 1A 051722	ALT 1A 051722	1.5 MAF Reservoir
Alternative 1B 051722	ALT 1B 051722	1.5 MAF Reservoir with 101 TAF of Reclamation Investment

Model Name	Label Name (as seen in spreadsheet)	Description
Alternative 2 051722	ALT 2 051722	1.27 MAF Reservoir
Alternative 3 051722	ALT 3 051722	1.5 MAF Reservoir with 360 TAF of Reclamation Investment

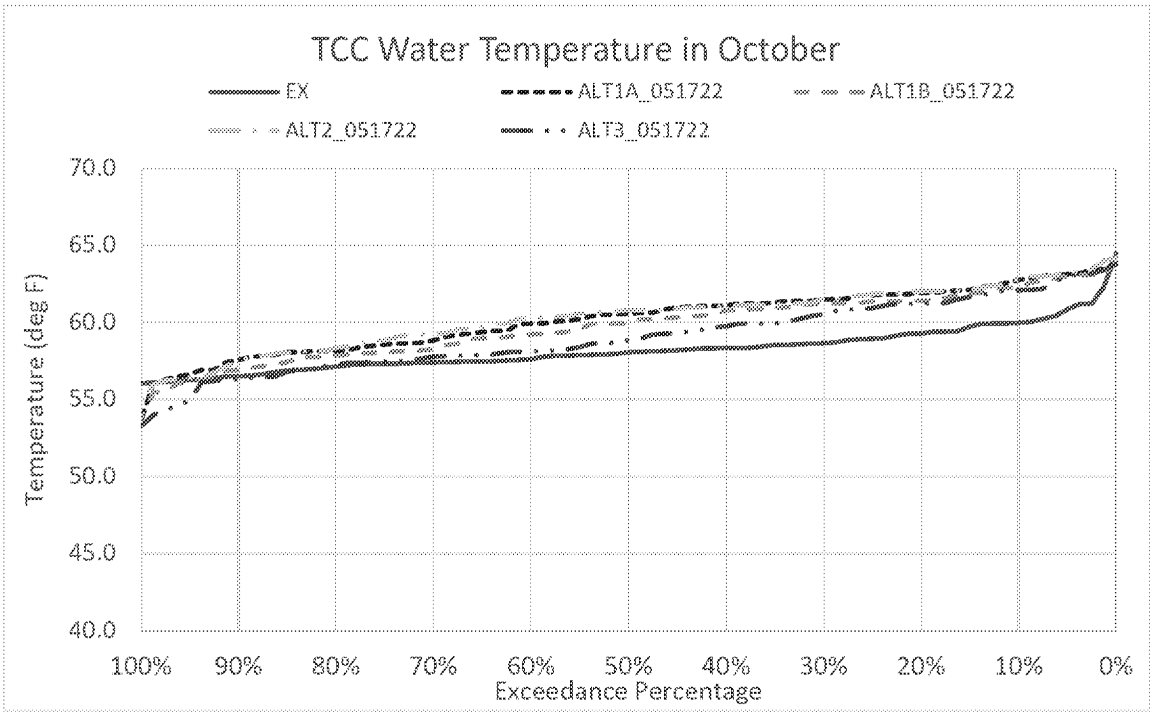
The Sites Reservoir temperature and release temperature blending results were developed for the Sites Final EIR/EIS. Please review Appendix 6D of the Sites Reservoir Project Final EIR/EIS. These results are useful so long as the results are interpreted consistent with the model limitations.

3. Model Simulations for Modeled Scenarios

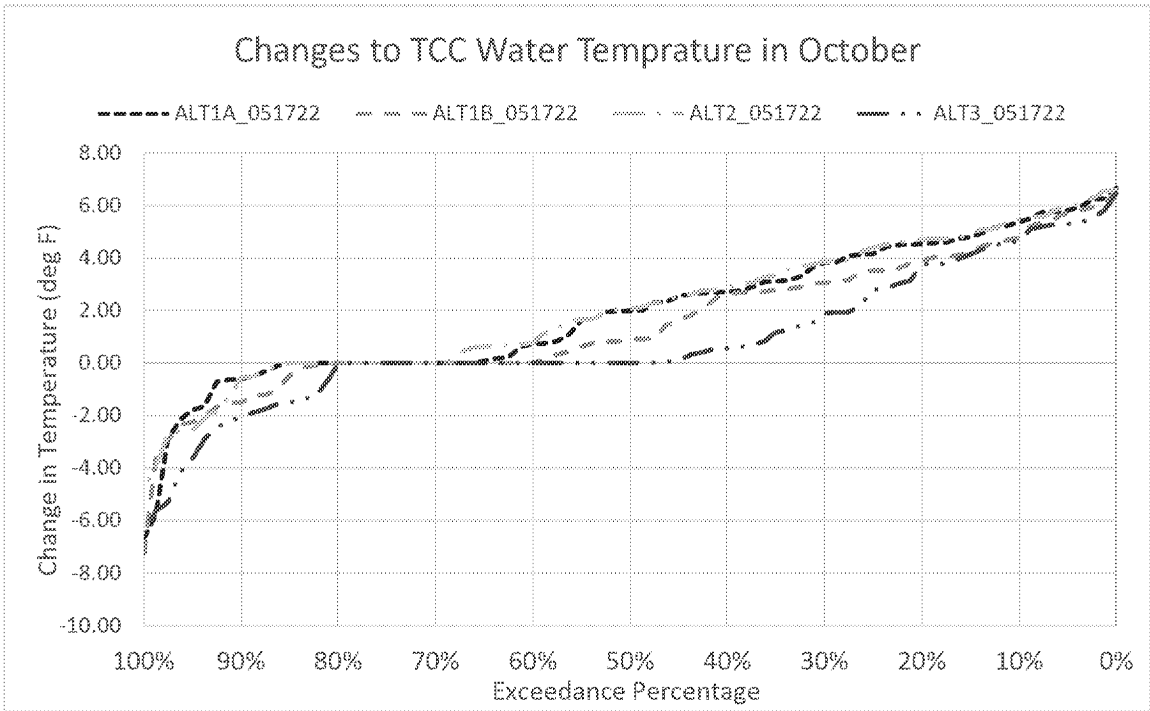
3.1 Sites Reservoir Temperature and Release Temperature Blending

The following results are provided:

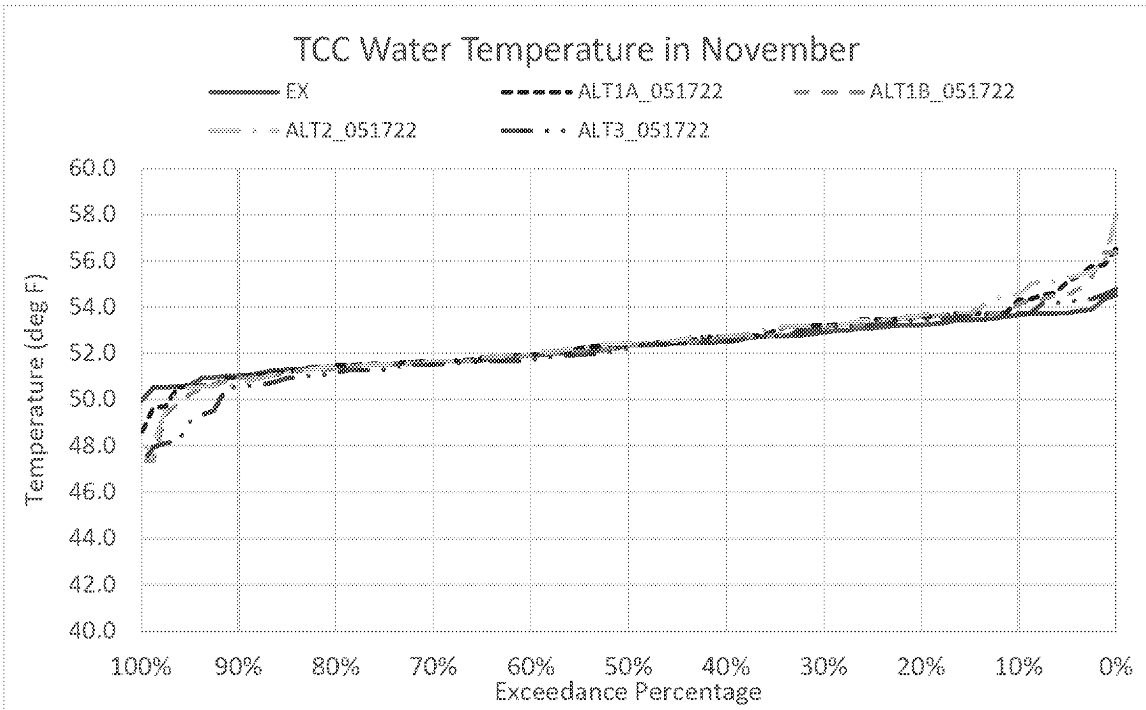
- SPJPA_Sites_CEQUAL_SitesReservoir__ALT1A_051722_ALT1B_051722_ALT2_051722_ALT3_051722.xlsx, and
- SPJPA_Sites_ReservoirReleaseTemperatureBlending_rev11_20220810.pdf.

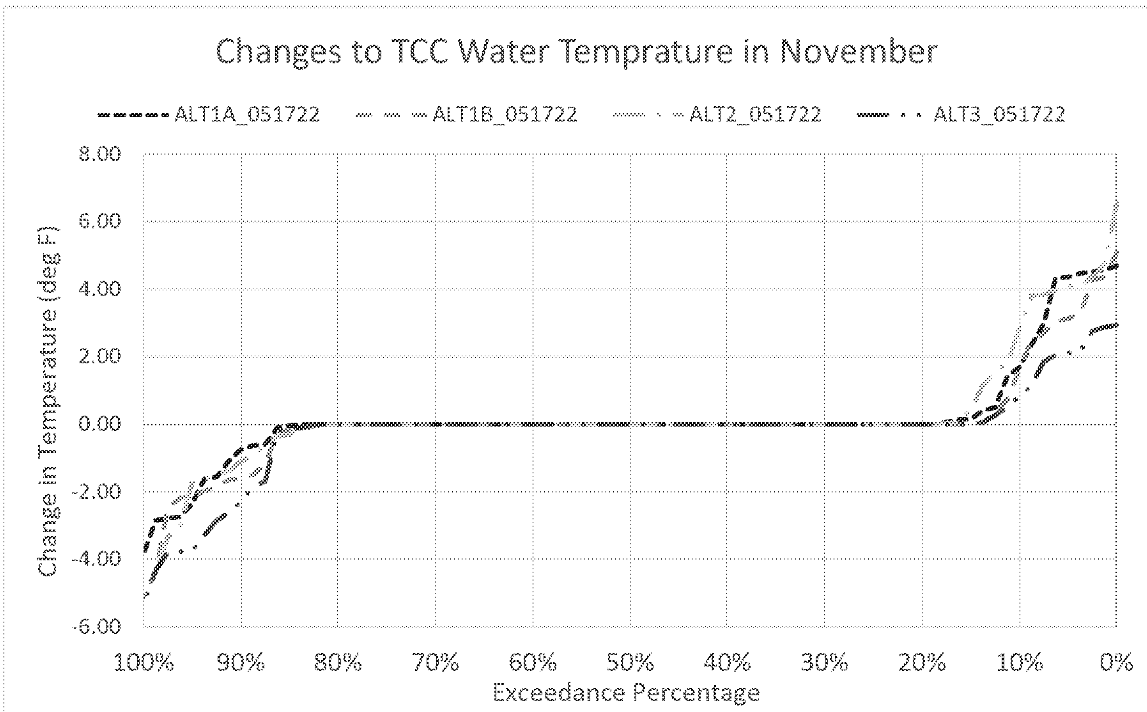


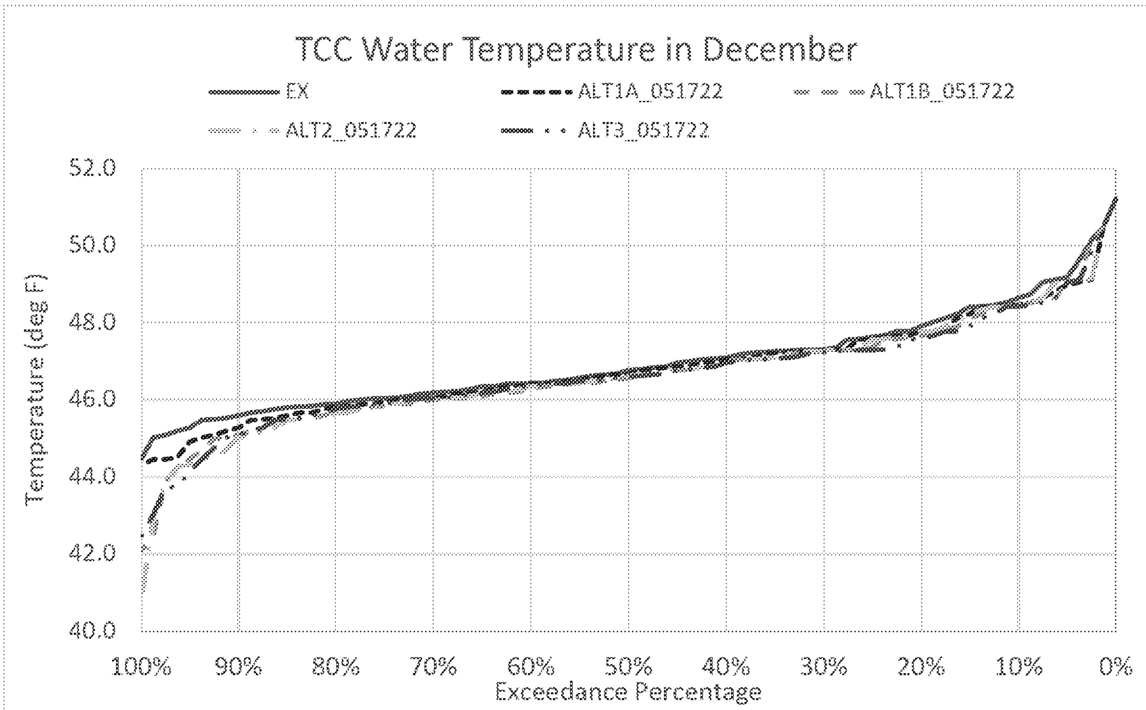
TCC Water Temperature in October
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
70.0
65.0
60.0
55.0
50.0
45.0
40.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

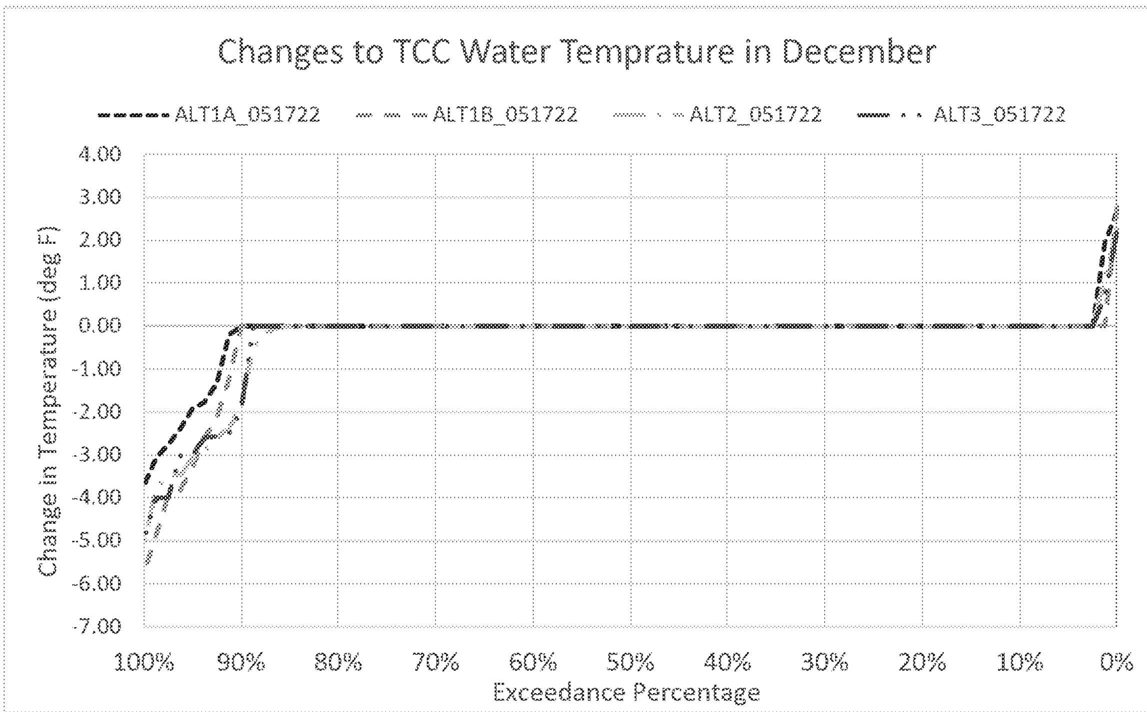


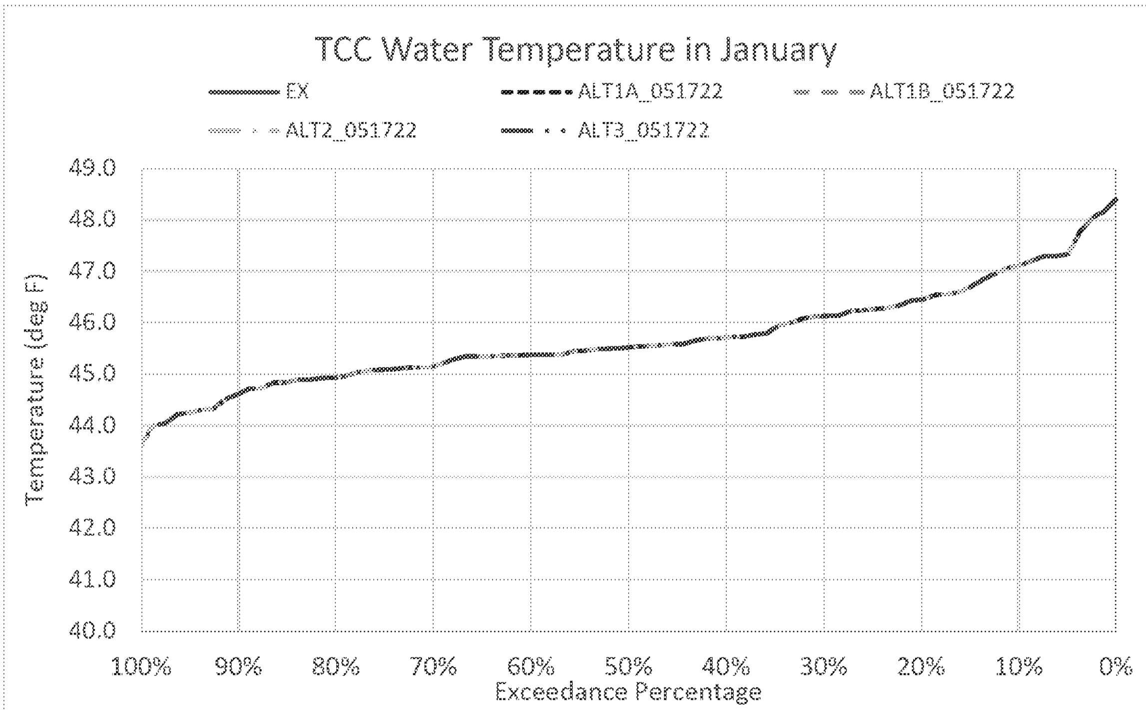
Changes to TCC Water Temprature in October
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

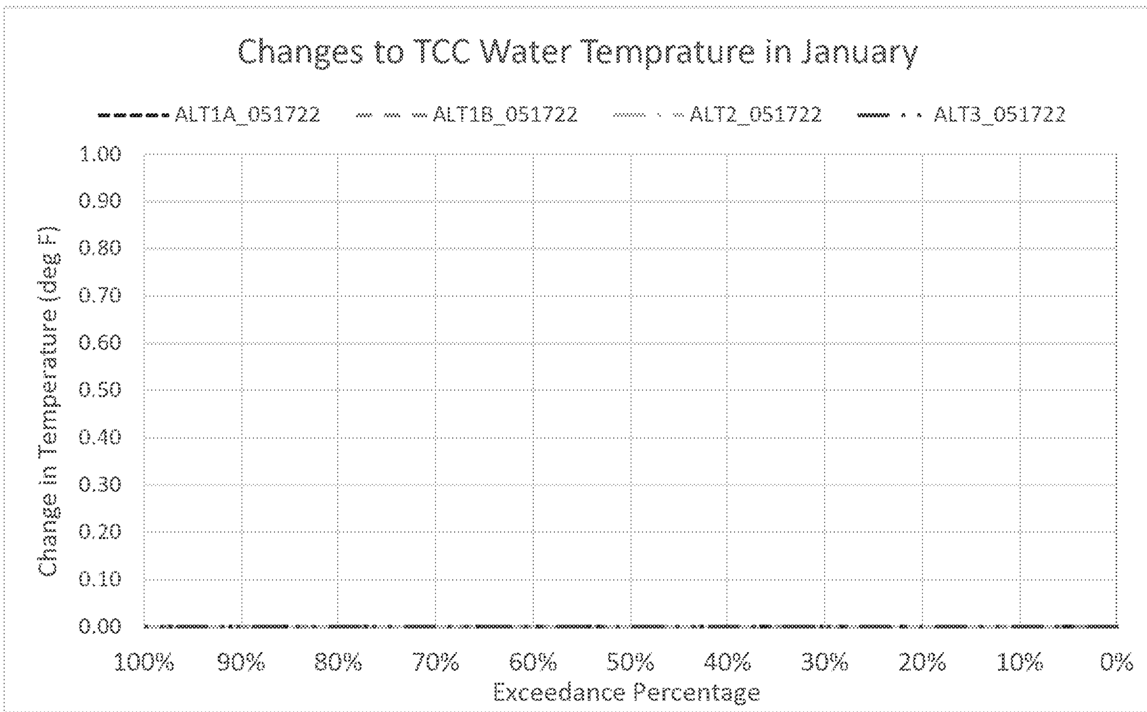

TCC Water Temperature in November
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
60.0
58.0
56.0
54.0
52.0
50.0
48.0
46.0
44.0
42.0
40.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

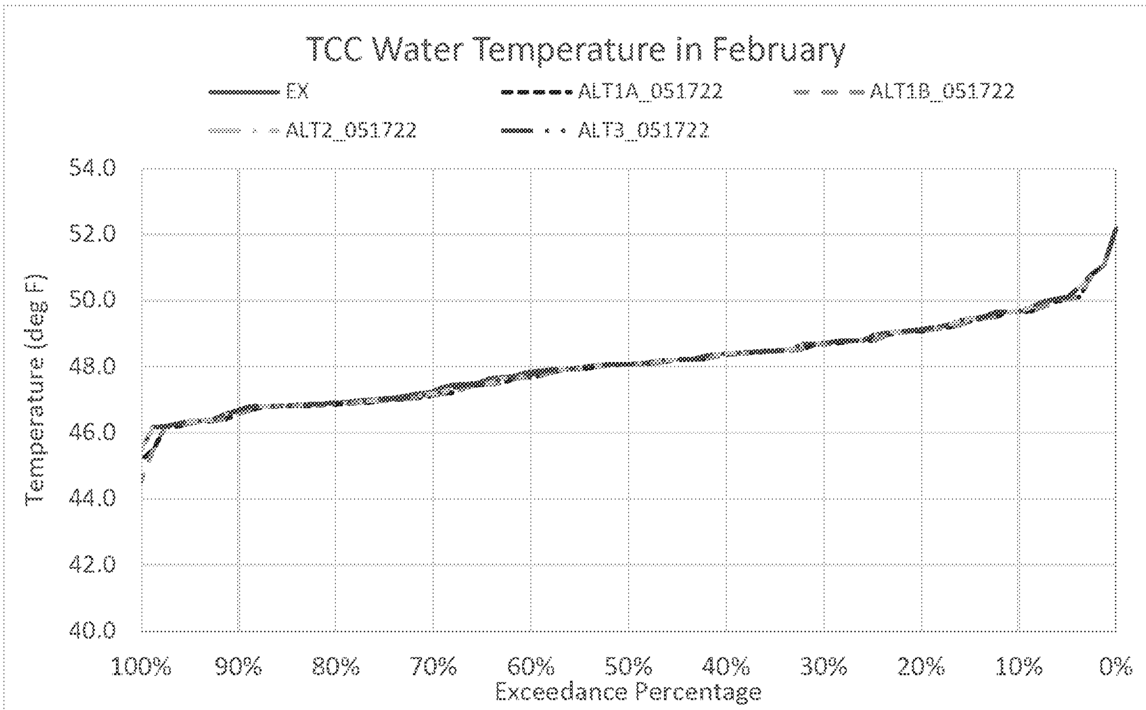

Changes to TCC Water Temprature in November
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

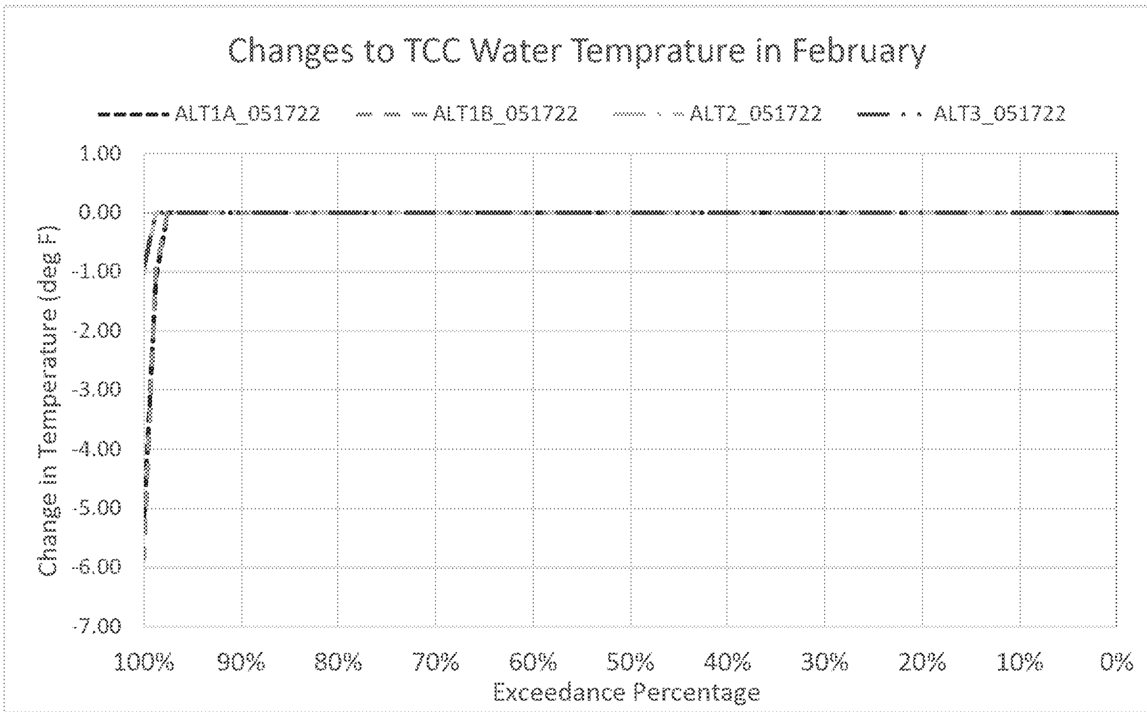

TCC Water Temperature in December
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
52.0
50.0
48.0
46.0
44.0
42.0
40.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

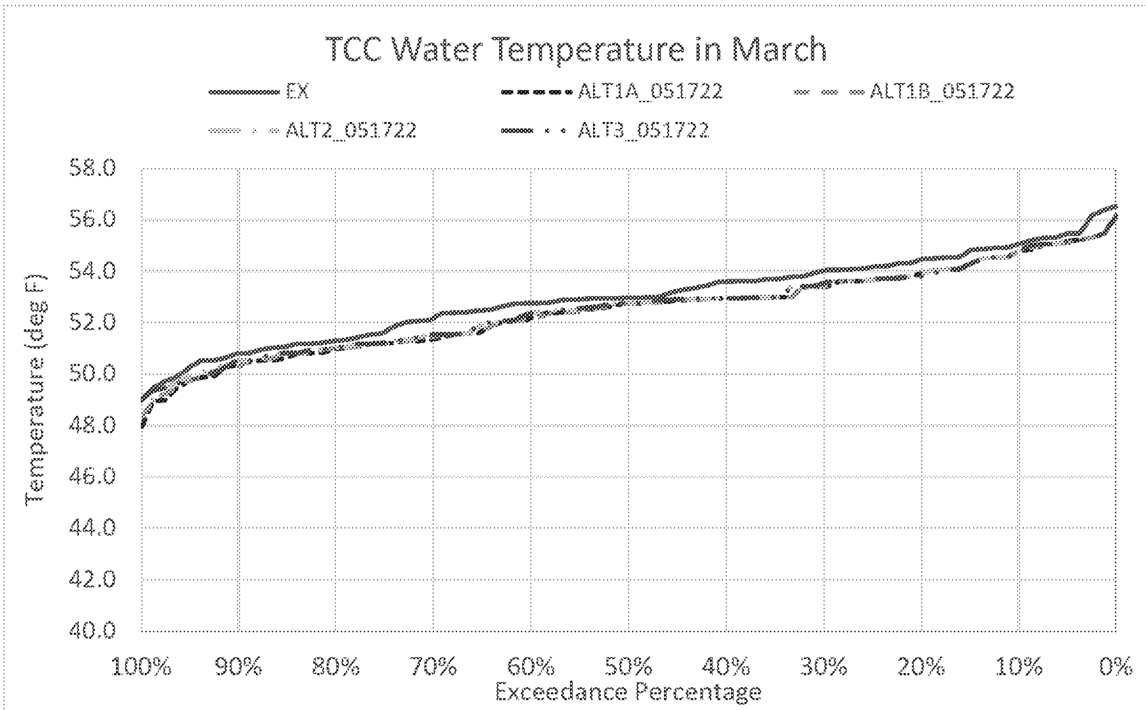

Changes to TCC Water Temprature in December
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
-7.00
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

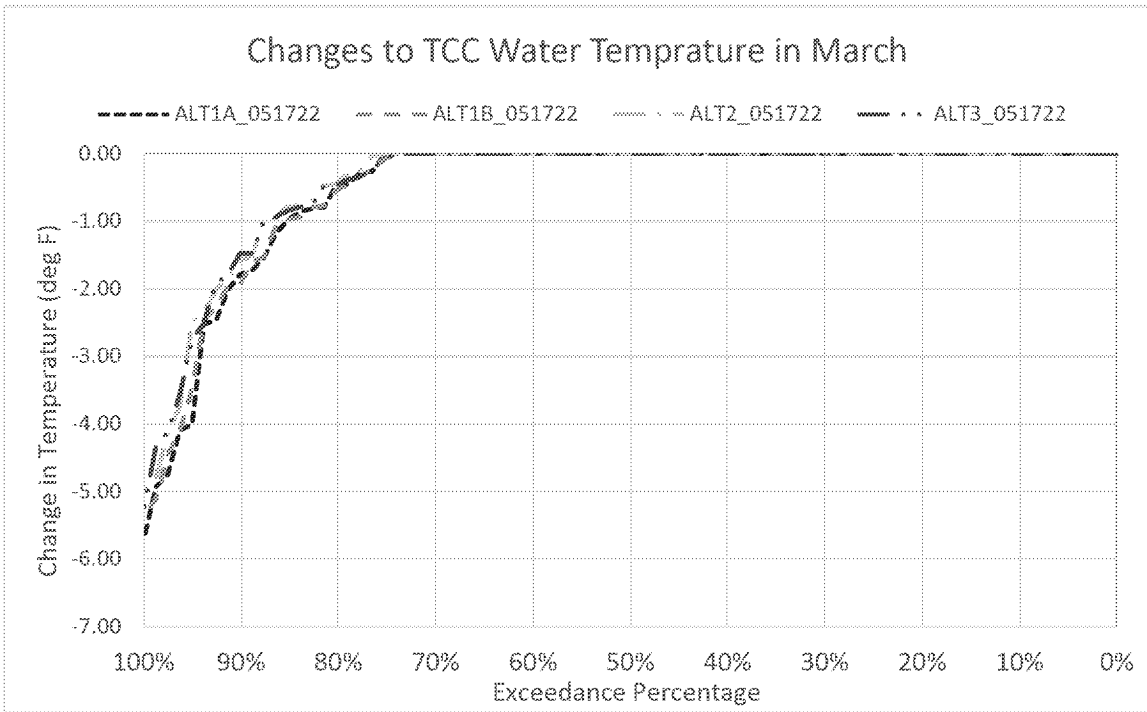

TCC Water Temperature in January
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
49.0
48.0
47.0
46.0
45.0
44.0
43.0
42.0
41.0
40.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

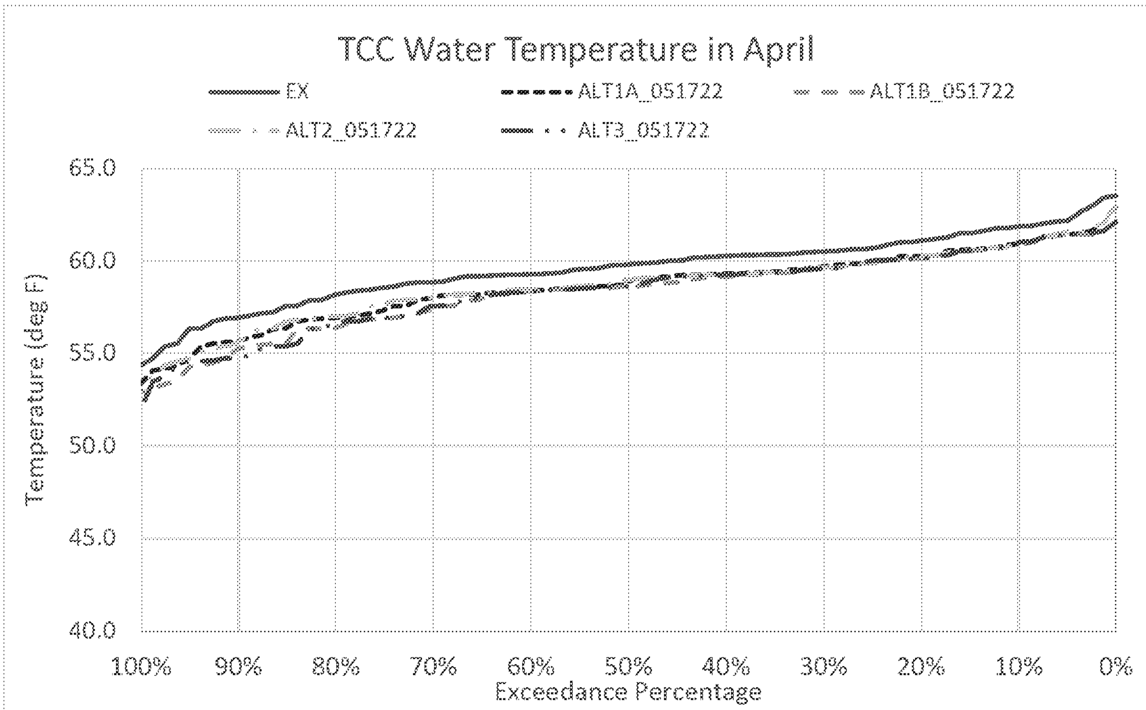

Changes to TCC Water Temprature in January
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

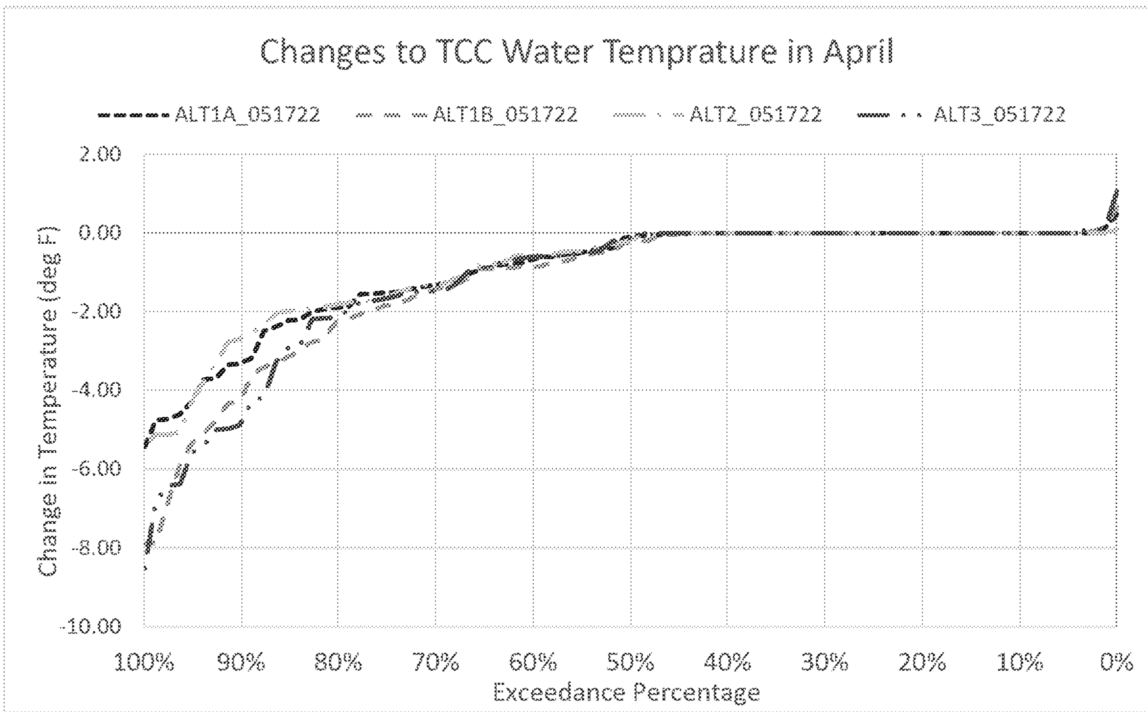

TCC Water Temperature in February
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
54.0
52.0
50.0
48.0
46.0
44.0
42.0
40.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage


Changes to TCC Water Temprature in February
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
-7.00
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage


TCC Water Temperature in March
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
58.0
56.0
54.0
52.0
50.0
48.0
46.0
44.0
42.0
40.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage


Changes to TCC Water Temprature in March
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
-7.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage


TCC Water Temperature in April
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
65.0
60.0
55.0
50.0
45.0
40.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage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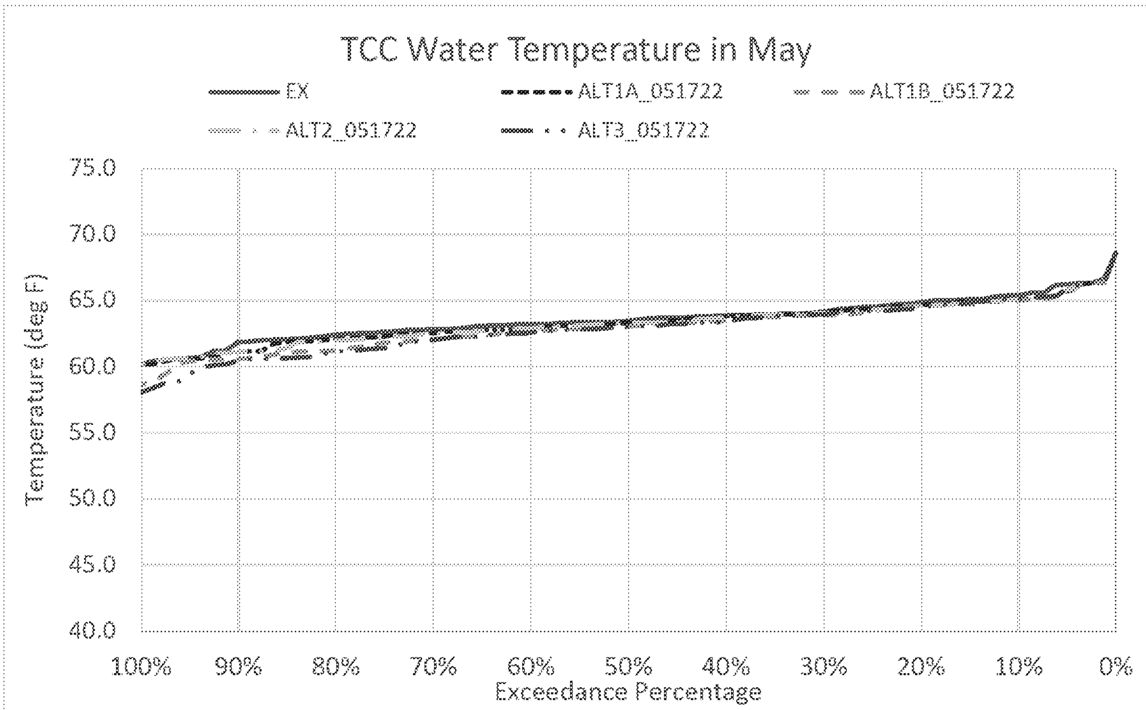
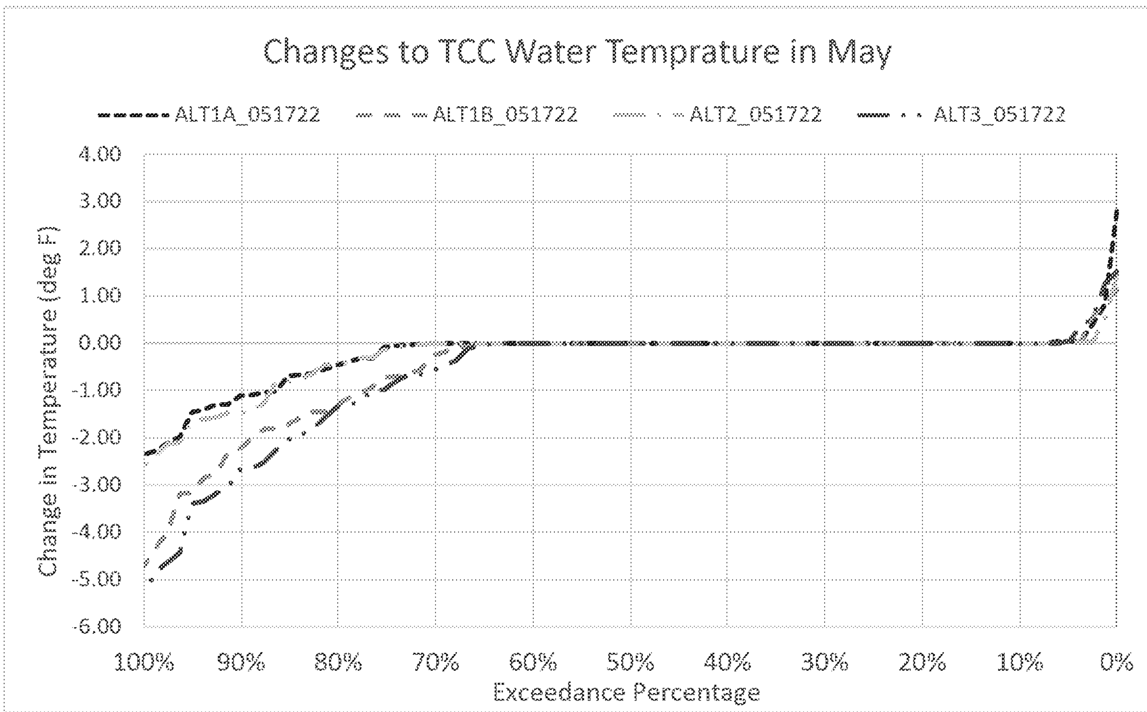
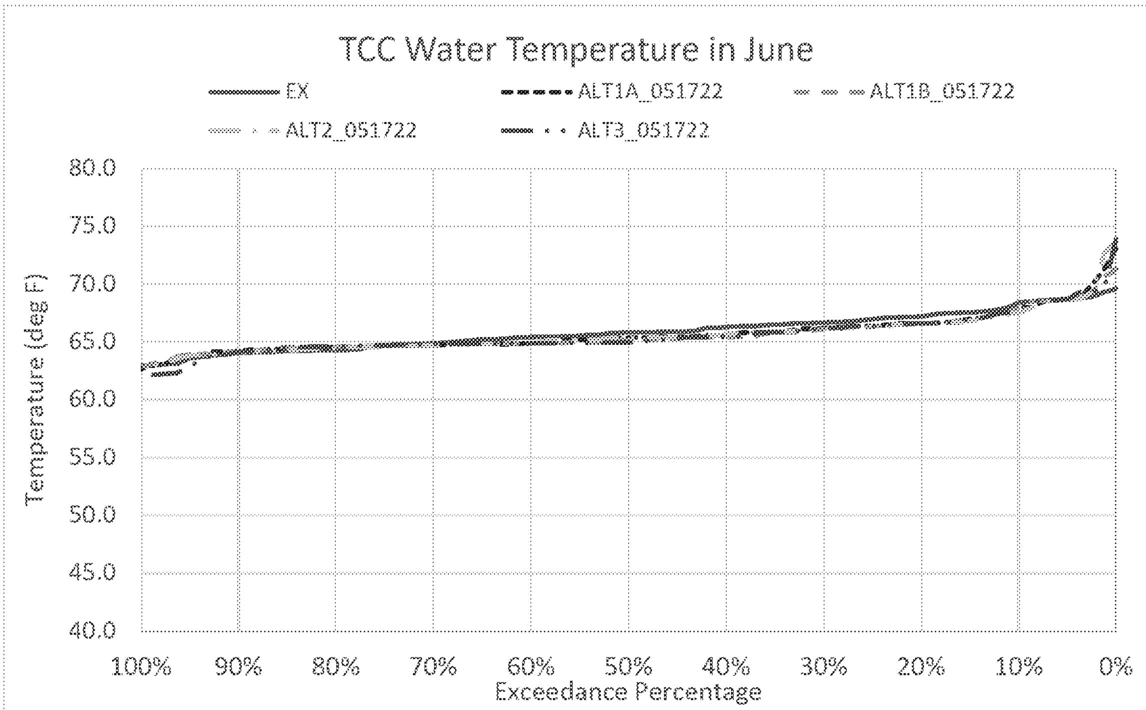
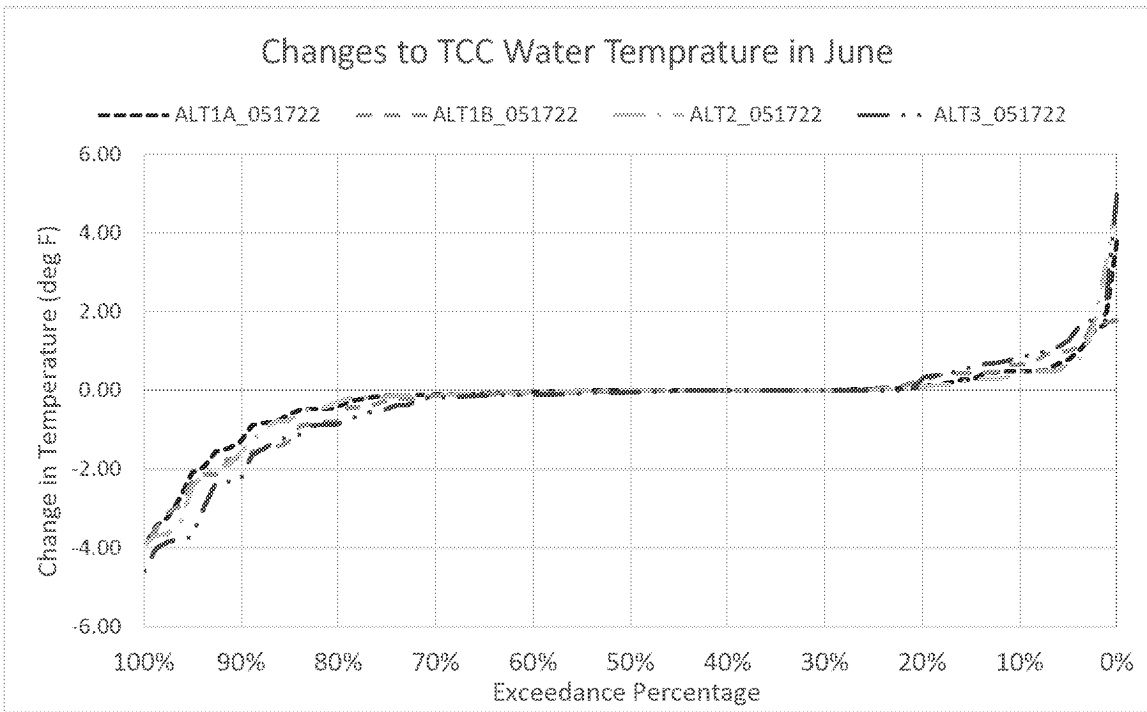
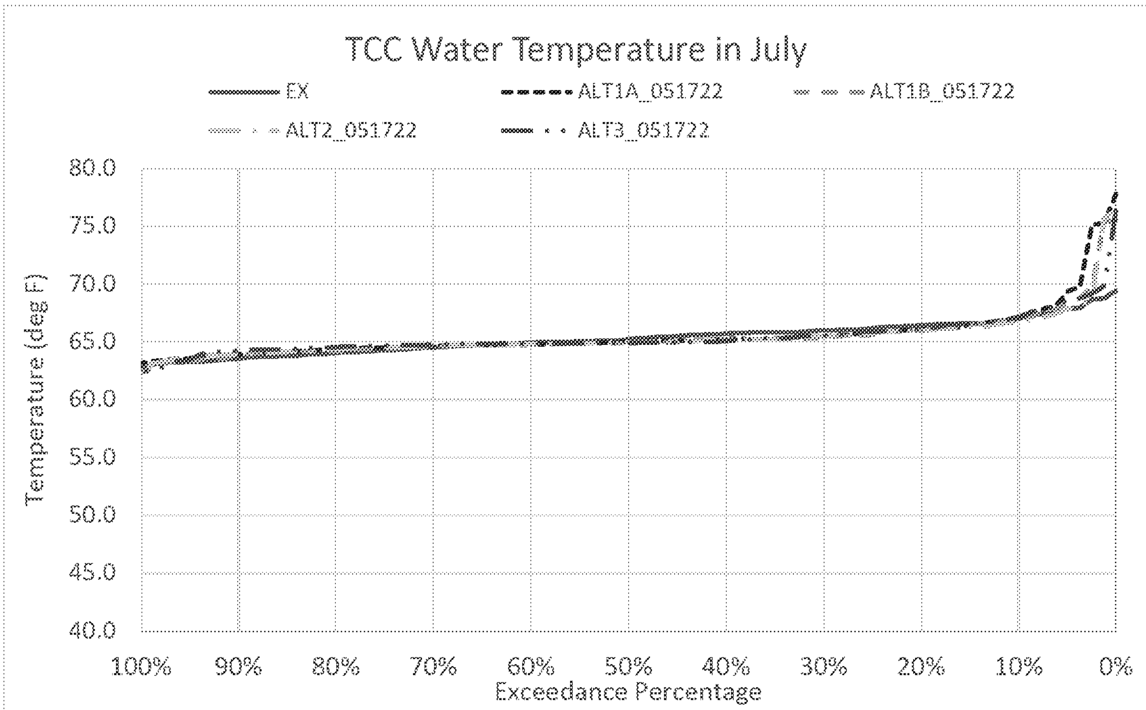
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

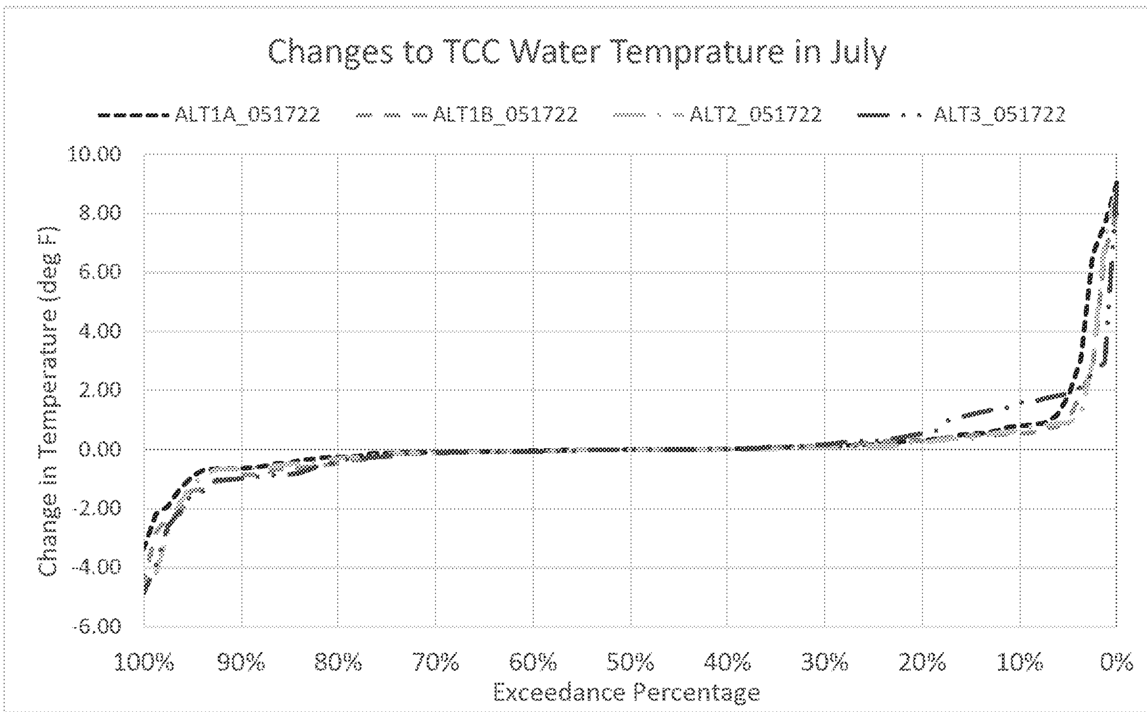

TCC Water Temperature in May
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

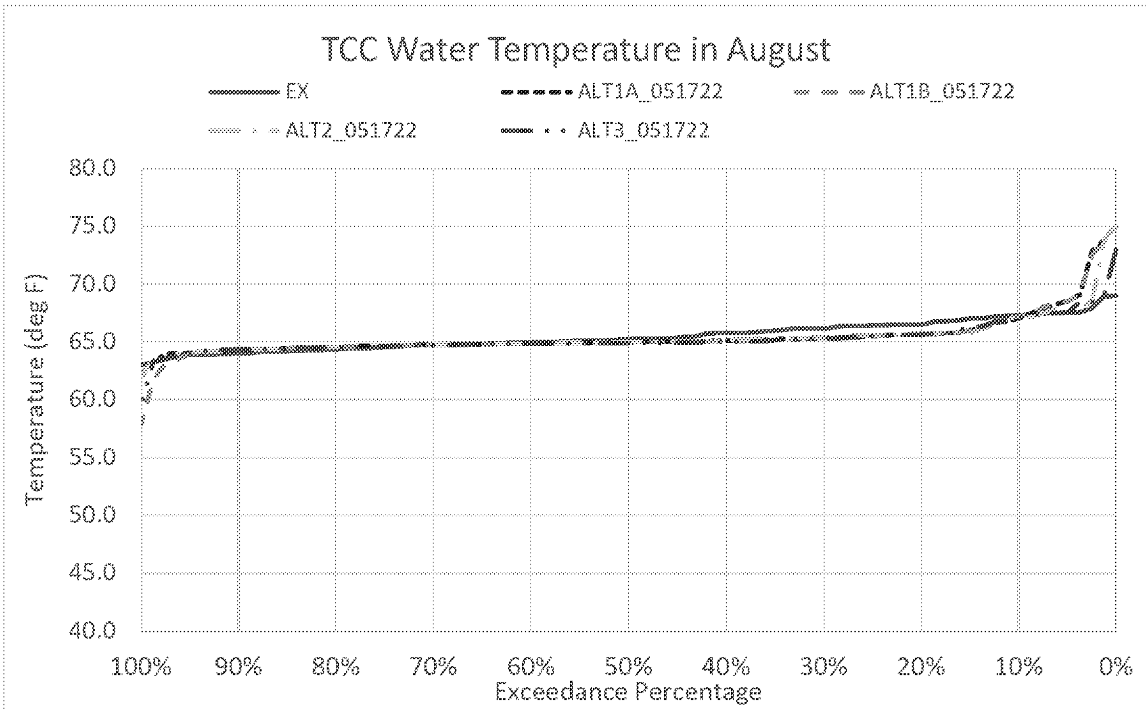

Changes to TCC Water Temprature in May
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

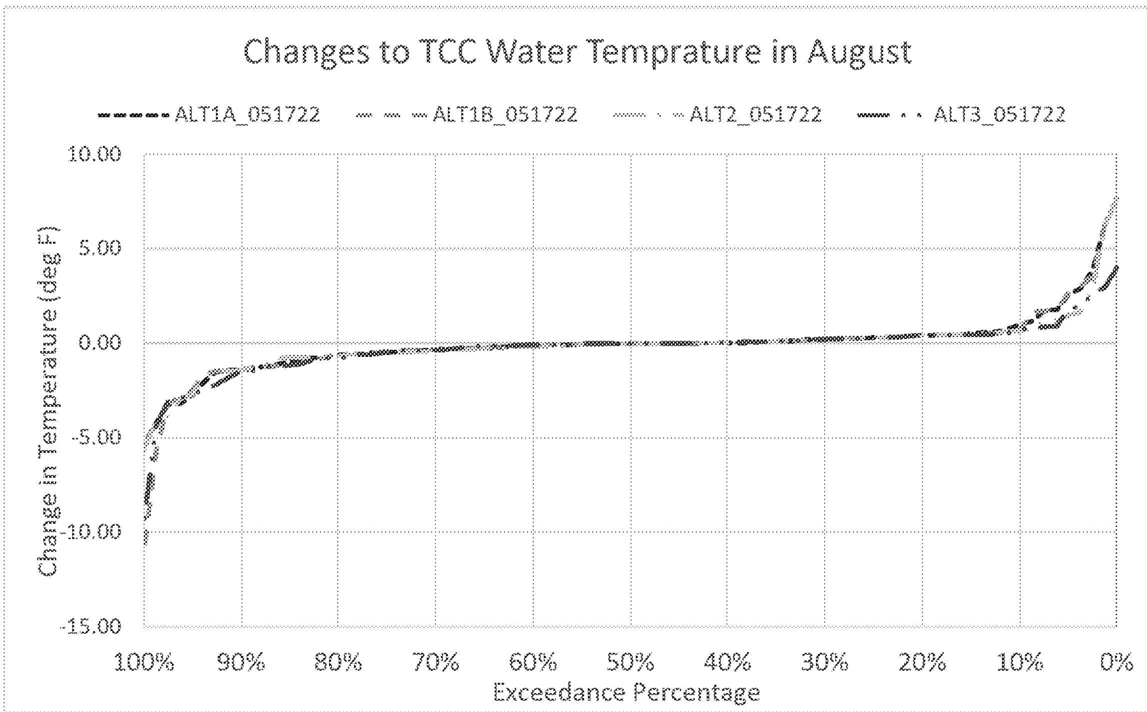

TCC Water Temperature in June
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

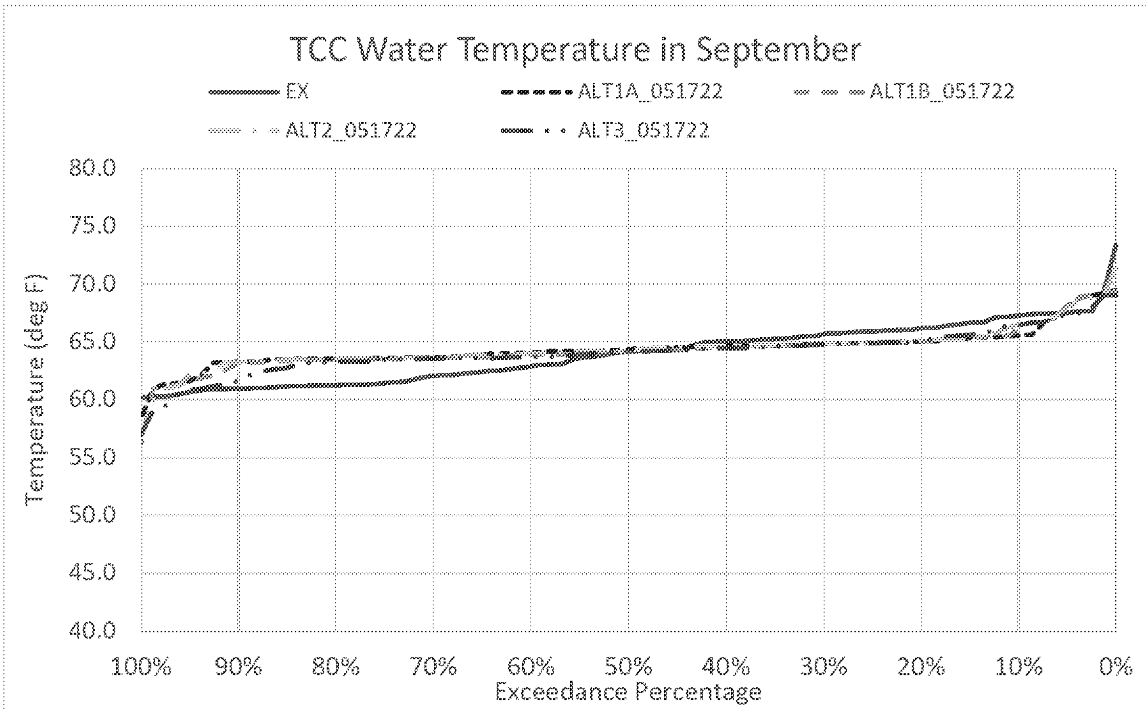

Changes to TCC Water Temprature in June
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

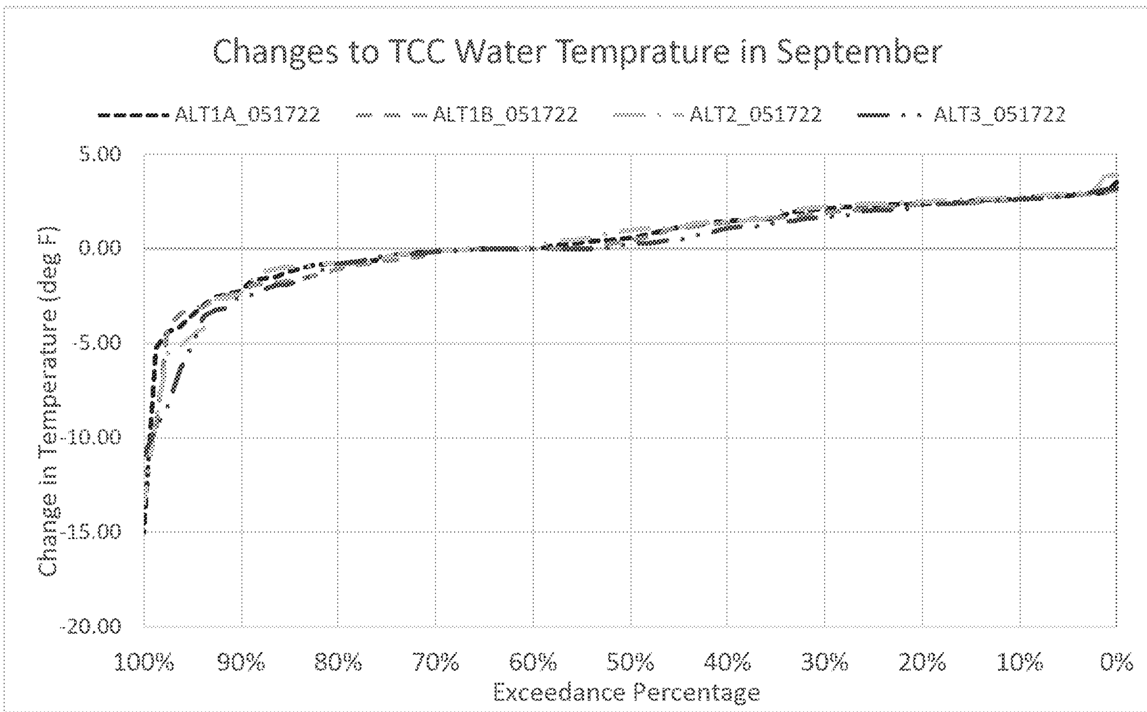

TCC Water Temperature in July
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

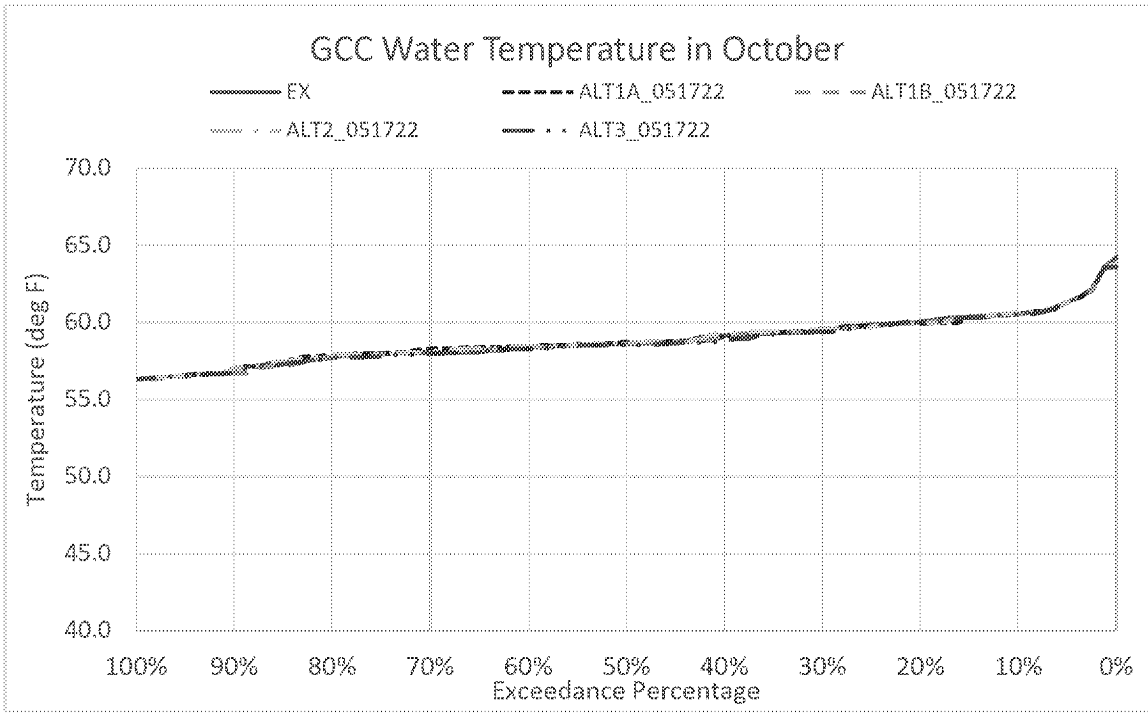

Changes to TCC Water Temprature in July
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

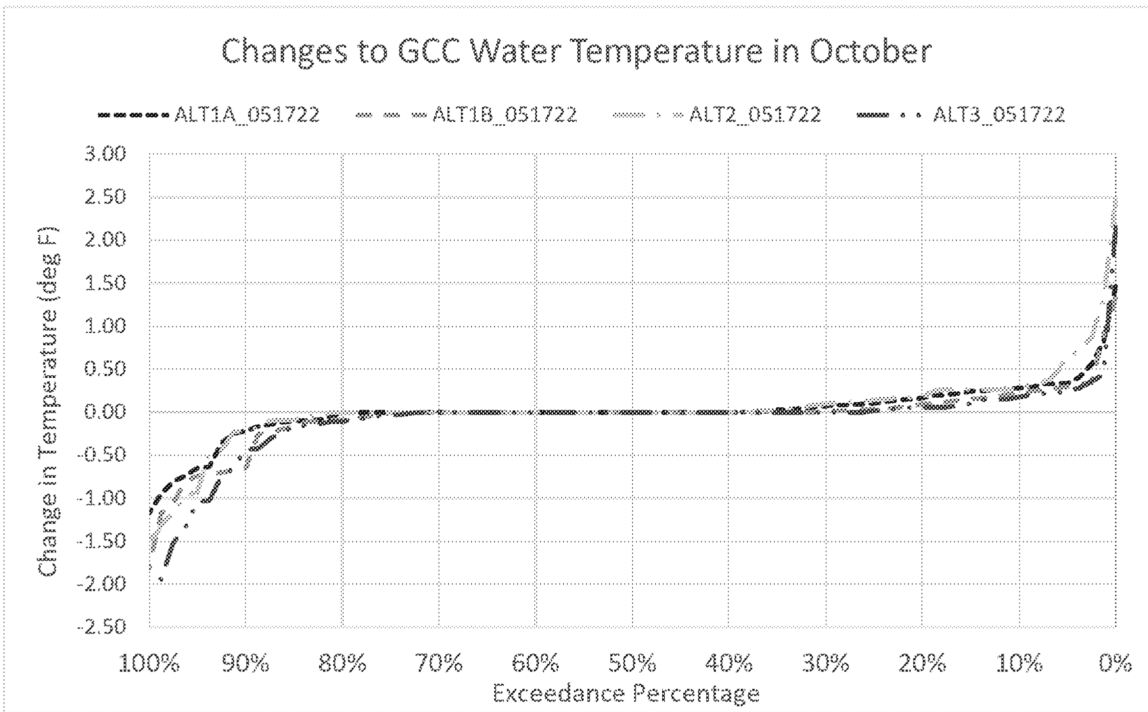

TCC Water Temperature in August
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

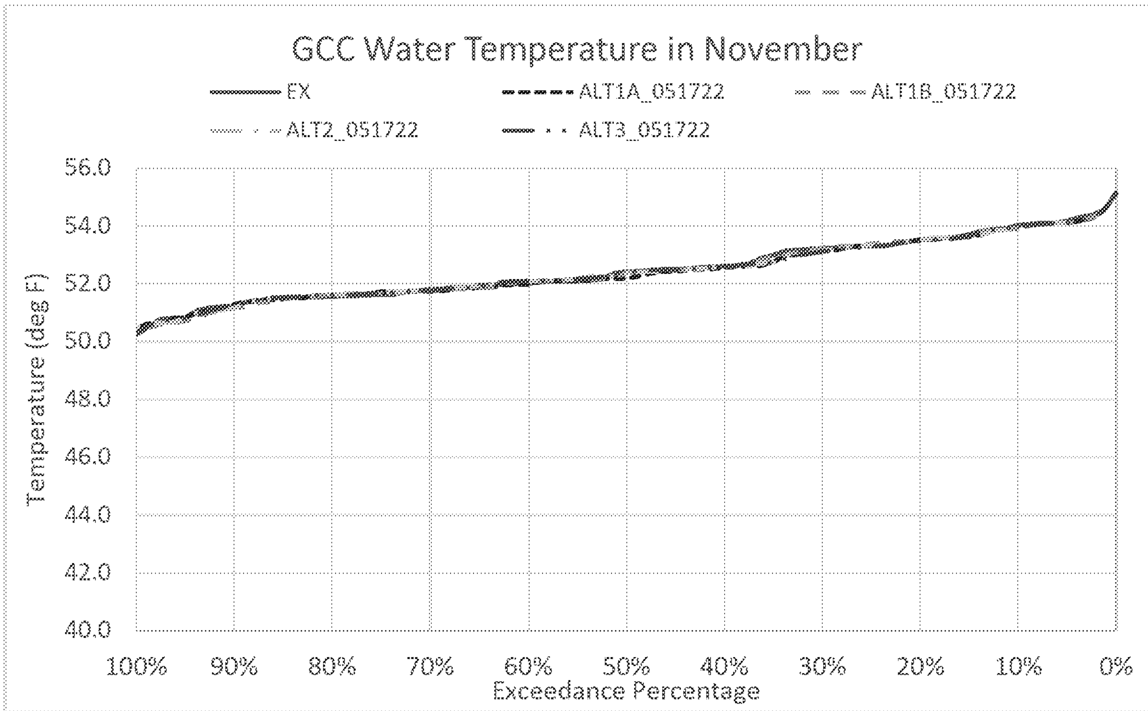

Changes to TCC Water Temprature in August
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
10.00
5.00
0.00
-5.00
-10.00
-15.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

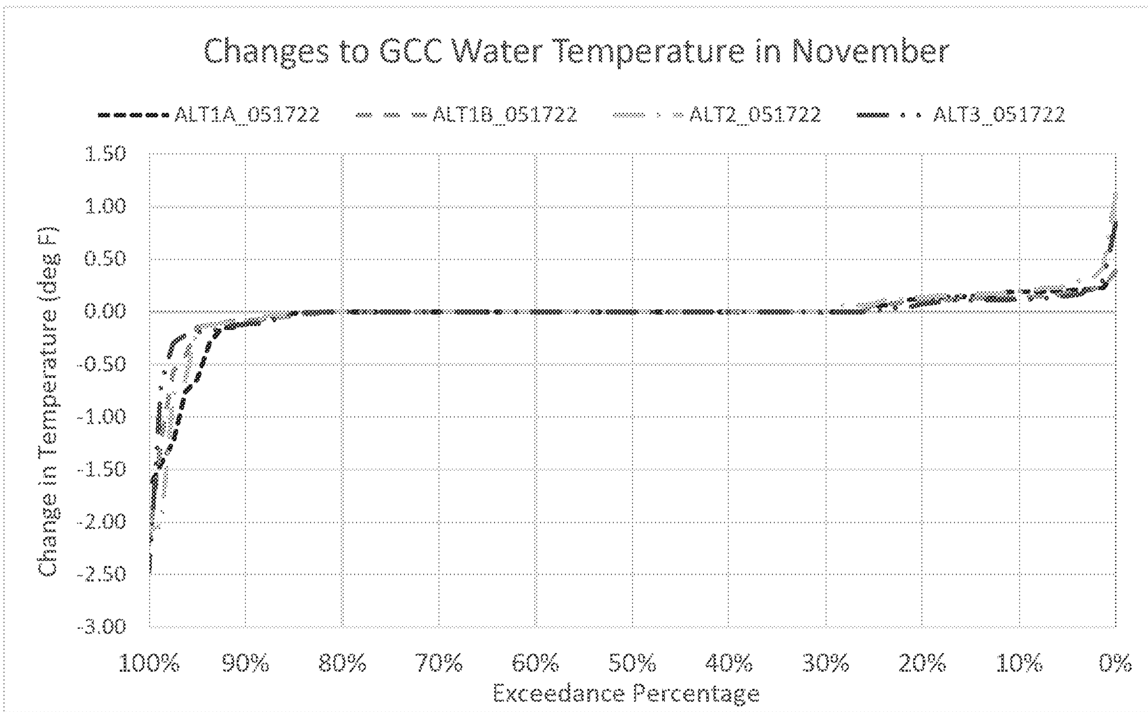

TCC Water Temperature in September
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

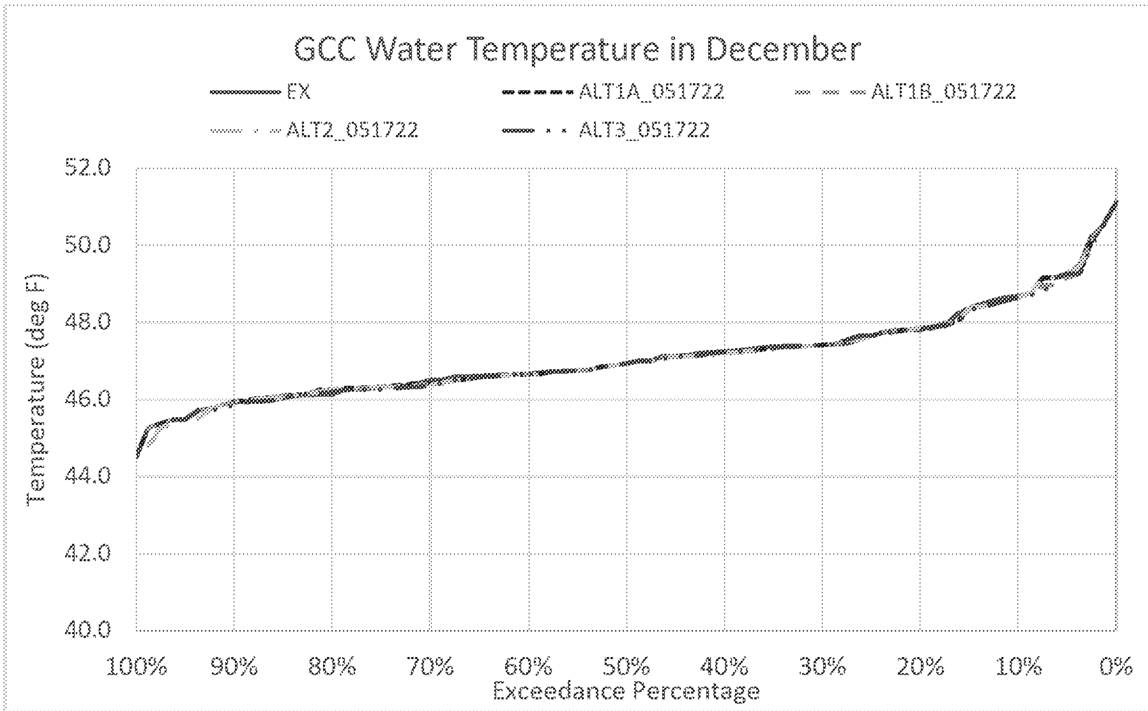

Changes to TCC Water Temprature in September
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
5.00
0.00
-5.00
-10.00
-15.00
-20.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

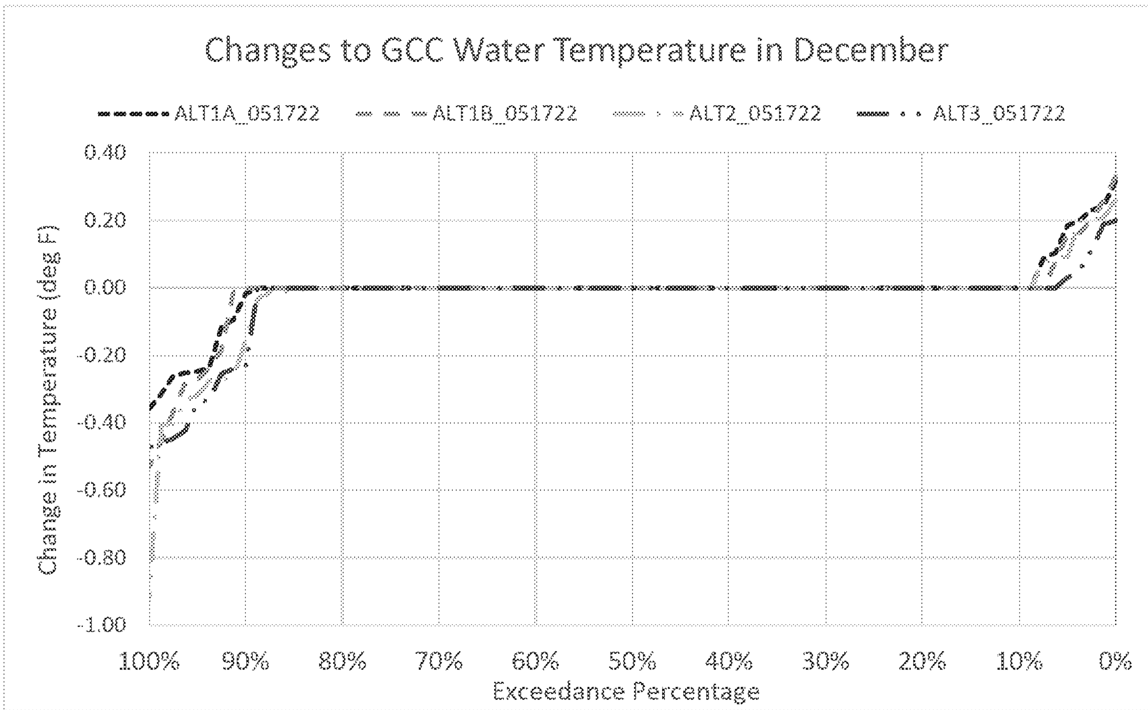

GCC Water Temperature in October
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
70.0
65.0
60.0
55.0
50.0
45.0
40.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

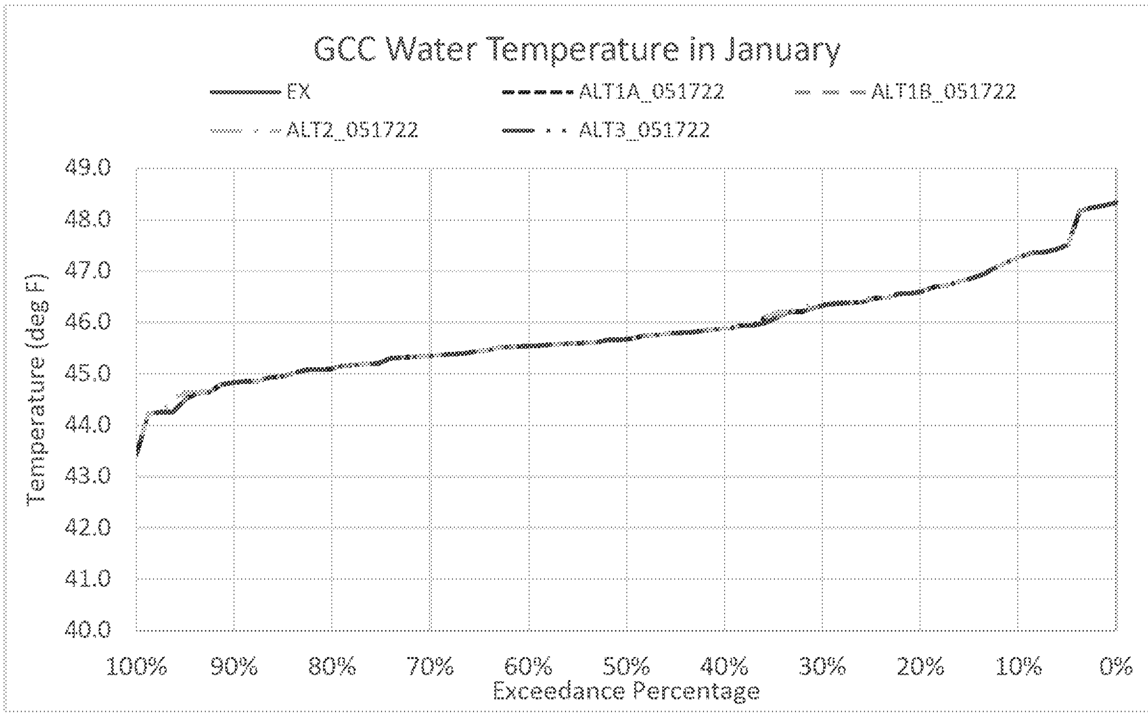

Changes to GCC Water Temperature in October
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
3.00
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

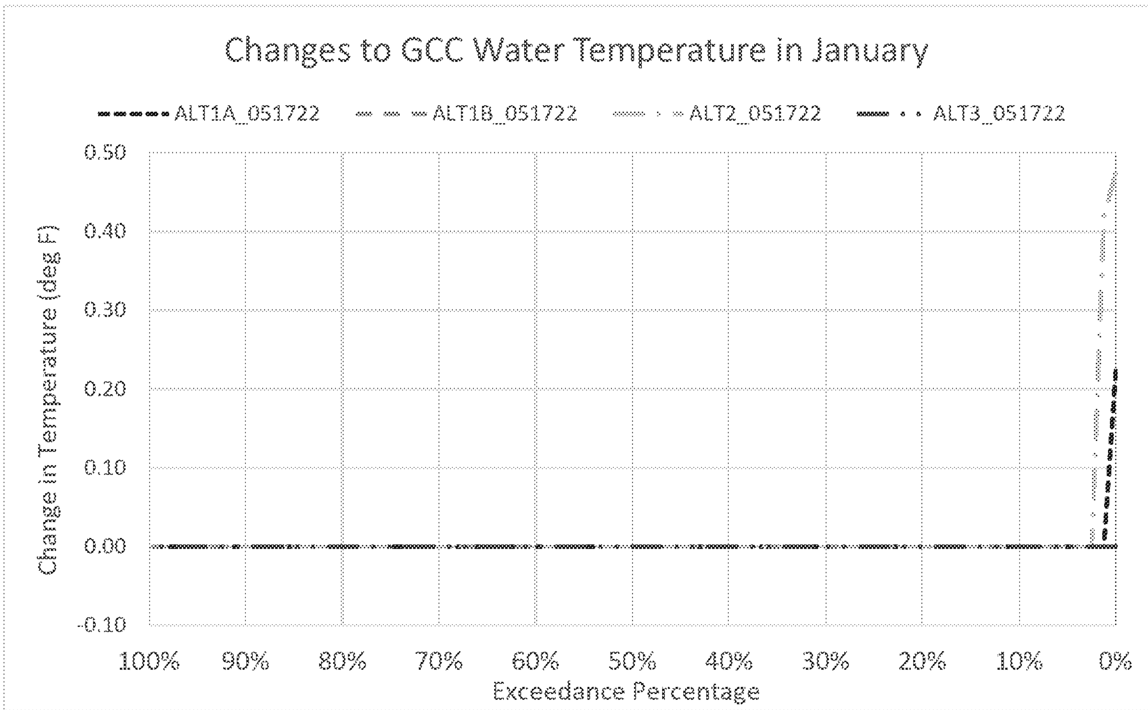

GCC Water Temperature in November
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
56.0
54.0
52.0
50.0
48.0
46.0
44.0
42.0
40.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

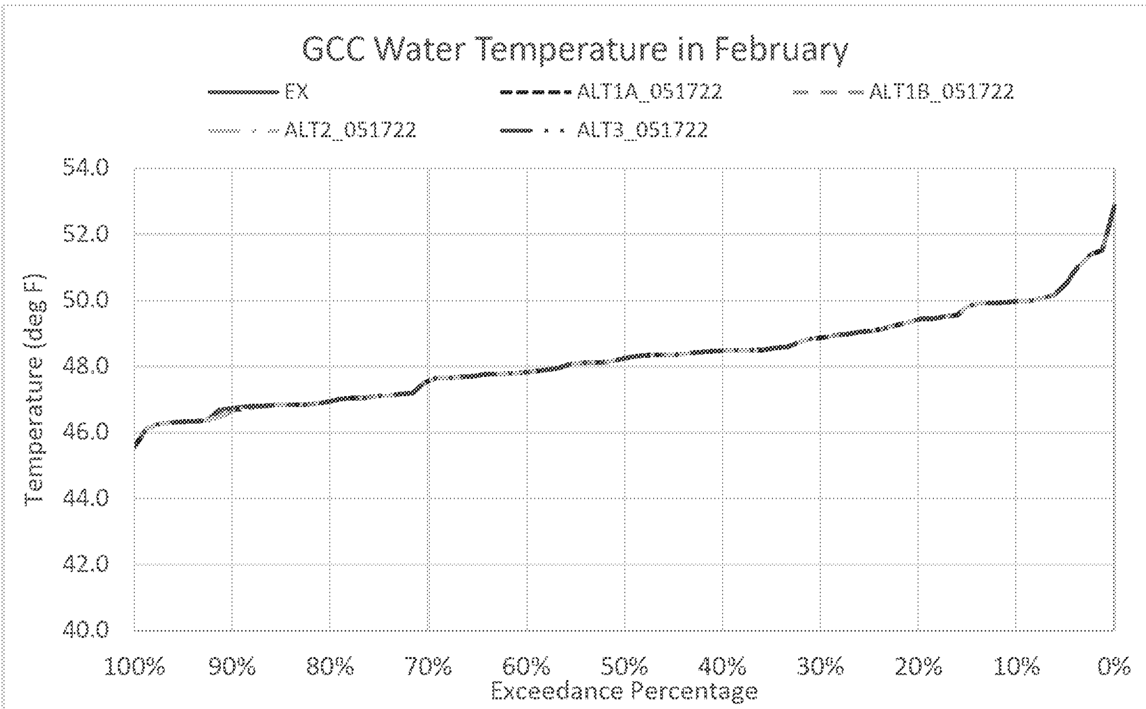

Changes to GCC Water Temperature in November
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
-3.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

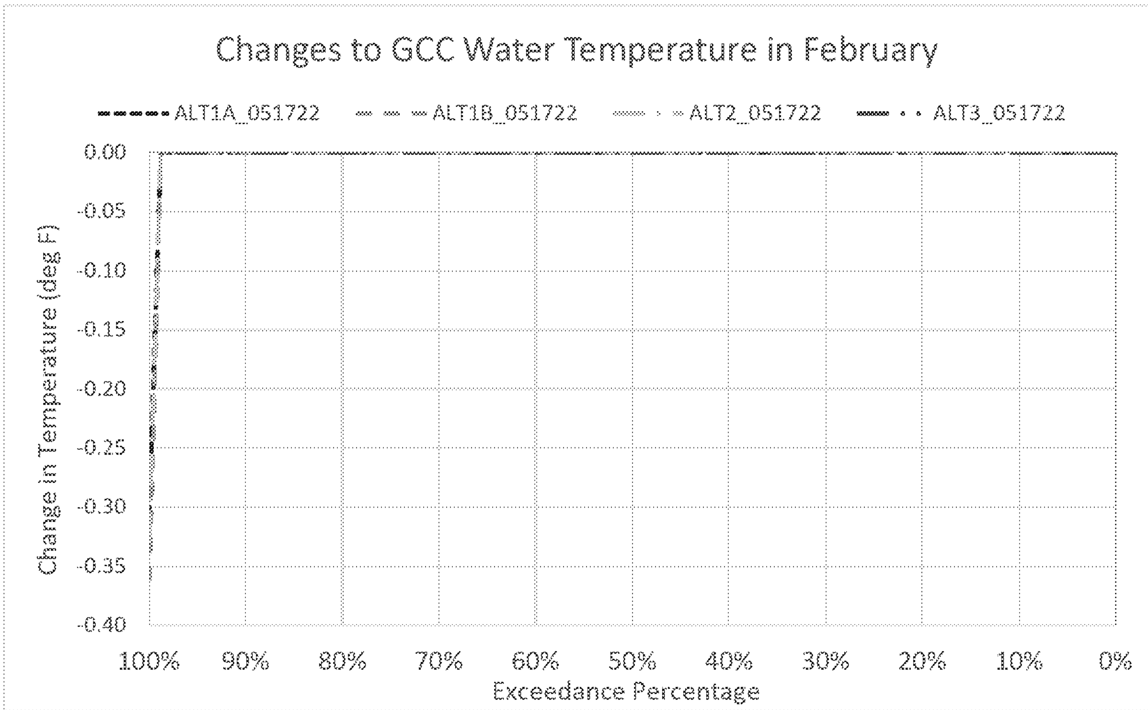

GCC Water Temperature in December
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
52.0
50.0
48.0
46.0
44.0
42.0
40.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

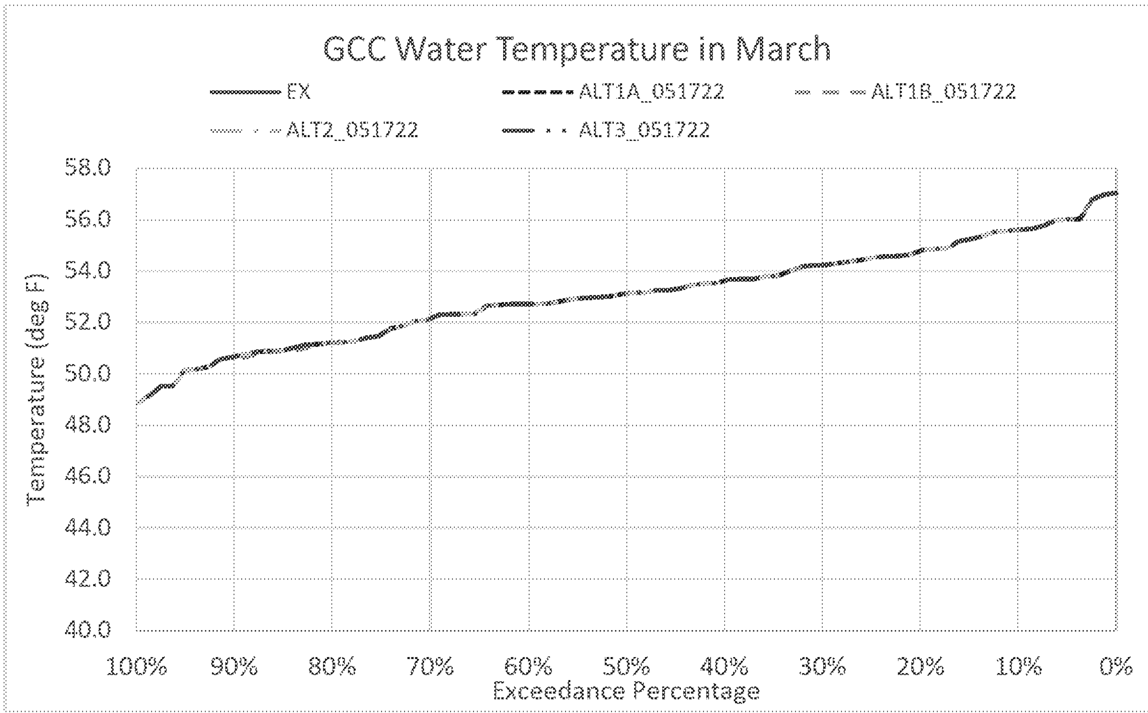

Changes to GCC Water Temperature in December
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

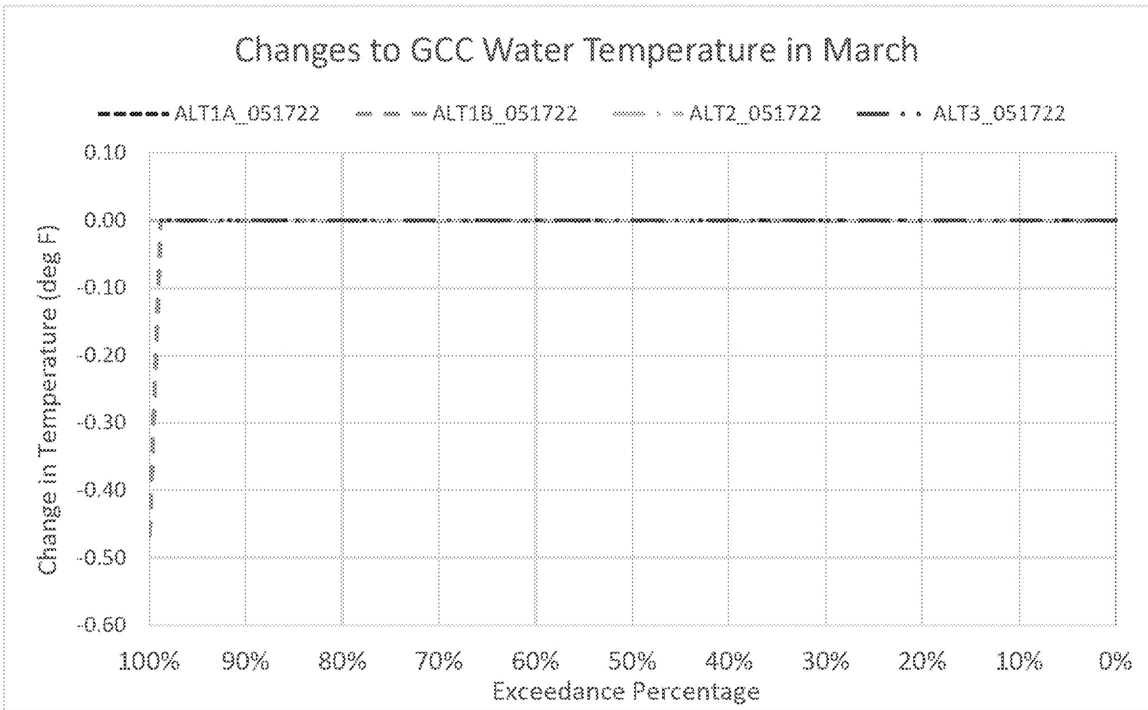

GCC Water Temperature in January
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
49.0
48.0
47.0
46.0
45.0
44.0
43.0
42.0
41.0
40.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

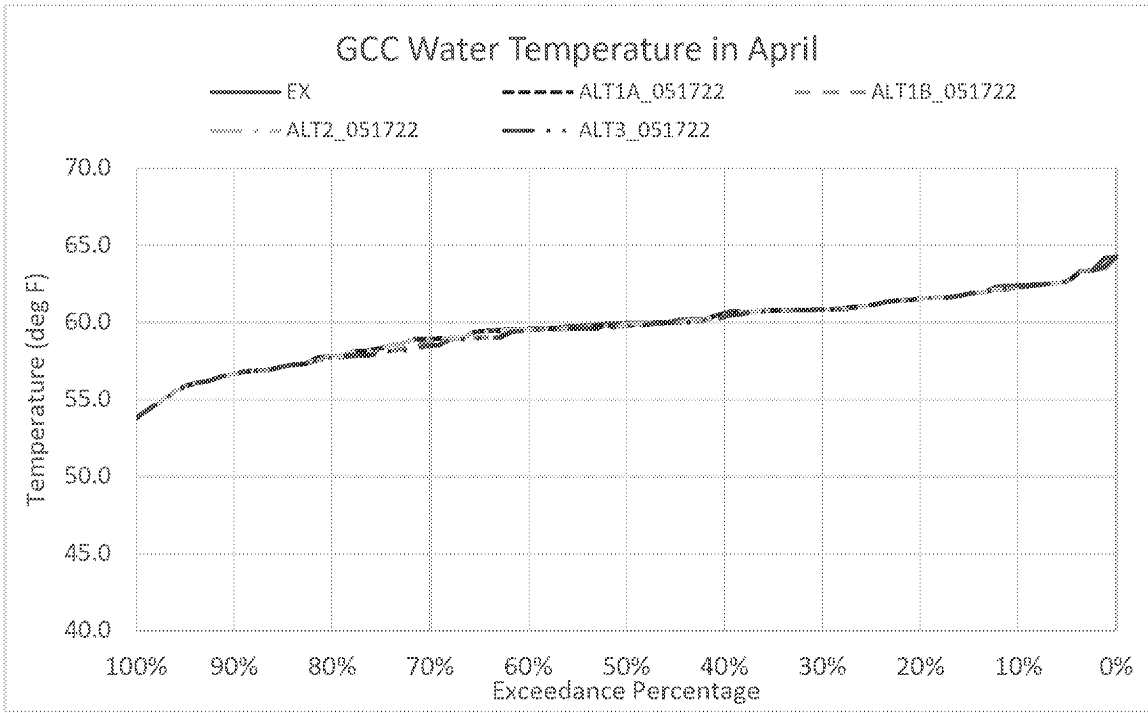

Changes to GCC Water Temperature in January
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

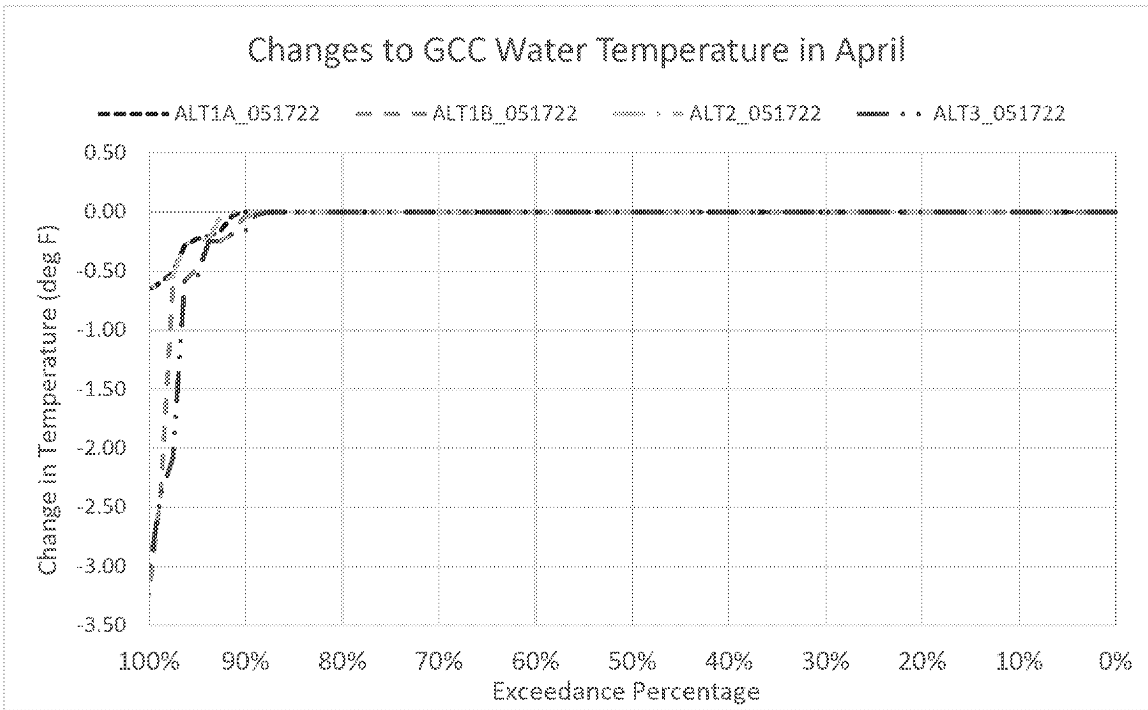

GCC Water Temperature in February
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
54.0
52.0
50.0
48.0
46.0
44.0
42.0
40.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

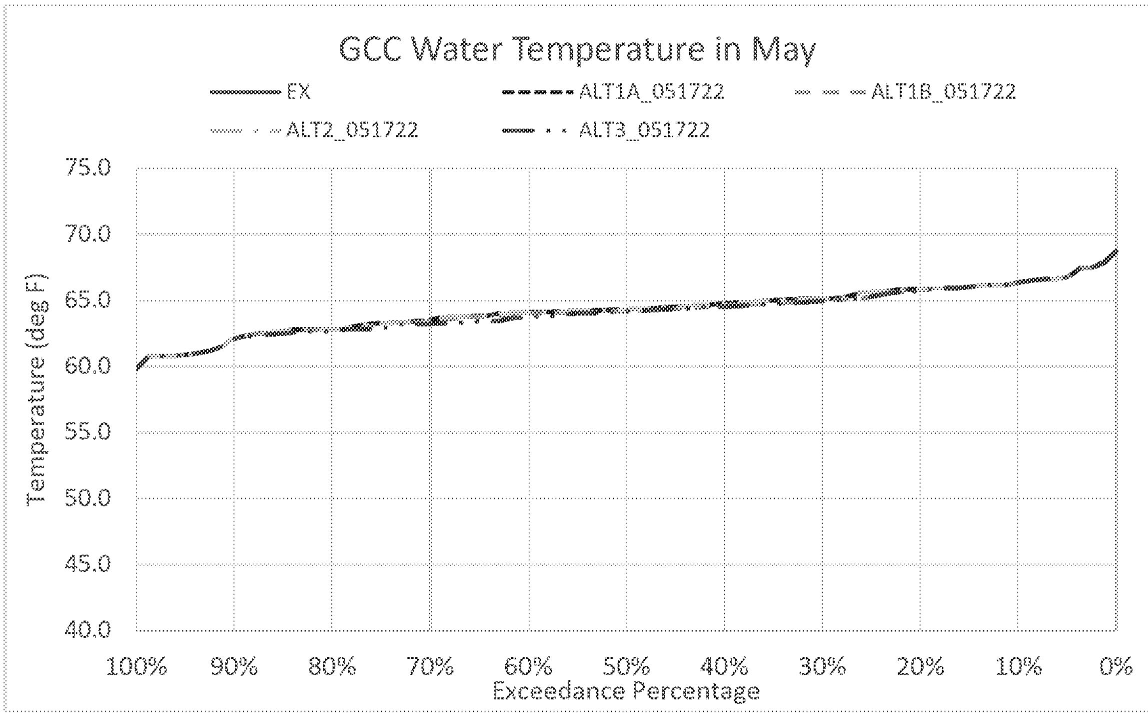

Changes to GCC Water Temperature in February
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
0.00
-0.05
-0.10
-0.15
-0.20
-0.25
-0.30
-0.35
-0.40
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

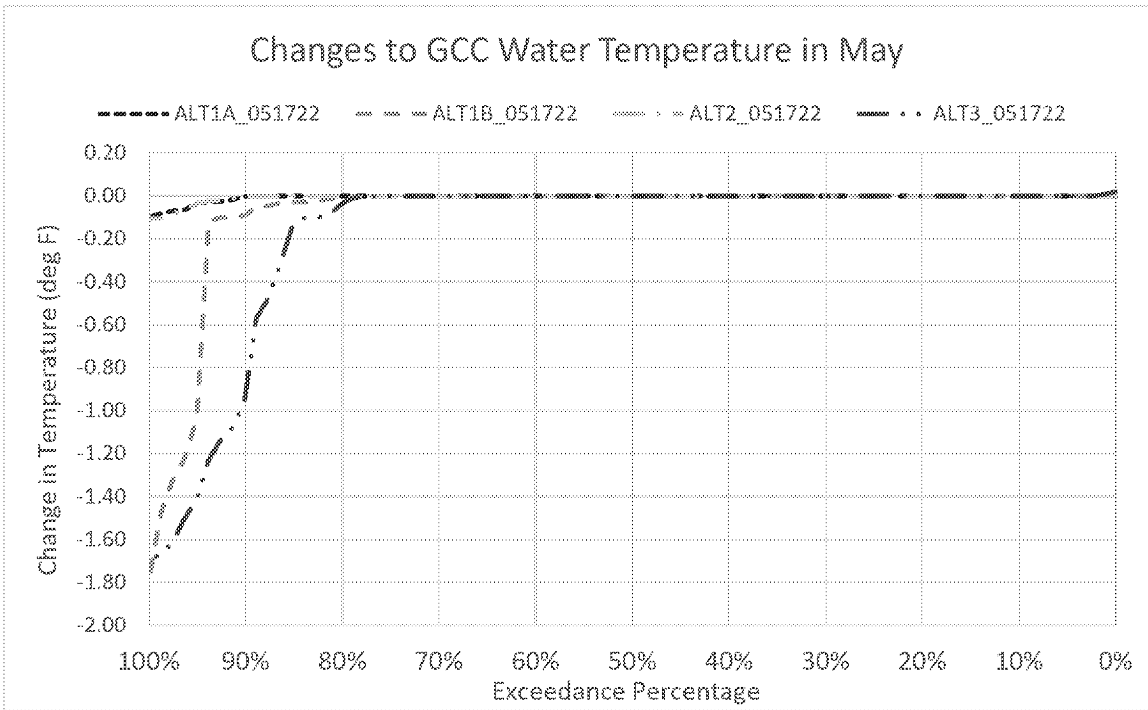

GCC Water Temperature in March
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
58.0
56.0
54.0
52.0
50.0
48.0
46.0
44.0
42.0
40.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

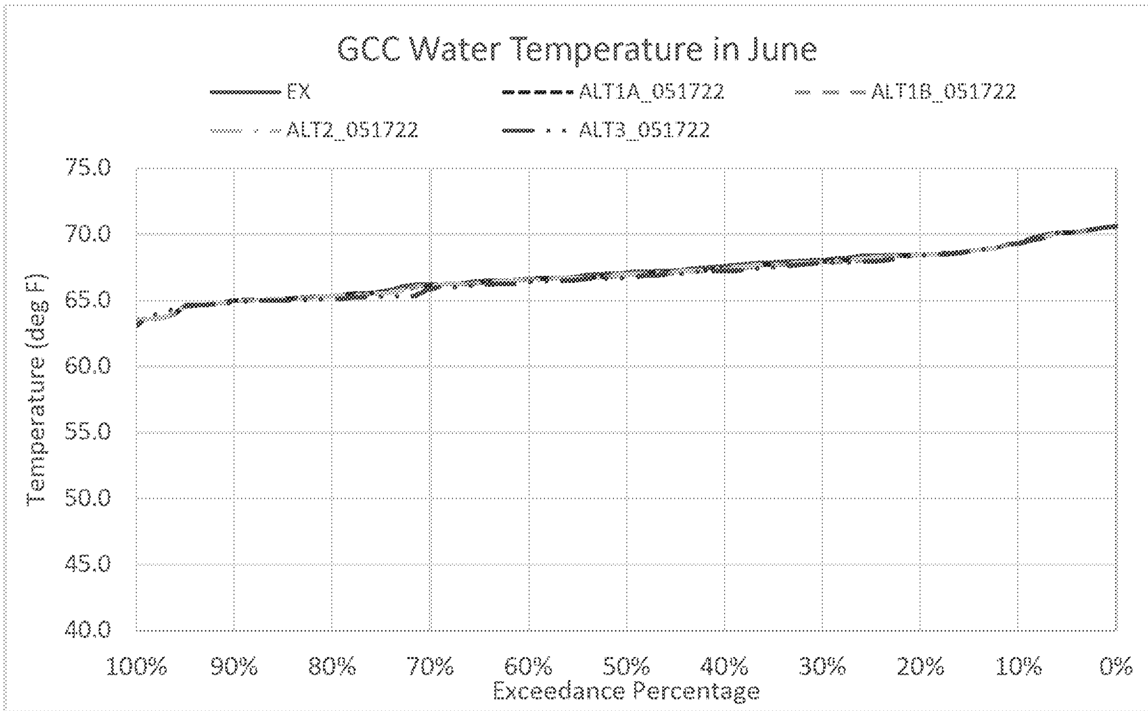

Changes to GCC Water Temperature in March
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-0.50
-0.60
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

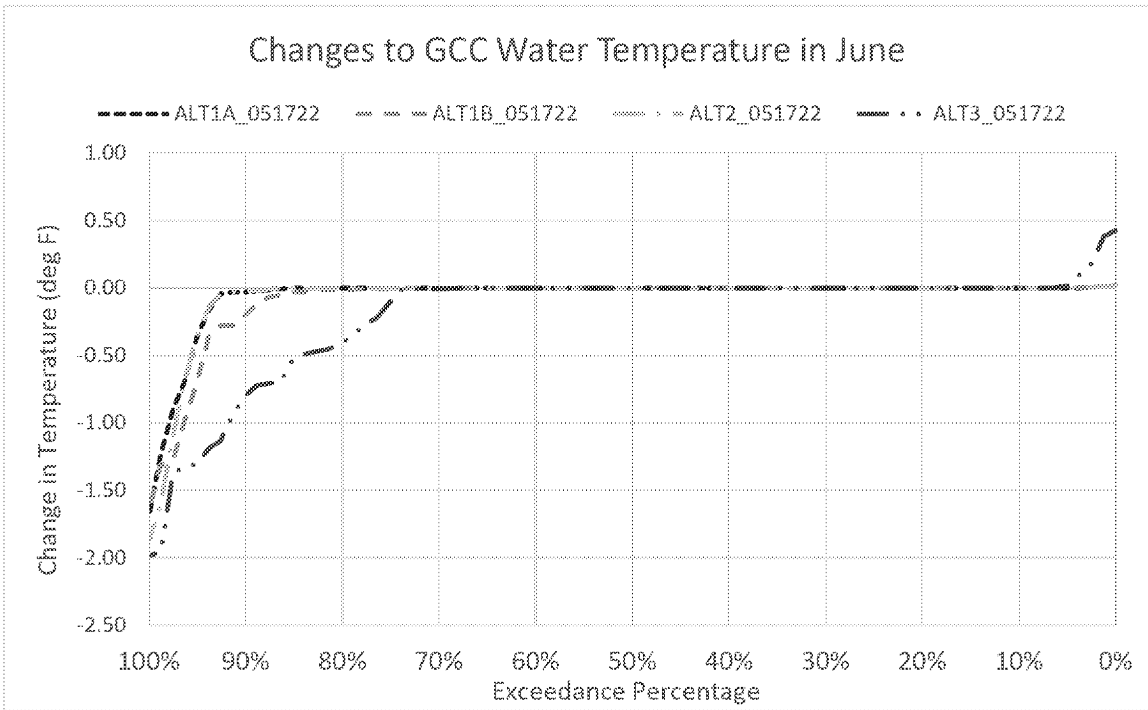

GCC Water Temperature in April
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
70.0
65.0
60.0
55.0
50.0
45.0
40.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

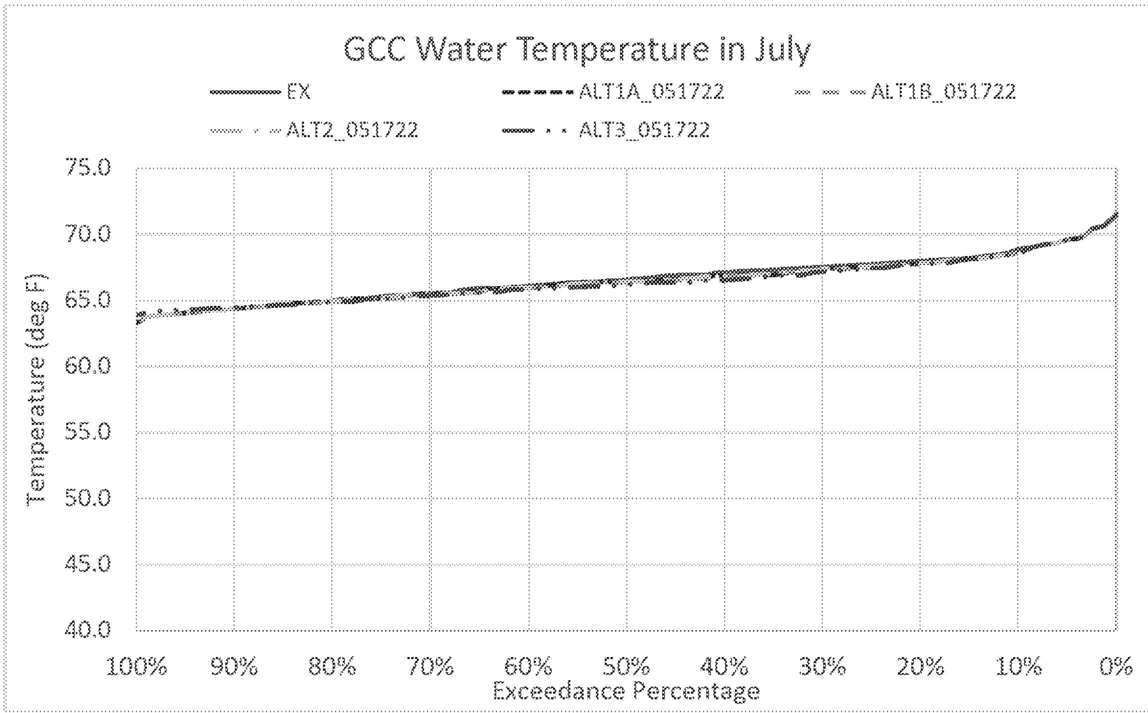

Changes to GCC Water Temperature in April
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
0.50
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
-3.00
-3.50
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

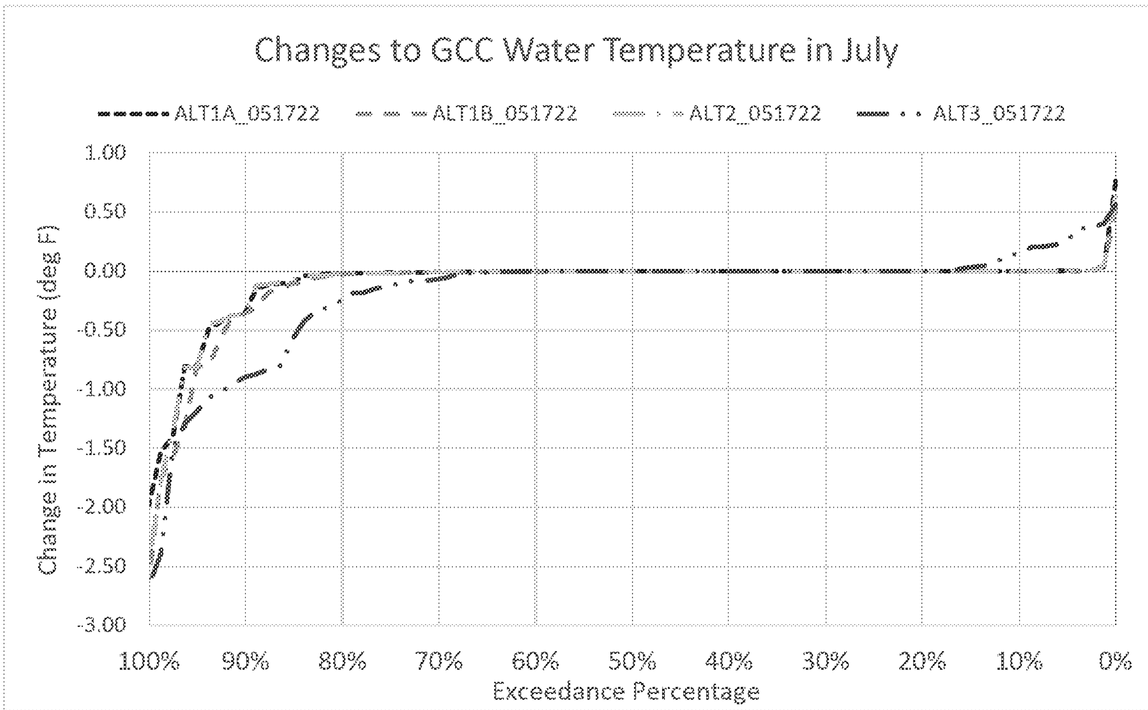

GCC Water Temperature in May
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

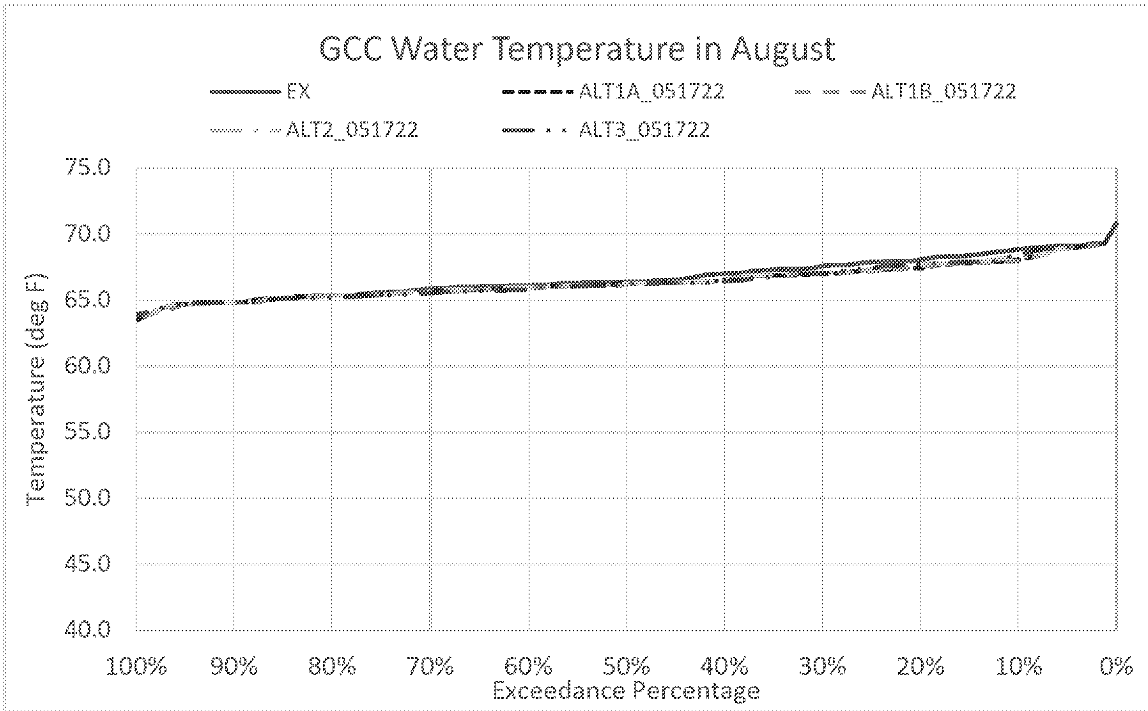

Changes to GCC Water Temperature in May
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
-1.20
-1.40
-1.60
-1.80
-2.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

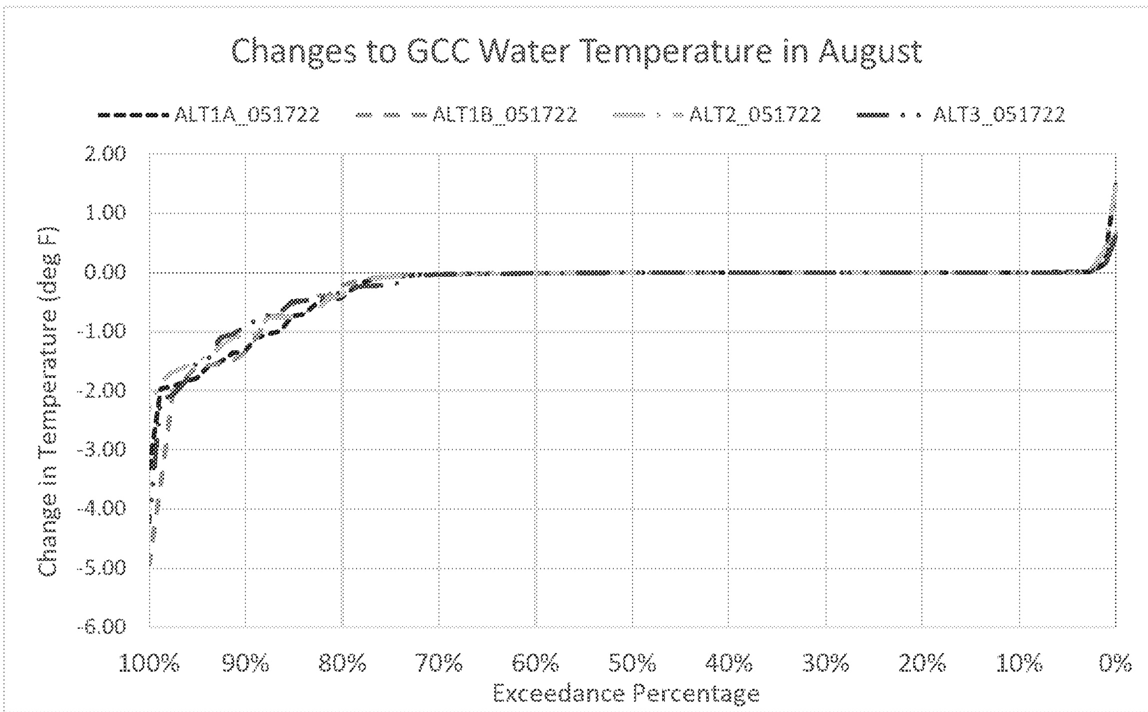

GCC Water Temperature in June
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

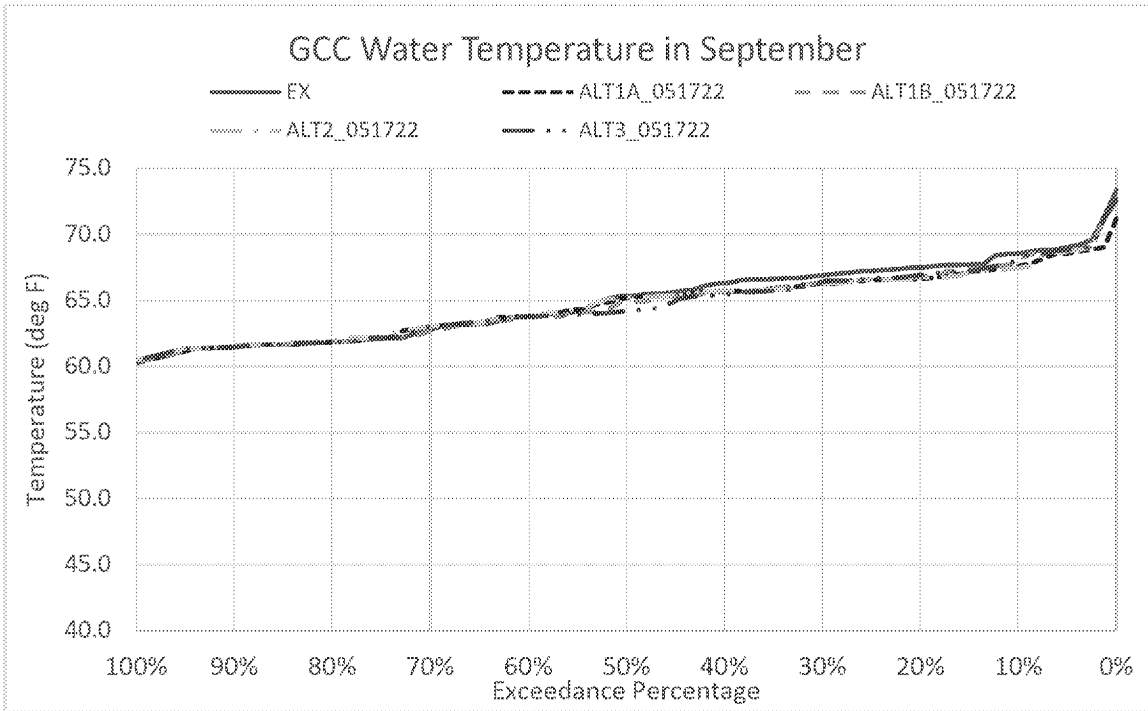

Changes to GCC Water Temperature in June
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

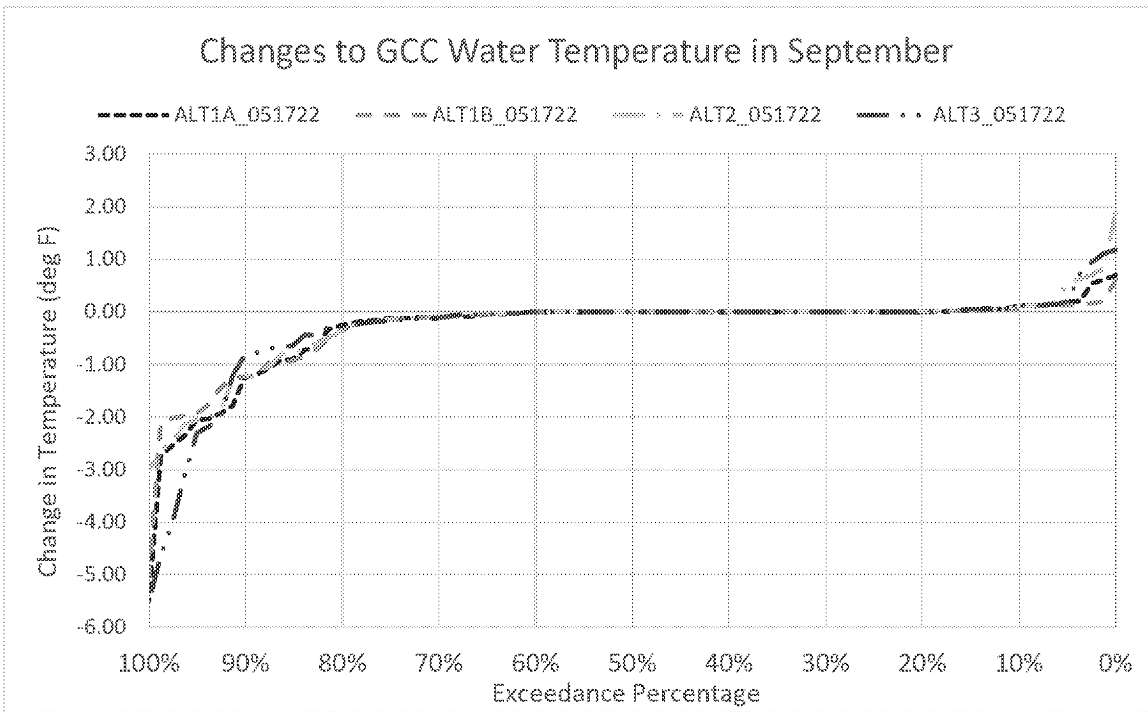

GCC Water Temperature in July
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

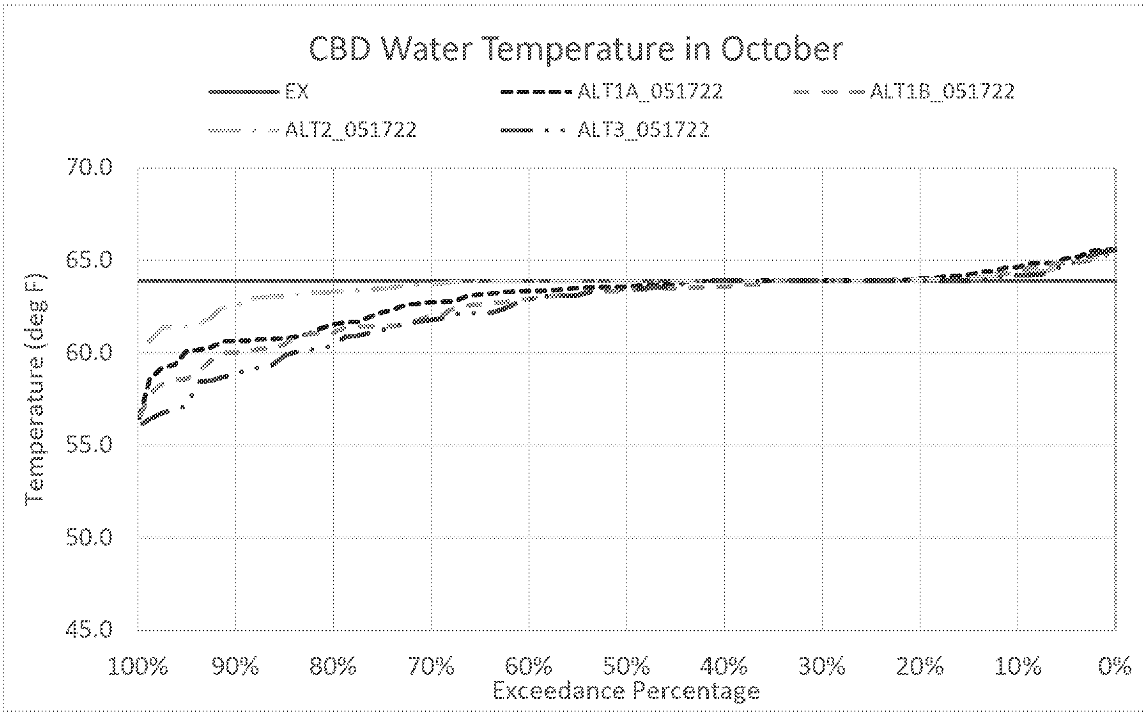

Changes to GCC Water Temperature in July
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
-3.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage


GCC Water Temperature in August
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

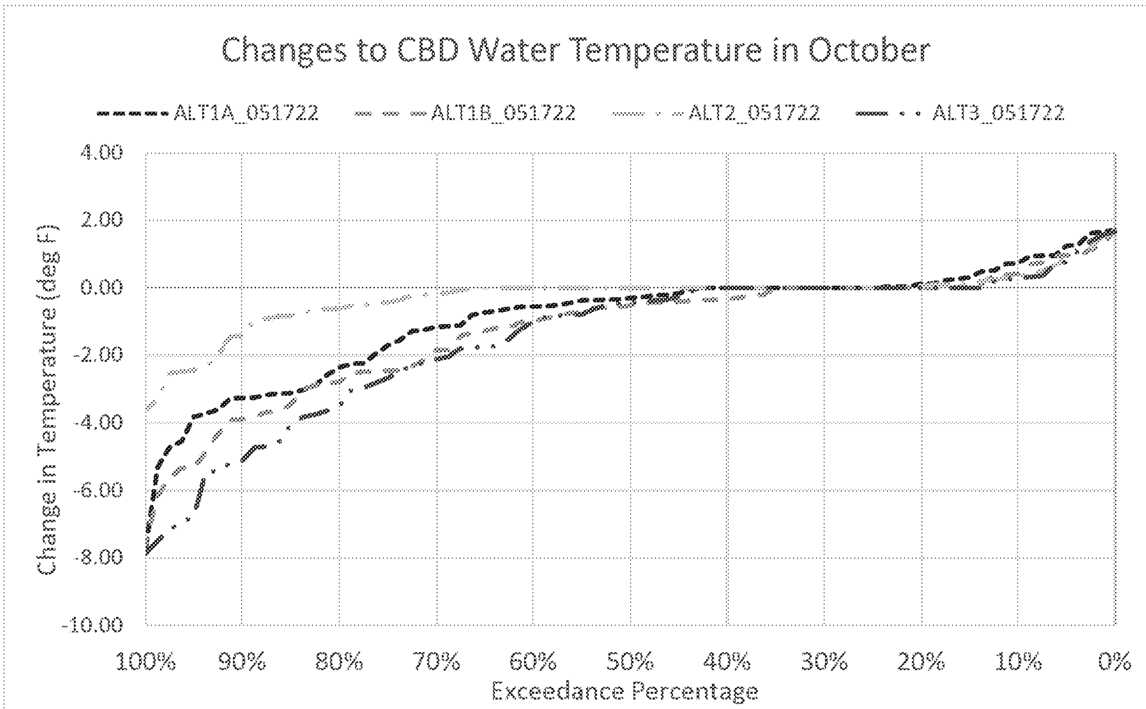

Changes to GCC Water Temperature in August
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage


GCC Water Temperature in September
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

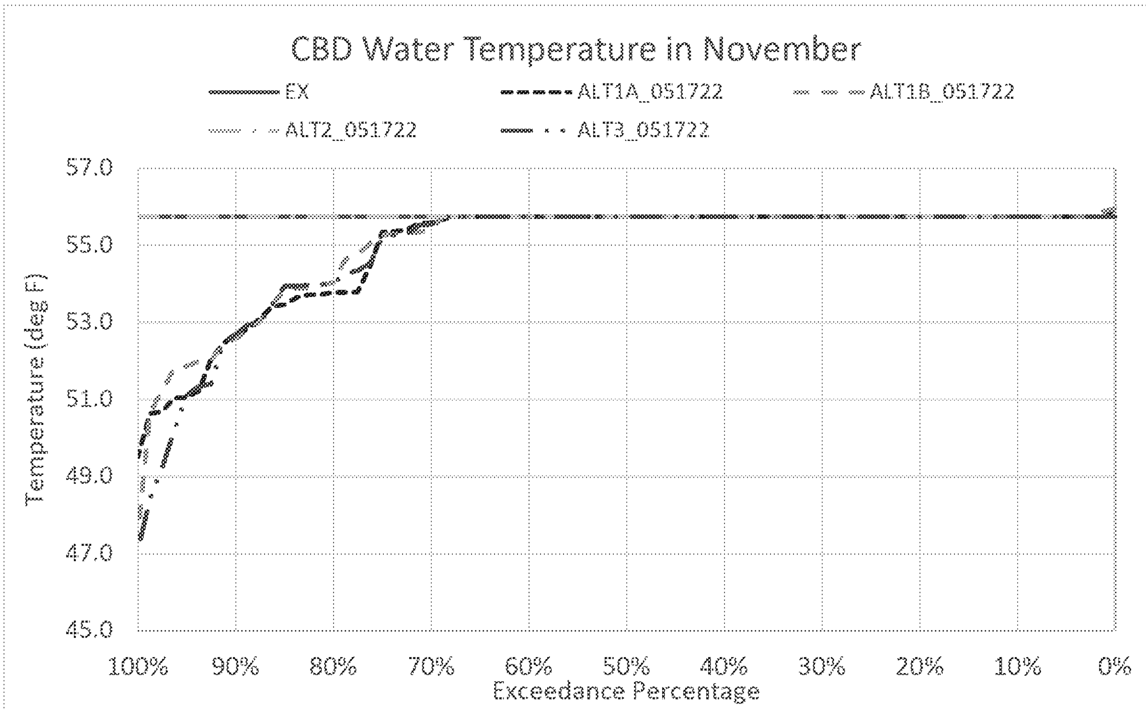

Changes to GCC Water Temperature in September
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

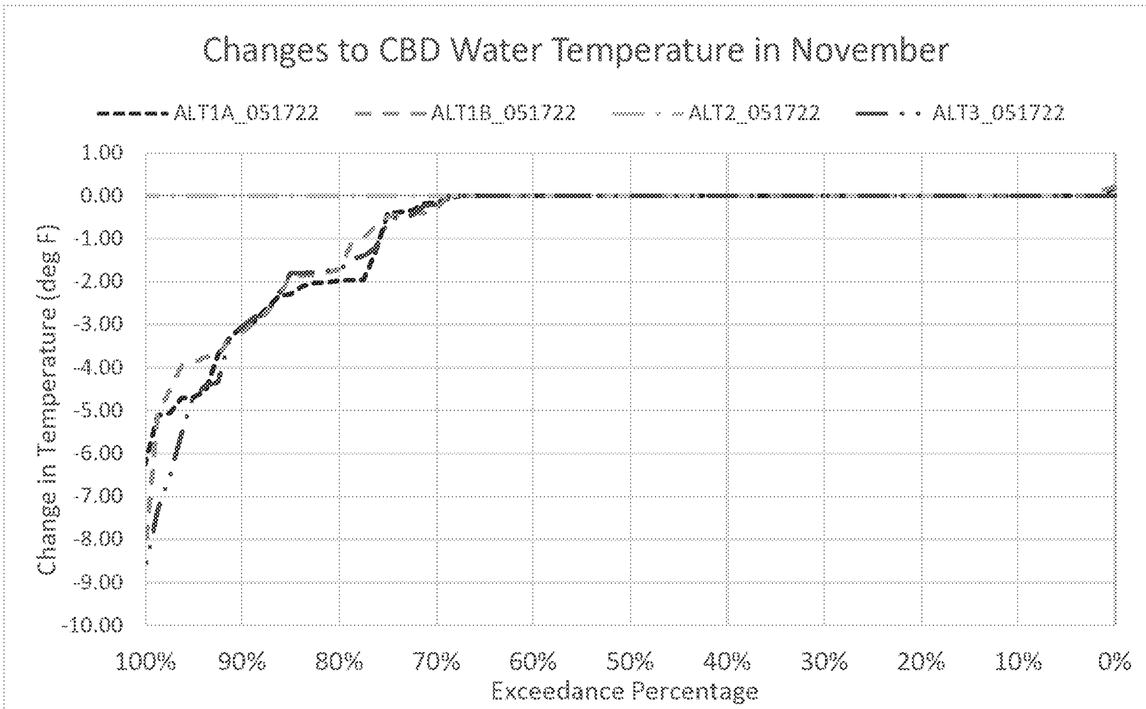


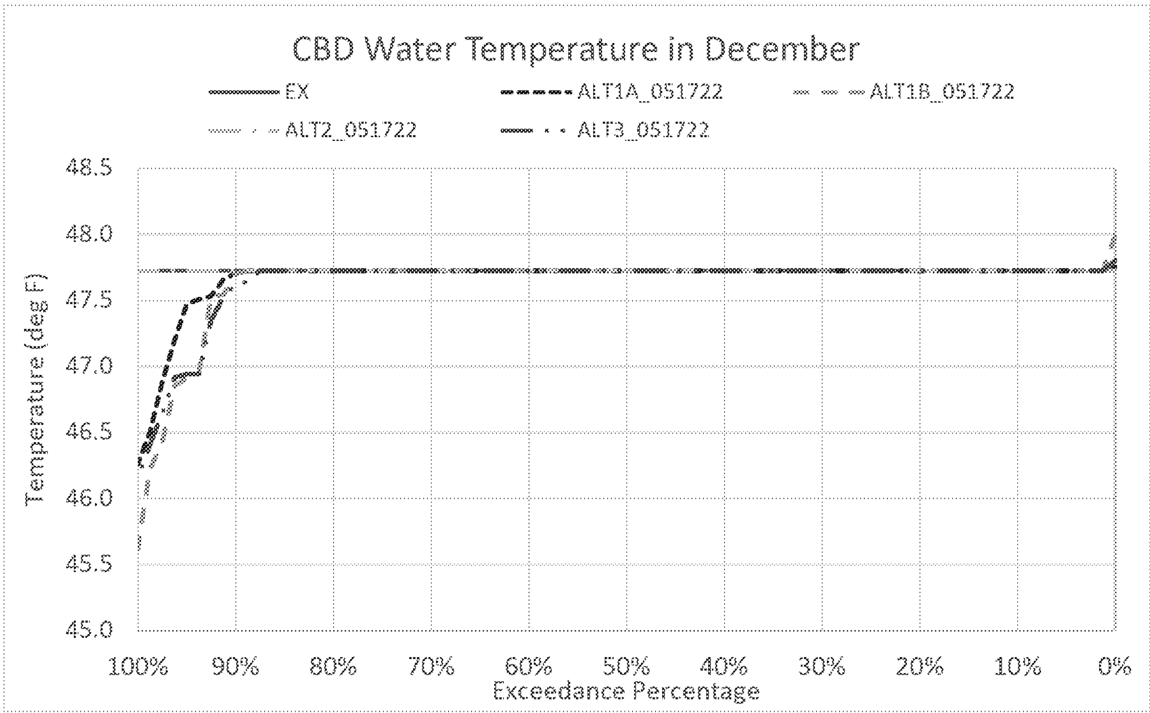
CBD Water Temperature in October
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
70.0
65.0
60.0
55.0
50.0
45.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

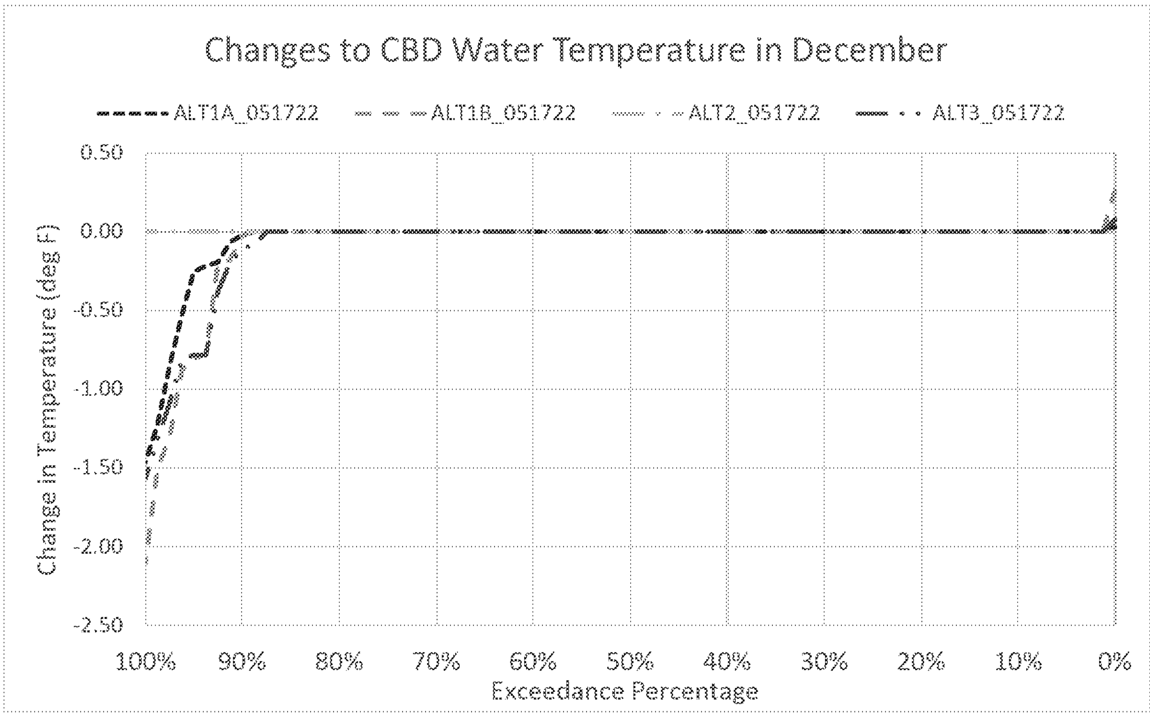


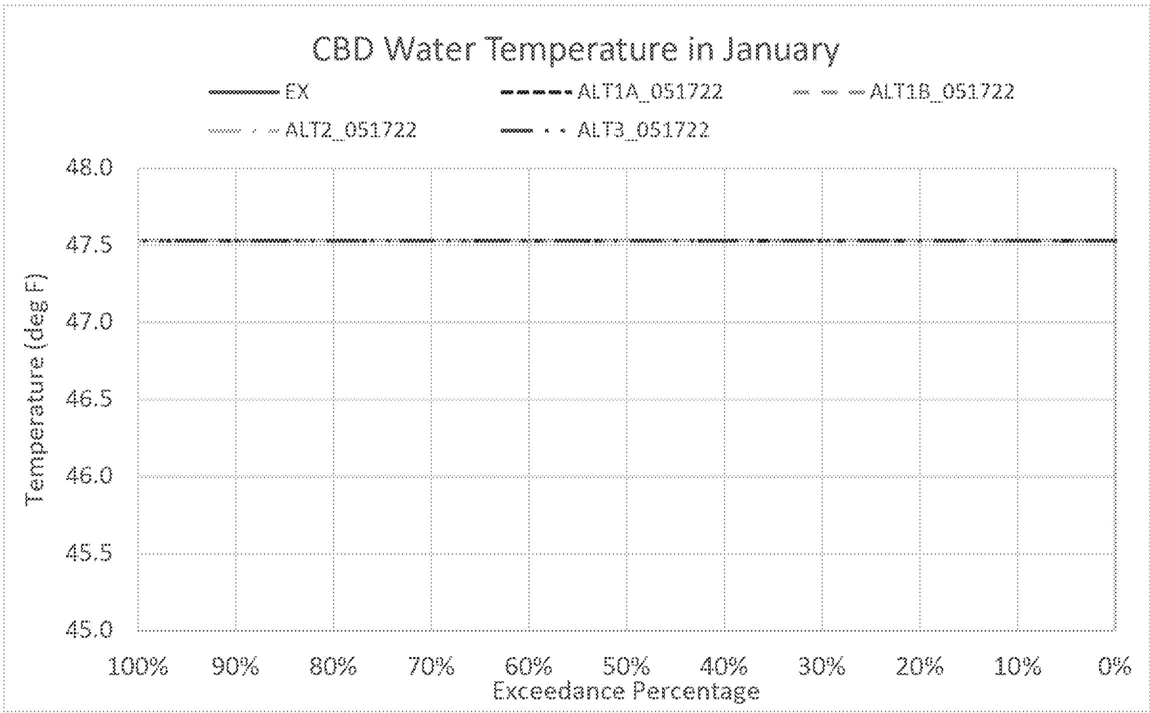
Changes to CBD Water Temperature in October
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

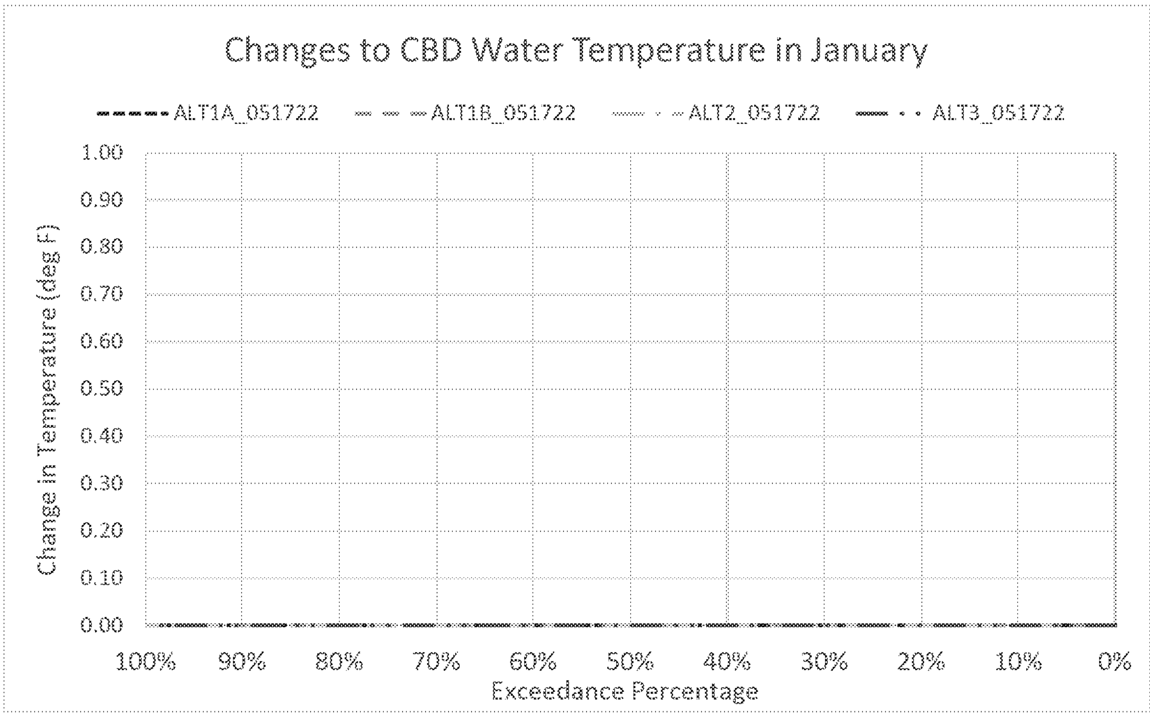

CBD Water Temperature in November
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
57.0
55.0
53.0
51.0
49.0
47.0
45.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

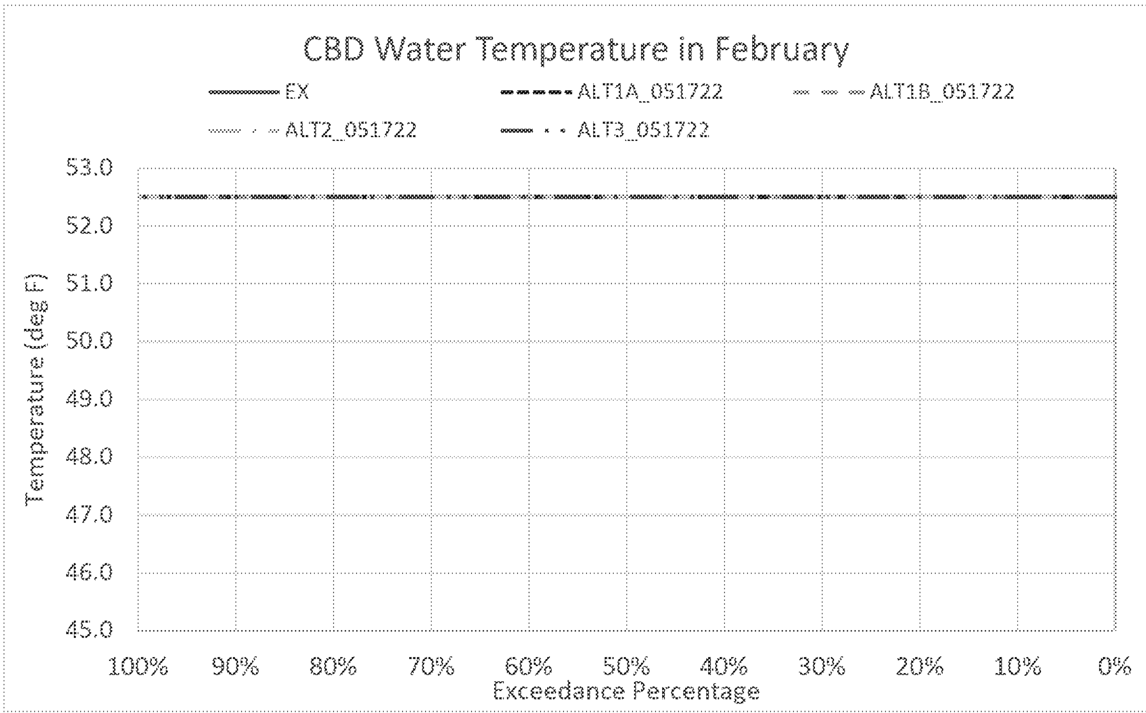

Changes to CBD Water Temperature in November
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
-7.00
-8.00
-9.00
-10.00
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

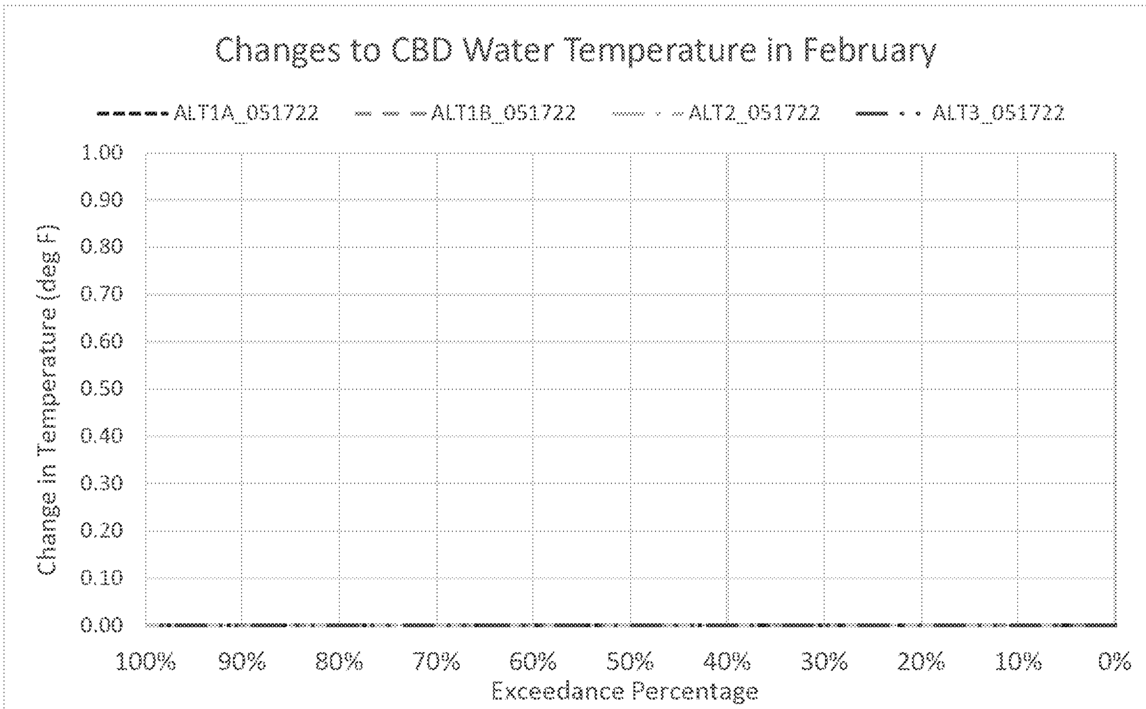

CBD Water Temperature in December
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
48.5
48.0
47.5
47.0
46.5
46.0
45.5
45.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

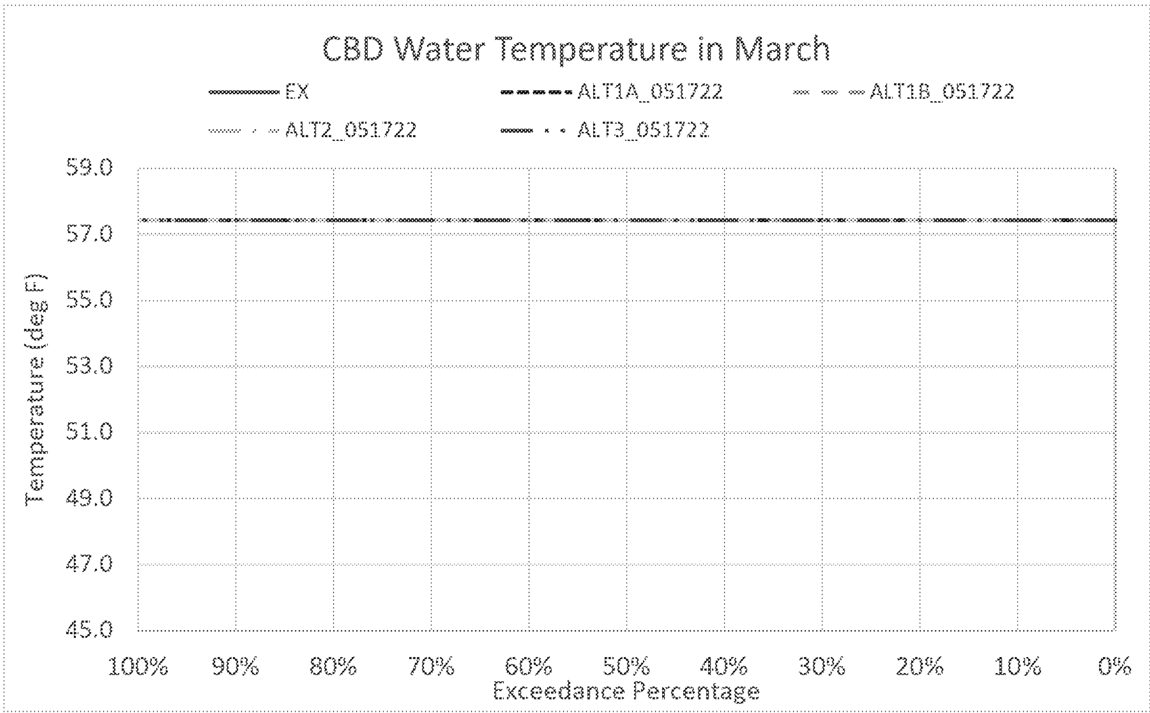

Changes to CBD Water Temperature in December
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
0.50
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

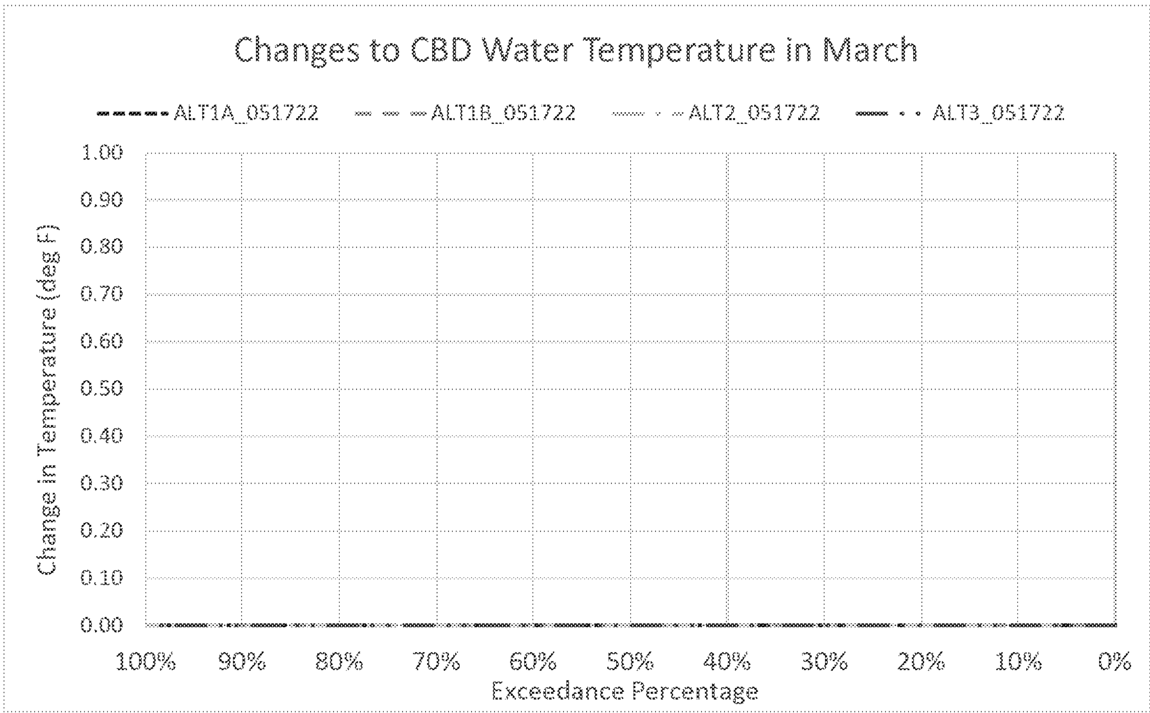

CBD Water Temperature in January
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
48.0
47.5
47.0
46.5
46.0
45.5
45.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

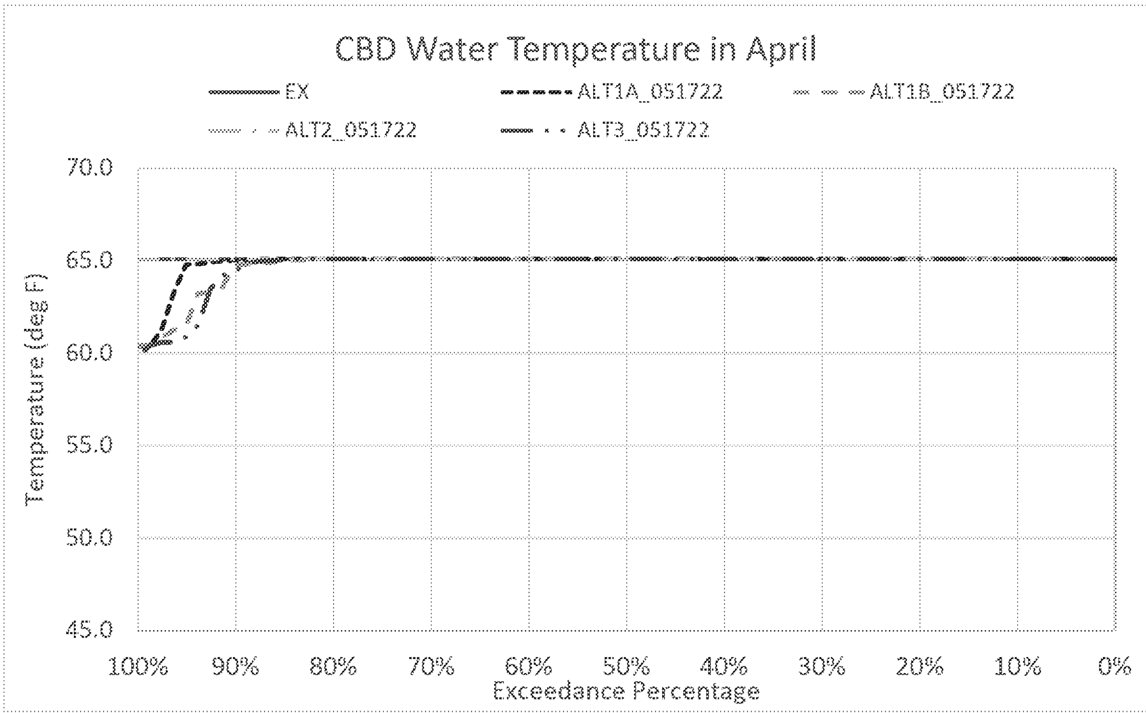

Changes to CBD Water Temperature in January
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

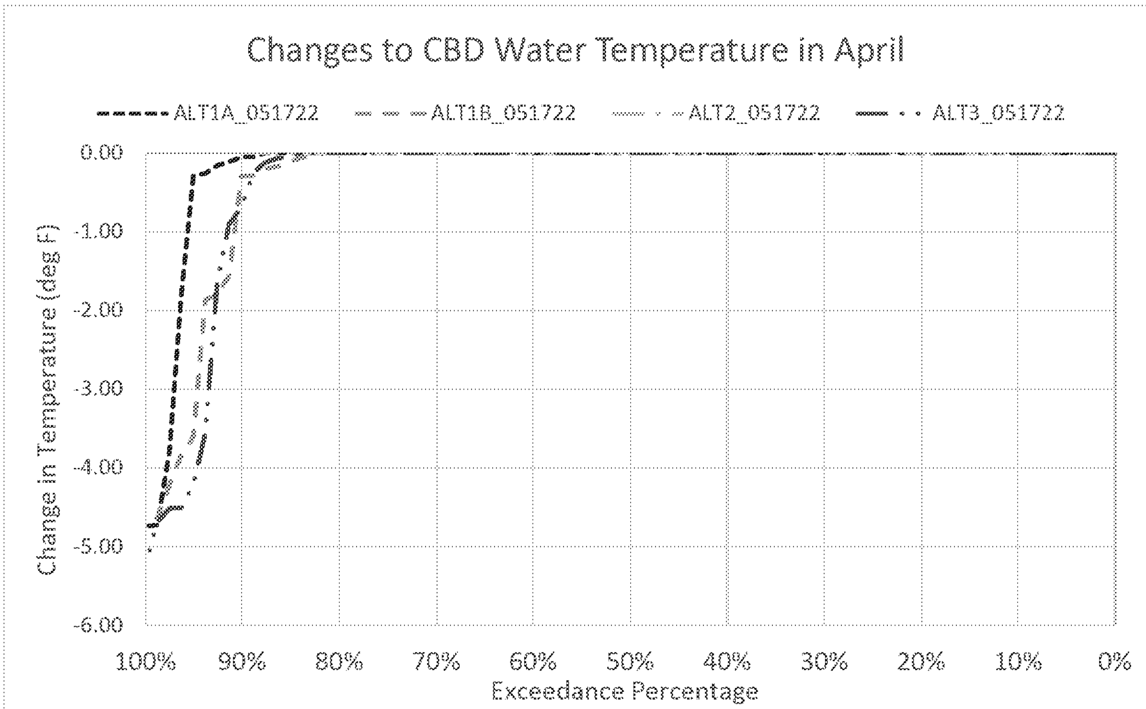

CBD Water Temperature in February
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
53.0
52.0
51.0
50.0
49.0
48.0
47.0
46.0
45.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

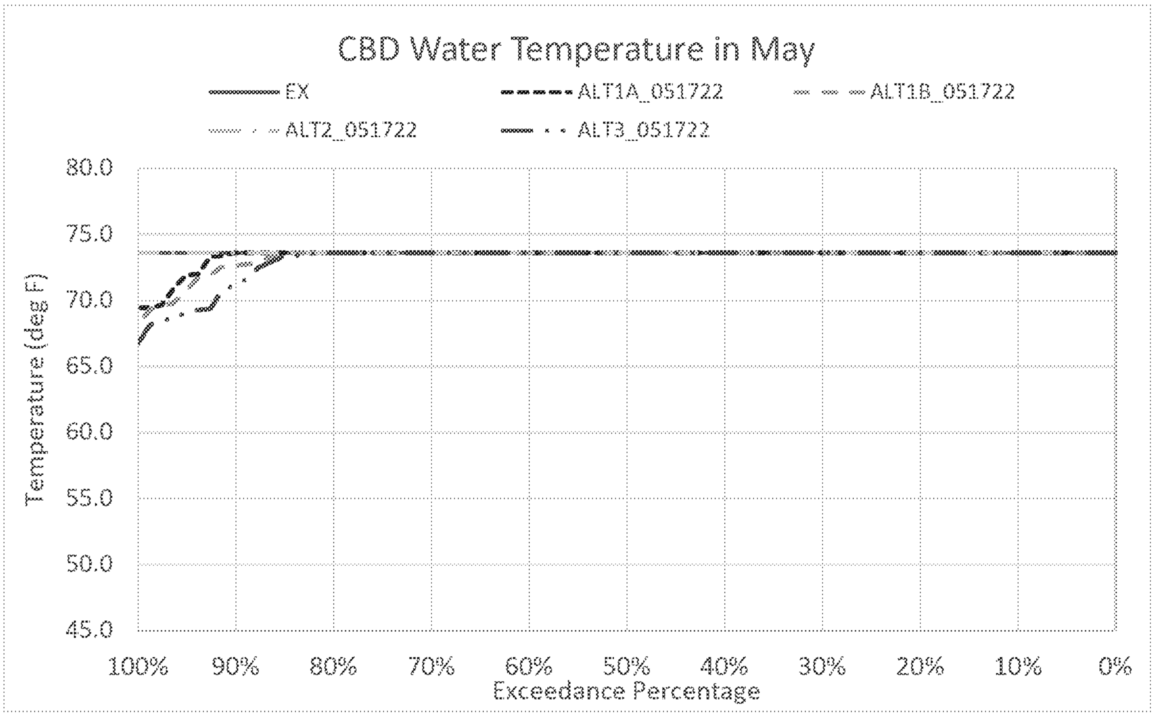

Changes to CBD Water Temperature in February
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

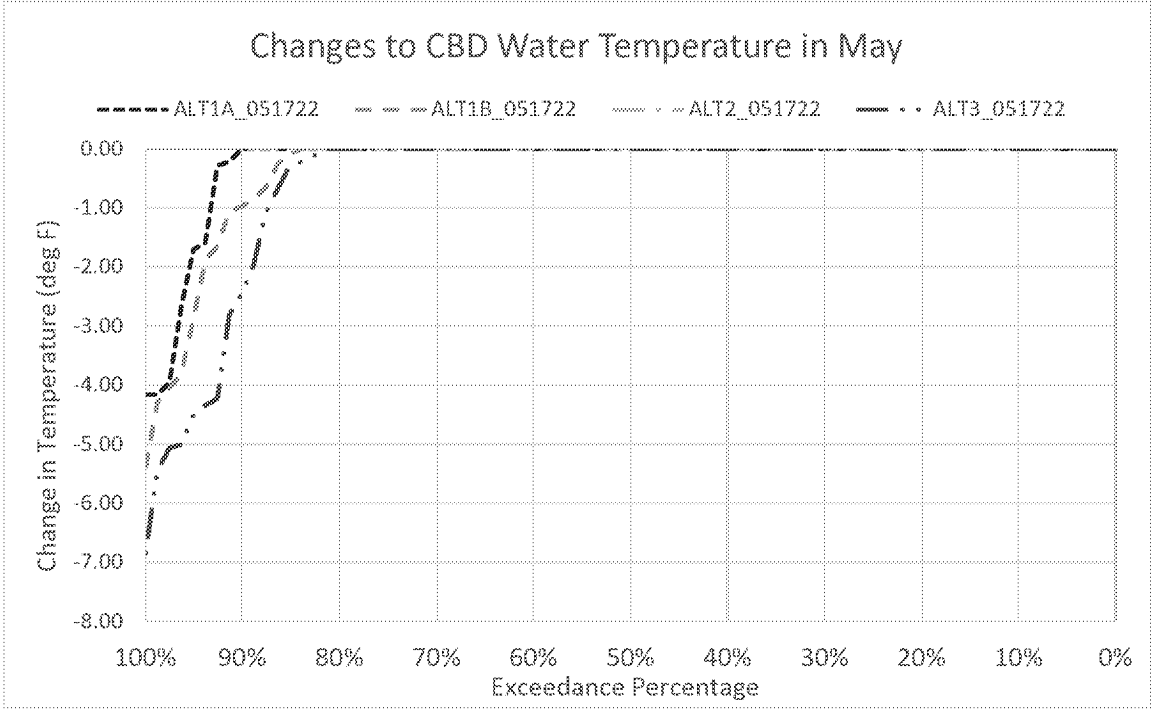

CBD Water Temperature in March
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
59.0
57.0
55.0
53.0
51.0
49.0
47.0
45.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

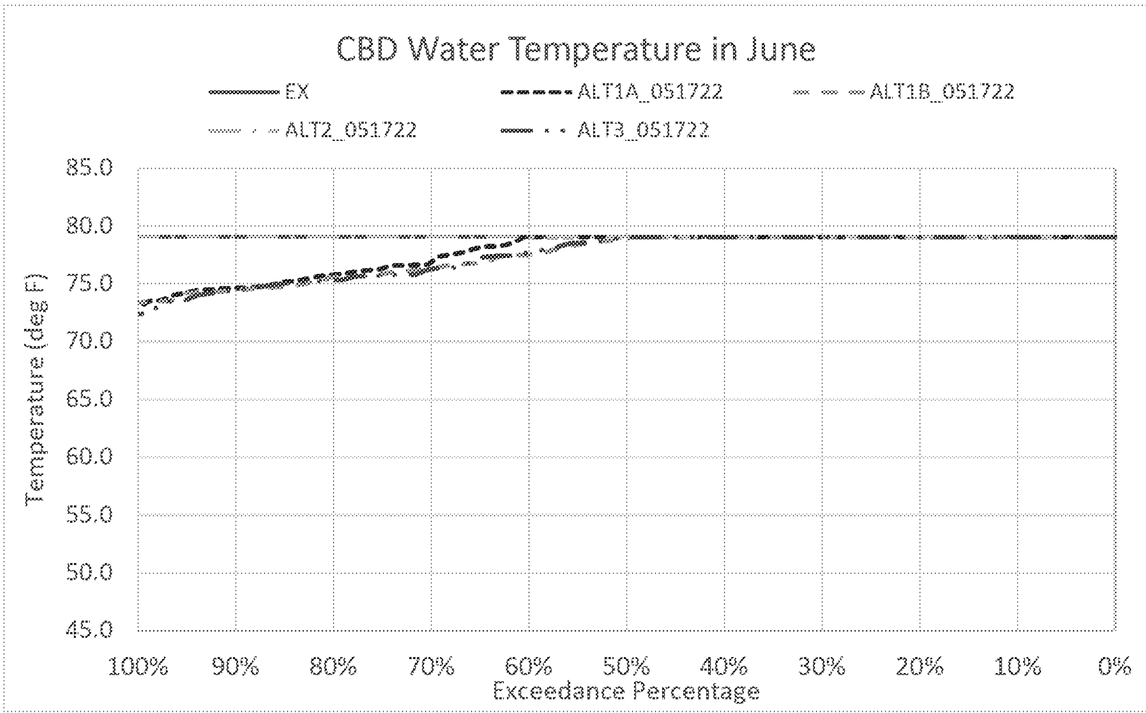

Changes to CBD Water Temperature in March
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

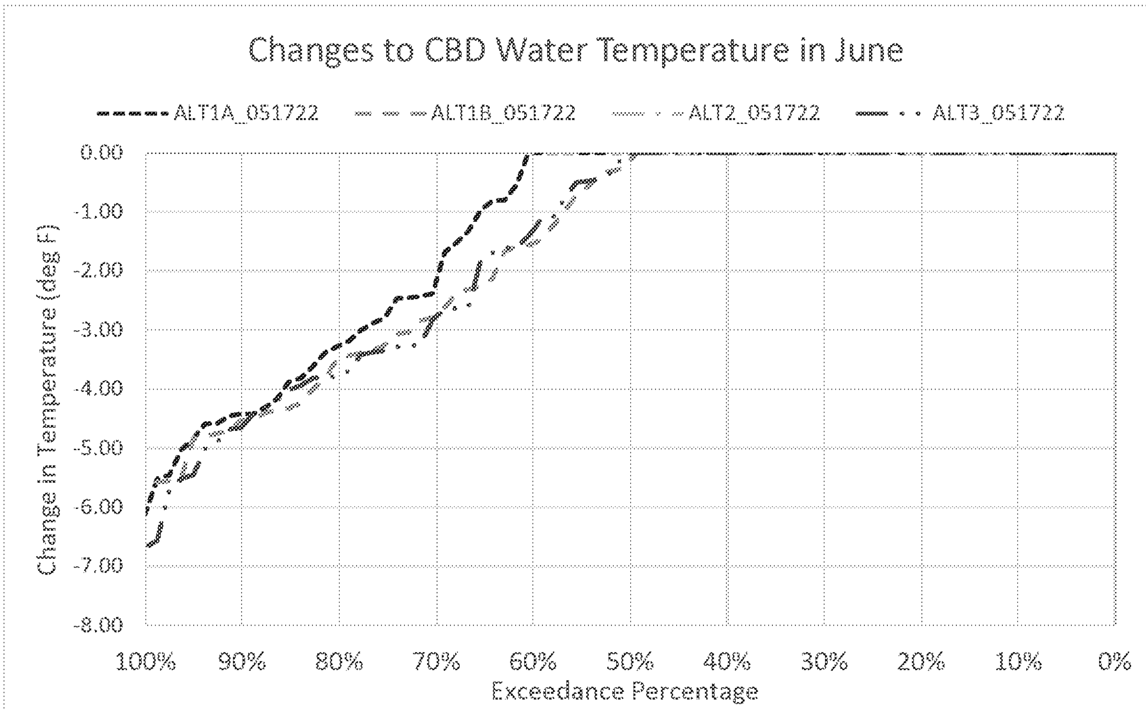

CBD Water Temperature in April
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
70.0
65.0
60.0
55.0
50.0
45.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

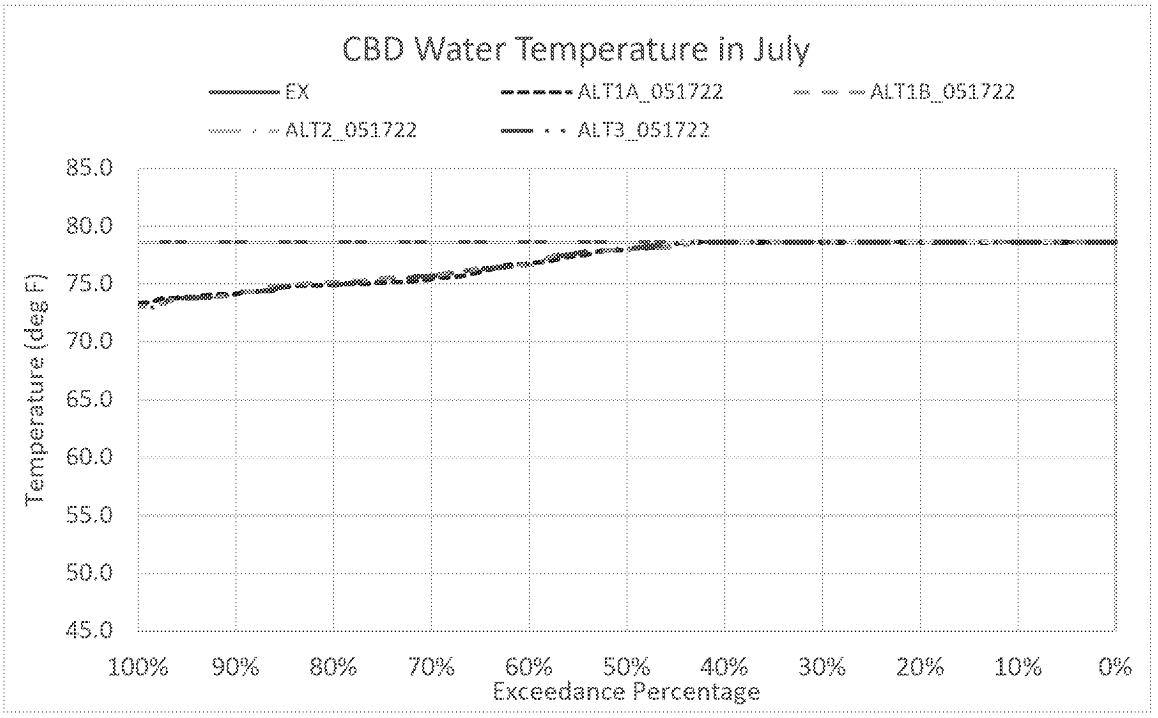

Changes to CBD Water Temperature in April
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

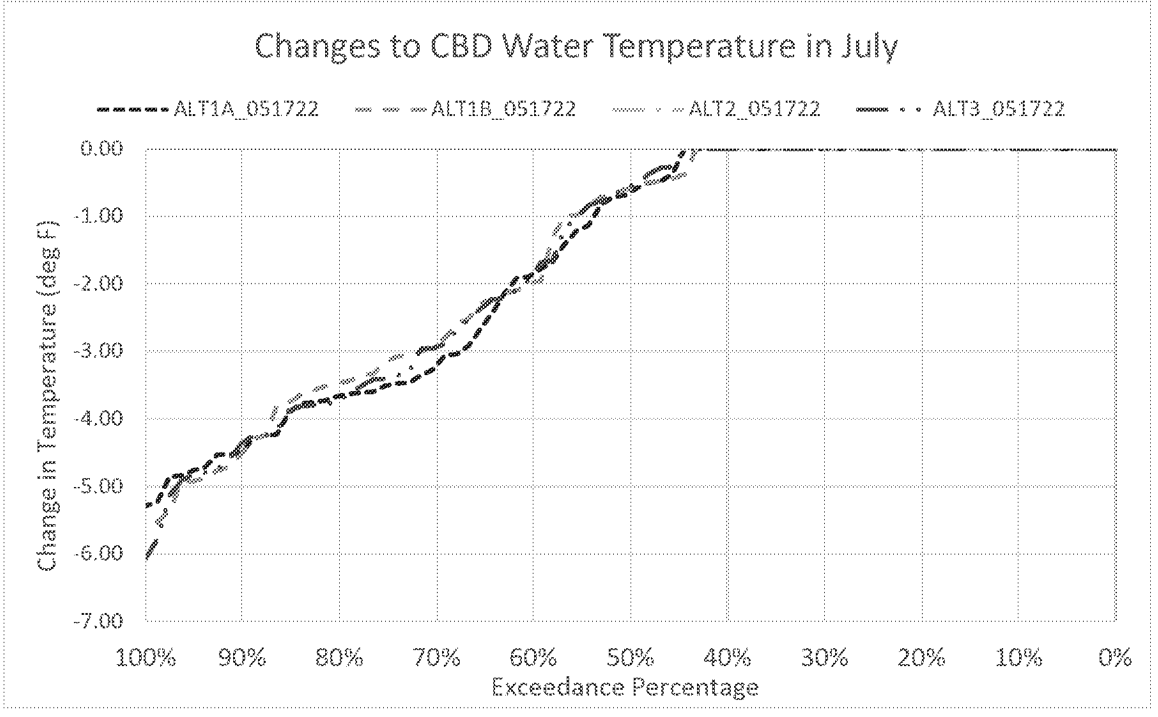

CBD Water Temperature in May
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

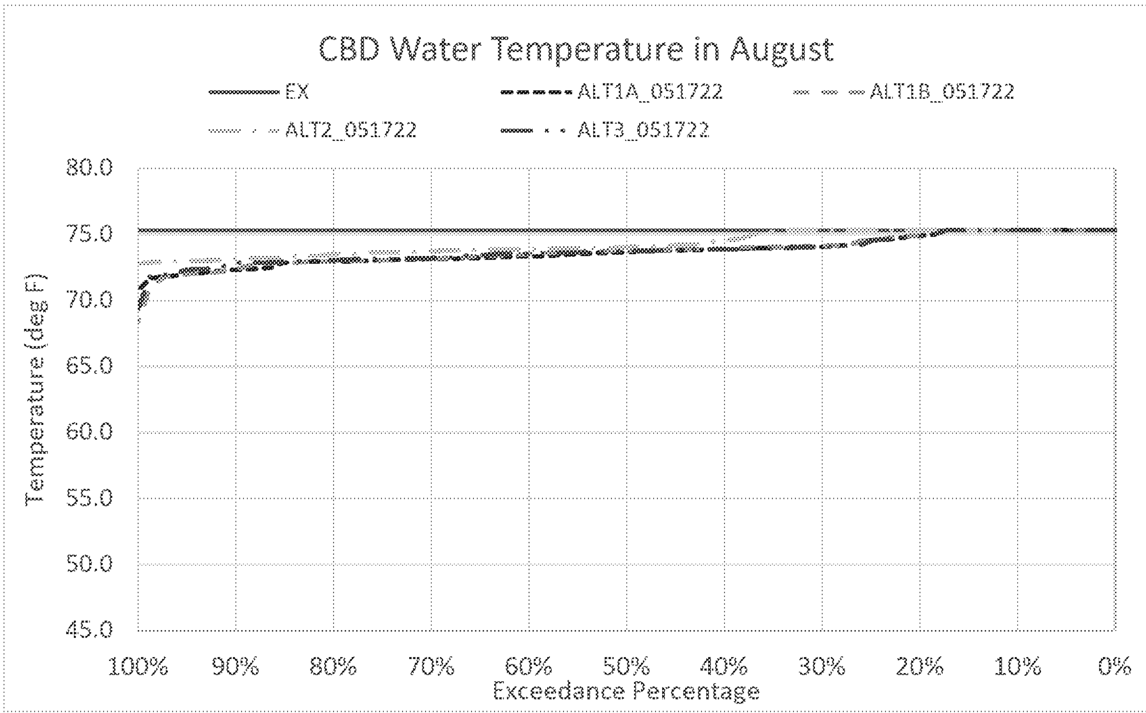

Changes to CBD Water Temperature in May
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
-7.00
-8.00
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

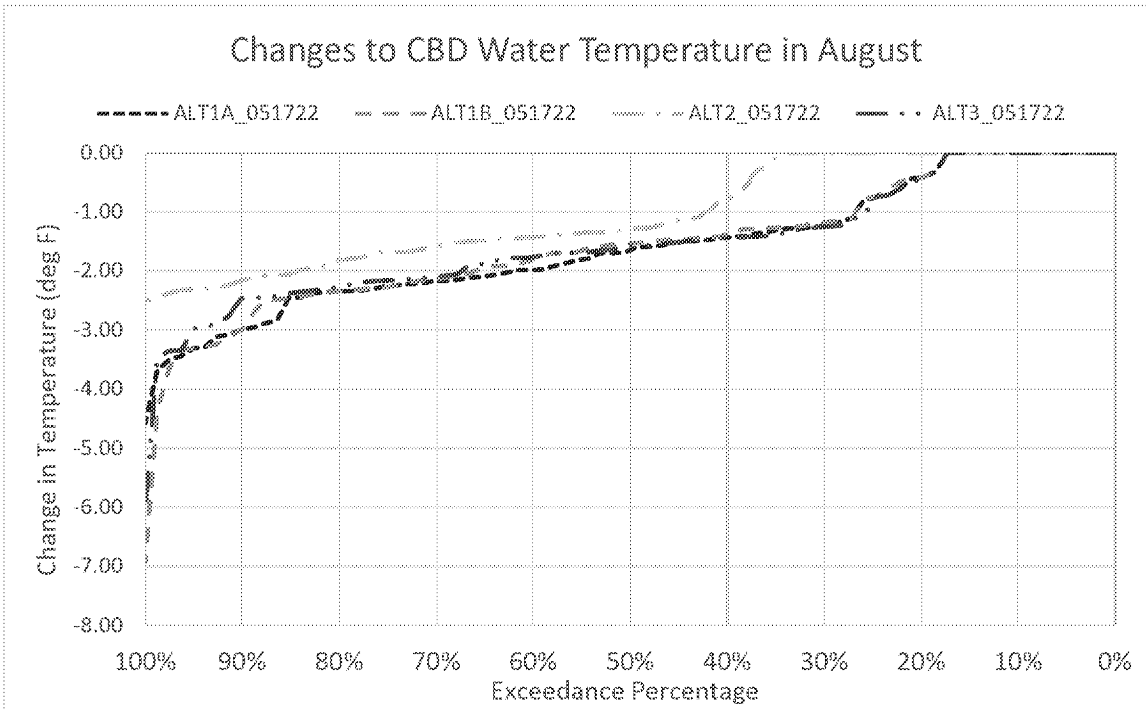

CBD Water Temperature in June
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

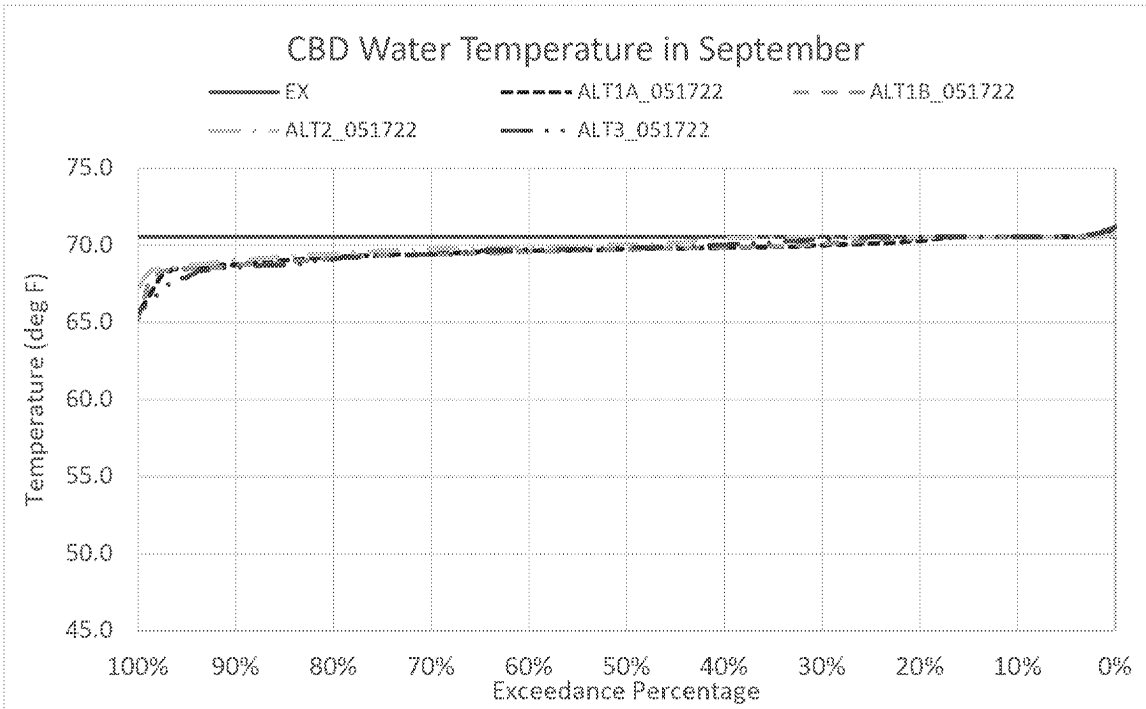

Changes to CBD Water Temperature in June
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
-7.00
-8.00
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

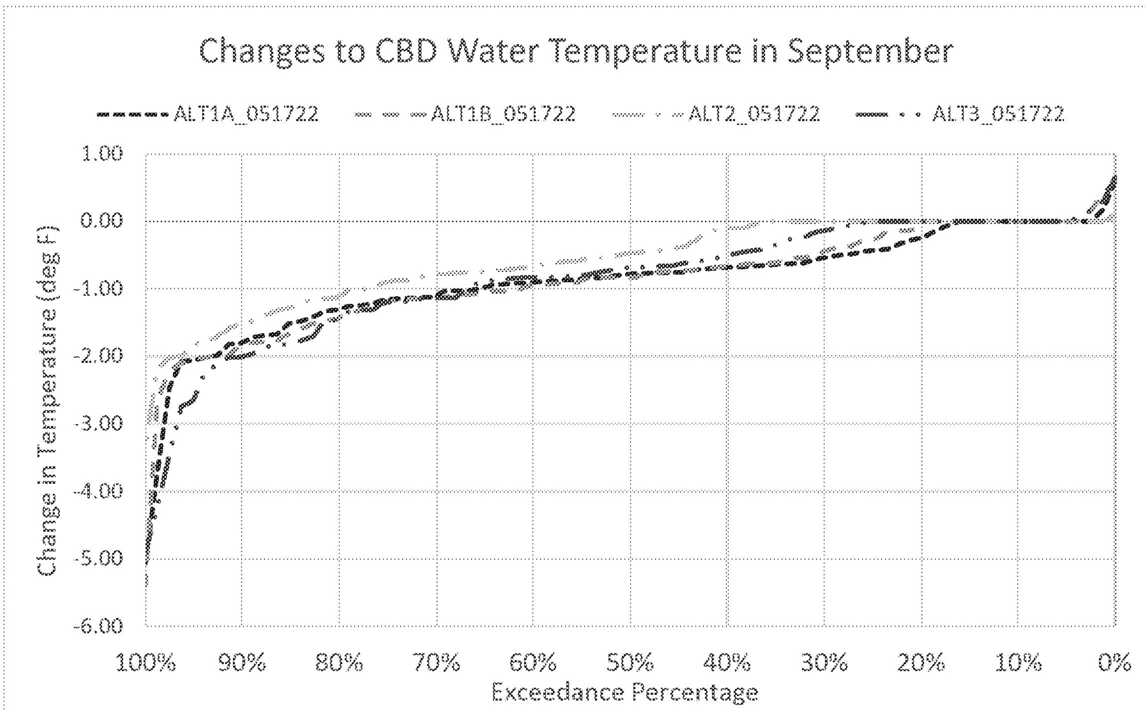

CBD Water Temperature in July
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

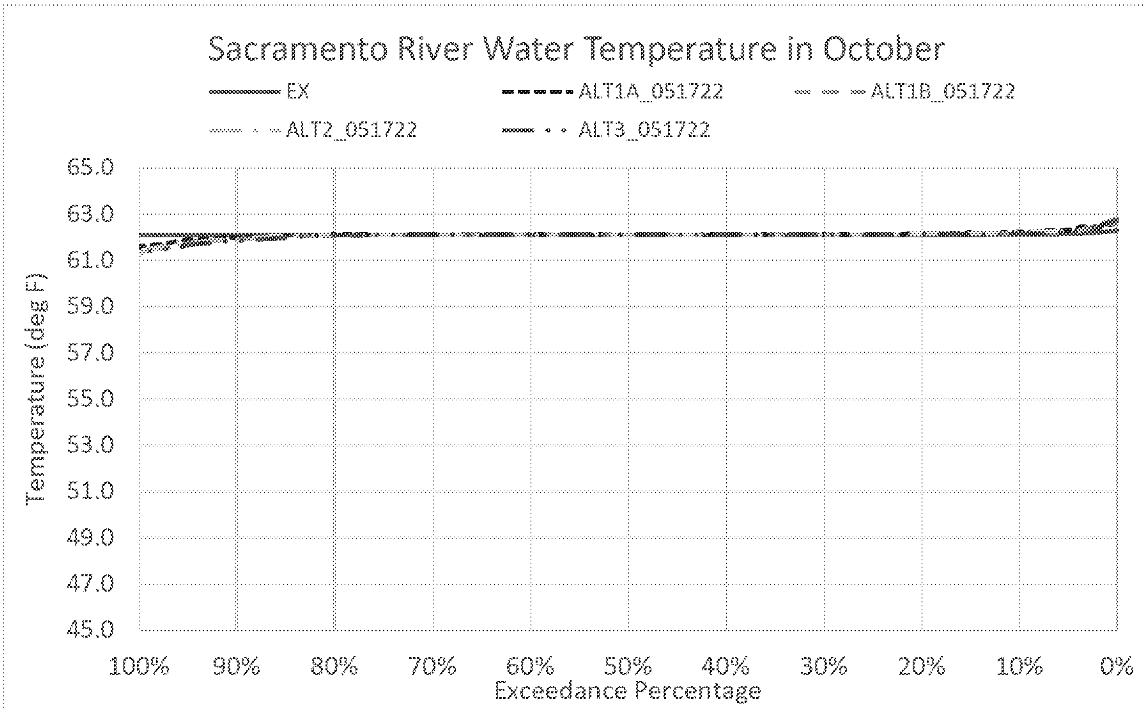

Changes to CBD Water Temperature in July
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
-7.00
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage


CBD Water Temperature in August
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

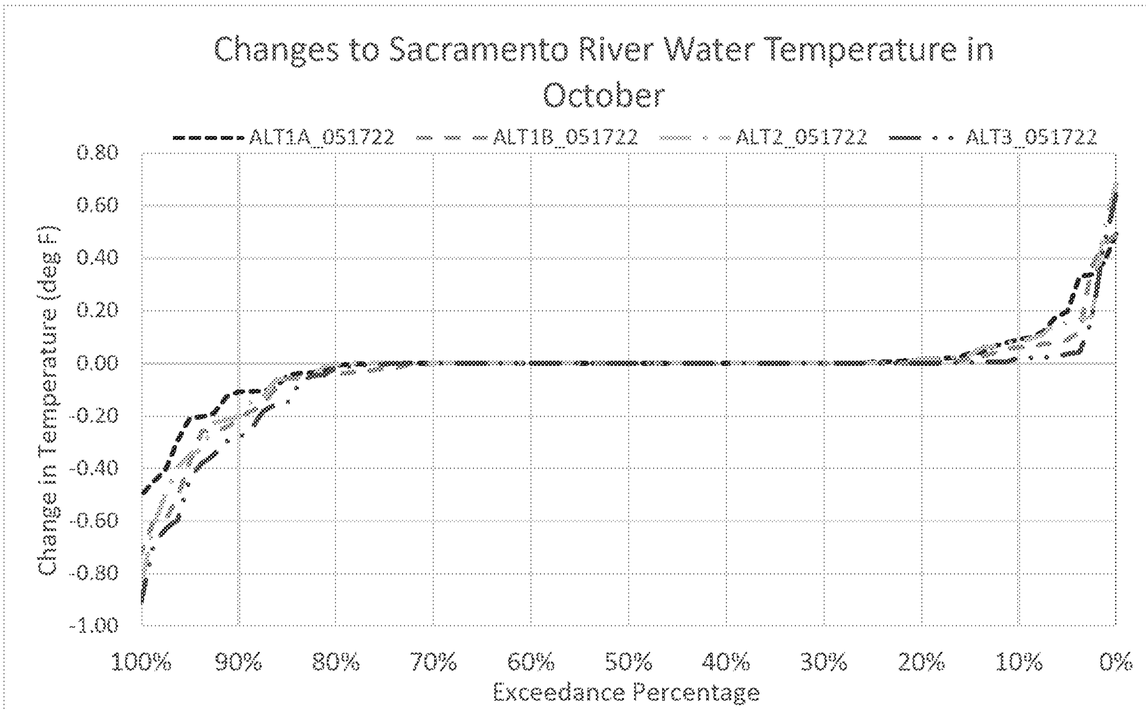

Changes to CBD Water Temperature in August
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
-7.00
-8.00
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage


CBD Water Temperature in September
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
75.0
70.0
65.0
60.0
55.0
50.0
45.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

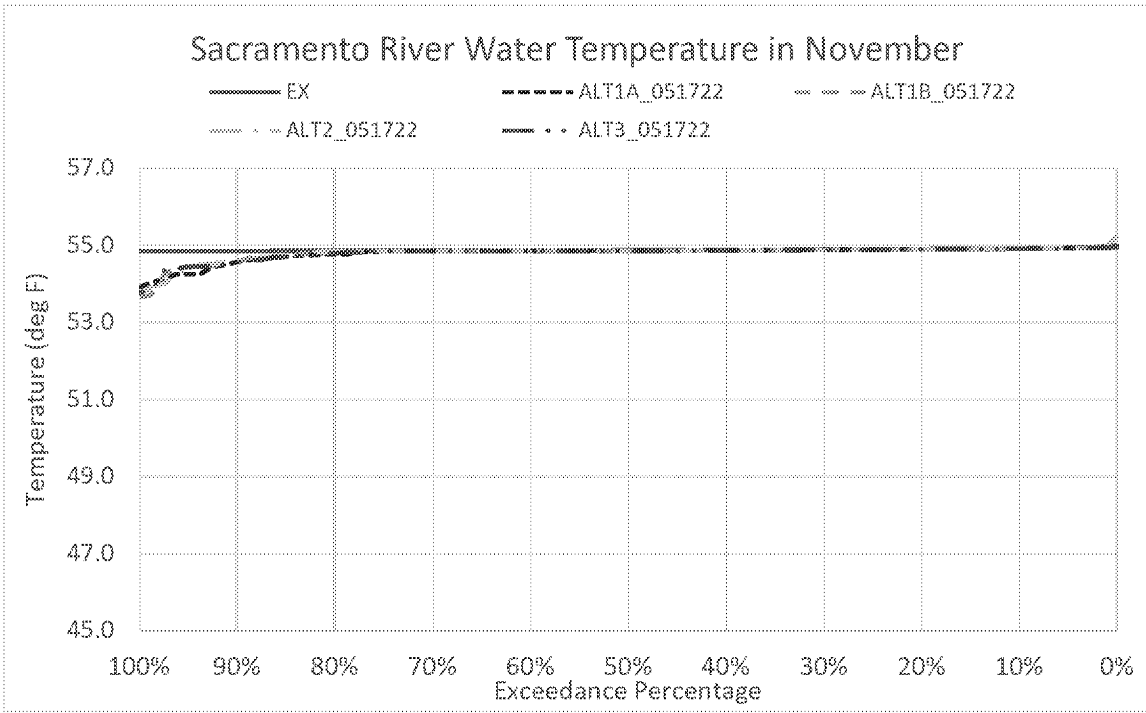

Changes to CBD Water Temperature in September
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

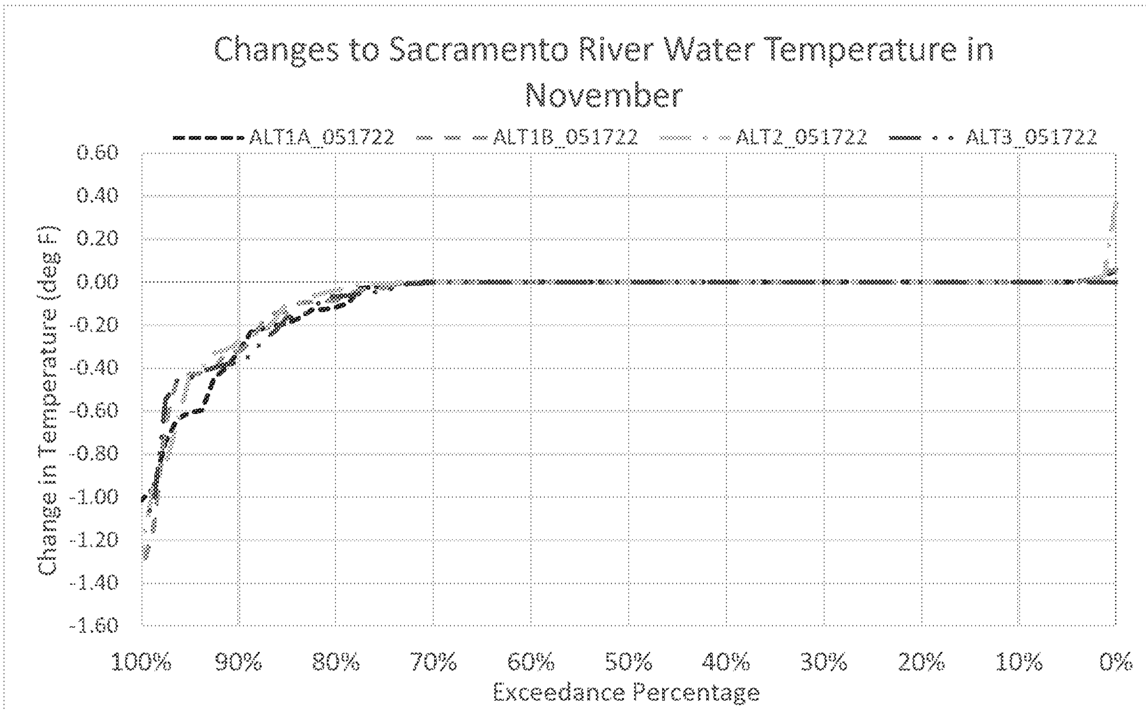


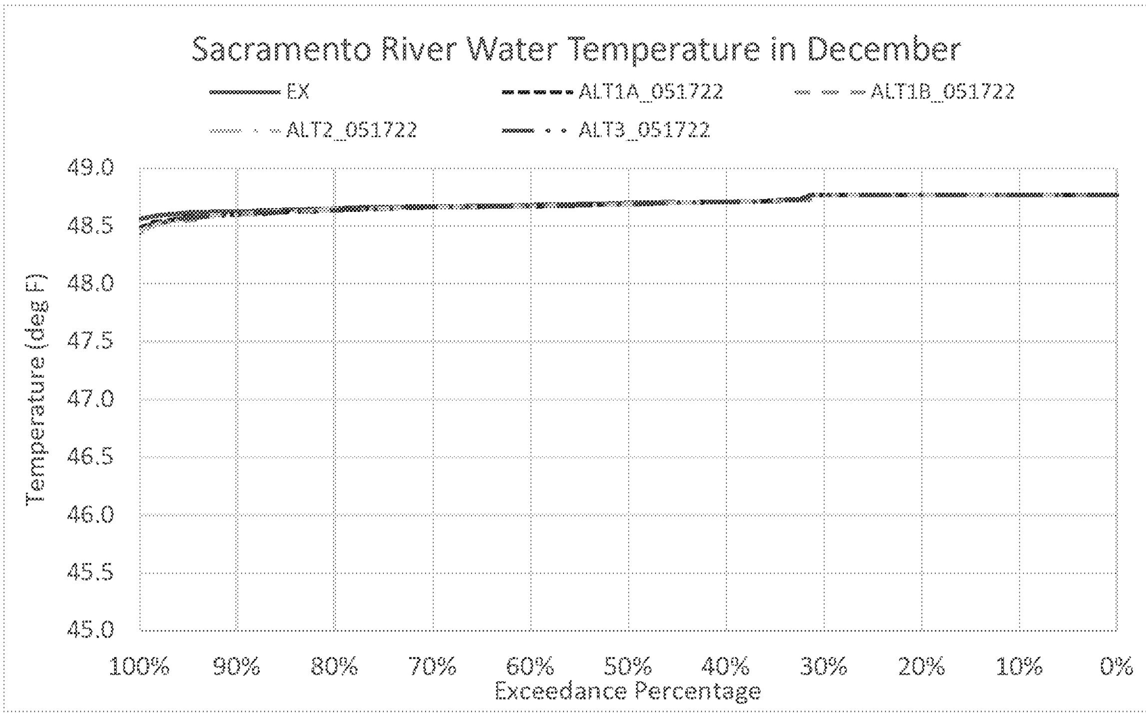
Sacramento River Water Temperature in October
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
65.0
63.0
61.0
59.0
57.0
55.0
53.0
51.0
49.0
47.0
45.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

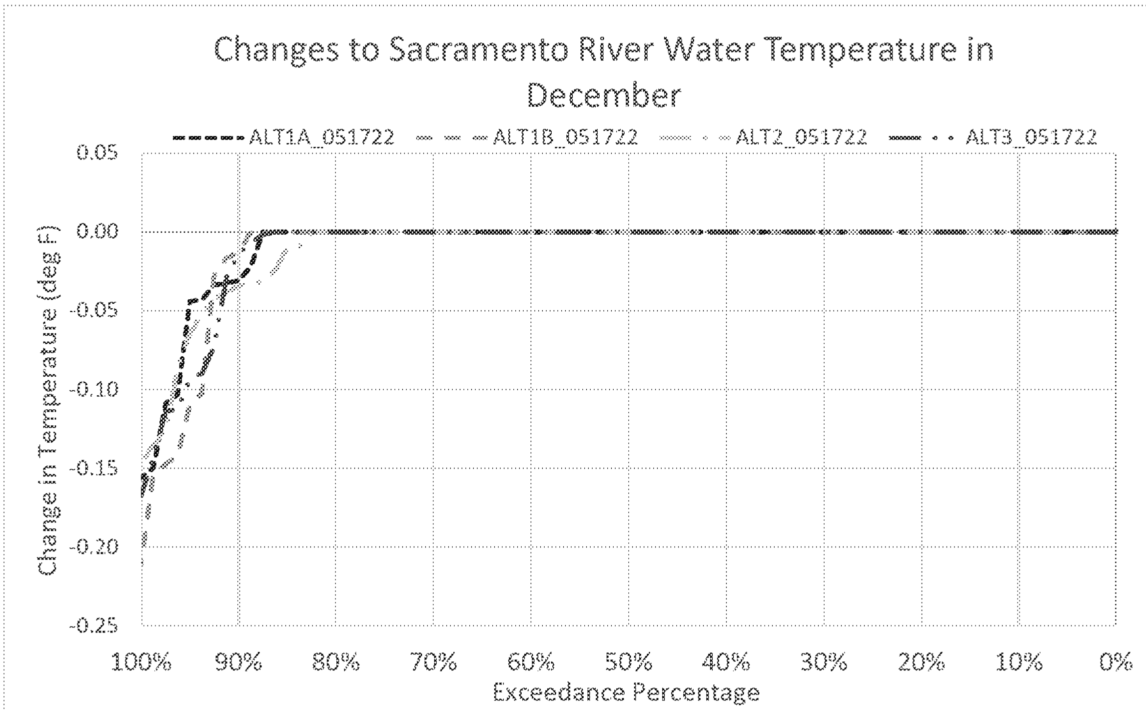


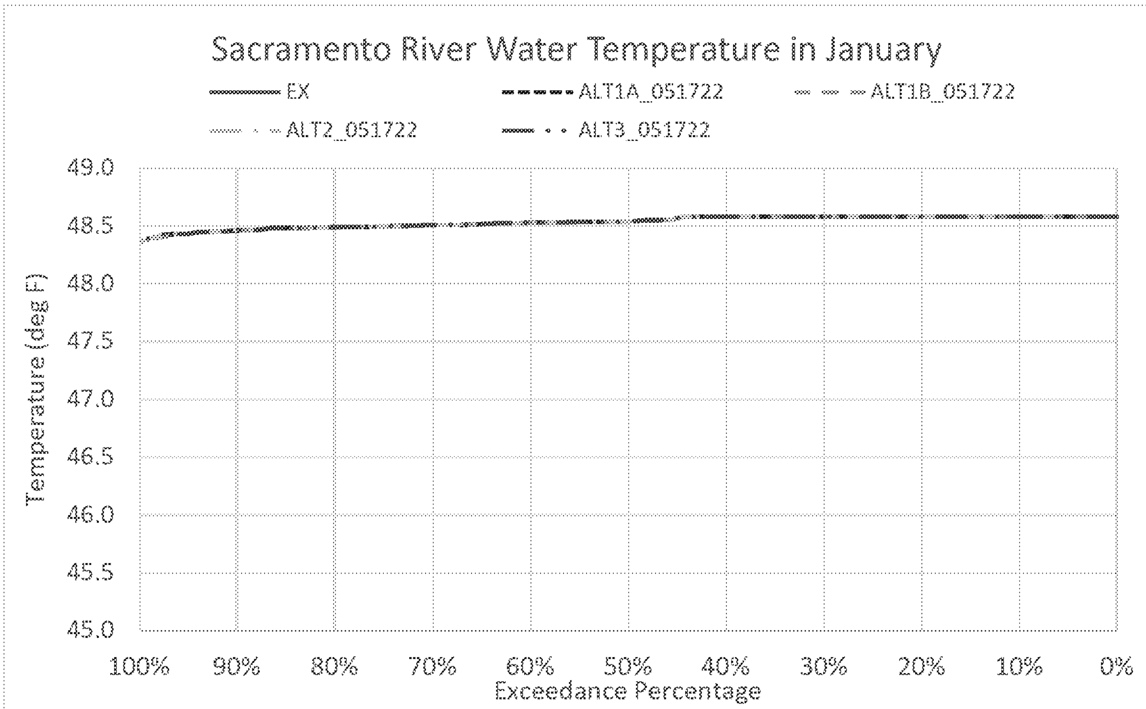
Changes to Sacramento River Water Temperature in October
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
0.80
0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

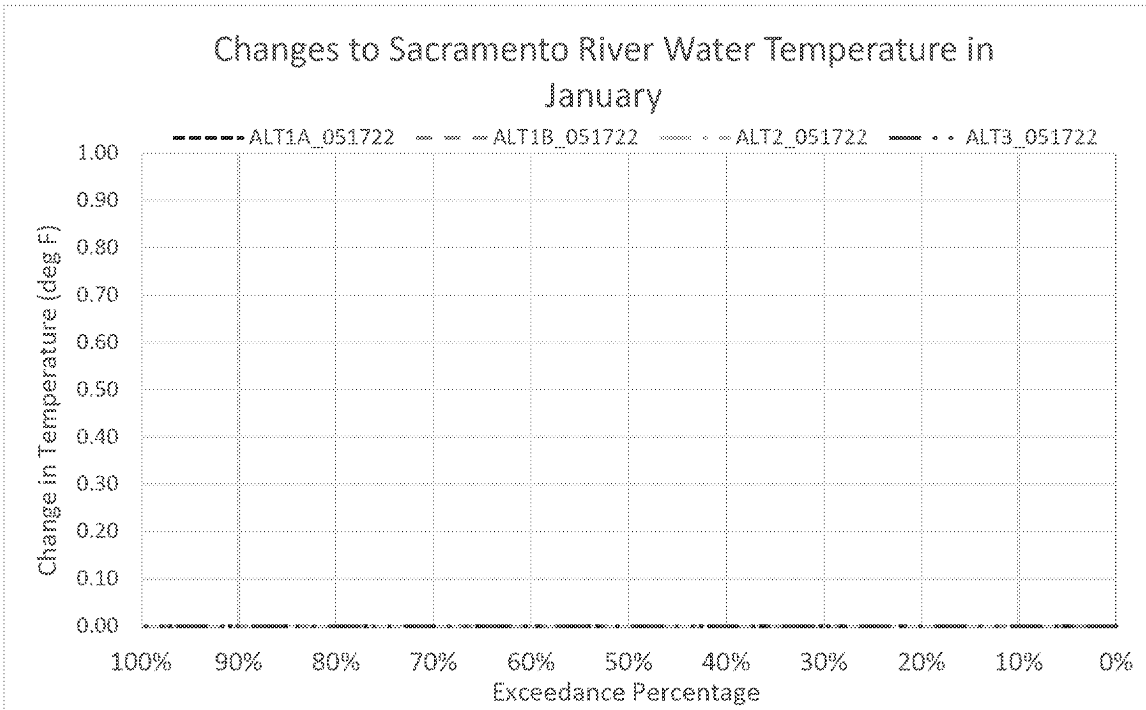

Sacramento River Water Temperature in November
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
57.0
55.0
53.0
51.0
49.0
47.0
45.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

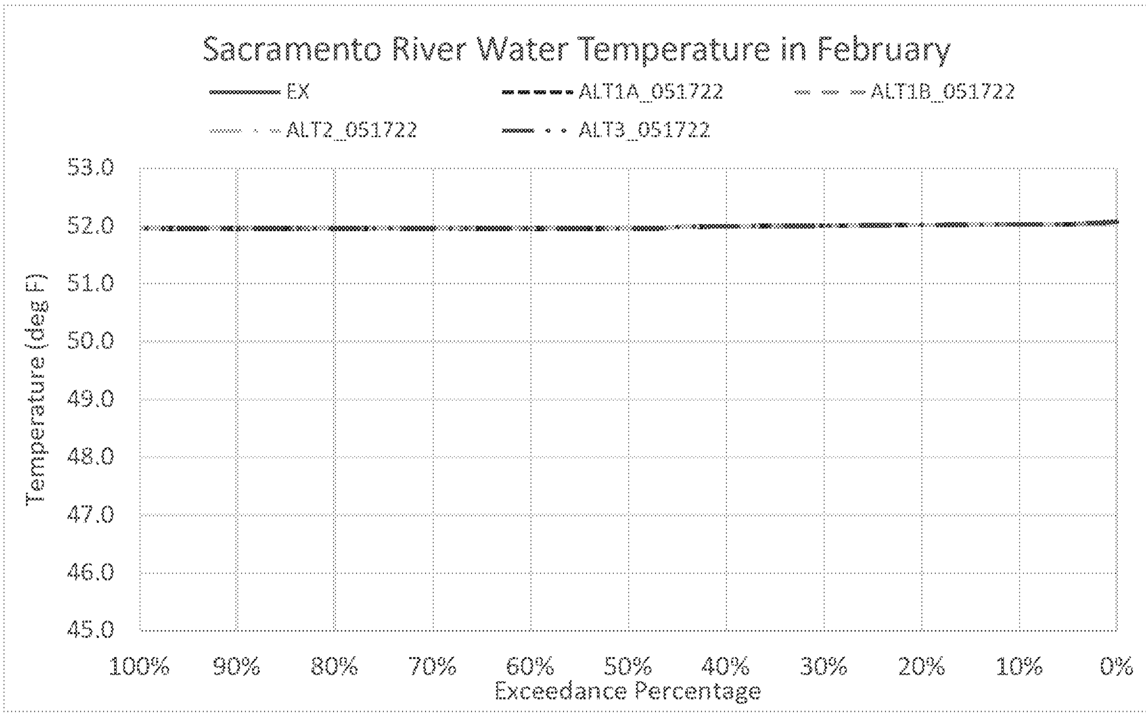

Changes to Sacramento River Water Temperature in November
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
-1.20
-1.40
-1.60
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

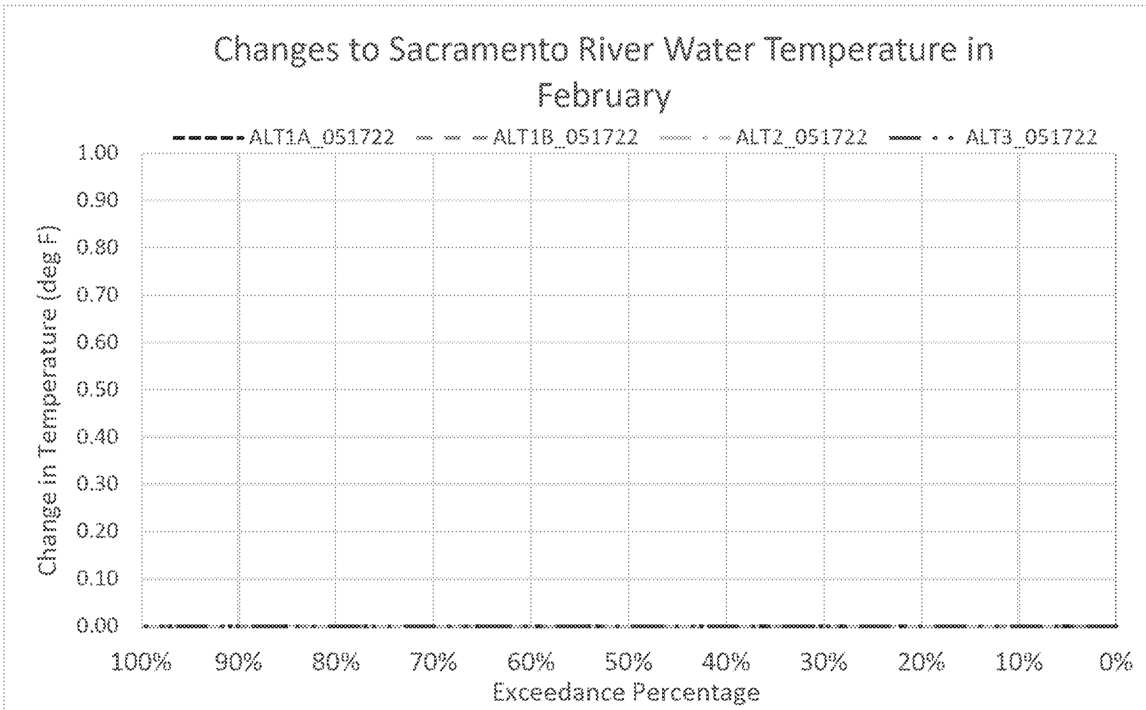

Sacramento River Water Temperature in December
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
49.0
48.5
48.0
47.5
47.0
46.5
46.0
45.5
45.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

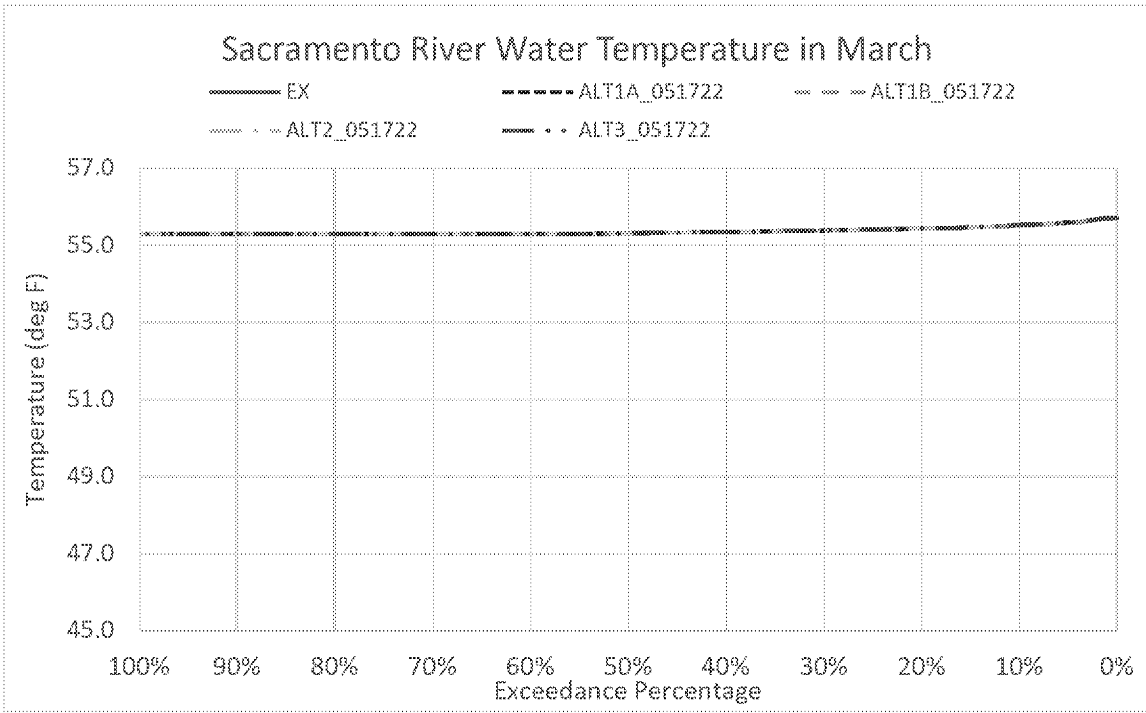

Changes to Sacramento River Water Temperature in December
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
0.05
0.00
-0.05
-0.10
-0.15
-0.20
-0.25
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

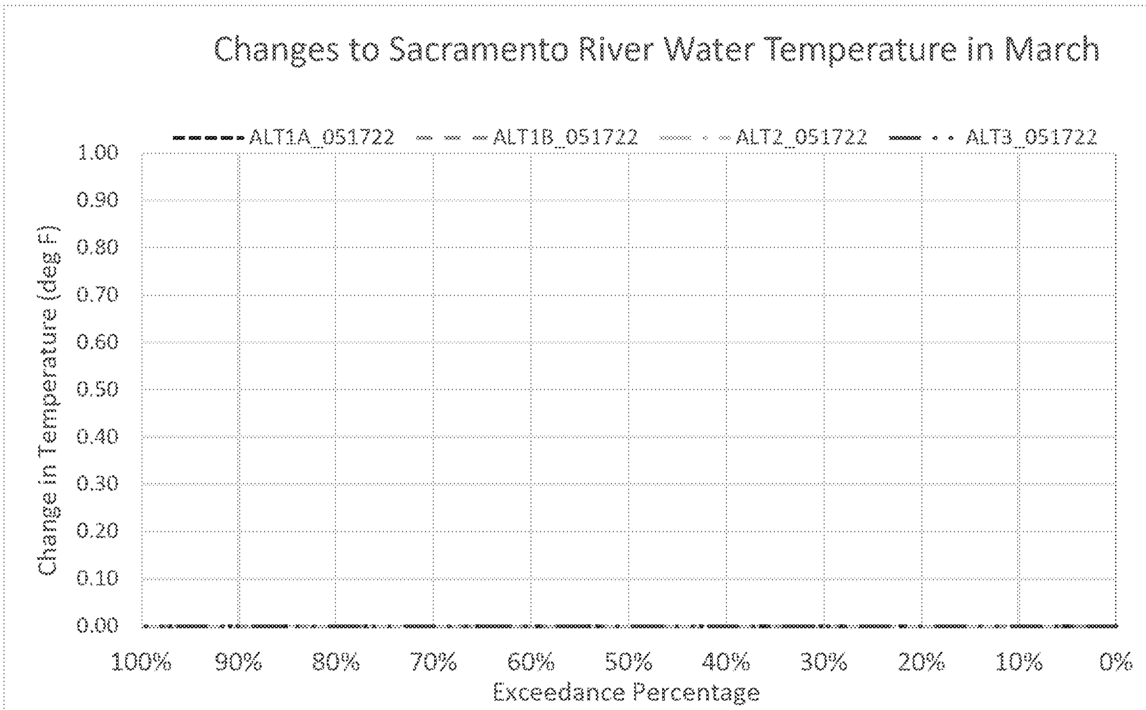

Sacramento River Water Temperature in January
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
49.0
48.5
48.0
47.5
47.0
46.5
46.0
45.5
45.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

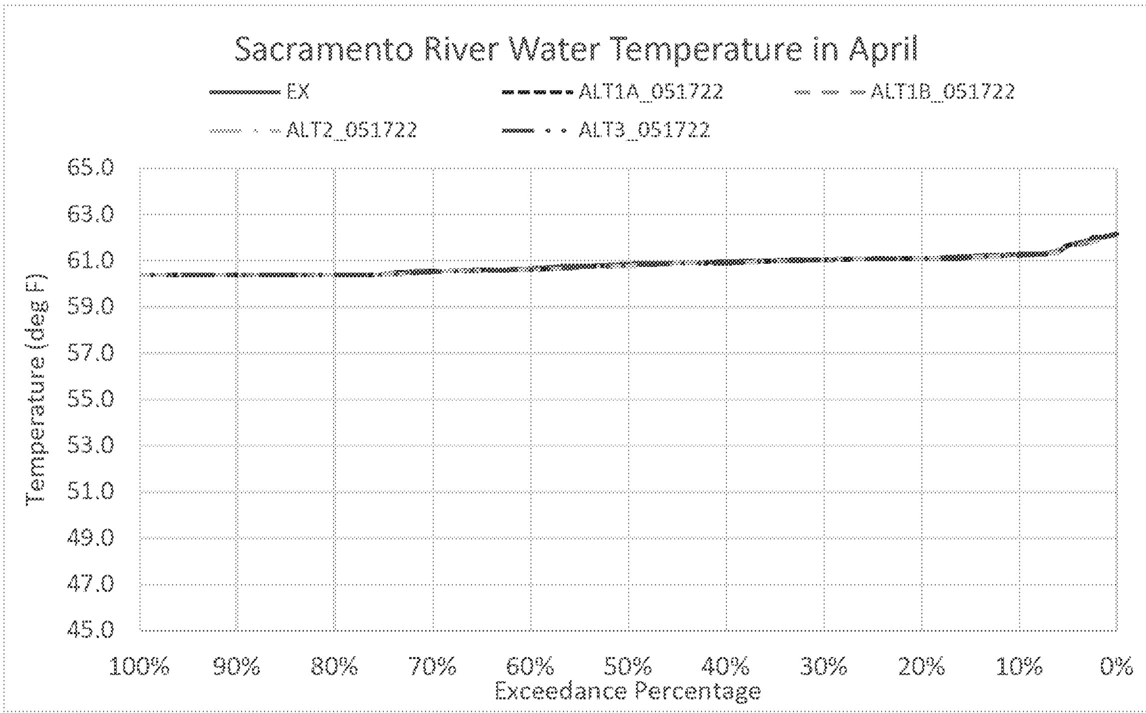

Changes to Sacramento River Water Temperature in January
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

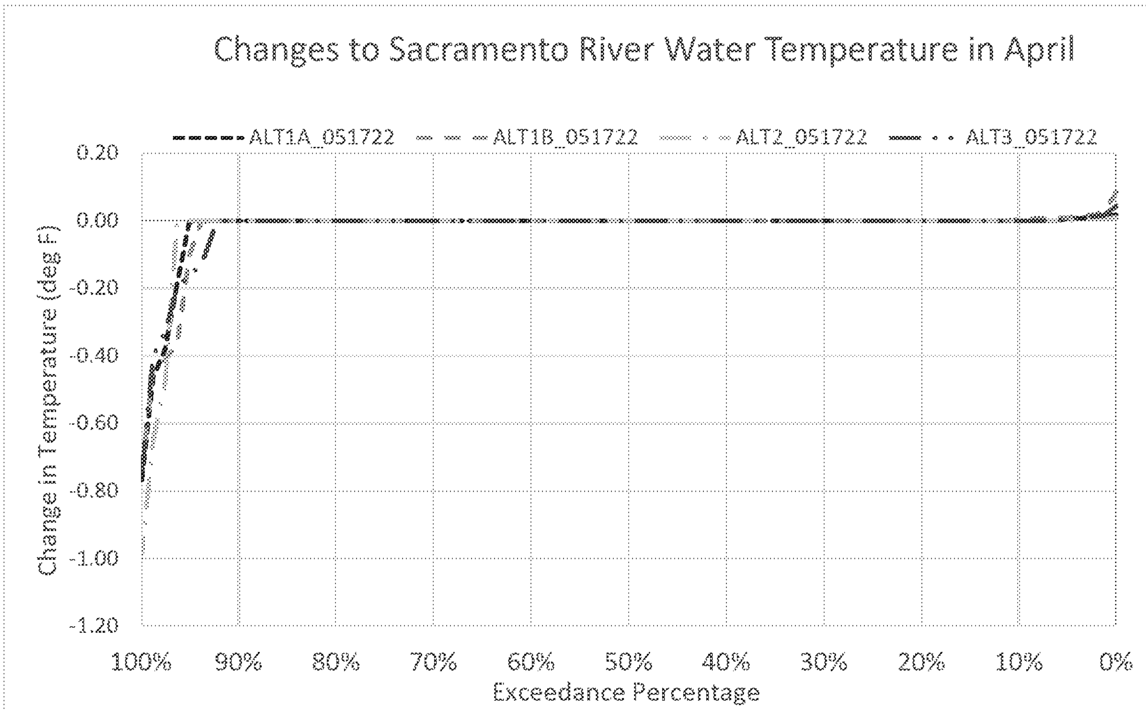

Sacramento River Water Temperature in February
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
53.0
52.0
51.0
50.0
49.0
48.0
47.0
46.0
45.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

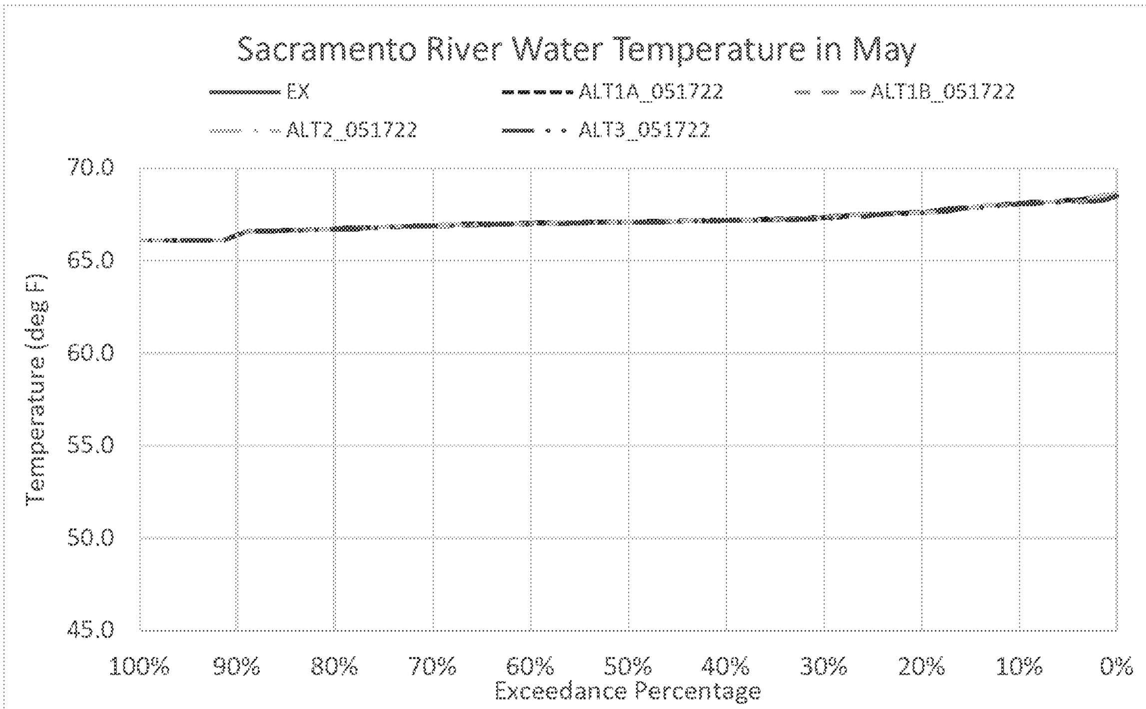

Changes to Sacramento River Water Temperature in February
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

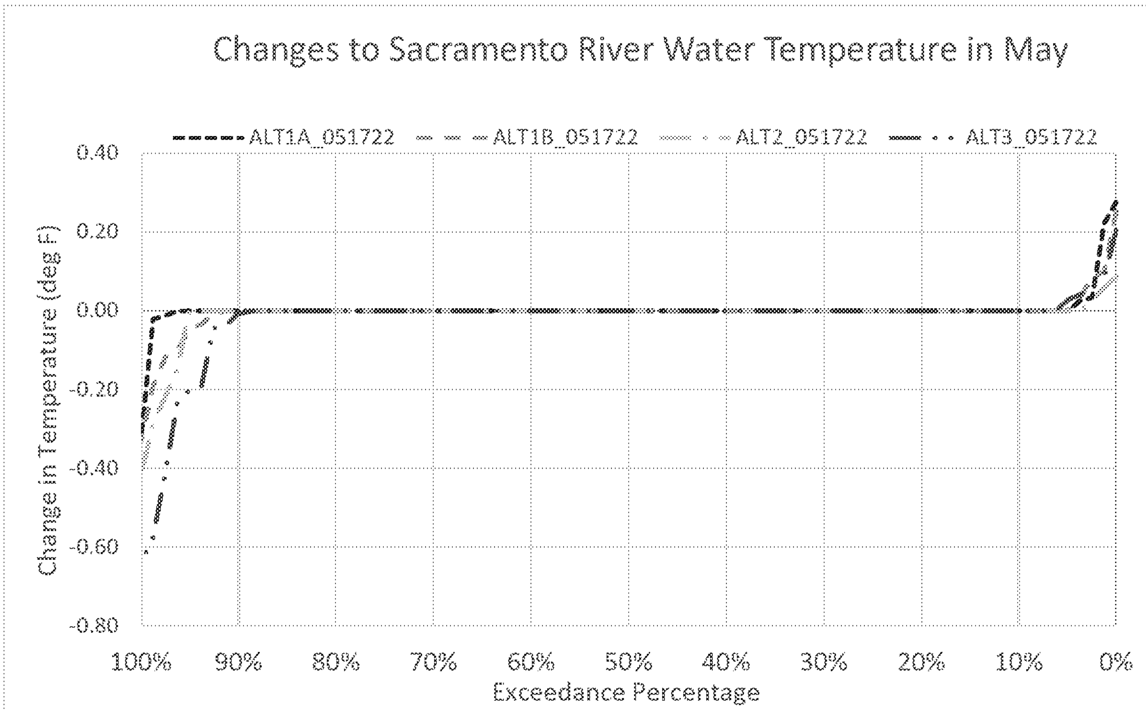

Sacramento River Water Temperature in March
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
57.0
55.0
53.0
51.0
49.0
47.0
45.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

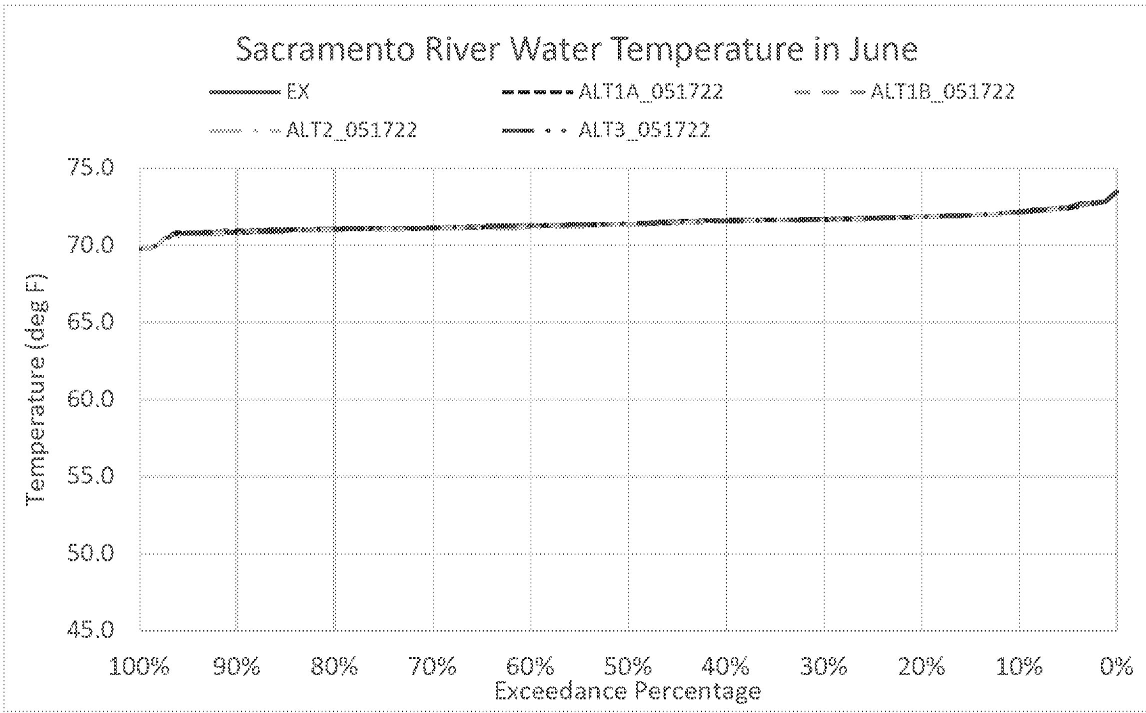

Changes to Sacramento River Water Temperature in March
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage


Sacramento River Water Temperature in April
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
65.0
63.0
61.0
59.0
57.0
55.0
53.0
51.0
49.0
47.0
45.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage


Changes to Sacramento River Water Temperature in April
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
-1.20
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage


Sacramento River Water Temperature in May
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
70.0
65.0
60.0
55.0
50.0
45.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage


Changes to Sacramento River Water Temperature in May
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage


Sacramento River Water Temperature in June
EX
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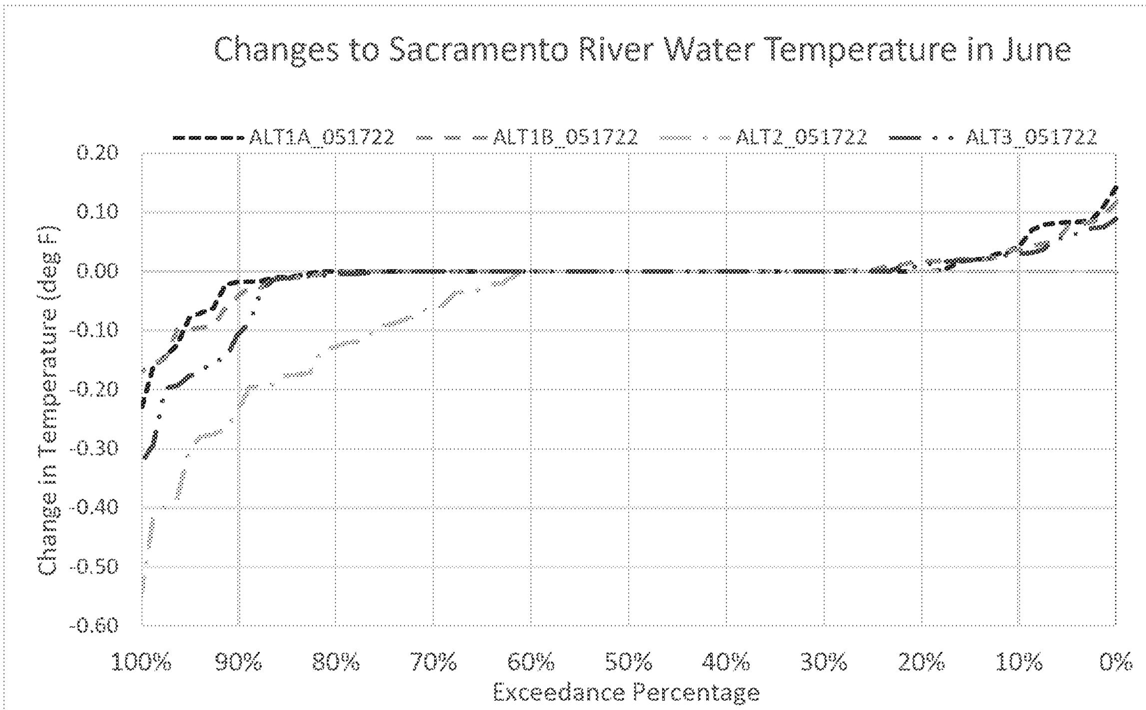
ALT1B_051722
ALT2_051722
ALT3_051722
75.0
70.0
65.0
60.0
55.0
50.0
45.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage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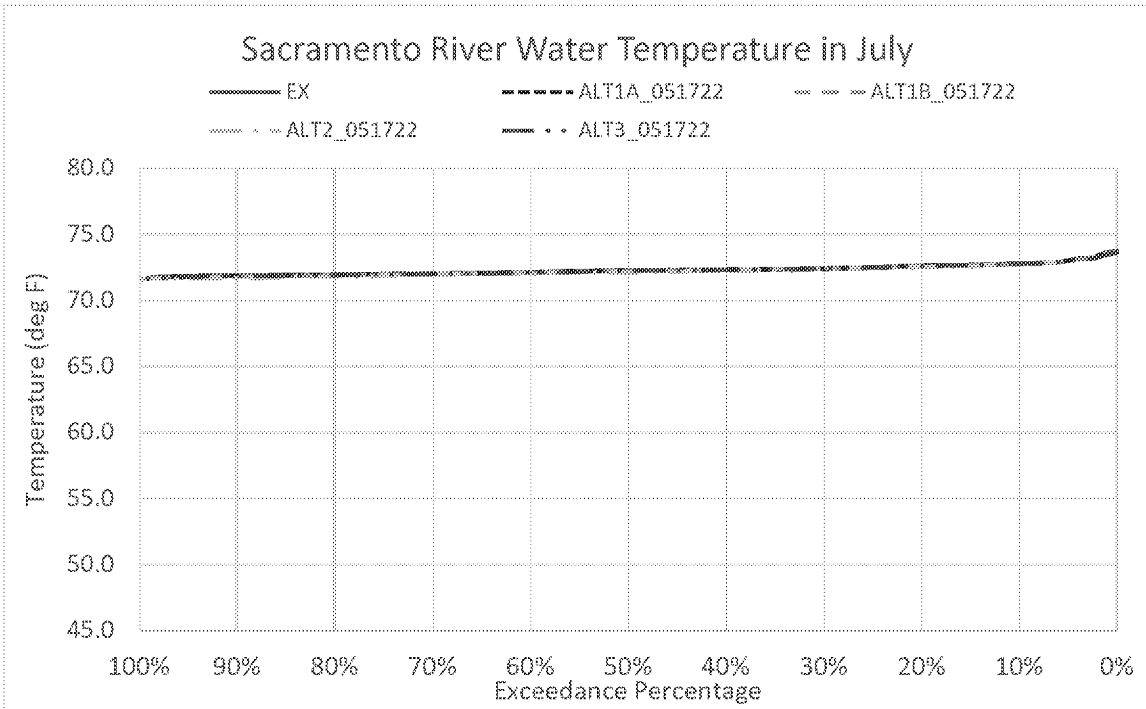
ALT1B_051722
ALT2_051722
ALT3_051722
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-0.50
-0.60
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage


Sacramento River Water Temperature in July
EX
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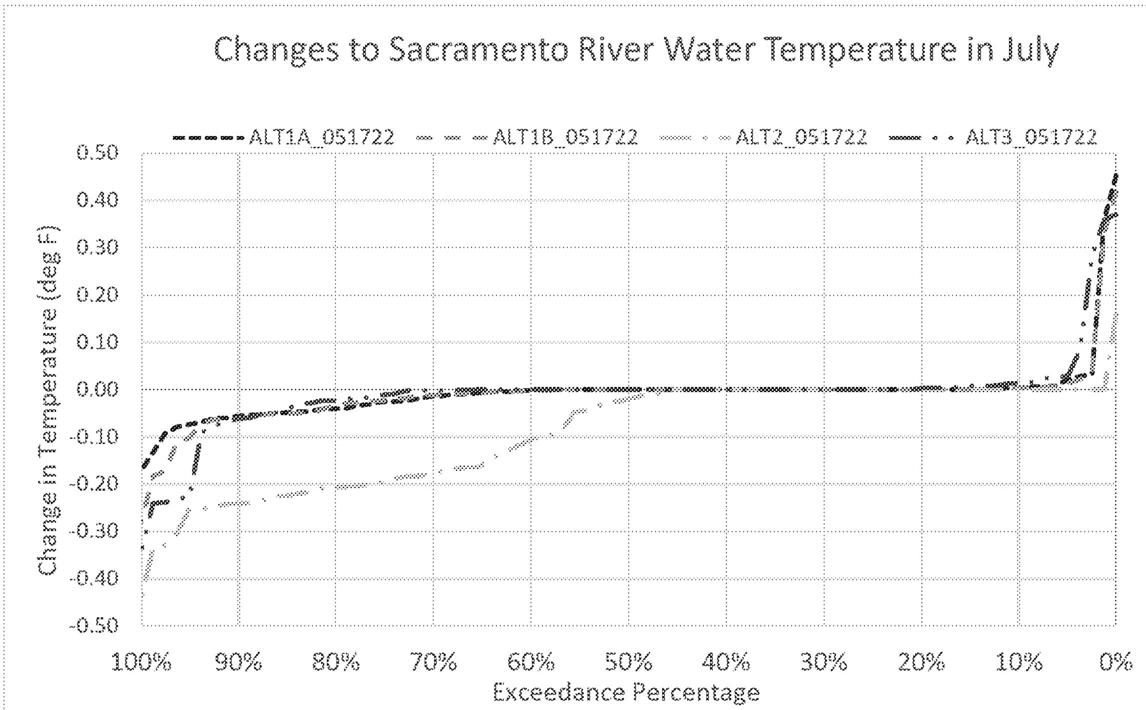
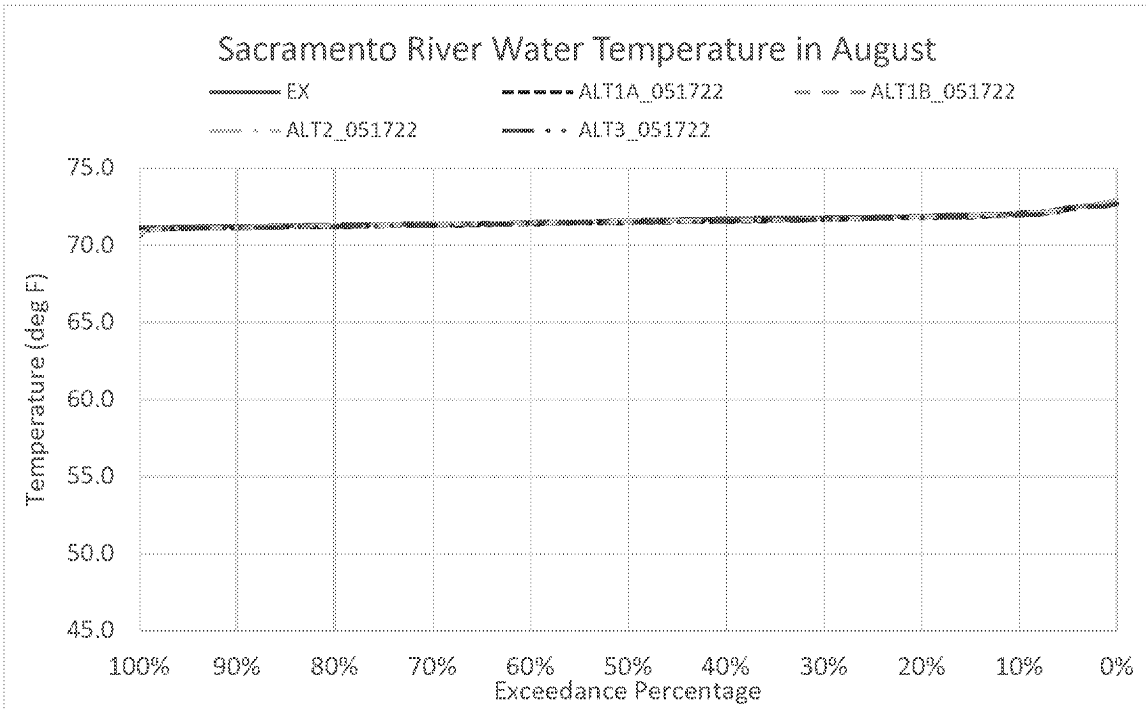
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage


Changes to Sacramento River Water Temperature in July
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-0.50
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage


Sacramento River Water Temperature in August
EX
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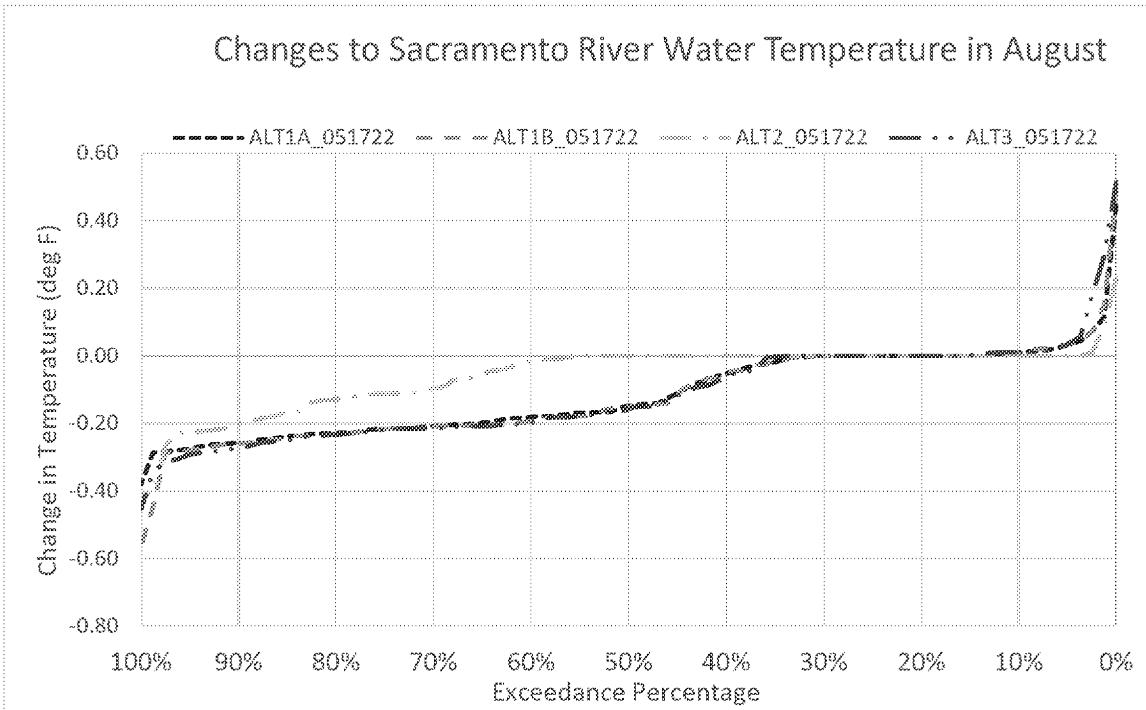
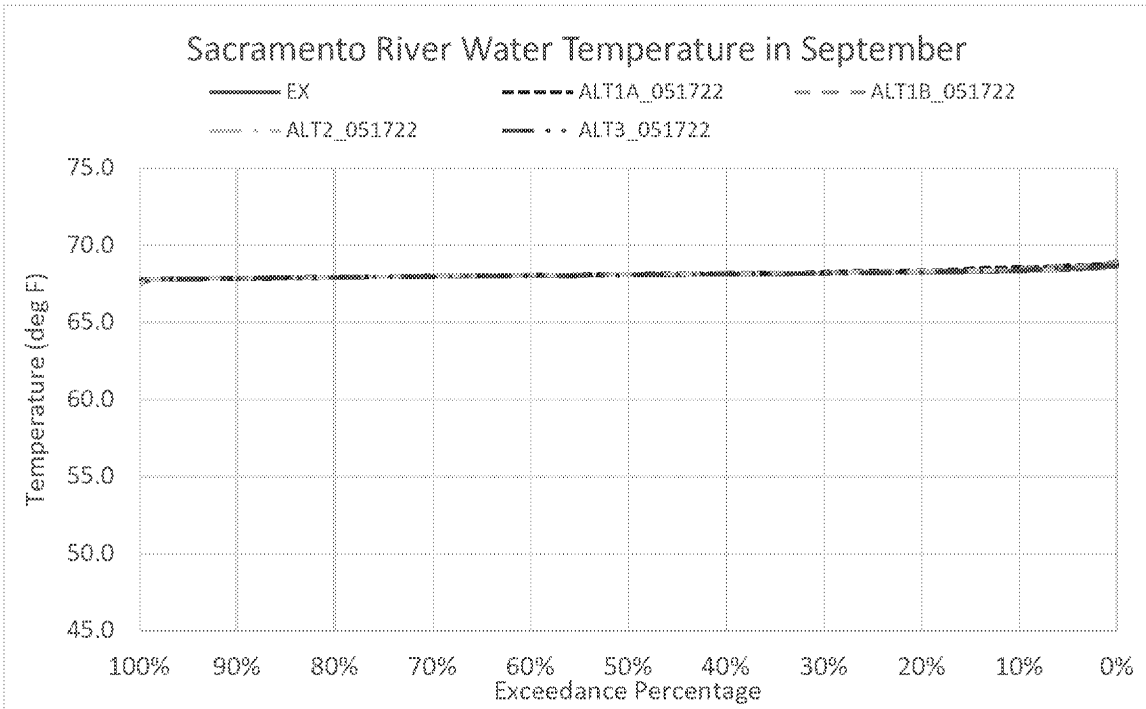
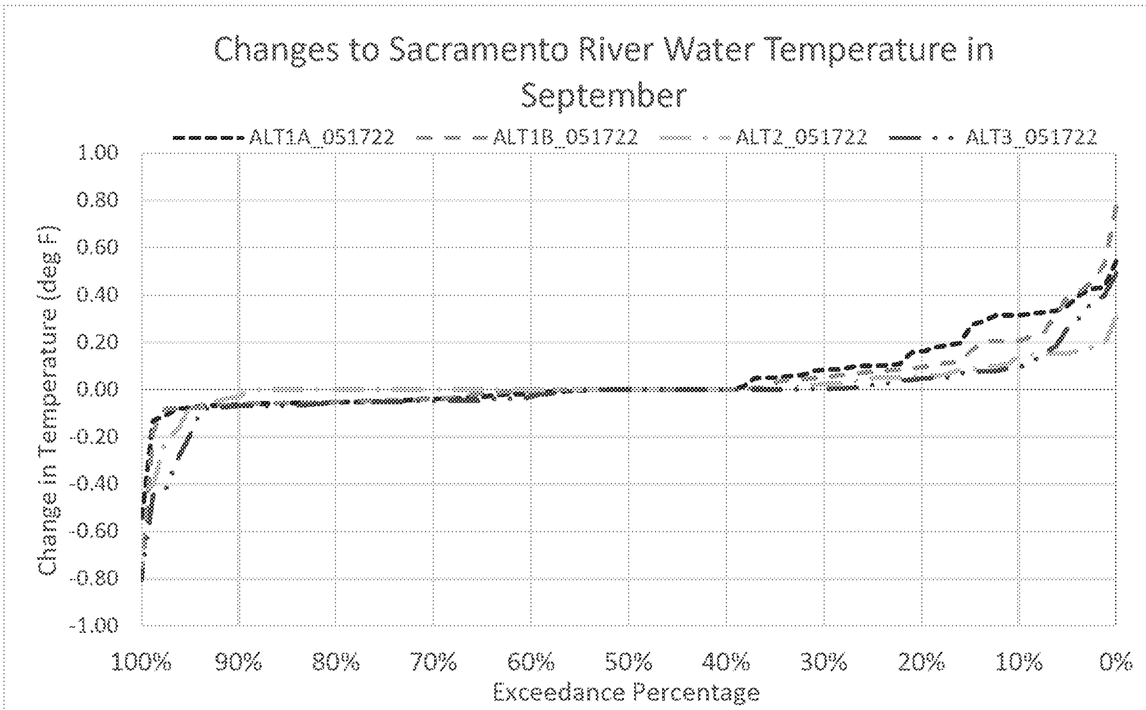
ALT1B_051722
ALT2_051722
ALT3_051722
75.0
70.0
65.0
60.0
55.0
50.0
45.0
Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage


Changes to Sacramento River Water Temperature in August
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
Change in Temperature (deg F)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage



Sacramento River Water Temperature in September
EX
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Temperature (deg F)
75.0
70.0
65.0
60.0
55.0
50.0
45.0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage



Changes to Sacramento River Water Temperature in September
ALT1A_051722
ALT1B_051722
ALT2_051722
ALT3_051722
Change in Temperature (deg F)
1.00
0.80
0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Exceedance Percentage

File Provided Natively

To: steve.micko@jacobs.com
CC: Angela Bezzone [bezzone@mbkengineers.com]
Subject: FW: WSIP Cumulative Flow Study
Attachments: CFS draft 8-4-22 _clean.docx

Hi Steve – Thanks for bringing this up on our call today. Please do plan to attend the call on Monday.

I am also going to read through the memos and Erins comments. I'll circle back with you all next week on comments. They are due 9/17, so we have some time, but would want to make sure we meet that schedule.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Tuesday, August 9, 2022 6:22 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Heydinger, Erin <erin.heydinger@hdrinc.com>
Subject: FW: WSIP Cumulative Flow Study

I took a quick glance at this material and I don't see anything here that causes me any concerns. Please ensure we provide by comments by the requested date. Also I plan to attend the general audience session. Please join fi you're available and have our modelers attend the technical session as you see fit.

thanks

From: "Okita, David@DWR" <David.Okita@water.ca.gov>
Date: Monday, August 8, 2022 at 7:39 AM
To: Jerry Brown <jbrown@sitesproject.org>, "Heydinger, Erin" <erin.heydinger@hdrinc.com>, Maureen Martin <mmartin@ccwater.com>, Marguerite Patil <mpatil@ccwater.com>, Cindy Kao <ckao@valleywater.org>, Michael Martin <MichaelMartin@valleywater.org>, Dana Jacobson <DJacobson@valleywater.org>, Andrew Garcia <AndrewGarcia@valleywater.org>, Dave Richardson <drichardson@woodardcurran.com>, Terrie Mitchell <mitchellt@sacsewer.com>, "Young, Amy@DWR" <Amy.Young@water.ca.gov>, "Boland-Brien, Samuel@Waterboards" <Samuel.Boland-Brien@waterboards.ca.gov>, "Riddle, Diane@Waterboards" <Diane.Riddle@waterboards.ca.gov>, "Sugar, Sarah@Waterboards" <Sarah.Sugar@Waterboards.ca.gov>, "Kirkland, Marianne@DWR" <Marianne.Kirkland@water.ca.gov>, "Maroney, Jagruti@DWR" <Jagruti.Maroney@water.ca.gov>, Fiona Sanchez <sanchezf@irwd.com>, "Gordon, David@DWR" <David.Gordon@water.ca.gov>, Christiana Daisy <cdaisy@ieua.org>, "Cowin, Mark" <mcowin@geiconsultants.com>, "Ashenfelter, Mark" <mashenfelter@geiconsultants.com>, Paul Weghorst <Weghorst@irwd.com>, Lee Bergfeld <bergfeld@mbkengineers.com>, Mark Beuhler <mbeuhler@wswaterbank.com>, Dwayne Chisam <dchisam@avek.org>, "Davis-Fadtke, Kristal@Wildlife" <Kristal.Davis-Fadtke@wildlife.ca.gov>, "Uttley, Paige@Wildlife" <Paige.Uttley@wildlife.ca.gov>, "Llaban, Angela@Wildlife" <Angela.Llaban@Wildlife.ca.gov>,

"Chilmakuri, Chandra@SWC" <cchilmakuri@swc.org>, "slee@ieua.org" <slee@ieua.org>, "'ehurst@ieua.org'" <ehurst@ieua.org>, "dpolyzos@mwdh2o.com" <dpolyzos@mwdh2o.com>, "bgoshi@mwdh2o.com" <bgoshi@mwdh2o.com>, "Melton, Holly" <hmelton@kcwa.com>, "cwallace@kcwa.com" <cwallace@kcwa.com>, "Leahigh, John@DWR" <John.Leahigh@water.ca.gov>, "White, Molly@DWR" <Molly.White@water.ca.gov>, "Williams, Jonathan@Wildlife" <Jonathan.Williams@wildlife.ca.gov>, Dale Melville <dmelville@ppeng.com>, Dan Bartel <dbartel@rrbwsd.com>, "Pettit, Tracy@DWR" <Tracy.Pettit@water.ca.gov>, Steve Arakawa <sarakawa@mwdh2o.com>, "Safely,Jack S" <jsafely@mwdh2o.com>, "Hawk,Nina E" <nhawk@mwdh2o.com>, Trent Taylor <ttaylor@rrbwsd.com>, Jonathan Young <jyoung@swc.org>, "Asante, Kwabena" <kasante@geiconsultants.com>, "McQuirk, Jacob@DWR" <Jacob.McQuirk@water.ca.gov>, "Fock, Anna@DWR" <Anna.Fock@water.ca.gov>, Liza Muñoz <lmunoz@ieua.org>, Shankar Parvathinathan <shankar@mbkengineers.com>
Subject: WSIP Cumulative Flow Study

To: 7 WSIP projects, Partner Contractors and State agencies:

As you know, DWR has been working on a Cumulative Flow Study that shows how all 7 WSIP projects would affect flows key water ways. We have some new draft documents to share with you and to collect comments. First a "history" of efforts to date.

1. An initial draft Cumulative Flow Study was prepared by AECOM dated 6/21/21. Stantec as a subcontractor to AECOM had some level of review of document.

2. After review and comments by the 7 WSIP projects, state agencies and State Water Contractors, DWR agreed to do a more quantitative analysis using CalSim II post processing. That product was completed 12/19/21 in draft form.

3. The AECOM contract expired 12/31/21. After a few months of contacting delay, DWR hired Stantec independently to continue work.

4. In the meantime a "technical team" of Aaron Miller (DWR) and Chandra Chilmakuri (State Water Contractors) were assigned to review the 12/19/21 draft report. They provided some major comments.

5. Stantec provided a revised report on 6/27/22. DWR provided comments (Chandra was out of office).

6. DWR comments were incorporated into the 8/4/22 attached version.

7. DWR prepared a draft narrative summary of the 8/4/22 Stantec Report. It uses a similar format as the 6/21/21 AECOM report, but is more extensive.

Please provide any comments on both documents by September 16.

We will be having two workshops for different audiences.

First, we will have a technical workshop on the Stantec modeling on Monday August 29 from 3-5 PM. This workshop is for modeling "experts" who have questions about the Stantec work - it is not geared towards a general overview. Stantec will provide an overview of the modeling method, then take questions. To facilitate an efficient workshop, Stantec asks that technical questions and comments be provided in advance by COB August 24. Questions to be sent to Yung-Hsin Sun (yung-hsin.sun@stantec.com) and David.Okita@water.ca.gov. This will allow Stantec to prepare and group similar questions together. Time will be allotted for other questions at the meeting.

Second, we will have a workshop for a more general audience on Thursday August 25 from 3:15 - 5:00 PM. Note that 3-4 PM is the regular bi-monthly meeting of the three pulse flow projects so we will be shortening that meeting to 3:00-3:15 and holding the workshop for a larger audience after that. DWR will be making a presentation on the Narrative Report and taking questions and comments. Target audience is the 7 WSIP projects, State agency staff and State Water Contractors.

Teams meeting announcements will be sent out for these meetings. The mailing list used for this email will also be used for both meetings. Please forward invitation to others in your organization that I may have missed, in particular those who might be interested in the technical workshop.

David Okita, PE
Department of Water Resources
530 902-7588

United States Department of the Interior

FISH AND WILDLIFE SERVICE
San Francisco Bay-Delta Fish and Wildlife Office
650 Capitol Mall, Suite 8-300
Sacramento, California 95814

In Reply Refer to:
08FBDT00-2021-CPA-0002

Memorandum

To: Ernest A. Conant, Regional Director, Interior Region 10, California-Great Basin, Bureau of Reclamation, Sacramento, California

From: Jana Affonso, Acting Field Supervisor, San Francisco Bay-Delta Fish and Wildlife Office, Sacramento, California

JANA AFFONSO
Digitally signed by JANA AFFONSO
Date: 2021.08.05 18:04:52 -07'00'

Subject: Planning Aid Memorandum for the North-of-the-Delta Offstream Storage (NODOS)/Sites Reservoir Project

This Planning Aid Memorandum (PAM) is provided under the authority of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq*.). The FWCA requires Federal agencies proposing water resource development projects or involved in issuance of related permits or licenses to consult with the Service and provide equal consideration to the conservation, rehabilitation, and enhancement of fish and wildlife resources with other project purposes. The Bureau of Reclamation (Reclamation) has provided funding under FWCA for the U.S. Fish and Wildlife Service's (Service) involvement in early planning, including participation in interagency meetings, coordination with other resource agencies, review and comment on administrative draft materials of environmental documents, and the preparation of this PAM. The purpose of this PAM is to provide Reclamation with the Service's comments and recommendations on the project pertaining to effects on natural resources for consideration in project planning and preparation of a public revised draft environmental document.

The proposed project would be construction and operation of an offstream reservoir (Sites Reservoir) to be located in Colusa and Glenn counties west of the town of Maxwell. The operating concept for Sites Reservoir is to capture and store flows originating from unregulated tributaries of the Sacramento River downstream of Shasta Dam by pumping them into the reservoir during the late Fall-Spring and releasing from it during the late Spring-early Fall. The proposed project would involve two main dams, seven saddle dams or dikes, and two recreation areas. The reservoir would be filled from Sacramento River sources using existing diversions/canals at Red Bluff (Tehama Colusa (TC) canal) and Hamilton City (Glen Colusa Irrigation District (GCID) canal) that would be pumped into the reservoir through pipelines constructed from existing Funks Reservoir and a new terminal regulating reservoir.

Hydroelectric turbines and appurtenant power lines would also be constructed for both Funks and terminal reservoirs. Releases would be into the Colusa Basin Drain (CBD) (and/or Sacramento River, for one alternative) via a newly constructed Dunnigan pipeline. A new bridge or roadway, depending on alternative, would be constructed to maintain surface transportation access. Some modifications to existing canals and other facilities would also be needed.

Coordination History:

An offstream reservoir at this location has been studied in concept for at least 70 years with various sizings of the reservoir, diversion and release locations, and flows, most recently in a 2017 environmental document. The Service engaged in coordination with Reclamation in 2017, but did not submit an official FWCA document at that time. The design has since been revised based on comments and cost considerations. FWCA coordination on the current revised design, which is the subject of this PAM, began in October 2020, and included Service attendance in at least five interagency meetings organized by Reclamation (October 26, 2020; February 4, April 9, May 14, July 14, 2021). The Service held a coordination meeting with NOAA-Fisheries and the California Department of Fish and Wildlife on July 1, 2021, to informally share and discuss potential effects on resources. This latter coordination meeting was informational only. At this time, the views in this PAM represent those of the Service only, pending official responses by other fish and wildlife agencies after their reviews of the current project have been completed.

In addition to materials presented at meetings, Reclamation provided some administrative draft chapters and appendices of the pending Draft Revised Environmental Impact Statement for our comment and use in preparation of this PAM. Those of particular importance in this PAM include Vegetation and Wildlife (Chapter 9; Appendices 9A-B; 10 A-C), which includes effects on terrestrial habitats; Surface Water (Chapter 5) which summarizes changes in river flow and water operations; and Aquatic Resources (Chapter 11) which summarizes effects on those resources. Due to the limited amount of time to review draft materials, including key sections (i.e, since May 2021; Chapters 5 and 11 in June 2021), the findings in this PAM are preliminary and subject to refinement/revision after the draft environmental document is published.

Alternatives:

Alternative 1 would include a 1.5 million acre foot (MAF) reservoir, a bridge over it to provide road access, and discharge capability into the CBD (connecting to the Sacramento River) enabled by a 4-mile Dunnigan Pipeline that connects the TC/GCID to the CBD. Alternative 1 has water operation options termed Alternative 1A and 1B, which represent 0% and 7% Reclamation investment, respectively. The investment determines Reclamation's share of water stored in Sites that could be used to meet CVP water supply and environmental objectives, with the remainder managed by Sites Storage Partners. Alternative 2 would include a 1.3 MAF reservoir, a road around the reservoir to provide road access, the ability to discharge directly into the Sacramento River with an extended pipeline, and no Reclamation investment. Alternative 3 is the same as Alternative 1 but with 25% Reclamation investment, providing more flexibility to meet CVP water supply and environmental objectives. Although the materials do not state a preference, for the purpose of this PAM, we have assumed that Alternative 1 or some variation of it would be selected as preferred because it would avoid the cost and additional direct impacts of the extended pipeline and perimeter road construction.

To limit effects on aquatic resources, aimed primarily at salmonid fishes, diversions to Sites would be restricted to when flows exceed 3,250 and 4,000 cubic feet per second (cfs) at Red Bluff and Hamilton City, respectively, and when flows on the Sacramento River at Wilkins Slough are at least 5,000 cfs in most months (8,000 cfs in April/May). Additionally, diversions would cease when outmigration is detected for 7 day periods as a pulse protection measure when tributary flows upstream of Bend Bridge (Cow, Cottonwood, and Battle Creeks) are 2,500 cfs and the Sacramento River flow at Bend Bridge exceeds 8,000 cfs. For reference, diversion capacities are 1,800 and 2,100 cfs for GCID and Red Bluff Diversion Dam (RBDD) diversions, respectively. Finally, flows over the Fremont weir would be reduced no more than 10% when spills are between 600-6000 cfs. Operations would also implement exchanges between Sites and Shasta, Oroville, or Folsom Lakes in order to preserve cold water reserves in these systems.

The alternatives are revised from the 2017 documents by having a smaller reservoir (1.3-1.5 MAF) and eliminating the Delevan pipeline in favor of a shorter, Dunnigan pipeline which connects to the CBD. The CBD will not be available to convey Sites releases in August/September when it is in use to drain rice fields.

General Comments:

The project and its operation will result in a combination of beneficial and adverse impacts to fish and wildlife resources and their habitats. The project has the potential to benefit resources as the result of: greater late summer storage in Shasta in some years - which could conserve cold water and yield benefits to spawning/rearing Federally-endangered Sacramento River Winter-Run Chinook Salmon; increased level 4 water supplies to Refuges in some years - which would benefit migratory waterfowl; and late summer flows into the Yolo Bypass - which could benefit rearing delta smelt and other resources via the dispersal of phyto- and zooplankton into the Delta. The proposed project will incrementally improve the operational flexibility of the Central Valley Project (CVP) and State Water Project (SWP) systems to meet environmental flow objectives.

Introductory materials provided for review only briefly describe recent history leading to the current alternative, referencing a 2006 study that led to the selection of the Sites location, and further refinement based on comments on the 2017 environmental document. Nevertheless, this location has general characteristics that allow, but limit, the ability to store and deliver water as well as limit the ability to mitigate impacts. Foremost, is its position on the west side of the Sacramento Valley. This reservoir site is in a relatively broad flat area but does not capture large quantities of natural runoff. Several smaller creeks, Funks and Stone Corral, are present in the footprint and can flow up to several thousand cfs during intense events, but otherwise have very low natural flows. As such, the proposed project would have more limited direct impacts to anadromous fish spawning habitat, compared to prior or future possible projects constructed on mainstems or major tributaries. Additionally, releases of storage from Sites can be timed to limit effects of export in the Delta on listed fish species including delta smelt.

As the term offstream implies, the overwhelming majority of storage in Sites will depend on filling it from the Sacramento River via the existing GCID and TC diversions. These facilities have a limited combined capacity (3,900 cfs), which means diversion must occur for extended periods in order to store enough water to make the project feasible. It is this requirement for extended diversion which causes the project to have significant and, we believe, some unavoidable impacts to aquatic resources.

Such diversion durations will subtract from base flows of the Sacramento River during periods when water is not truly in excess. That is, diversion of water to Sites Reservoir is proposed to occur in lower flow ranges of the hydrograph where flow quantity and variation will cause effects on fishery and riparian resources, and includes diverting during critically dry years where natural runoff is more limited. The effects of diversion include: increased impingement mortality at the diversion intake screens as well as increased mortality via mechanisms that are inversely proportionate to flow. Reduced flows in the Sacramento River are also expected to result in a reduced rate of juvenile fish transport and movement that results in an increase exposure to predation risk and lower survival. There are other aquatic resources and functions which will be incrementally diminished, or changed, by the effect of project operation on flows. These include adult attraction, consequences of changes in temperature, effects of exporting Sites water in the Sacramento-San Joaquin Delta (Delta), geomorphic effects of flow reduction in the higher flow range on habitat (cut bank formation, cottonwood seed dispersion/regeneration processes, wood transport) and sensitive species which use it (e.g., bank swallows, yellow-billed cuckoo), reduction in near-channel overbanking/inundation, and effects of exchanges on the American and Feather Rivers.

The project would have direct impacts to over 20 square miles of habitat, albeit mostly grassland, which would be replaced by a relatively shallow, warm reservoir. Hundreds of acres of woodland and wetland would be impacted (see Specific Comments). Properly managed, the reservoir could provide significant recreational benefits, primarily boating-based activities. Certain upland species, especially hawks, golden eagle, burrowing owl, and others, would be adversely affected due to loss of habitat. Others, such as warmwater fish and bald eagle, would benefit from the action. The hydropower element of the project creates a risk of mortality to birds which may contact transmission lines. Reclamation has stated that water quality and temperature are not concerns, but these may be adversely affected depending on storage level, wind, and weather conditions.

Even without the project, aquatic resources - both species and ecological regions such as the Delta - have already been severely stressed and depleted by the combined impact of existing major dams and diversions and their operations, and other factors such as bank protection, and invasive species, due to urban development, agriculture, and associated water demands. The net result of lost habitat and reduced, modified flows, has been a progressive decline in populations of salmonids and native fishes, with several near extinction, and further incremental degradation of the Delta. At risk species are most susceptible to elevated rates of loss in low water years, when the proposed project will continue to operate, and will cause the largest, proportional changes to flows in the Sacramento, Feather, and American Rivers. The proposed project will divert up to an additional 1.4 MAF into storage, of which 0.3+MAF would be delivered to project partners, including an allocation for habitat purposes. The project and its operation will result in a combination of beneficial and adverse natural resource impacts, however, some of those adverse impacts may prove difficult to fully mitigate.

In the Specific Comments below, we describe in greater detail some of the more significant effects, both beneficial and adverse, that project construction and operation would have on fish and wildlife resources and their habitats.

<u>Specific Comments</u>:

Water for National Wildlife Refuges

The National Wildlife Refuges (Refuges) in the Central Valley were established to provide sanctuary and wintering habitat for migratory waterfowl. These Refuges are managed intensively to provide a consistent quantity and quality of habitats for wintering waterfowl to compensate for habitat losses due to agricultural and urban development. These Refuges currently support over 250 species of birds and are known for the large concentrations of waterfowl (in some areas more than 750,000 ducks and geese) that use the Refuges during their winter migrations. Therefore, the acquisition and delivery of sufficient water to these Refuges is a high priority for the Service.

One of the benefits associated with the proposed project is that it could provide a source for Level 4 water supplies to wildlife refuges. Overall, 10-13% of Sites water deliveries would be to Refuges in critically dry and dry years, with more water going to Refuges in the San Joaquin Valley. In general, the timing of Sites releases would be consistent with Refuge needs by providing additional water that could be used by Refuges managing for migratory waterfowl and other species. We consider this benefit, although not well defined at present, to have a relatively high degree of certainty and effectiveness. The Service can assist Reclamation to better identify and evaluate how these water deliveries could benefit Refuges and the wildlife species and habitats they support.

Lake Shasta Storage

One stated benefit of the project and its operation (including exchanges with other reservoirs) is that of increased storage in Shasta Lake. According to materials provided, Shasta storage would be 3-6% greater in August of critically dry years. This translates into around 90,000 ac-ft for storage during an average critically dry year at that time (1.88 MAF) but only a foot or so difference in elevation. The coldwater pool at Shasta is accessed through a temperature control device with intakes at different levels. The frequency of benefit appears in less than 10% of years, and not more than 2°F in the Sacramento River at Keswick or Clear Creek and typically less (Figure F6C-5-17; F6C-6-6; Appendix 6C). Preceding weather, water releases, and lake elevation will affect the precise extent to which this additional storage can yield a thermal benefit. If realized, a 2°F benefit, could allow for higher survival of winter-run Chinook salmon juveniles in critically dry years and increase the success of fall-run Chinook salmon spawning.

Yolo Bypass

The Yolo Bypass can be an important rearing habitat for Chinook salmon and delta smelt. The project operation would reduce flows into the bypass by 2-4% during the November-May project diversion season in all water year types. When water is released from Sites in April-October, a small amount will be allowed to flow into the bypass (up to ~400 cfs in wet years, 200 cfs in critically dry years; Chapter 5, Table 5-21). On the basis of pilot studies, Reclamation suggests that such flows can stimulate algal production and associated lower trophic level food organisms in the Yolo Bypass Toe Drain, which would provide a food subsidy for delta smelt rearing in the area. The pilot studies were not comparable to the project flows in timing or magnitude, so it is difficult to make direct comparisons or projections from them. At other times of the year, a reduction in flow could have an adverse effect on salmonid rearing habitat. To better evaluate the net effect and benefit potential, we recommend that Reclamation estimate any differences in flooded area and duration as a result of both the winter flow reduction and these small releases from Sites, and consider additional pilot studies that better match the operations proposed.

Footprint Impacts

The project would permanently impact about 14,000 acres of habitat and associated wildlife, with exact amounts depending on the alternative. Most of the impact would be within the inundation zone of the reservoir and reregulating reservoir. It is estimated that the Project would result in the loss of approximately 11,000 acres of annual grassland, 1,000 acres of oak woodlands, 400 acres of seasonal and perennial wetlands, 180 acres of permanent and ephemeral streams, and 50-100 acres of upland riparian vegetation, in addition to small quantities of other vegetation types.

The uplands are known to support raptors such as golden eagle and other raptors. There is also habitat (e.g. riparian, upland, stream, and wetland) that could support special status species including the listed valley elderberry longhorn beetle, red-legged frog, and several rare plants are potentially present within the impact area.

Reclamation has proposed surveys to occur at some point in the future when access is possible. Much of the area has been infrequently examined in the past for lack of access. In the absence of species-specific survey data, Reclamation has proposed avoidance measures. The Service looks forward to working with Reclamation so that appropriate resource protection measures can be identified. Reclamation has also identified the need for compensatory mitigation, because most of the losses cannot be avoided, and has proposed mitigation in terms of a ratio commitment (2:1 or 1:1, depending on the habitat) and a listing of various forms (banks, restoration, conservation). The Service recommends that Reclamation provide greater specificity by identifying the locations of potential mitigation lands or banks for each of the habitat types for which mitigation is proposed.

There are some significant differences between alternatives. Specifically, Alternative 2 would impact a modestly smaller area of grasslands, but a significantly larger area of woodlands, riparian, and wetland, due to the impacts of the perimeter road and extension of the pipeline to the Sacramento River.

Diversions

In general, whenever water diversions occur, there will be an associated loss of food organisms and sediment, incidental mortality of fish at the intake screen(s), and lower survival due to lower flows and related mechanisms (predation exposure, less inundated edge cover, less food production, less suspended sediment). Bypass flow criteria can limit, but cannot entirely avoid this impact.

The proposed project would allow diversion of water to Sites Reservoir whenever flow at Wilkins Slough was at least 5,000 cfs (8,000 cfs in April/May). This bypass flow criterion may not adequately protect downstream migrating salmonids, including the winter-run Chinook salmon, threatened Central Valley Spring-Run Chinook Salmon, threatened Central Valley Steelhead Trout, and Central Valley Fall/Late Fall-Run Chinook Salmon (no Federal status). Chapter 11 and Appendix 11P, as well as materials presented by Reclamation at an April 9, 2021 workshop cite recently published materials about juvenile survival-flow relationships in the Sacramento River (Michel, C., J. Notch, F. Cordoleani, A. Ammann, and E. Danner. 2021. Nonlinear survival of imperiled fish informs managed flows in a highly modified river. Ecosphere. DOI: 10.1002/ecs2.3498). The analysis provided by Michel et al. (2021) indicates juvenile survival decreases dramatically when flows decrease below approximately 11,000 cfs at Wilkins Slough. Chapter 5 indicates the project would reduce flows by 2-11% in critically dry years with lesser reductions in wet years. Because monthly average flows are always below 11,000 cfs in critically dry years, and from May-November of wet years (Table 5-16, Chapter 5), this reduced flow will affect survival. This effect would depend on run and migration timing; although much salmonid movement occurs in April and May, it may also occur earlier, or later, and will vary between years. In June-October of critically dry years, project operation would increase flows at this location because Sites water is being used in lieu of GCID diversion from the river; this may benefit survival of winter-run Chinook salmon which are rearing in the river at this time.

According to the tables in Chapter 5 provided, increased November-May diversions at RBDD to fill Sites would lower flows by 1-9% during critically dry years, which would increase any diversion-associated mortality of affected juvenile fish and loss of rearing habitat. Chapter 11 uses Weighted Usable Area (WUA), to conclude that rearing conditions improve with reduced flows; this is likely a consequence of the habitat suitability curves that show a preference of salmonid fry/juveniles for lower velocity. However, diverting flow can have other effects on habitat volume and available food that are likely more limiting, and not apparent in WUA calculations. Flows differences at Bend Bridge are more limited, as this is upstream of this diversion, but also as much as 1-9% lower in critically dry years and 1-4% lower in wet years.

In addition to anadromous salmonids, the Project may adversely affect other fish in the Sacramento River. For example, white sturgeon spawning in the Sacramento River is generally not seen under Colusa (north of Wilkins Slough) flows of 6,400 cfs, and the fish have been known to stop spawning and drift downstream under 5,300 cfs. Since adults migrate in the winter and spawn in the early spring, and diversions occur whenever flow at Wilkins Slough exceeds 5,000 cfs, its movement could be affected by the project. The conclusion of no impact based on long term averages above 7,500 cfs during sturgeon migration appears incorrect (Chapter 11, p. 11-218). Long term average monthly critically dry flows during the migration season are generally above 7,500 cfs and would be sufficient for migration if this threshold occurred at all times in every year, however, this average may include years, months or days, of lower flow where diversion could coax the sturgeon into spawning less frequently. Since sturgeon have natural mortality and fishing related mortality during each year of life, lower frequency spawning may have implications for population dynamics.

Delta Outflow/Export

Water diversions from the Sacramento River can affect flows into and out of the Delta. Currently, winter diversion at RBDD/GCID is very limited because irrigation water is not widely needed during this naturally cold and wet time of year. With the project, November-May diversions would increase at RBDD in critically dry years (157-465 cfs, depending on month/alternative), and much more in wet years (up to 1,205 and 494 cfs at RBDD and GCID, respectively; Tables 5-13 and 5-15, Chapter 5). This coincides with a 2-8% reduction in Delta outflow with the project in critically dry years, the combined effect of increased diversion and the tail end of project-related south Delta exports (Tables 5-27 and 5-28; Chapter 5). Information elsewhere in the document collates the data in other ways to suggest there is little effect on exports (i.e., Chapter 11; Table exportss.1; mean March-May south Delta exports; 0-1% differences; all years), or increase Delta outflow (Chapter 11; Table outflowjulsep1; July-September Delta outflow increases with project 1-9%, all years). This suggests the project will have a limited effect on delta smelt and other fishes. A similar timing-based analysis indicates that proposed changes to Old and Middle River (OMR) negative flows do not affect delta smelt. Outflows are reduced and OMR flows are projected to become more negative in July - September with the project, and may affect fish other than delta smelt, that are present in the South Delta at that time.

Simulations in the materials provided indicate a reduction in winter Delta outflow due to project operations that would move X2 east by a 0.3-0.5 km in January-March of critically dry years. This could affect estuarine fish, and Reclamation has proposed 11-15 acres of tidal habitat restoration to compensate for such effects on longfin smelt. The 1-5% increase in July-September Delta outflow noted above could move X2 west by 0.3-1.3 km in July-October of critically dry years. This could incrementally improve Delta conditions related to outflow and position of X2, specifically through food web and other habitat attribute enhancements that are a function of these parameters. The largest project effects are in July-September, corresponding to 23-42% increases in Delta exports. We expect these increased exports to have commensurate increased losses of fish associated with screens and predation at export facilities.

Pulse Flows

Pulse flows on the Sacramento River can produce important ecological benefits. The proposed pulse flow protection consists of halting diversions for 7 days when tributary flows exceed 2,500 cfs, but with limitations for another one contingent on the Sacramento River or tributaries falling below 7,500 or 2,500 cfs, respectively, for seven consecutive days. Language in Chapter 2 suggests that this measure relies on the general concept that natural pulses stimulate juvenile fish to move downstream but this is not a precise relationship. Longer and/or more frequent flows may be necessary to protect downstream-migrating juvenile salmonids. The Service looks forward to working with Reclamation to help identify pulse flows that are of sufficient size and duration to protect downstream-migrating juvenile salmonids and to cue upstream migrations of salmonids, sturgeon, and other native fishes.

Exchange Effects - Folsom/Oroville storage and release

The CVP and SWP have coordinated operations such that if storage is being conserved in one reservoir, other reservoirs may be called upon to make up differences in river flows. We use the term exchange effects to describe this coordinated operation of Central Valley reservoirs. The project could reduce Folsom storage by as much as 3-6%, and Oroville storage by 1-3%, in August of critically dry years, conditions when both of these reservoirs are relatively low. Reduced storage could potentially affect coldwater reserves and raise temperature of releases to the American or Feather Rivers. With the project, American River flows could increase or decrease, depending on month (-15 to +20%, critically dry years). Feather River flows at the mouth could also change by similar amounts (-14 to + 25%, June-October, critically dry years). Far field analyses in Chapter 11 indicated that such differences could cause redd dewatering of fall-run Chinook salmon redds in the American River and the high flow channel of the Feather River in critically dry years. Chapter 11 also suggested that project-caused flow variations between months may cause juvenile stranding and loss of rearing habitat. Limited time did not permit a thorough evaluation, however, the information provided to us supports the need for a careful further examination of effects of exchanges on other systems, particularly for critically dry water years when reservoir storage is already low.

Cumulative Impacts/Other Projects

Chapter 31 includes a long list of other projects, including several large infrastructure/development projects for diversion and additional storage via dam raises at various locations (e.g., Delta Conveyance Project; Shasta Lake, San Luis, Pacheco dam raises). The extent to which any of these could offer similar benefits to the proposed project, or are higher priority than the proposed project, is not described. We recommend that Reclamation consider the benefits of these other projects, how they would interact with the proposed project, and explain the sequence of construction/completion relative to the proposed project.

The Service appreciates the opportunity to participate in planning for the NODOS project. If you have any questions about this PAM, contact Steven Schoenberg of my staff at Steven_Schoenberg@fws.gov.

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Preliminary Evaluation of the Planning Aid Memorandum Technical Memorandum

To:	Alicia Forsythe, Sites Project Authority
CC:	John Spranza, Sites Integration Laurie Warner-Herson, Sites Integration
Date:	July 14, 2022
From:	ICF
Quality Review:	Mike Hendrick (ICF)
Authority Agent Review:	N/A
Subject:	Preliminary Evaluation of the Planning Aid Memorandum

1.0 Purpose

This memorandum presents a preliminary evaluation of the August 5, 2021, Planning Aid Memorandum (PAM) provided by the U.S. Fish and Wildlife Service (USFWS) to the Bureau of Reclamation (Reclamation) for the Sites Reservoir Project (Project). The purpose of the PAM was to provide Reclamation with the USFWS's comments and recommendations regarding the Project's potential effects on biological resources for consideration in project planning and preparation of a public revised draft environmental document. The PAM was prepared under the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq*.). The Fish and Wildlife Coordination Act requires federal agencies proposing water resource development projects or involved in issuance of related permits or licenses to consult with the USFWS and provide equal consideration to the conservation, rehabilitation, and enhancement of fish and wildlife resources with other project purposes.

The PAM summarized early coordination between USFWS and Reclamation regarding potential effects of the proposed Project. It provided a high-level description of the Project and USFWS's views of potential effects of the inundation of upland habitat (i.e., upland effects), increased diversions of Sacramento River water (i.e., in-river effects), and cumulative impacts associated with implementation of other projects. The PAM also summarized information and early analysis of effects provided to the USFWS by Reclamation and identified areas and concerns where the USFWS indicated that more information or analysis was needed.

The key concerns identified in the PAM are categorized as upland effects (Section 2.0), in-river effects (Section 3.0), and cumulative impacts (Section 4.0). Responses summarizing how each key concern was addressed are provided herein. The Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement (RDEIR/SDEIS) released in November 2021 contained much of the information to address these key concerns (Sites Project Authority and Bureau of Reclamation 2021). The PAM was developed based on the USFWS's review of the first administrative draft of the RDEIR/SDEIS and there were several substantive changes that occurred between the administrative draft and the publicly released RDEIR/SDEIS, which are explained below. In addition, subsequent analysis that has been developed to date in preparation of responses to public comments on the RDEIR/SDEIS and for the development of related permitting processes was also used to address the key concerns.

It is important to note that the analysis of the comments on the RDEIR/SDEIS, the response to those comments, and the preparation of the Final EIR/EIS are ongoing. The Authority has recently changed the Project's diversion criteria and has worked with Reclamation since the issuance of the RDEIR/SDEIS to enhance the Project's anadromous species benefits, especially as reflected in the modeling framework. In addition, the Authority has moved from Alternative 1 as its Preferred Project for the purposes of the California Environmental Quality Act compliance to Alternative 3. Revised modeling is underway to reflect these adjustments and once modeling is completed, the Authority and Reclamation look forward to discussing the results and revisions to subsequent species analysis with the USFWS, National Marine Fisheries Service [NMFS], and the California Department of Fish and Wildlife [CDFW]. Therefore, the information and responses in this memorandum may change as these enhanced species protections and species benefits are incorporated into the Project.

2.0 Upland Effects

Key Concern: Provide greater specificity regarding potential mitigation lands or banks for each of the habitat types for which mitigation is proposed.

Response: Given the size of the Project, the Sites Project Authority (Authority) will rely on several mitigation strategies including a mix of mitigation banks and other mitigation mechanisms. The Project's Mitigation and Monitoring Plan (Plan) is under development and will be provided to the USFWS as part of the Project's Biological Assessment (anticipated summer 2022) and Final EIR/EIS (anticipated early 2023). The Plan includes a comprehensive mitigation planning strategy, implementation approach and general criteria for species and habitats based on anticipated Project impacts on regulated biological resources. As access is currently limited to less than 1% of the Project Area, a final analysis of impacts will be conducted once land access is obtained and following the final refinements of Project design and completion of on-the-ground, protocol-level biological field surveys.

Following completion of Project construction, temporary impacts will be mitigated through restoration and revegetation of areas disturbed by construction in accordance with an approved habitat restoration plan. Permanent impacts will be mitigated on site and at agency-approved (USFWS, NMFS, and/or CDFW) offsite locations. Onsite compensatory mitigation may include restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or preservation of aquatic or terrestrial biological resources that occur within the proposed Project area. Offsite compensatory mitigation for the proposed Project may include the purchase of agency-approved mitigation/conservation bank credits, the establishment of third party-responsible "turn-key" mitigation/conservation bank projects, preservation of biological resources through conservation easements with private landowners, payments to in-lieu fee programs, or the establishment of permittee-responsible offsite mitigation sites. The methods for assessing resources in the project footprint, best management practices to be applied, tools available for mitigating effects of the Project are discusses in chapters 9 – *Vegetation and Wetland Resources*, and 10 – *Wildlife Resources* of the RDEIR/SDEIS.

The Authority has conferred with USFWS about species habitat models and used this information to estimate mitigation obligations. The Authority expects to continue to work with USFWS and Reclamation as the Project moves forward and better information becomes available to define mitigation requirements.

Key Concern: Provide a better description of how increases in Incremental Level 4 refuge water will be provided and the expected benefit to migratory birds.

Response: Providing Incremental Level 4 refuge water is an environmental benefit of the Project recognized by the California Water Commission in its authorization of State funding from the Water Storage Investment Program (WSIP). The Authority envisions that CDFW will take an active role in managing the ecosystem water and the Authority would work with CDFW to schedule and adjust releases of ecosystem water to address real-time conditions and needs. The Authority also recognizes that Incremental Level 4 refuge water would be made available to federal refuges north and south of the Sacramento–San Joaquin Delta (Delta) and as such, expects that it would provide Incremental Level 4 water to appropriate destinations based on guidance from, and coordination with the CDFW, USFWS, and Reclamation. The Authority understands that Reclamation and CDFW have an existing methodology to allocate Incremental Level 4 refuge water to the National Wildlife Refuges, State Wildlife Areas, and privately managed wetlands included in Central Valley Project Improvement Act Refuge Water Supply Program. The Authority anticipates that CDFW and Reclamation would allocate the Incremental Level 4 refuge water that results from the Project in the same way they allocate all Incremental Level 4 refuge water.

Table 1 below is from the Authority's *Water Storage Investment Program: Sites Reservoir Project Continuing Eligibility and Feasibility Determination* report (Authority 2021). It identifies the Project's Incremental Level 4 refuge water supply benefits in terms of water supply increases to National Wildlife Refuges, State Wildlife Areas, and privately managed wetlands projected in 2030 and 2070 as estimated based on WSIP Unit Water Values. Incremental Level 4 represents the additional increment of water required for optimal wetland habitat development on the National Wildlife Refuges, State Wildlife Areas, and privately managed wetlands included in Central Valley Project Improvement Act Refuge Water Supply Program. The benefits to migratory birds of Incremental Level 4 refuge water supply were identified as part of the original foundational documents of the Central Valley Project Improvement Act and differ for each individual National Wildlife Refuge, State Wildlife Area, and privately managed wetland.

Table 1. Sites Reservoir Project Incremental Level 4 Refuge Water Supply Increases (2030 and 2070) (TAF/year)

Period	North-of-the-Delta	South-of-the-Delta [b]	Total
2030 Results			
Long-Term Average [a]	5	11	17
Wet	0	0	0
Above Normal	9	5	14
Below Normal	9	13	22
Dry	8	27	34
Critical	6	17	23
2070 Results			
Long-Term Average [a]	5	10	15
Wet	0	0	0
Above Normal	9	1	10
Below Normal	7	8	16
Dry	7	10	17
Critical	6	21	27

Source: CALSIM II.

Notes:
(a) Average weighted based on water-year frequency rates
(b) Includes both San Joaquin and Tulare Lake Refuge deliveries and based on San Joaquin Valley 60-20-20 Index Year Class.
TAF = thousand acre-feet

Key Concern: More thorough analysis is needed of geomorphic effects of flow reduction in the higher flow range on habitat (cut bank formation, cottonwood seed dispersion/regeneration processes, wood transport) and the sensitive species that use it (e.g., bank swallows, yellow-billed cuckoo).

Response: The SRH-Meander model results presented in the RDEIR/SDEIS (Chapter 7 – *Fluvial Geomorphology*) suggested that the tendency for meander is not significant among the Project alternatives and the No Action Alternative (NAA). The river meandering, bank erosion, and deposition modeling concluded that there were no significant differences in the channel alignments between existing conditions and the modeled alternatives. Thus, operational impacts on the geomorphic regime (including natural river geomorphic processes such as sediment transport and bank erosion) and existing river geomorphic characteristics (e.g., sinuosity, channel gradient, substrate composition, channel width and depth, and riparian vegetation) of the greater Sacramento River system are expected to be minimal, and consequently, impacts on sensitive species would be negligible or minimal as well. The Authority will review these results with USFWS and Reclamation to determine whether additional analysis is warranted, or additional considerations will be added to the monitoring and adaptive management plans or the Project description.

Key Concern: Additional review may be needed of the resource protection measures identified for habitats (e.g., riparian, upland, stream, and wetland) that could support special-status species including the listed valley elderberry longhorn beetle, red-legged frog, and several rare plants, which are potentially present within the impact area.

Response: As stated above, verification of species' presence and habitat suitability has been limited by lack of access to lands that would be affected by the Project. Potential wildlife resources in the study area were evaluated by reviewing existing information and identifying potentially suitable habitat with geographic information system modeling. Sources of information and modeling techniques are summarized in Chapter 10, *Wildlife Resources*, of the RDEIR/SDEIS. The Authority will continue to work with Reclamation, USFWS, NMFS, CDFW, and other regulatory agencies to review these results and discuss the resource protection measures, including avoidance and minimization measures. These efforts have been ongoing for some time for aquatic species with more limited discussion on terrestrial species. The Authority with Reclamation would like to engage in more detailed discussion of these concerns with regard to terrestrial species.

3.0 In-River Effects

Key Concern: Provide a better demonstration of temperature benefit expected from opportunities to increase storage in Shasta Reservoir.

Response: In coordination with Reclamation, text was developed to expand the discussion of fisheries benefits related to increased operational flexibility associated with Shasta Reservoir. This text was developed after issuance of the PAM and was included in Chapter 2, *Project Description and Alternatives*, of the RDEIR/SDEIS. Additional water supply from Sites Reservoir would provide opportunities for improved management of salmonid habitat, particularly in the Sacramento River above Red Bluff Diversion Dam. By exchanging Sites Reservoir water for Central Valley Project (CVP) water, Reclamation has an additional tool to maintain and improve habitat for salmonid spawning, incubation, rearing, and migration. By delivering water to CVP contractors from Sites Reservoir, Reclamation may maintain supply in Shasta Reservoir. Maintenance of supply can then be allocated in real-time management scenarios to uses that protect and enhance anadromous fish benefits, including protecting and enhancing the cold-water pool, which is essential for temperature control in the salmonid spawning reaches below Keswick Dam during Dry and Critically Dry Water Years. Increased storage may provide benefits beyond temperature such as providing a resource for maintaining fall flows to sustain spawning redds that persist in the wetted margins of the Sacramento River. In years when storm events are weak and naturally-occurring pulse flows are minimal, this maintenance of supply could be used to manufacture a spring pulse flow to assist juvenile salmonids in completing their migration from the upper Sacramento River to the Delta and ultimately the Pacific Ocean. The Authority is working with Reclamation to assess and enhance fisheries benefits associated with Reclamation's participation for the multiple objectives related to increased Shasta Reservoir storage.

The Project would also provide an additional capability to address expected changes in precipitation and runoff patterns anticipated to result from climate change (see Chapter 28 of the RDEIR/SDEIS). While long-term averages in precipitation are not expected to change, more precipitation is expected to fall as rain, resulting in a decreased snowpack and changes in runoff patterns. These changes will likely present challenges for future water management, including that for environmental benefits. The ability of the Project to capture and store water that cannot be captured and stored by Reclamation and to exchange water with Shasta Reservoir creates flexibility to provide environmental benefits to anadromous fish in the upper Sacramento River under climate change scenarios.

Key Concern: In general, whenever water diversions occur, there will be an associated loss of food organisms and sediment, incidental mortality of fish at the intake screen(s), and lower survival due to lower flows and related mechanisms (predation exposure, less inundated edge cover, less food production, less suspended sediment). Specific concerns expressed are as follows:

A. Flow criteria at Wilkins Slough (8,000 cfs [cubic feet per second] in April and May; 5,000 cfs in other months) is likely inadequate to protect downstream migrating salmon. Suggest consideration of Michel et al. (2021).

B. Need more thorough analysis of effects of habitat reduction on survival. Weighted usable area (WUA) curves do not disclose all effects associated with reduced flow.

C. Need more complete analysis of effects of flow reductions on sturgeon migration.

Response:

A. Wilkins Slough: In response to the concerns expressed in the PAM and the comments on the RDEIR/SDEIS from CDFW and others, the Authority increased the minimum bypass flow requirement at Wilkins Slough during October to June to 10,700 cfs (303 m^3/s), which is consistent with the step function identified to in Michel et al. (2021) for increased Chinook salmon survival in the Sacramento River. In summary, Michel et al. (2021) looked at the challenge of implementing functional flows to optimize ecosystem improvements given the limited resources. The minimum bypass flow at Wilkins Slough during September remains at 5,000 cfs. The Project will not be diverting water from June 15 to the end of August. Revisions have been made to the Project diversion criteria. These revisions are reflected in Table 2.

Table 2. Comparison of RDEIR/SDEIS and Revised Diversion Criteria

Location (Listed from North to South)	RDEIR/SDEIS with Mitigation Included	Revised and Expected in the Final EIR/EIS
Bend Bridge Pulse Protection	Protection of all qualified precipitation-generated pulse events (i.e., peaks in river flow rather than scheduled operational events) from October to May based on the detection of fish presence and migration during the beginning of the flow event. For each event where fish presence and migration is detected, diversions from the Sacramento River would cease for 7 days.	Similar except the following: (1) a qualified precipitation-generated pulse event is determined based on forecasted flows and (2) pulse protection may cease earlier than 7 days if flows at Bend Bridge exceed 29,000 cfs and Project diversions subtracted from Bend Bridge flows continue to be at least 25,000 cfs
Minimum Bypass Flows in the Sacramento River at the RBPP	3,250 cfs minimum bypass flow at all times; rate of diversion controlled by fish screen design	No change
Minimum Bypass Flows in the Sacramento River at the Hamilton City Pump Station	4,000 cfs minimum bypass flow at all times; rate of diversion controlled by fish screen design	No change
Minimum Bypass Flows in the Sacramento River at Wilkins Slough	10,700 cfs in March through May; 5,000 cfs all other times	10,700 cfs October through June; 5,000 cfs September (not diverting from June 15 to end of August)
Fremont Weir Notch Protections	No more than 1% reduction in flow over weir when spill over the weir are less than 600 cfs. No more than a 10% reduction in flow over weir when spills over the weir are between 600 cfs and 6,000 cfs. No restriction when flows over the weir are greater than 6,000 cfs	No longer included. Revised minimum bypass flows in the Sacramento River at Wilkins Slough and Bend Bridge Pulse Protection provide protections for Fremont Weir Notch
Freeport, Net Delta Outflow Index, X2, and Delta Water Quality	Operations consistent with all applicable laws, regulations, biological opinions and incidental take permits, and court orders in place at the time that diversion occurs	No change

Note: This table mimics Table 2-5 in the RDEIR/SDEIS and the Wilkins Slough flow requirements have been incorporated into the Project Description.

The Authority is working with Reclamation to revise the modeling and determination of effects of the Project's revised operations criteria on fisheries resources. The Authority is also in ongoing conversations with Reclamation, CDFW, NMFS, and USFWS to develop language to describe how these operational requirements will be implemented and develop the associated fish monitoring program.

A. Upstream habitat: The Authority agrees diverting flow can have effects on habitat volume and available food that are likely more limiting, and not apparent in WUA calculations. The WUA is derived from the CALSIM runs and as such the WUA's are based on monthly averages that may not accurately reflect real time operations. The analysis in Chapter 11, *Aquatic Biological Resources*, of the RDEIR/SDEIS considers factors such as temperature, flow, and the effects of flow reductions on side channel and floodplain habitats to support its impact determination of less than significant with mitigation for salmonids.

The Authority will revise the CALSIM analysis with the revised diversion criteria and enhanced anadromous fish benefits to reassess the effects on WUA in the Final EIR/EIS. During 2022, the Authority will work with Reclamation, USFWS, NMFS, and CDFW to review the revised modeling and related analyses to assess the adequacy of the analysis and work toward consensus on impact determinations and any measures needed to reduce impacts to less than significant levels (CEQA) and no adverse effects (NEPA).

B. Sturgeon: Shaffter (1997) reported spawning on white sturgeon in the Sacramento River at flows of about 6,500 to 6,640 cfs (184 to 188 m^3/s) after observing pulse of about 1,400 cfs (40 m^3/s) over base flow conditions. This reference appears to be the source for the concern. The Authority's decision to adopt a higher minimum bypass flow at Wilkins Slough and the Project's pulse flow protection measure would ensure the Project diversion do not cause flows to decline below those likely to influence sturgeon migration and spawning.

Key Concern: The relationship between pulses and fish movement is not a precise relationship. Longer and more frequent flows may be necessary to protect downstream-migrating juvenile salmon.

Response: The Project's pulse protection measure is intended to account for the importance of pulses in stimulating and providing for the redistribution of juvenile fish from their spawning grounds to downstream rearing areas and seaward migration (Poytress 2014, Steel 2020, Michel 2021, Hassrick 2022). The Authority recognizes that the precise relationship between flow pulses and fish movement is not known at this time. As such, the Authority intends to incorporate the pulse protection criteria, and strategies for evaluating the effectiveness of the criteria, into its adaptive management plan to address this uncertainty and continue to refine the criteria as the science and understanding of fish movement is better understood.

Key Concern: Need to address pulses as a mechanism to initiate/attract adult salmon and sturgeon up stream.

Response: As presented in the RDEIR/SDEIS, the Project is not expected to impede the upstream migration of adult salmon or sturgeon. The proposed pulse flow criteria ensure pulses are protected and propagate downstream. In addition, the revised minimum bypass flow requirement at Wilkins Slough ensures that Project operations do not diminish flows below levels which may interrupt or delay the upstream migration of sturgeon.

Key Concern: Provide a better explanation of effects and benefits of fall pulse flows into Yolo Bypass for plankton production and discussion of consequences of reduced flow into the bypass due to reduction in flows attributable to diversions at TCCA and GCID diversions.

Response: An analysis of the expected timing and benefit of the Yolo Bypass flow measure to stimulate food production and convey forage species to the north Delta for the benefit of delta smelt (*Hypomesus transpacificus*) and other planktivorous fish is presented in Chapter 11 - *Aquatic Biological Resources*, of the RDEIR/SDEIS. The benefit of this measure has been acknowledged by CDFW in the review of the Project during the California Water Commission's WSIP approval process. An analysis of the consequences of reduced flow into the Yolo Bypass due to reduction in flows attributable to diversions at TCCA and GCID diversions is provided in the section, *Impact FISH-2: Operations Effects on Winter-Run Chinook Salmon, Floodplain Inundation and Access,* in Chapter 11 - *Aquatic Biological Resources*, of the RDEIR/SDEIS, as well as in Appendix 11M. The analysis concludes that Sites diversions result in minor reductions in Yolo Bypass acreages inundated during the winter and spring, but that when the net effect of all differences between the NAA and Alternatives 1, 2, and 3 are examined, the differences are small and the effect on fish populations is expected to be minor.

Key Concern: Address expected increase in loss of fish at South Delta export facilities associated with July through September increases in Delta exports.

Response: The effect of moving Sites Reservoir water across the Delta to the Delta export facilities on the location of X2, flows in Old and Middle River, and expected loss at the export facilities are addressed in Chapter 11 - *Aquatic Biological Resources*, and Appendix 5B3, *Delta Operations*, of the RDEIR/SDEIS. The results of these analyses suggest there would be little difference in south Delta loss between the NAA and Alternatives 1, 2, and 3, primarily due to absence of juvenile ESA-listed fish in the Delta between July and September.

Key Concern: More thorough analysis may be needed of the effects of exchanges on spawning and rearing habitat in the American and Feather Rivers.

Response: The effects of Project operations on temperatures in the American and Feather Rivers are discussed in Chapter 11, *Aquatic Biological Resources*; Appendix 11B, *Upstream Fisheries Impact Assessment Quantitative Methods*; and Appendix 11D, *Fisheries Water Temperature Assessment*, of the RDEIR/SDEIS. The results indicate impacts from changes in temperatures are less than significant. The effects of Project operations on availability of spawning and rearing habitat in the American and Feather Rivers are also analyzed in Chapter 11 and Appendix 11K, *Weighted Usable Area Analysis*, of the RDEIR/SDEIS. The analysis suggests no significant differences between Alternatives 1, 2, and 3 and the NAA with respect to WUA. An analysis of the potential redd dewatering in the American and Feather Rivers was also conducted and discussed in Chapter 11. The results of that analysis suggested no significant differences among the alternatives and the NAA.

These analyses will be revised to reflect the revised diversion criteria and enhanced anadromous fish benefits in revised CALSIM and other model runs. Once the updated modeling is completed, the Authority will be available to present and discuss those results with Reclamation, USFWS, NMFS, CDFW and the other regulatory agencies.

4.0 Cumulative Impacts with Other Projects

Key Concern: Reclamation should consider the benefits of these other projects, how they would interact with the Project, and explain the sequence of construction/completion relative to the Project.

Response: The Authority understands the interest in exploring how the Project may operate in conjunction with other projects such as the revised Delta Conveyance Project and the Shasta Raise Project. However, these projects are presently not sufficiently developed to assess how they would be constructed and operated, and any analysis of cumulative effects would be speculative. The Authority thinks adding speculative results to the cumulative effects analysis could be misleading; therefore, it does not plan to pursue such an analysis. For additional details, refer to Chapter 31, *Cumulative Impacts*, in the RDEIR/SDEIS. Chapter 31 states "The cumulative analysis is primarily qualitative. The cumulative analysis qualitatively addresses projects listed in Table 31-1, such as Delta Conveyance Project. For many of the projects in Table 31-1 it would be speculative to define multiple parameters and assumptions within a numerical modeling effort."

5.0 References

Hassrick, J.L., A.J. Ammann, R.W. Perry, S.N. John, and M.E. Daniels, 2022. Factors affecting spatiotemporal variation in survival of endangered winter-run Chinook salmon out-migrating from the Sacramento River. N. Am. J. of Fish. Man. https://doi.org/10.1002/NAFM.10748

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Poytress, W. R., J. J. Gruber, F. D. Carrillo, and S. D. Voss. 2014. *Compendium Report of Red Bluff Diversion Dam Rotary Screw Trap Juvenile Anadromous Fish Production Indices for Years 2002–2012*. Prepared for California Department of Fish and Wildlife Ecosystem Restoration Program and the U.S. Bureau of Reclamation. July. U.S. Fish and Wildlife Service, Red Bluff, CA.

Schaffter, R. G. 1997. White Sturgeon spawning migrations and location of spawning habitat in the Sacramento River, California. Calif Fish Game 83(1):1-20.

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Steel, A.E., Anderson, J.J., Mulvey, B., & Smith, D.L. (2020). Applying the mean free-path length model to juvenile Chinook salmon migrating in the Sacramento River, California. Environmental Biology of Fishes, 103, 1603-1617. https://doi.org/10.1007/s10641-020-01046-8

From: Alicia Forsythe [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A6CDF06A7E904B65BAA21702A82AD329-AFORSYTHE]
Sent: 8/24/2022 11:57:15 AM
To: Angela Bezzone [bezzone@mbkengineers.com]
Subject: FW: WSIP Cumulative Flow Study

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Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

hdrinc.com/follow-us

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Sent: Tuesday, August 9, 2022 6:22 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Heydinger, Erin <erin.heydinger@hdrinc.com>
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Department of Water Resources

530 902-7588

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Sent: 8/24/2022 12:24:27 PM
To: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: RE: WSIP Cumulative Flow Study

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530 902-7588

From: Diane Livia [dianelivia@sbcglobal.net]
Sent: 8/24/2022 1:37:42 PM
To: Sites Project [info@sitesproject.org]
Subject: Re: InSITES: We Need To #BuildSitesNow

We need to vastly reduce diversions from the Delta, first. We don't need new infrastructure. We need to quit delivering cheap water to billionaire farmers.

****

Diane Livia
6445 Colby St.
Oakland, CA 94618
510-290-5295

On Wednesday, August 24, 2022 at 10:58:57 AM PDT, Sites Project Authority <info@sitesproject.org> wrote:

View this email in your browser

WE NEED TO #BUILDSITESNOW

Over the past few months, Sites Reservoir has been diligently working on building momentum for the project. As made evident by Governor Newsom at his press conference where he announced his new water-supply strategy for California, we are running out of time to take action against the severe drought conditions. The governor's strategy lays out a series of actions aimed at preparing the state for an estimated 10% decrease in California's water supply by 2040 because of higher temperatures and decreased runoff. The plan focuses on accelerating infrastructure projects (such as Sites Reservoir), boosting conservation, and upgrading the state's water system to match the increasing pace of climate change, securing enough water for an estimated 8.4 million households.

With crushing drought conditions upon us, it is all the more evident that we need Sites Reservoir to create a more resilient water supply for California. Sites is the modern, smart, 21st century storage future generations

need to get through the next century.

PUBLICCEO

California's Top News For Local Government Leaders

OP-ED: CALIFORNIA NEEDS SITES RESERVOIR

BY JEFF HARRIS, COUNCIL MEMBER, CITY OF SACRAMENTO

“In the face of crushing drought conditions, the need for Sites is clearer than ever. Our cities, farms and environment will depend on this important water savings account for years to come—let’s build Sites now.”

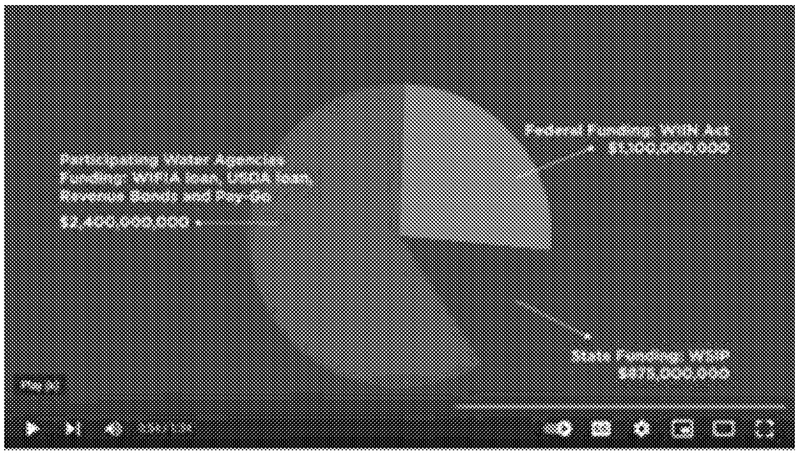
AgAlert

COMMENTARY: SITES AUTHORITY CLOSING IN ON FULFILLING WATER PROMISE

BY FRITZ DURST, SITES AUTHORITY BOARD CHAIRMAN

"We are fortunate to live in a portion of the nation capable of producing more than a third of the country's vegetables and two-thirds of the country's fruits and nuts. However, impacts of a changing climate, including less snowpack and extreme drought like the one we are in today…it isn't the only solution, but it's an important part. We need an all-of-the-above approach. Sites is the modern, smart type of water storage we need to get through the next century."

SITES: A PUBLICLY FUNDED PROJECT



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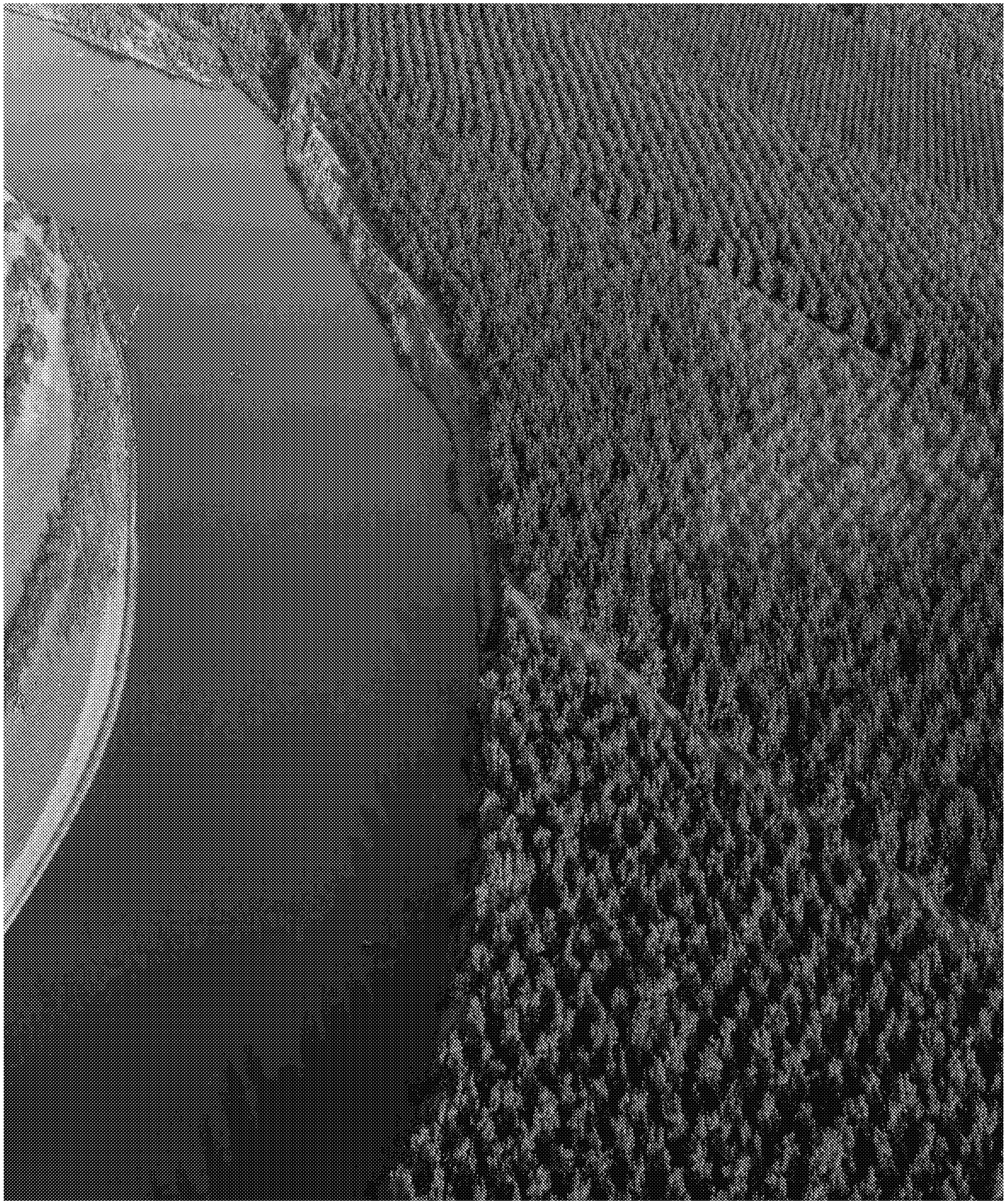

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We Grow California Podcast

Fore-Sites or Hind-Sites?
Sites Project Authority Chairman Fritz Durst discusses the past, present and future of Sites Reservoir.

Sites in the News

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- California Farm Bureau Ag Alert: Farm Bureau board advocates on issues

Environment:

- San Jose Mercury-News: Here's how low California's reservoirs are and what to expect in the future
- Sacramento Bee: California could lose 10% of its water. Gavin Newsom offers new drought, water blueprint

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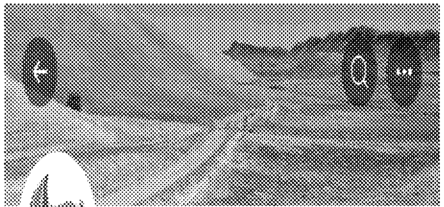

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Innovative and modern water storage project that secures long-term water sustainability and benefits CA's economy and environment now and into the future

Maxwell, CA sitesproject.org

Joined October 2016

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2021 was a significant year for Sites Reservoir:

✅We launched the RDEIR/SDEIS and began the public comment process
✅Received additional financial commitments from the federal government

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In addition to providing new water supplies for the environment, farms and people during dry years, Sites Reservoir also provides critical floo... See More

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From: Fred Rinne [fredrinne@yahoo.com]
Sent: 8/24/2022 5:25:57 PM
To: Sites Project [info@sitesproject.org]
Subject: Re: InSITES: We Need To #BuildSitesNow

Sites Reservoir is public water for private profit. FUCK THE SITES DAM!

On Wednesday, August 24, 2022, 10:58:54 AM PDT, Sites Project Authority <info@sitesproject.org> wrote:

View this email in your browser

WE NEED TO #BUILDSITESNOW

Over the past few months, Sites Reservoir has been diligently working on building momentum for the project. As made evident by Governor Newsom at his press conference where he announced his new water-supply strategy for California, we are running out of time to take action against the severe drought conditions. The governor's strategy lays out a series of actions aimed at preparing the state for an estimated 10% decrease in California's water supply by 2040 because of higher temperatures and decreased runoff. The plan focuses on accelerating infrastructure projects (such as Sites Reservoir), boosting conservation, and upgrading the state's water system to match the increasing pace of climate change, securing enough water for an estimated 8.4 million households.

With crushing drought conditions upon us, it is all the more evident that we need Sites Reservoir to create a more resilient water supply for California. Sites is the modern, smart, 21st century storage future generations
need to get through the next century.

PUBLICCEO California's Top News For Local Government Leaders

OP-ED: CALIFORNIA NEEDS SITES RESERVOIR

BY JEFF HARRIS, COUNCIL MEMBER, CITY OF SACRAMENTO

“In the face of crushing drought conditions, the need for Sites is clearer than ever. Our cities, farms and environment will depend on this important water savings account for years to come—let’s build Sites now.”

AgAlert

COMMENTARY: SITES AUTHORITY CLOSING IN ON FULFILLING WATER PROMISE

BY FRITZ DURST, SITES AUTHORITY BOARD CHAIRMAN

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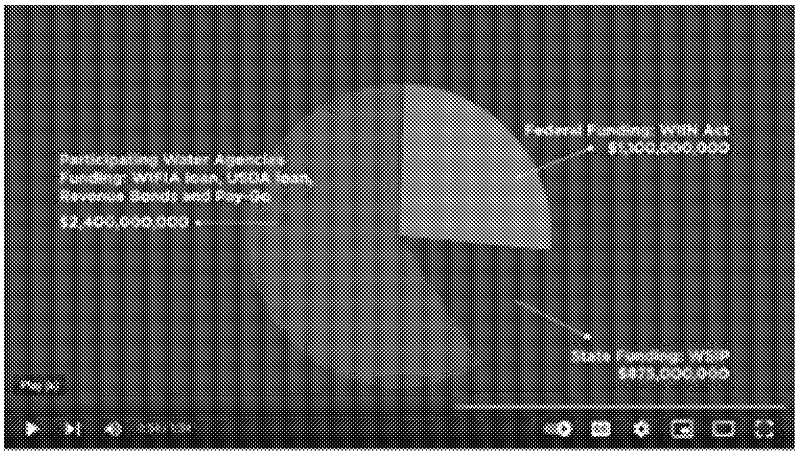

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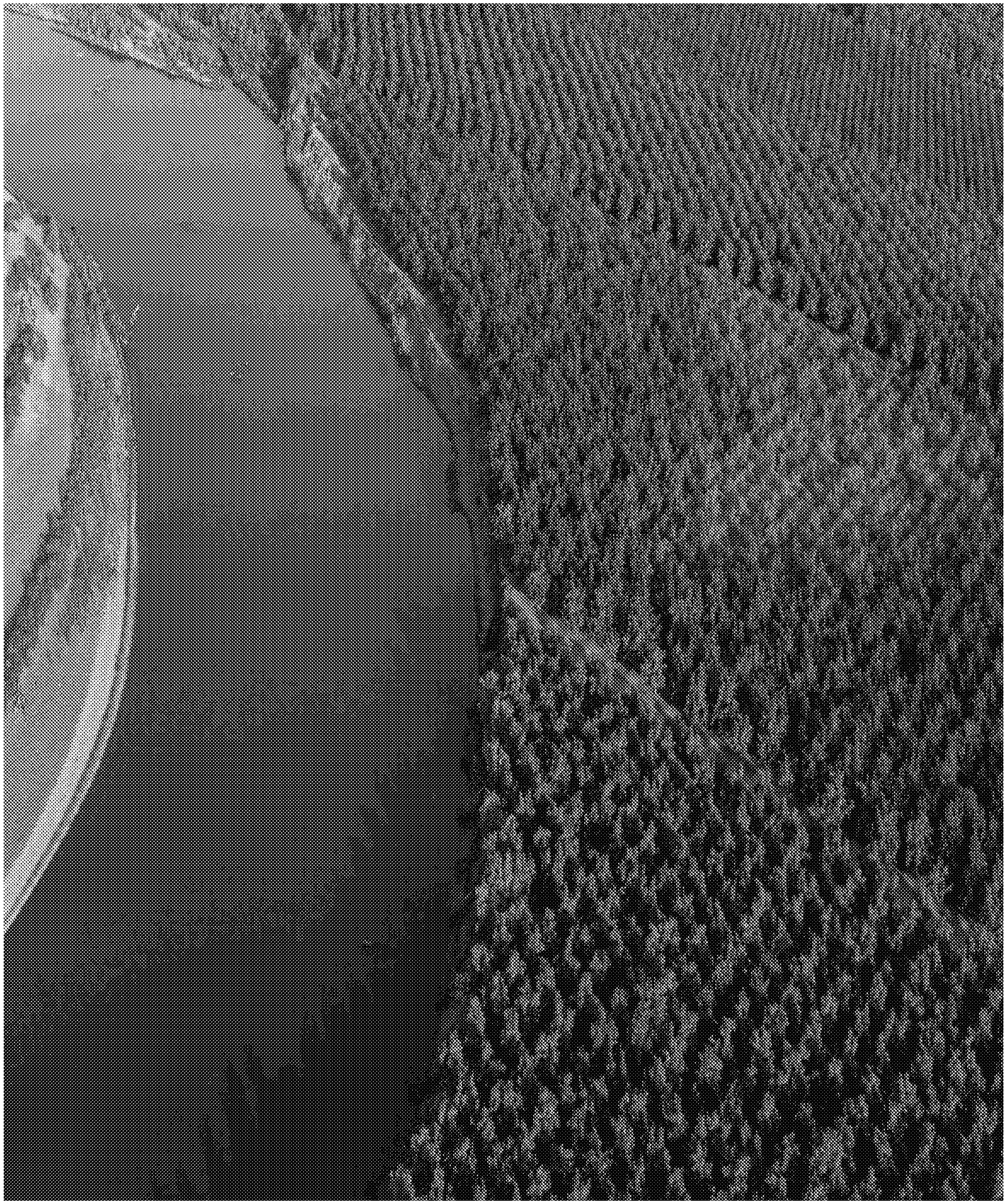

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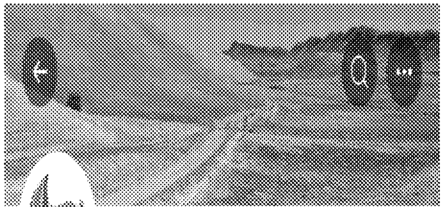

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Nov 23, 2021 ·

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Sites Reservoir Project – Trinity River Discussions
August 23, 2022

Humboldt County Proposed Term:

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 Protect 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 right petitions.

Possible Revised Term Version 4[i]:

The Sites Project shall not divert Trinity River water (water diverted by the Bureau of Reclamation from the Trinity River watershed into the Sacramento River watershed pursuant to its water rights) to storage in Sites Reservoir under this Permit unless the Trinity River water is abandoned in the Sacramento River and all other diversion criteria in this Permit are met.

Furthermore, the Sites Project diversions shall not negatively impact Trinity River obligations of the Bureau of Reclamation, including but not limited to those obligations specified in the 1959 Contract between the United States and Humboldt County, the Trinity River Mainstem Fishery Restoration Record of Decision, and the Long-Term Plan to Protect Adult Salmon in the Lower Klamath River, and related obligations in the Bureau of Reclamation's water right permits 11966, 11967, 11968, 11969, 11970, 11971, 11972, and 11973.

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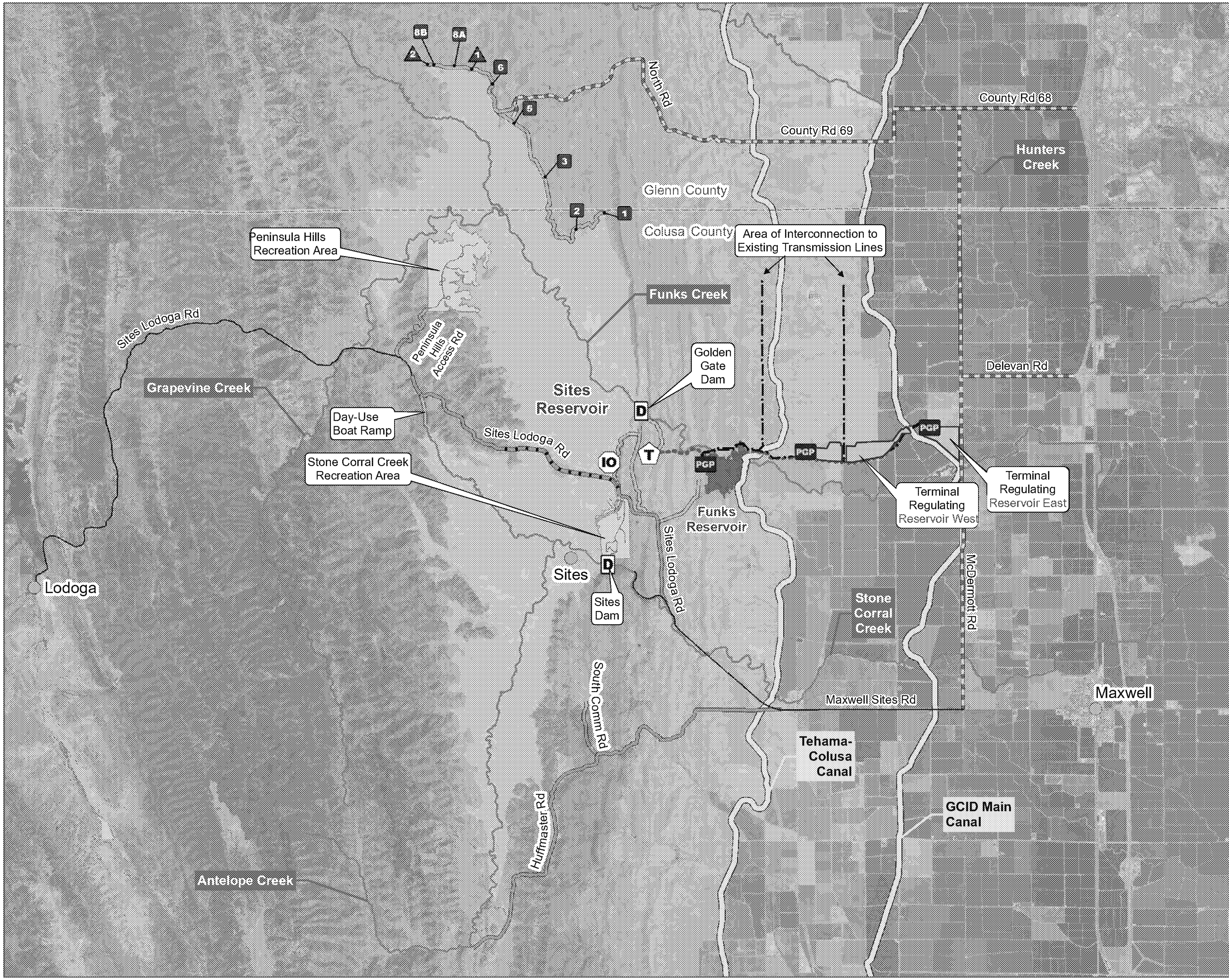
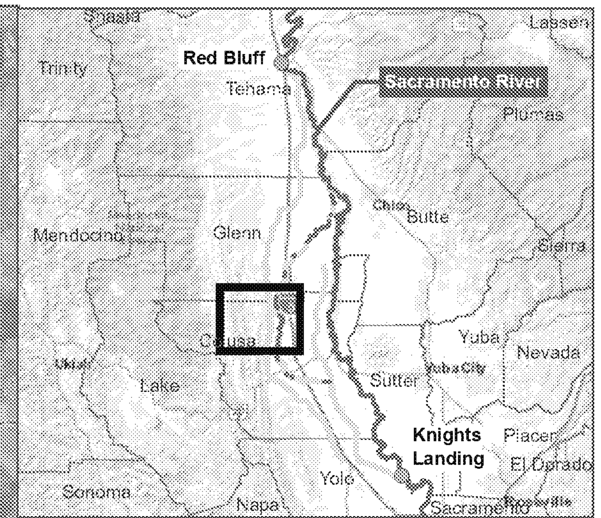
[i] The Sites Authority Board has not reviewed or approved this possible revised term. Staff has provided this language for discussion purposes only.





City/Town/Community
Canal
Existing Roads
Creek\Slough

Project Features

- Inundation Area (1.5 MAF)
- Underground Pipeline (total of 4)
- Access Roads
- Road Improvements
- Road Realignment
- Transmission Line
- Day-Use Boat Ramp
- Recreation Areas
- D Main Dam
- IO Inlet\Outlet Tower
- T Transition Manifold
- PGP Pumping Generating Plant
- Saddle Dikes (total of 2)
- 1 Saddle Dams (total of 7; 8B includes spillway)
- Bridge with Prism Fill

DATA SOURCES: Inlet/Outlet Tower and PGP - ICF, 2020; City\Town - GNIS, 2020; Project Features - AECOM, 2020; Canal, River and Creek/Slough (NHD) - USGS, 2018; Aerial Imagery (NAIP) - USDA, 2020; Counties - CALFIRE-FRAP, 2019.

DISCLAIMER: This exhibit is preliminary and is subject to change.

MAP DATE: 7/9/2021

ATTACHMENT A

TERMINAL REGULATING RESERVOIR SITING

N

0 1 2
MILES

Sites

PATH: \\PDCCITRDSGIS1\PROJECTS_1\SITES_PA\00528_20\FIGURES\DOC\EIR\S\1_DEIR\01_ADEIR\CHAPTER2\FIG2-1_ALT1_3_REGRESERVOIRS_CONV.MXD - USER: 24991 - DATE: 7/9/2021

Sites Reservoir Project
Colusa-Glenn Landowner Meeting
8.16.22

Questions & Comments

- Can you point out old town of Sites?
- I presume you'll pay back the federal loans by water usage?
- What kind of price will you put on the water? ($720/AF)
- Can the individual property owners (participants) retain water rights? (this will be something subject to negotiation)
- Governor Newsom is talking about a pipeline under Delta? Won't that affect this project? Isn't it the same water? You're going to be fighting for the same water. (Delta tunnel relying on existing water rights; Sites would be a new water right based upon all other requirements/water rights being met; Sites is independent of what's happening with tunnel)
- But you're only going to dam up 1.5 AF? (size of reservoir not actually a function of how much water we can produce; divert up to 300K AF; will take 5 years to fill it)
- Does anyone get any compensation for storm runoff that doesn't go into reservoir? (Yes, the county and Sites have entered into MOU and water will remain within the counties)
- How big is this going to be compared to Oroville and Shasta? (7th largest in state))
- The first thing you need to do is put fences up around where you're going to be working. (concerns with interaction with cattle; won't be starting that until late 2024); can't just leave gates open (all of this work will be coordinated with landowners; develop a work plan to avoid your operations as much as possible)
- If you go in and tear up things for the dams and you quit, will you go back in and restore it? (getting ahead to construction; authority would restore areas impacted by construction)
- You guys will replace fences? Have you decided if 100 foot is still the setback? (assumption in EIR, but will be determined on a property by property basis and we're flexible; Oroville is on-stream, so the setback requirements are different)
- Is there going to be recreation, like paid boating? Revenue from recreation? (preliminary plans include two boat ramps, but still a lot of planning to be done)
- Will East Park Reservoir be a part of this? (no, it's separate)
- Construction starts in 2024, but it won't be up and running for six years? (correct)
- All these kids come down from Ladoga. If you start construction on dams before you build a bridge, that's a problem. (One of the first activities is the roadwork; make sure we maintain that connectivity, and it's sequenced first in our schedule)
- Does it make any sense…take $600M to build the bridge? Maybe you need to go south and build it in a narrower spot? (site picked is most cost effective and safest; looked at the South Road, but it was more expensive than that without mitigation; will use as much dirt and topography as we can)
- Regarding land acquisition process, when do you expect to start discussions/negotiations with landowners? Would this be an adverse condemnation so we can take advantage of tax benefits of 1034 exchange (gives you three years to find alternate property, instead of 90 days with 1031)? (starting some conversations about option agreements with some critical properties; working with willing sellers; if you have an interest in being a willing seller, please let Kevin Spesert know that; Kevin willing to meet with landowners one-on-one to talk specifics about each property)

- Regarding the terminal reservoir, I'm assuming you'll have a pump station there with pipeline? Easement or fee parcel? (property owner would prefer easement so they can farm over the top of it; Board recently adopted TR West as preferred alternative)
- What is the size of the terminal reservoir? (40 acres)
- Pertaining to water rights holders downstream? How would those permits be filled during years Sites pulls water? (Sites can't take water until all other rights are first met)
- Assuming construction starts in 2024, you'll do all the land acquisition before then? (We could; that will be desirable, but not an absolute requirement because the project will be phased; roads, dams, the perimeter, fencing, etc)
- When are landowners going to have to sell? (these are the things we'll discuss with individual property owners as we move forward; acquisition will be 2-3 steps ahead of construction. Will need to identify long-lead parcels, like those requiring relocation; Authority would maintain property during construction; if we buy in 2024, but not constructing until 2029, there may be creative solutions that allow property owner or adjacent property owner use; safety is paramount, but flexibility is possible; would like to be done by 2025)
- Do you know where you're going to start in terms of property acquisition? (Bridge, roadwork)
- As far as size of reservoir, scale of S/M/L, where does this fit into that scale? (Medium size reservoir)
- Dams: are they regulated by state, or is it federal? (State will permit; Authority Board will be the owner/operator; offstream means we control ingress and egress of water and the only way we'll use the emergency spillway is if we forget to turn off the pumps)
- Will farmers get first dibs on water? (needs of Sac Valley watershed get met first; very expensive, and not everyone in CV can afford it, so we're rounding out with investors from elsewhere in the state)
- How is security of water ensured? How in 20 years from now can we guarantee that state won't take the water for health and safety? (absent Gov emergency powers, it will be completely under local control)
- Is percentage of water based on percentage of ownership? (each investor gets storage space and how they use the water in that space is up to them; this is a private reservoir, which is different than Oroville; state is project participant in Sites, so they get share of storage and pipeline, but state doesn't have authority to come in and reallocate shares)
- If we're in a drought year and you're releasing water, you'll be releasing through TC. How will anyone north of the canal get that water? (water transfers; release Sites water allowing hold on Shasta water; there are no participants upstream as of now)
- How much of this is going to LA? How much does MWD own? (22%) Are they the biggest participant? (Yes, but there are others; state is a large investor; we sought local participants first, but there was some sticker shock; without statewide participants we couldn't build this reservoir)
- What do you call this water, officially? Private, project, federal? (Sites water; independent of any other water. New, stand alone water right)
- Why is it called Golden Gate dam? (it's where all the sheep came out and went into the Valley in the 1800s)
- What's your mechanical ability to add water per day? (8K AF/day)

From: Jerry Brown [jbrown@sitesproject.org]
Sent: 8/25/2022 4:31:48 PM
To: steve.micko@jacobs.com
CC: Angela Bezzone [bezzone@mbkengineers.com]; Alicia Forsythe [aforsythe@sitesproject.org]
Subject: FW: WSIP Cumulative Flow Study
Attachments: WSIP Cumulative Narrative Paper 8-2-22 .docx; CFS draft 8-4-22 _clean.docx

In the overview call today, DWR was not clear about whether there is a water quality improvement in the south and central delta as a result of the Sites through delta deliveries to and through Banks in the dry and critical years.

Is this something you and Rob have looked at?
Should we ask DWR to incorporate this analysis in their cumulative flow study?

Thanks
Jerry

From: "Okita, David@DWR" <David.Okita@water.ca.gov>
Date: Monday, August 8, 2022 at 7:39 AM
To: Jerry Brown <jbrown@sitesproject.org>, "Heydinger, Erin" <erin.heydinger@hdrinc.com>, Maureen Martin <mmartin@ccwater.com>, Marguerite Patil <mpatil@ccwater.com>, Cindy Kao <ckao@valleywater.org>, Michael Martin <MichaelMartin@valleywater.org>, Dana Jacobson <DJacobson@valleywater.org>, Andrew Garcia <AndrewGarcia@valleywater.org>, Dave Richardson <drichardson@woodardcurran.com>, Terrie Mitchell <mitchellt@sacsewer.com>, "Young, Amy@DWR" <Amy.Young@water.ca.gov>, "Boland-Brien, Samuel@Waterboards" <Samuel.Boland-Brien@waterboards.ca.gov>, "Riddle, Diane@Waterboards" <Diane.Riddle@waterboards.ca.gov>, "Sugar, Sarah@Waterboards" <Sarah.Sugar@Waterboards.ca.gov>, "Kirkland, Marianne@DWR" <Marianne.Kirkland@water.ca.gov>, "Maroney, Jagruti@DWR" <Jagruti.Maroney@water.ca.gov>, Fiona Sanchez <sanchezf@irwd.com>, "Gordon, David@DWR" <David.Gordon@water.ca.gov>, Christiana Daisy <cdaisy@ieua.org>, "Cowin, Mark" <mcowin@geiconsultants.com>, "Ashenfelter, Mark" <mashenfelter@geiconsultants.com>, Paul Weghorst <Weghorst@irwd.com>, Lee Bergfeld <bergfeld@mbkengineers.com>, Mark Beuhler <mbeuhler@wswaterbank.com>, Dwayne Chisam <dchisam@avek.org>, "Davis-Fadtke, Kristal@Wildlife" <Kristal.Davis-Fadtke@wildlife.ca.gov>, "Uttley, Paige@Wildlife" <Paige.Uttley@wildlife.ca.gov>, "Llaban, Angela@Wildlife" <Angela.Llaban@Wildlife.ca.gov>, "Chilmakuri, Chandra@SWC" <cchilmakuri@swc.org>, "slee@ieua.org" <slee@ieua.org>, "'ehurst@ieua.org'" <ehurst@ieua.org>, "dpolyzos@mwdh2o.com" <dpolyzos@mwdh2o.com>, "bgoshi@mwdh2o.com" <bgoshi@mwdh2o.com>, "Melton, Holly" <hmelton@kcwa.com>, "cwallace@kcwa.com" <cwallace@kcwa.com>, "Leahigh, John@DWR" <John.Leahigh@water.ca.gov>, "White, Molly@DWR" <Molly.White@water.ca.gov>, "Williams, Jonathan@Wildlife" <Jonathan.Williams@wildlife.ca.gov>, Dale Melville <dmelville@ppeng.com>, Dan Bartel <dbartel@rrbwsd.com>, "Pettit, Tracy@DWR" <Tracy.Pettit@water.ca.gov>, Steve Arakawa <sarakawa@mwdh2o.com>, "Safely,Jack S" <jsafely@mwdh2o.com>, "Hawk,Nina E" <nhawk@mwdh2o.com>, Trent Taylor <ttaylor@rrbwsd.com>, Jonathan Young <jyoung@swc.org>, "Asante, Kwabena" <kasante@geiconsultants.com>, "McQuirk, Jacob@DWR" <Jacob.McQuirk@water.ca.gov>, "Fock, Anna@DWR" <Anna.Fock@water.ca.gov>, Liza Muñoz <lmunoz@ieua.org>, Shankar Parvathinathan <shankar@mbkengineers.com>
Subject: WSIP Cumulative Flow Study

To: 7 WSIP projects, Partner Contractors and State agencies:

As you know, DWR has been working on a Cumulative Flow Study that shows how all 7 WSIP projects would affect flows key water ways. We have some new draft documents to share with you and to collect comments. First a "history" of efforts to date.

1. An initial draft Cumulative Flow Study was prepared by AECOM dated 6/21/21. Stantec as a subcontractor to AECOM had some level of review of document.

2. After review and comments by the 7 WSIP projects, state agencies and State Water Contractors, DWR agreed to do a more quantitative analysis using CalSim II post processing. That product was completed 12/19/21 in draft form.

3. The AECOM contract expired 12/31/21. After a few months of contacting delay, DWR hired Stantec independently to continue work.

4. In the meantime a "technical team" of Aaron Miller (DWR) and Chandra Chilmakuri (State Water Contractors) were assigned to review the 12/19/21 draft report. They provided some major comments.

5. Stantec provided a revised report on 6/27/22. DWR provided comments (Chandra was out of office).

6. DWR comments were incorporated into the 8/4/22 attached version.

7. DWR prepared a draft narrative summary of the 8/4/22 Stantec Report. It uses a similar format as the 6/21/21 AECOM report, but is more extensive.

Please provide any comments on both documents by September 16.

We will be having two workshops for different audiences.

First, we will have a technical workshop on the Stantec modeling on Monday August 29 from 3-5 PM. This workshop is for modeling "experts" who have questions about the Stantec work - it is not geared towards a general overview. Stantec will provide an overview of the modeling method, then take questions. To facilitate an efficient workshop, Stantec asks that technical questions and comments be provided in advance by COB August 24. Questions to be sent to Yung-Hsin Sun (yung-hsin.sun@stantec.com) and David.Okita@water.ca.gov. This will allow Stantec to prepare and group similar questions together. Time will be allotted for other questions at the meeting.

Second, we will have a workshop for a more general audience on Thursday August 25 from 3:15 - 5:00 PM. Note that 3-4 PM is the regular bi-monthly meeting of the three pulse flow projects so we will be shortening that meeting to 3:00-3:15 and holding the workshop for a larger audience after that. DWR will be making a presentation on the Narrative Report and taking questions and comments. Target audience is the 7 WSIP projects, State agency staff and State Water Contractors.

Teams meeting announcements will be sent out for these meetings. The mailing list used for this email will also be used for both meetings. Please forward invitation to others in your organization that I may have missed, in particular those who might be interested in the technical workshop.

David Okita, PE
Department of Water Resources
530 902-7588

From: Jerry Brown [jbrown@sitesproject.org]
Sent: 8/26/2022 10:58:03 AM
To: steve.micko@jacobs.com
CC: Angela Bezzone [bezzone@mbkengineers.com]; Alicia Forsythe [aforsythe@sitesproject.org]; Leaf, Rob [Rob.Leaf@jacobs.com]; JP Robinette [jrobinette@sitesproject.org]
Subject: Re: WSIP Cumulative Flow Study

Steve - Ok thanks, then I'll not ask DWR to look at south and central delta in their cumulative flow study. Let Angela know if there is anything about your updated salinity cost analysis that needs to be reflected in our DWR/Reclamation operations agreement.

Ali/Angela – please add an item on the 3 month look ahead for an O&E item to review updated operations modeling prior to final EIR/EIS.

From: "Micko, Steve" <Steve.Micko@jacobs.com>
Date: Friday, August 26, 2022 at 10:23 AM
To: Jerry Brown <jbrown@sitesproject.org>
Cc: Angela Bezzone <bezzone@mbkengineers.com>, Alicia Forsythe <aforsythe@sitesproject.org>, "Leaf, Rob" <Rob.Leaf@jacobs.com>
Subject: RE: WSIP Cumulative Flow Study

Hi Jerry,

Since publication of the RDEIR/SDEIS, Rob and I have updated the modeling approach for Sites salinity cost.
It is now more of a "pay as you go" approach, where we trained the model to estimate salinity cost in each month.
This approach results in less salinity costs for Sites through-Delta deliveries. We no longer see as much south and central Delta freshening as we did in the RDEIR/SDEIS.

Best,
Steve

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Thursday, August 25, 2022 4:32 PM
To: Micko, Steve <Steve.Micko@jacobs.com>
Cc: Angela Bezzone <bezzone@mbkengineers.com>; Alicia Forsythe <aforsythe@sitesproject.org>
Subject: [EXTERNAL] FW: WSIP Cumulative Flow Study

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From: "Okita, David@DWR" <David.Okita@water.ca.gov>
Date: Monday, August 8, 2022 at 7:39 AM
To: Jerry Brown <jbrown@sitesproject.org>, "Heydinger, Erin" <erin.heydinger@hdrinc.com>, Maureen

Martin <mmartin@ccwater.com>, Marguerite Patil <mpatil@ccwater.com>, Cindy Kao <ckao@valleywater.org>, Michael Martin <MichaelMartin@valleywater.org>, Dana Jacobson <DJacobson@valleywater.org>, Andrew Garcia <AndrewGarcia@valleywater.org>, Dave Richardson <drichardson@woodardcurran.com>, Terrie Mitchell <mitchellt@sacsewer.com>, "Young, Amy@DWR" <Amy.Young@water.ca.gov>, "Boland-Brien, Samuel@Waterboards" <Samuel.Boland-Brien@waterboards.ca.gov>, "Riddle, Diane@Waterboards" <Diane.Riddle@waterboards.ca.gov>, "Sugar, Sarah@Waterboards" <Sarah.Sugar@Waterboards.ca.gov>, "Kirkland, Marianne@DWR" <Marianne.Kirkland@water.ca.gov>, "Maroney, Jagruti@DWR" <Jagruti.Maroney@water.ca.gov>, Fiona Sanchez <sanchezf@irwd.com>, "Gordon, David@DWR" <David.Gordon@water.ca.gov>, Christiana Daisy <cdaisy@ieua.org>, "Cowin, Mark" <mcowin@geiconsultants.com>, "Ashenfelter, Mark" <mashenfelter@geiconsultants.com>, Paul Weghorst <Weghorst@irwd.com>, Lee Bergfeld <bergfeld@mbkengineers.com>, Mark Beuhler <mbeuhler@wswaterbank.com>, Dwayne Chisam <dchisam@avek.org>, "Davis-Fadtke, Kristal@Wildlife" <Kristal.Davis-Fadtke@wildlife.ca.gov>, "Uttley, Paige@Wildlife" <Paige.Uttley@wildlife.ca.gov>, "Llaban, Angela@Wildlife" <Angela.Llaban@Wildlife.ca.gov>, "Chilmakuri, Chandra@SWC" <cchilmakuri@swc.org>, "slee@ieua.org" <slee@ieua.org>, "'ehurst@ieua.org'" <ehurst@ieua.org>, "dpolyzos@mwdh2o.com" <dpolyzos@mwdh2o.com>, "bgoshi@mwdh2o.com" <bgoshi@mwdh2o.com>, "Melton, Holly" <hmelton@kcwa.com>, "cwallace@kcwa.com" <cwallace@kcwa.com>, "Leahigh, John@DWR" <John.Leahigh@water.ca.gov>, "White, Molly@DWR" <Molly.White@water.ca.gov>, "Williams, Jonathan@Wildlife" <Jonathan.Williams@wildlife.ca.gov>, Dale Melville <dmelville@ppeng.com>, Dan Bartel <dbartel@rrbwsd.com>, "Pettit, Tracy@DWR" <Tracy.Pettit@water.ca.gov>, Steve Arakawa <sarakawa@mwdh2o.com>, "Safely,Jack S" <jsafely@mwdh2o.com>, "Hawk,Nina E" <nhawk@mwdh2o.com>, Trent Taylor <ttaylor@rrbwsd.com>, Jonathan Young <jyoung@swc.org>, "Asante, Kwabena" <kasante@geiconsultants.com>, "McQuirk, Jacob@DWR" <Jacob.McQuirk@water.ca.gov>, "Fock, Anna@DWR" <Anna.Fock@water.ca.gov>, Liza Muñoz <lmunoz@ieua.org>, Shankar Parvathinathan <shankar@mbkengineers.com>
Subject: WSIP Cumulative Flow Study

To: 7 WSIP projects, Partner Contractors and State agencies:

As you know, DWR has been working on a Cumulative Flow Study that shows how all 7 WSIP projects would affect flows key water ways. We have some new draft documents to share with you and to collect comments. First a "history" of efforts to date.

1. An initial draft Cumulative Flow Study was prepared by AECOM dated 6/21/21. Stantec as a subcontractor to AECOM had some level of review of document.

2. After review and comments by the 7 WSIP projects, state agencies and State Water Contractors, DWR agreed to do a more quantitative analysis using CalSim II post processing. That product was completed 12/19/21 in draft form.

3. The AECOM contract expired 12/31/21. After a few months of contacting delay, DWR hired Stantec independently to continue work.

4. In the meantime a "technical team" of Aaron Miller (DWR) and Chandra Chilmakuri (State Water Contractors) were assigned to review the 12/19/21 draft report. They provided some major comments.

5. Stantec provided a revised report on 6/27/22. DWR provided comments (Chandra was out of office).

6. DWR comments were incorporated into the 8/4/22 attached version.

7. DWR prepared a draft narrative summary of the 8/4/22 Stantec Report. It uses a similar format as the 6/21/21 AECOM report, but is more extensive.

Please provide any comments on both documents by September 16.

We will be having two workshops for different audiences.

First, we will have a technical workshop on the Stantec modeling on Monday August 29 from 3-5 PM. This workshop is for modeling "experts" who have questions about the Stantec work - it is not geared towards a general overview. Stantec will provide an overview of the modeling method, then take questions. To facilitate an efficient workshop, Stantec asks that technical questions and comments be provided in advance by COB August 24. Questions to be sent to Yung-Hsin Sun (yung-hsin.sun@stantec.com) and David.Okita@water.ca.gov. This will allow Stantec to prepare and group similar questions together. Time will be allotted for other questions at the meeting.

Second, we will have a workshop for a more general audience on Thursday August 25 from 3:15 - 5:00 PM. Note that 3-4 PM is the regular bi-monthly meeting of the three pulse flow projects so we will be shortening that meeting to 3:00-3:15 and holding the workshop for a larger audience after that. DWR will be making a presentation on the Narrative Report and taking questions and comments. Target audience is the 7 WSIP projects, State agency staff and State Water Contractors.

Teams meeting announcements will be sent out for these meetings. The mailing list used for this email will also be used for both meetings. Please forward invitation to others in your organization that I may have missed, in particular those who might be interested in the technical workshop.

David Okita, PE

Department of Water Resources

530 902-7588

From: Spranza, John [John.Spranza@hdrinc.com]
Sent: 8/29/2022 6:54:35 AM
To: Angela Bezzone [bezzone@mbkengineers.com]
CC: Marc VanCamp [Vancamp@mbkengineers.com]; Kyle Knutson [knutson@mbkengineers.com]; Alicia Forsythe [aforsythe@sitesproject.org]
Subject: RE: Sutter Nov - May Flows

This is very helpful, thank you for going the extra step on this. I'll walk the ICF team though what you have provided and see if it is sufficient to state that starting the analysis for a zero level of existing inundation would be a very conservative analysis. That may get us what we need.

If I need anything more I will reach out.
Thanks.

John

John Spranza

D 916.679.8858 M 818.640.2487

From: Angela Bezzone <bezzone@mbkengineers.com>
Sent: Friday, August 26, 2022 5:03 PM
To: Spranza, John <John.Spranza@hdrinc.com>
Cc: Marc VanCamp <Vancamp@mbkengineers.com>; Kyle Knutson <knutson@mbkengineers.com>
Subject: RE: Sutter Nov - May Flows

John,

I spoke with Kyle Knutson in our office who is more familiar with the Sutter Bypass than I am. I have cc'd him on this email. Marc is out of the office and will be returning the middle of next week, so please feel free to reach out to Kyle and Marc if you have any questions about this while I am out.

During discussions of the Tisdale Weir notch, many of the landowners in the Bypass were concerned about the extra inundation as sometimes the amount of water keeps the land wet for too long which can impact their planting schedules. However, the irrigators in the Sutter Bypass also flood up their fields after the irrigation season for rice decomp and/or duck clubs. They do this with water available in the bypass channels, or for a few landowners with well, using groundwater. We work for the Sutter Bypass-Butte Slough Water Users Association and can reach out to them if more detail is needed on this. We are not familiar with the Sutter NWR's operations during these months, but it may be worth looking into.

Please let us know if you would like us to look into this more.

Thanks,
Angela

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Thursday, August 25, 2022 12:21 PM
To: Angela Bezzone <bezzone@mbkengineers.com>; Marc VanCamp <Vancamp@mbkengineers.com>
Subject: Sutter Nov - May Flows

CAUTION - EXTERNAL SENDER: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Marc and Angela,

I'm working with ICF to address a question on our effects to dry year inundation in the lower Sutter bypass. We are showing about a 30% reduction in inundated acreage based on the reduction in weir spills due to project diversions. One of the assumptions in the analysis is that there is no area of the lower bypass that would already be inundated during the time of our diversions, e.g., there are no other flows into the lower bypass and weir spills are the only mechanism. We know that some flow comes in from Butte Slough, and that there are some other small inputs, but I was wondering if you guys know of any ag water, refuge water or other flows that would regularly be going through the bypass in Nov – May. This would give us an ability to modify the assumption that there would always be no areas already inundated in the bypass.

Happy to jump on a call if you would like.
Thanks.
John

John Spranza, MS, CCN
Senior Ecologist / Regulatory Specialist

HDR
2379 Gateway Oaks Drive, Suite 200
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D 916.679.8858 M 818.640.2487
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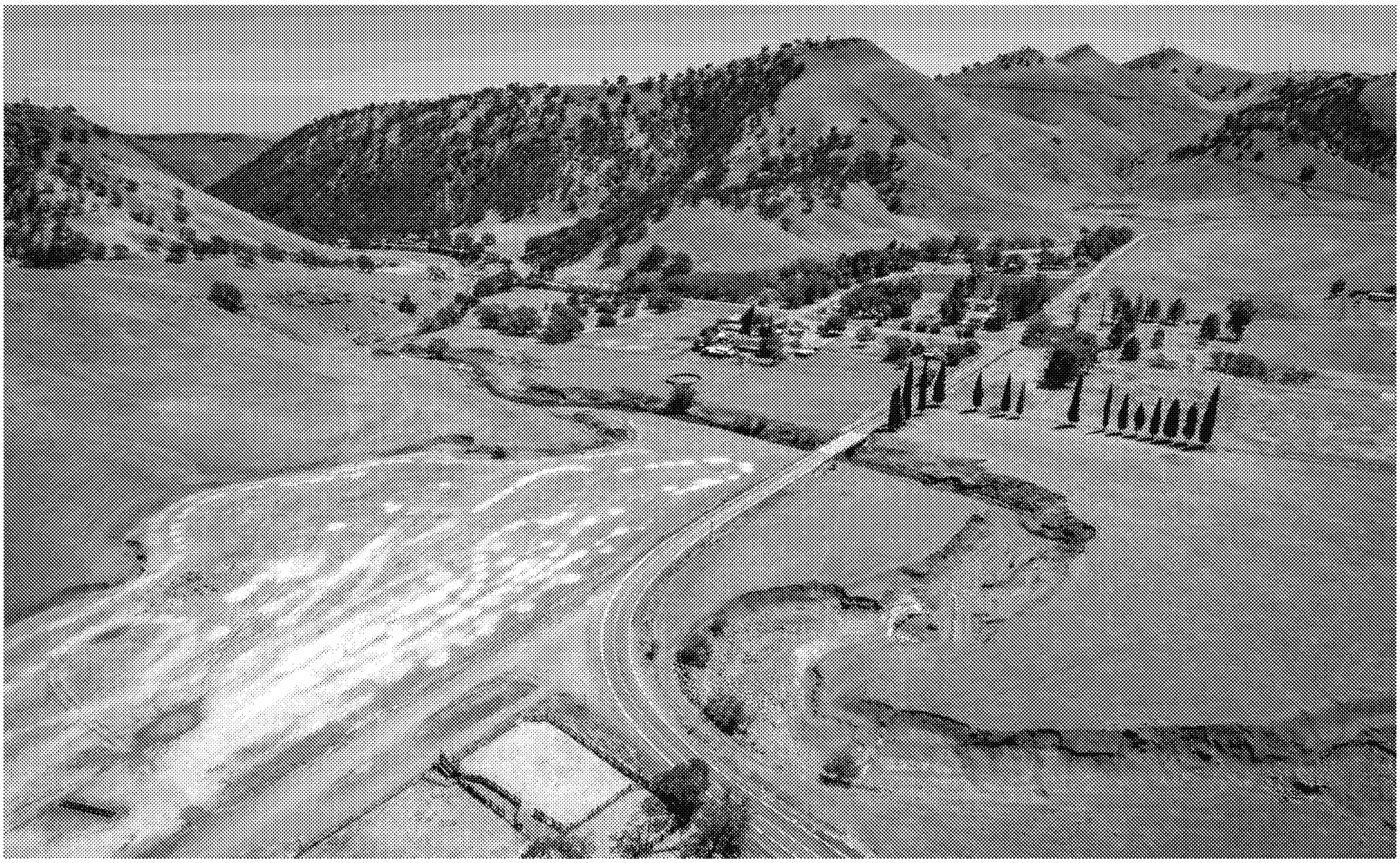
hdrinc.com/follow-us
hdrinc.com/follow-us

CLIMATE

Why California's largest reservoir in nearly 50 years may be derailed by water shortages

Kurtis Alexander

Updated: Aug. 28, 2022 6:47 p.m.



The rural community of Sites in Colusa County is shown in an aerial photograph on Aug. 9. An independent water authority is working to build a larger reservoir here and deliver supplies across California.
Carlos Avila Gonzalez/The Chronicle

SITES, Colusa County — Deep in California's farm country, this dusty valley ringed by brown hills and sunny skies is seen by many as the state's answer to drought.

Here, about 70 miles north of Sacramento, a coalition of water agencies is setting out to build the first major reservoir in California in nearly half a century. The $4 billion plan calls for flooding miles of ranchlands with flows from the nearby Sacramento River and sending the water to cities and irrigation districts as far away as the Bay Area and Los Angeles.

Much of the money is already lined up, and as state water shortages have intensified, the project has won increasing bipartisan support, including from Gov. Gavin Newsom.

But there's a problem: There may not be enough water to fill the new reservoir.

In a letter sent out by state regulators Friday, project officials were told that their application for a water right is incomplete because they failed to show that there's sufficient flow to draw from in the Sacramento River. The Sites Project Authority, the agency formed by the water suppliers to get the reservoir built, has 60 days to strengthen the application.

The opinion of the State Water Resources Control Board is not only a setback for the reservoir, it underscores the challenge that California faces in sustaining water supplies for 39 million people and a nearly $50 billion farming industry. Most of the state's rivers and creeks are already overdrawn, and in some spots the natural environment, including fish and wildlife, is degraded because of too little water.

The situation will only worsen as things get hotter and dryer with climate change.

The Sites Project Authority says it's undeterred by the state's letter. Project officials hope to address the concerns, and they remain confident in their application for a water right, which is probably the biggest hurdle and most important step to

Draft_0019261

getting the reservoir off the ground.

“I didn’t hear any hard-stop issues,” Jerry Brown, the project authority’s executive director told The Chronicle. Brown, who is not related to the former governor with the same name, said his staff would get right to work on amending the application.

Kevin Spesert, a manager at the Sites Project Authority, describes where one of the dams would be built, in the notch near the tree-spotted ridge, under a plan to build a new off-stream reservoir in the community of Sites (Colusa County).
Carlos Avila Gonzalez/The Chronicle

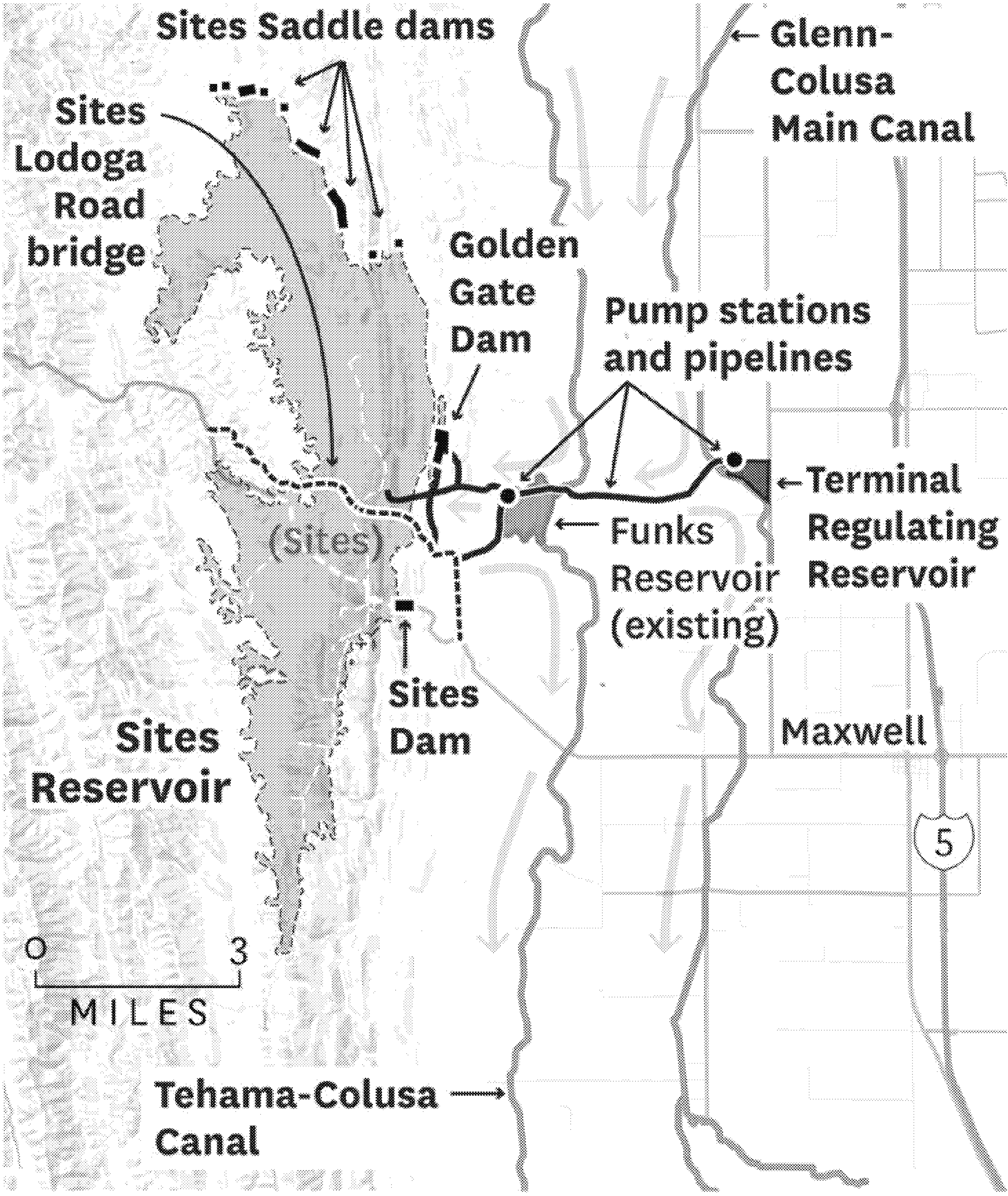
On a recent afternoon, Kevin Spesert, the on-site manager for the Sites Project Authority, made the short drive from the rural town of Maxwell along Interstate 5, where he has an office, to the community of Sites, basically a cluster of homes and trailers surrounded by cattle ranches.

“This would all be underwater,” Spesert said as he steered his white pickup over a small notch between hills and into the valley where the reservoir is proposed.

For decades, this site has been eyed for water storage. Except for a few gaps in the surrounding ridgeline, the area is naturally a near-perfect bowl, about 13 miles long and 4½ miles wide at its broadest, making it ideal for holding water.

Sites Reservoir plan

A coalition of water agencies is working to build a large reservoir in the Colusa County community of Sites that would collect and store water conveyed by canal from the Sacramento River.



Graphic: John Blanchard / The Chronicle

Source: Sites Project Authority

The plan is to plug the low points in the ridge with dams: two major ones, about

300 feet tall, and a handful of smaller ones. Pumping plants and pipelines would then be constructed to fill the basin with water from the Sacramento River through a network of existing irrigation canals.

Unlike most older reservoirs which were built on top of rivers, the proposed "off-stream" facility has the advantage of not damming a major waterway and directly interfering with river currents or fish. Proponents say the project could even benefit fish by releasing water when they need it.

The reservoir would offer 1.5 million acre-feet of storage, officials say. That's about enough water for 3 million households for a year. It would be the eighth largest reservoir in California, and the first one built with more than a million acre-feet of capacity since New Melones Lake was constructed by the federal government in the late 1970s.

"I remember my dad talking to me about how he watched the building of Oroville Dam," Spesert said in a nod to the nostalgia of the West's dam-building frenzy of the mid-20th century. "Looking at this (valley) now and thinking that it will also become a big reservoir … it's something that will benefit all of California."

Once filled, the new reservoir would release water similarly to how it came in, mostly through the infrastructure of local irrigation districts. After it's back in the Sacramento River, the water would flow south to the Sacramento-San Joaquin River Delta, where giant pumping stations could push it through pipelines and aqueducts across the state.

The roughly 30 urban and agricultural water agencies investing in the project would have first dibs on the new supply. In the Bay Area, the reservoir's backers include Santa Clara County's Valley Water, the Tri-Valley's Zone 7 Water Agency and the city of American Canyon, which combined serve about 2.3 million people.

Project officials say they hope to finalize the environmental review for the reservoir this year, begin site preparation in 2024 and start delivering water at the end of the decade.

Before any construction can begin, the project needs several local, state and federal approvals. None are as fundamental as the water right.

In May, the Sites Project Authority applied for a permit to take water from the Sacramento River, south of Shasta Lake. Because there are already so many water rights holders on the river, project officials are seeking permission to draw only during the wetter months — not summer — and only after the needs of other water users and fish, namely salmon, are met.

Project officials say that even with these limitations, wet years and big storms during dry years will provide enough water to fill the reservoir. Furthermore, they say because climate change is prompting bigger, more intense bouts of rain as well as reducing the snowpack that's historically acted as a reservoir by holding water until the dry summer months, there's greater need now for new storage.

Kevin Spesert, with the Sites Project Authority, explains how water would be piped into the proposed Sites Reservoir at his office in the town of Maxwell (Colusa County).
Carlos Avila Gonzalez/The Chronicle

Friday's letter from the State Water Board, however, says that the Sites Project Authority's water analysis is missing key details on Sacramento River flows and doesn't consider all the factors it should. The omissions include how much water is being taken from the river by senior water holders and the state's Bay-Delta Plan, which seeks to increase flows cumulatively in California's rivers. Both of these items could affect the amount of water available for the reservoir.

While the letter says the project's water right application is officially accepted, the state will only move forward with formal proceedings if and when project officials make their case for sufficient water.

"It has been this administration's priority to move more quickly on regulatory permitting," said Erik Ekdahl, a deputy directory who oversees water rights for the State Water Board. "At the same time, this is a big investment, and that means we should really take the time up front to make sure we have the technical details right."

Critics of the proposal have long questioned the wisdom of building more reservoirs. The opponents, who include environmentalists, fishermen and Native American communities, cite California's chronically low rivers and creeks and the fact that the state already has nearly 1,500 reservoirs capturing flows.

"They're not creating any more water with this project," said Caleen Sisk, chief of the Winnemem Wintu Tribe, which historically lived across much of the Sacramento Valley. "It's not like there's a groundswell of new water, a river developed or something. They're just trying to take out more."

Sisk worries that a lack of water will leave the reservoir's supplies sparse and subject to becoming warm under the hot sun and filled with harmful algal blooms, which could move into the river when water is released there. It's a concern that's been echoed in comments by the U.S. Environmental Protection Agency. During droughts, cyanobacteria is common in shallow lakes and reservoirs.

Opponents of the proposed reservoir, in general, prefer alternative means of acquiring and storing water in California, such as building desalination plants, recharging aquifers and doing more water recycling — areas that Newsom's administration is also supporting, as reflected in a state water plan released in August.

Drought Map

Track water shortages and restrictions across Bay Area

Updated to include drought zones while tracking water shortage status of your area, plus reservoir levels and a list of restrictions for the Bay Area's largest water districts.

A farm sits near the location of land once owned by John Sites, the namesake of the community where Sites Reservoir is proposed. The area would be submerged under the reservoir plan.

Carlos Avila Gonzalez/The Chronicle

Perhaps the biggest criticism of Sites Reservoir is the harm it could pose for fish, notably chinook salmon. Though the facility would not directly cut off fish passage and could send more water into the river when it suits salmon, critics say taking more water from the Sacramento River, on balance, will hamper fish migration.

Salmon in Northern California already are struggling from diminished flows. The Sacramento River's fall run, which drives the commercial salmon industry, has

declined in recent decades while the endangered winter run remains on the verge of extinction. Drought years have been particularly difficult for the fish.

"The big fight at the water board is going to be how much water will be taken and when," said Doug Obegi, a senior attorney at the Natural Resources Defense Council, who believes the diversions proposed by the Sites Project Authority are too high to ensure adequate fish protection."There's general agreement that we should take more water in wet periods and less in dry periods, but no one agrees on what constitutes a big gulp, a little sip and when it's wet and when it's dry."

In Maxwell, the nearest community to Sites with gas and groceries, most residents appear eager for the reservoir and the water to fill it.

The small town's ag-based economy has been hit hard by drought. Much of the surrounding farmland has descended into weed-dotted dirt and grim earth-tone hues. About 90% of Colusa County's rice fields, which typically dominate the region, were fallowed this year because of the water shortage, according to the local farm bureau.

"It's no different than a tornado coming through and taking out a town in the Midwest," said Cy Hawkins, a hog farmer who runs an insurance agency on

Maxwell's two-block-long main strip. "It's a catastrophe here. And it's a terrible failure on the part of the state and federal government that they haven't built any new water storage."

This year, Hawkins is on track to provide more payouts for crop insurance than any time in his 35 years in the business.

Outside of town, Jim Traynham runs cows on rangeland that would be submerged by the project, and still he wants to see the reservoir built. Project officials count about 70 parcels in and around Sites that will need to be acquired to move forward with the facility. Owners are mixed about whether they want to move out.

"It's tough, but you got to do what's right," Traynham said. "Our community is suffering desperately. We are entirely dependent on agriculture, and we need more water."

Local water agencies, including the Glenn-Colusa Irrigation District, are investors in the project and stand to have more water to provide area growers.

Waterfowl are visible in Funks Reservoir outside the town of Maxwell (Colusa County) on Aug. 9. The small reservoir would be used to help convey water from the Sacramento River to the proposed Sites Reservoir.
Carlos Avila Gonzalez/The Chronicle

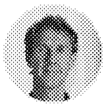
The project's biggest backer is the Metropolitan Water District of Southern California, which serves Los Angeles and the nearby counties. The agency lays claim to 30% of the reservoir's future water. The allocations are based on the level of investment.

The Zone 7 Water Agency is the largest investor in the Bay Area, poised for 6% of the reservoir water. The wholesaler, which supplies about 266,000 people in Pleasanton, Livermore, Dublin and San Ramon, has contributed $2.45 million to the project since 2016 and expects to put up another $4 million through 2024.

The total cost of the reservoir, which is estimated at just under $4 billion, will be partly covered by $875 million in voter-approved bonds and a yet-to-be-determined outlay by the federal Bureau of Reclamation. Additionally, the U.S. Environmental Protection Agency has preapproved a $2.2 billion loan. But the outstanding balance as well as the debt payments would remain the responsibility of the participating water agencies.

"Even before this drought and before climate change, we knew we needed to invest in additional water supplies," said Valerie Pryor, general manager of the Zone 7 Water Agency. "Right now, we are living off of our storage, and that will last us another few years. But we can't live off this forever."

Kurtis Alexander (he/him) is a San Francisco Chronicle staff writer. Email: kalexander@sfchronicle.com Twitter: @kurtisalexander



Written By
Kurtis Alexander

Reach Kurtis on

Kurtis Alexander is an enterprise reporter for The San Francisco Chronicle, with a focus on natural resources and the environment. He frequently writes about water, wildfire, climate and the American West. His recent work has examined the impacts of drought, threats to public lands and wildlife, and the nation's widening rural-urban divide.

Before joining the Chronicle, Alexander worked as a freelance writer and as a staff reporter for several media organizations, including The Fresno Bee and Bay Area News Group, writing about government, politics and the environment.

VIEW COMMENTS

Top of the News

What scientists hear when listening to blue whales off California's coast

Acoustic ecology is teaching us that blue whales are even more sophisticated than previously thought.

BY TARA DUGGAN AND YOOHYUN JUNG

A heat wave is on tap for the Bay Area. How hot will it get this week?

BY MICHELLE APON

Algal bloom fills San Francisco Bay with swirls of brown water

BY TARA DUGGAN

Do workers want to be in the office five days a week or not at all?

BY CHASE DIFELICIANTONIO

49ers' 53-man roster projection: Good news for Brock Purdy, Jimmy Garoppolo

BY ERIC BRANCH

Draft_0019275

From: Marcia Kivett [MKivett@sitesproject.org]
Sent: 8/29/2022 1:16:45 PM
To: Kathryn Carlisle [kathryncarlisle44@gmail.com]; Records Request [recordsrequest@sitesproject.org]
CC: Sandra Yarbrough [syarbrough@sitesproject.org]
Subject: Re: Records Request for Sites Reservoir Project
Attachments: INTERNAL_Sites_Huffmaster_Realignment_11x17.pdf; 11x17 Map Sites Reservoir Project - Sites Reservoir - DRAFT - SUBJECT TO CHANGE - August 2021.pdf; INTERNAL_Sites_Parcel_Dunnigan_CBD_11x17.pdf

Dear Kat:

The Sites Project Authority has evaluated your Public Records Act request of August 24, 2022, wherein you asked that the Authority provide "*the most recent maps, plans, designs, concepts, layouts, or sketches available that show the proposed improvements and easements throughout the Sites Reservoir project*". The Authority has determined that it has disclosable public records in its possession that are responsive to your request.

That said, your request is extremely broad. In an effort to assist you in identifying responsive records, the Authority advises that the Authority's Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement (RDEIR/SDEIS) contains the most recent compilation of maps, plans, designs, concepts, layouts and sketches relative to the Project. We further advise that providing you with the following link to the RDEIR/SDEIS could be the most efficient way to promptly satisfy your request, if in fact this is the information you have in mind. If it is not, please so advise and the Authority will further assist you in providing the information you are seeking.

https://sitesproject.org/environmental-review/

In addition to the RDEIR/SDEIS, the Authority is providing as an attachment to this email some recent maps pertaining to easements under consideration for use in connection with the Project.

Please respond to this email to confirm whether this response satisfies your request. We look forward to hearing from you.

Marcia Kivett
Sites Project Coordinator
561.843.9740
mkivett@sitesproject.org
P.O. Box 517
122 Old Hwy 99W
Maxwell, CA 95955

From: Marcia Kivett <MKivett@sitesproject.org>
Sent: Wednesday, August 24, 2022 12:40 PM
To: Kathryn Carlisle <kathryncarlisle44@gmail.com>; Records Request <recordsrequest@sitesproject.org>
Cc: Sandra Yarbrough <syarbrough@sitesproject.org>
Subject: Re: Records Request for Sites Reservoir Project

Good Afternoon,

Thank you for your records request. This is to let you know that we have received the request and will review it for responsive records.

Marcia Kivett
Sites Project Coordinator

561.843.9740
mkivett@sitesproject.org
P.O. Box 517
122 Old Hwy 99W
Maxwell, CA 95955

From: Kathryn Carlisle <kathryncarlisle44@gmail.com>
Sent: Wednesday, August 24, 2022 12:32 PM
To: Records Request <recordsrequest@sitesproject.org>
Subject: Records Request for Sites Reservoir Project

Good Afternoon,
I'd like to request the most recent maps, plans, designs, concepts, layouts, or sketches available that show the proposed improvements and easements throughout the Sites Reservoir project (Construction and operation of an offstream surface water reservoir to provide direct and real benefits to instream flows, the Sacramento–San Joaquin Delta ecosystem, and water supply reliability).
Please notify me of any associated costs before fulfilling this request.

Thank you!
Kat Carlisle

Dunnigan Pipeline to CBD

Legend

Dunnigan Pipeline to CBD

Yolo County Parcels

N

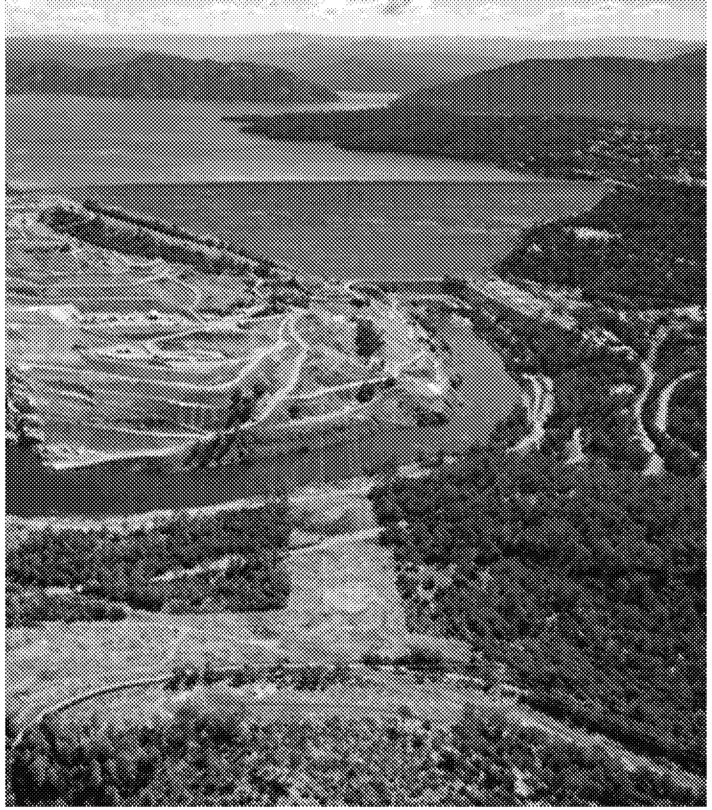
0 1,000 2,000 Feet

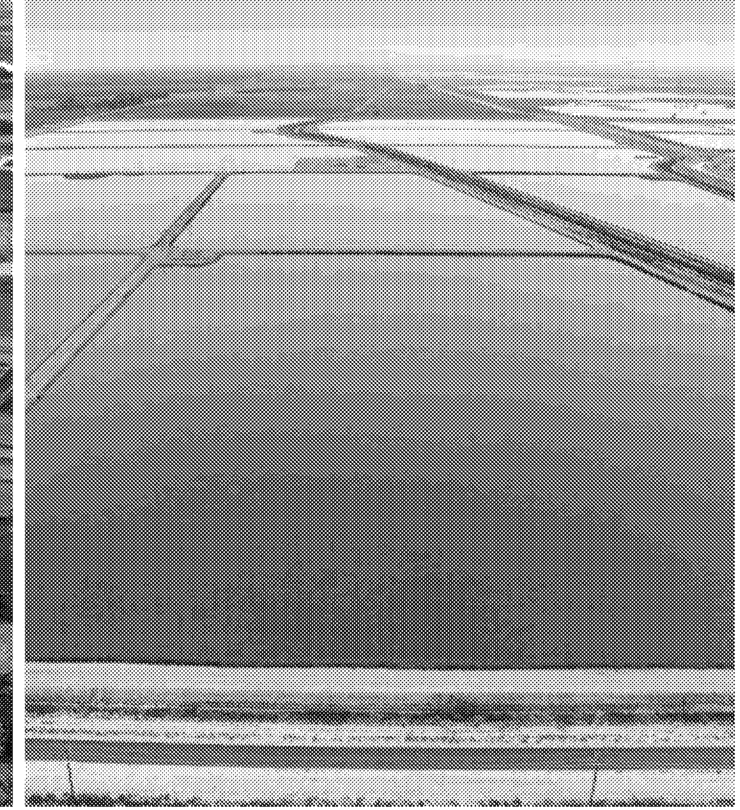
Draft_0019278

From: Jerry Brown [jbrown@sitesproject.org]
Sent: 8/29/2022 3:57:00 PM
To: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: Water Transfer Capability
Attachments: RE: Transfer Data; Screen Shot 2022-08-29 at 2.19.58 PM.png

Two things:

1. Attached is an email from Steve Micko relaying the modeling analysis plus graphics for Alt 1B (probably worst case) transfer of non-project water relative to available capacity. The graphic does a good job of illustrating various water year type scenarios.
2. The screen shot is from the DCP EIR which shows a tabulation of other non-project transfer potential and demonstrates substantial excess capacity to incorporate Sites transfers in dry and critical years and especially when the window is opened into Oct/Nov.





California Department of Water Resources

08/29/2022

Stantec

WSIP Cumulative Flow Study

Post-processor Overview

Agenda

1. Background
2. Approach and Assumptions
3. Preliminary Findings
4. Known Limitations

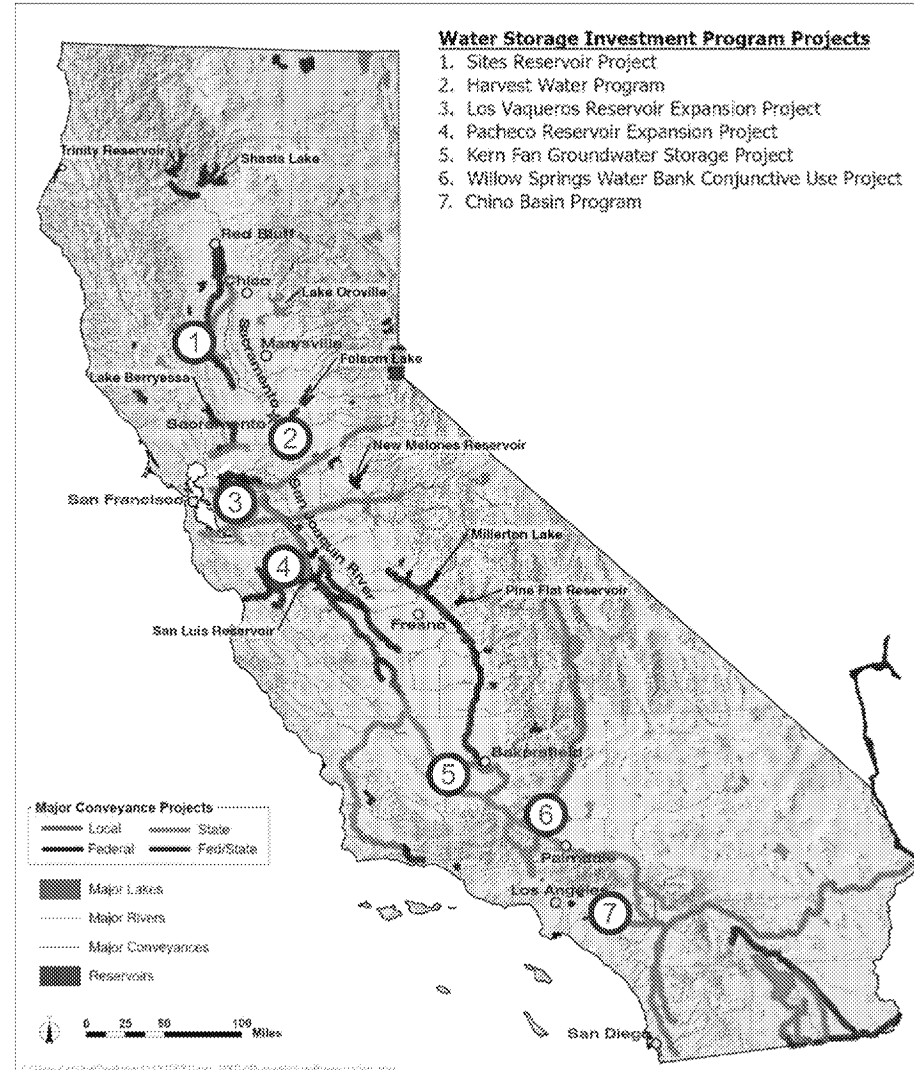
Background

Background

- Seven projects currently eligible for funding by the State of California under the Water Storage Investment Program (WSIP)

- Four surface water diversion projects:
    1. Sites Reservoir Project (Sites)
    2. Harvest Water Program (Harvest)
    3. Los Vaqueros Reservoir Expansion Project (LVE)
    4. Pacheco Reservoir Expansion Project (PREP)*

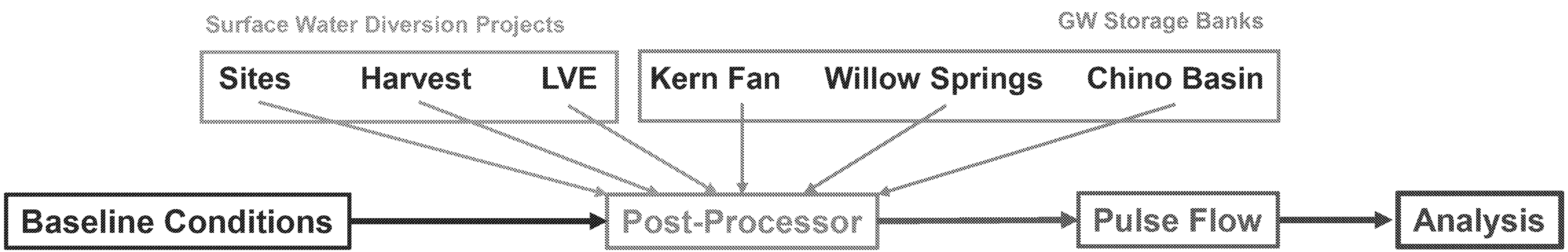
- Three groundwater (GW) storage banks:
    5. Kern Fan Groundwater Storage Project (Kern Fan)
    6. Willow Springs Water Bank Conjunctive Use Project (Willow Springs)
    7. Chino Basin Program (Chino Basin)



*PREP has no direct impact on the Delta watershed analyzed in this study, so it was excluded from further analysis.

Background

- Each project has developed an independent set of operational modeling tools to support the original WSIP application and subsequent permitting and feasibility assessments
- The primary objectives of this study are to:
  - Integrate a baseline conditions model and the most recent six independent operational modeling tools into one post-processor spreadsheet tool
  - Use the tool to incrementally layer on the cumulative flow effects and potential interactions between all six WSIP projects, including a pulse flow release from Lake Oroville coordinated across the three GW storage bank projects
  - Analyze the resulting Central Valley Project (CVP) and State Water Project (SWP) operations in the Sacramento River, Feather River, and Delta



Approach and Assumptions

Approach | Baseline

- Existing Conditions CalSim II model used as the basis of CVP and SWP operations (WSIP Baseline)
  - Developed by DWR in 2021
  - Final model reviewed by Reclamation
  - Historical hydrology
  - 2019 Biological Opinions (BiOps) for the long-term CVP and SWP operations
  - 2020 Incidental Take Permit (ITP) for the SWP operations

Scenario/Project	Existing Conditions Model (date developed)	Project Alternative Model
WSIP Baseline	2021 WSIP Baseline CalSim II model (09/30/2021, prepared by DWR)	N/A

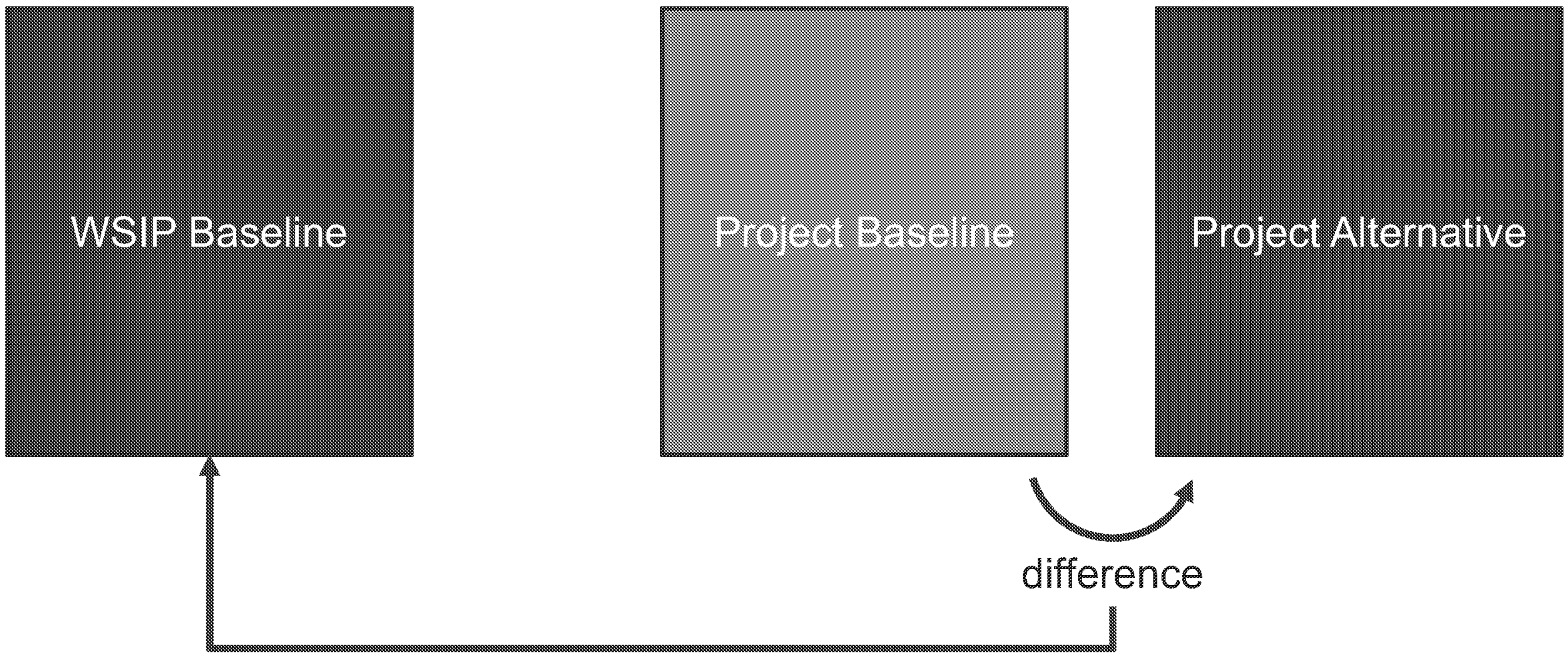
Approach | Project Model Collection

- Most recent CalSim II or spreadsheet models were obtained from each WSIP projet
- Operations and facility assumptions for each WSIP project were obtained from most recent existing documentation
- No WSIP project used the WSIP Baseline

Scenario/Project	Existing Conditions Model (date developed)	Project Alternative Model
WSIP Baseline	2021 WSIP Baseline CalSim II model (09/30/2021, prepared by DWR)	N/A
Sites	2022 Baseline CalSim II model (5/14/2022)	Sites Alt 3 CalSim II model (modified from Sites Existing Conditions Model)
Harvest	2017 WSIP 2030 Baseline CalSim II model (2017)	Regional San Program, Year 20 equilibrium conditions (modified from Harvest Existing Conditions Model)
LVE	2017 LVE Baseline CalSim II model (05/02/2017)	LVE Alt 1B CalSim II model (modified from LVE Existing Conditions Baseline)
Willow Springs	N/A	Custom spreadsheet model that simulates GW bank operation by post-processing a CalSim II baseline conditions model (04/06/2022)
Kern Fan	N/A	Custom spreadsheet model that simulates GW bank operation by post-processing a CalSim II baseline conditions model (02/09/2018)
Chino Basin	N/A	Custom spreadsheet model that simulates GW bank operation by post-processing a CalSim II baseline conditions model (01/10/2021)

Approach | General

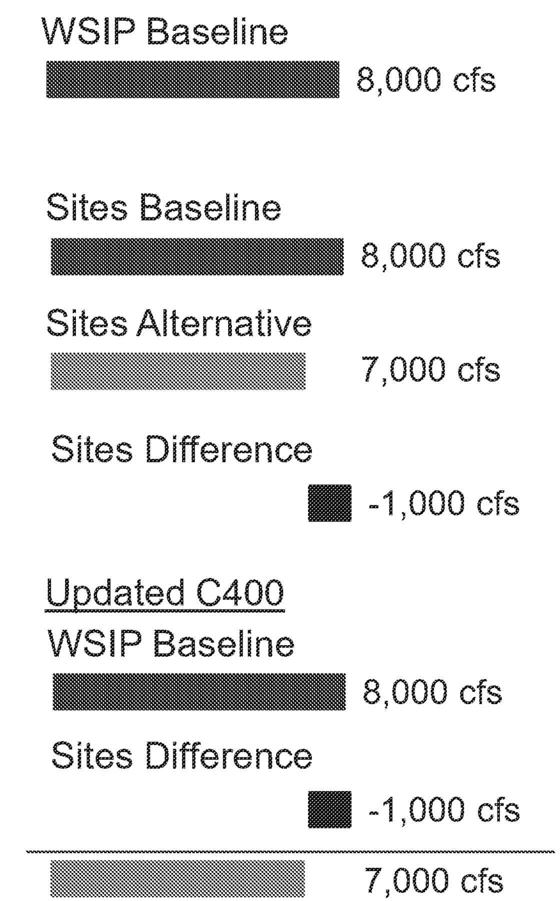
- No WSIP project used the WSIP Baseline CalSim II model
- We looked for the difference each project made in their own analysis
- We modified the WSIP Baseline with that difference



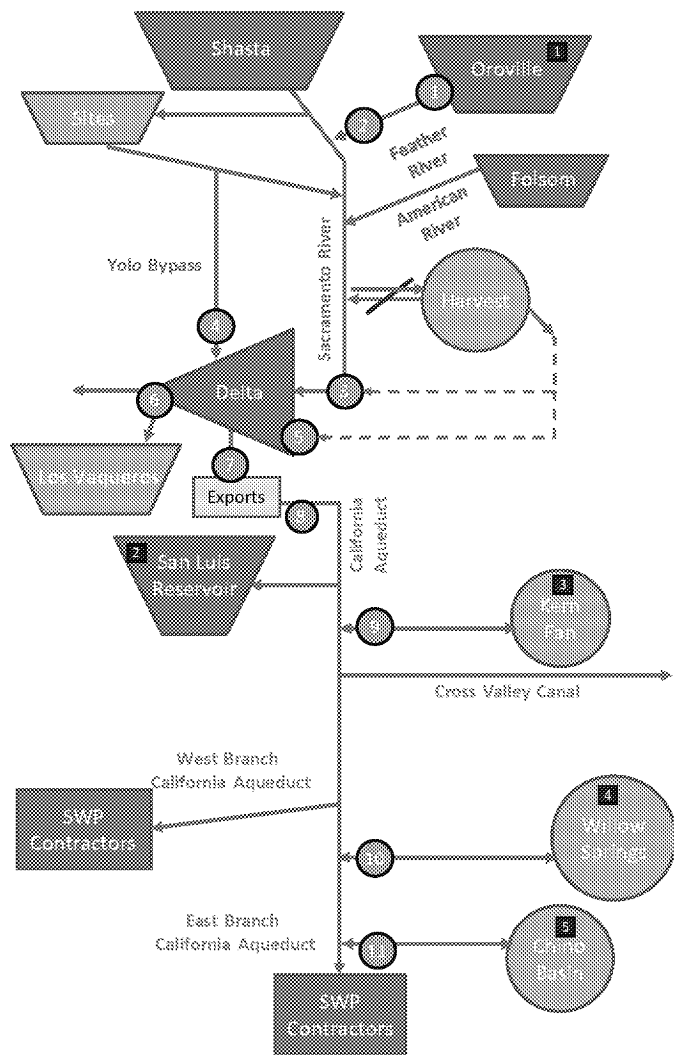
Approach | Cumulative Effects

- WSIP Baseline variables were adjusted as follows:
  1. Identify a variable of interest
     - *Example*:
       - Sacramento River flow at Hood = C400 in CalSim II
       - C400 value in WSIP Baseline for given month = 8,000 cfs
  2. Calculate the monthly difference in this variable between the individual WSIP project existing conditions model and the individual WSIP project alternative model
  3. Add the difference for the individual WSIP project to the WSIP Baseline
     - *Example*:
       - C400 in WSIP Baseline = 8,000 cfs
       - C400 difference from Sites = -1,000 cfs
       - Updated C400 = 7,000 cfs
  4. Repeat steps 1-3 for the next project, replacing the WSIP Baseline value with the updated value from the previous iteration

Monthly Example



Approach | Schematic



NODES/STORAGE FROM CALSIM FOR WSIP BASELINE, MOD1, AND MOD2

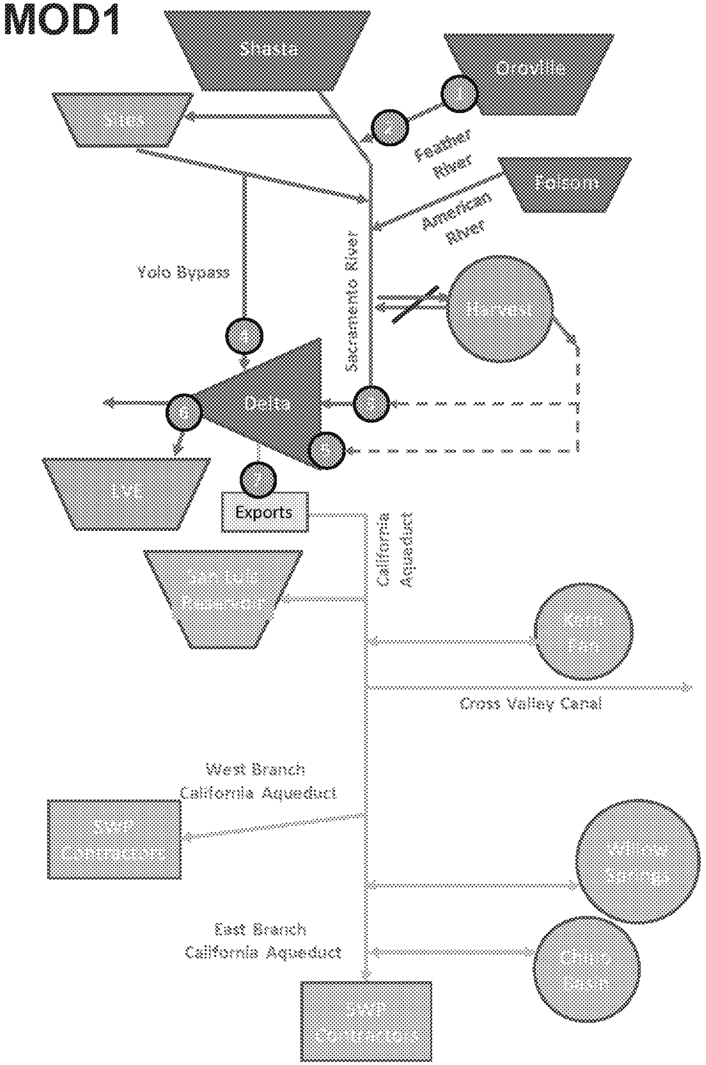
	Flow Variable	**CalSim II Node**
1	Feather River Flow below Thermalito	C203
2	Feather River Flow at mouth	C223
3	Sacramento River Flow at Hood	C400
4	Flow through Yolo Bypass	C157
5	Mokelumne River inflow to Delta	C504
6	Delta outflow surplus	C407_SWP + C407_CVP
7	Banks Exports	D419
8	Article 21 Delivered SOD	DEL_SWP_PIN (minus NOD deliveries)
9	Deliveries to Kern Fan	N/A
10	Deliveries to Willow Springs	N/A
11	Deliveries to Chino Basin	N/A

	Storage Variable	
1	Oroville Storage	S6
2	SWP San Luis Reservoir	S12
3	Kern Fan	N/A
4	Willow Springs	N/A
5	Chino Basin	N/A

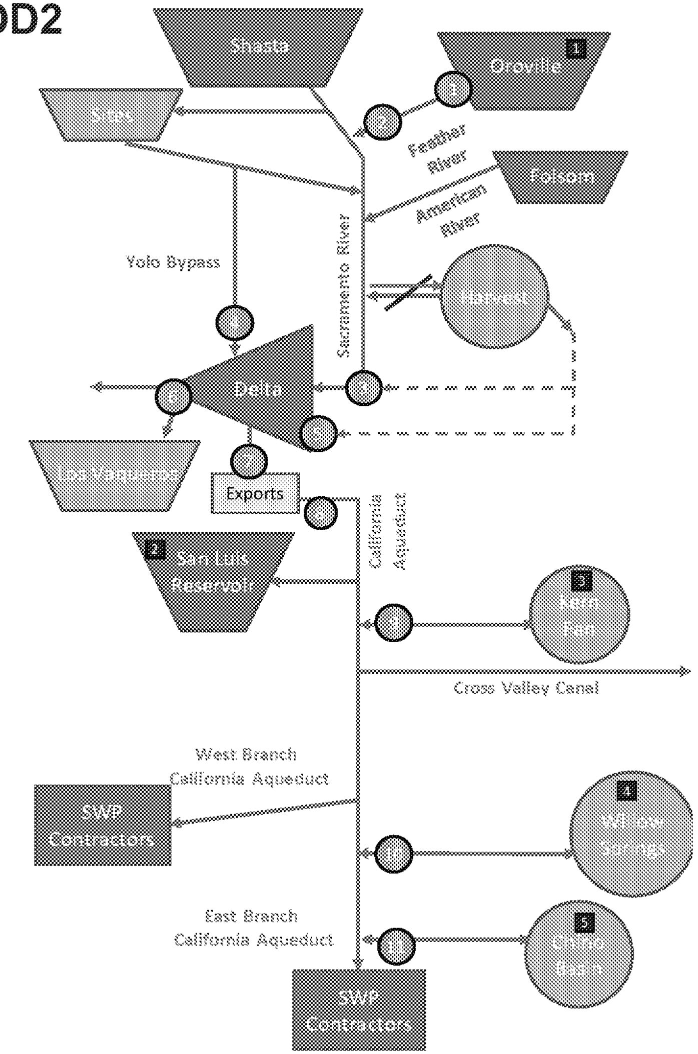
Approach | Implementation Order

- WSIP Baseline variables were incrementally adjusted in two modifications:
  - **MOD1:** Surface water diversion projects implemented incrementally from north to south: Sites, Harvest, then LVE.
  - **MOD2:** Coordinated operations of all three south-of-Delta GW banks were implemented together: Kern Fan, Willow Springs, and Chino Basin.

MOD1

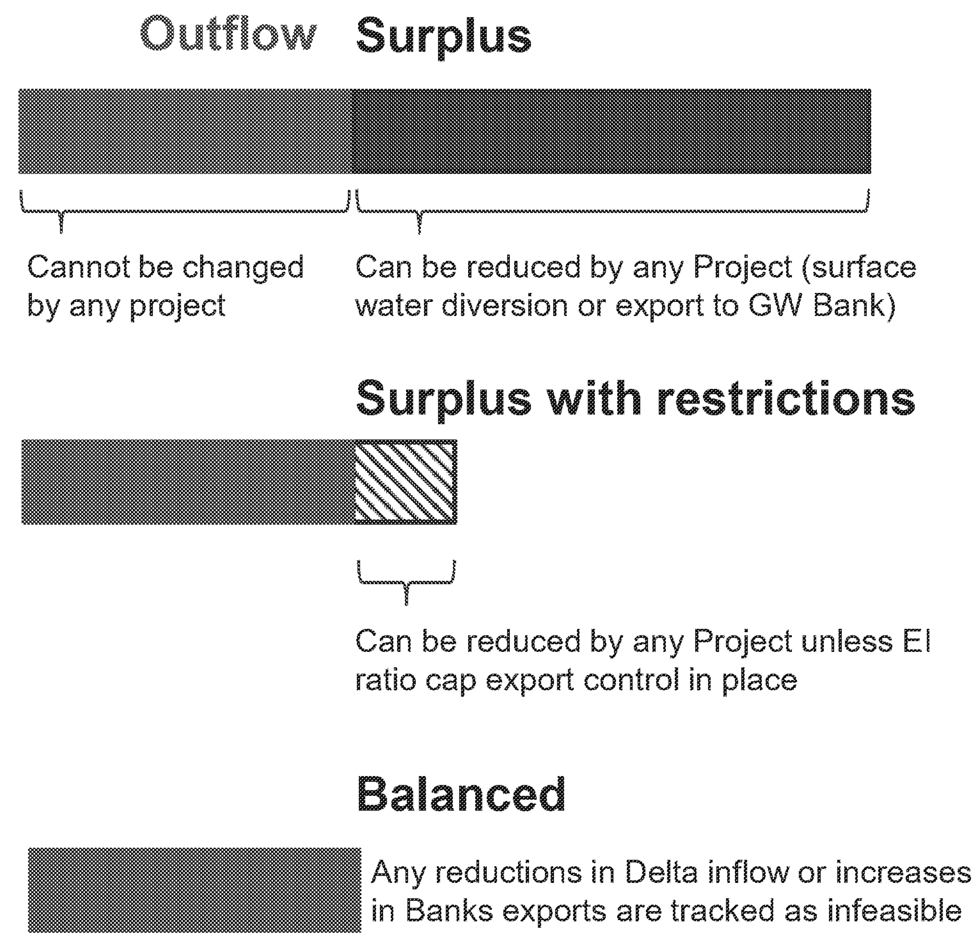


MOD2



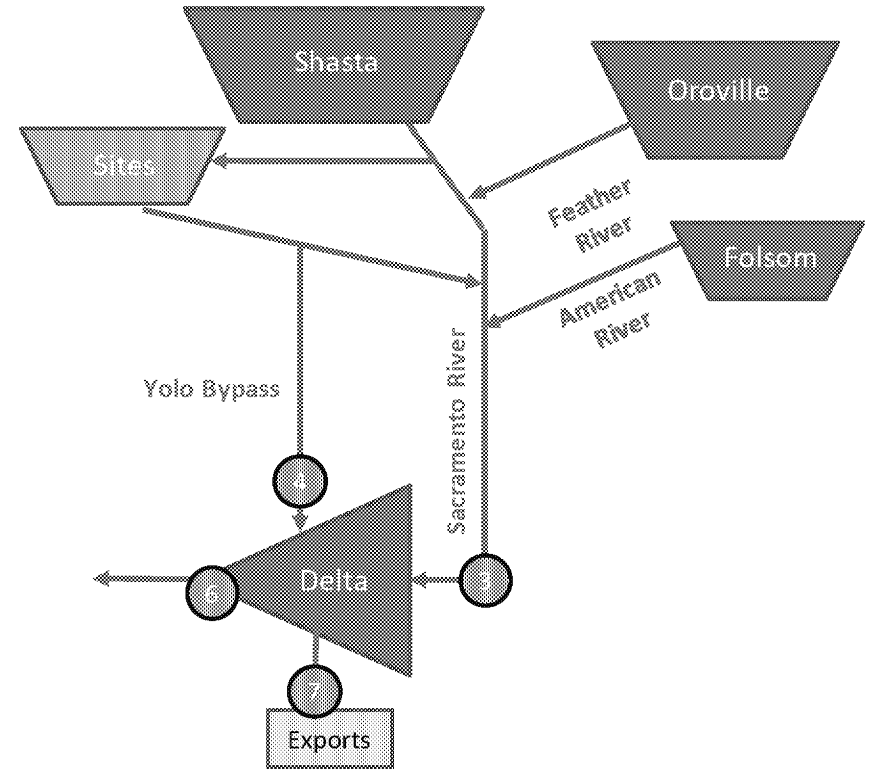
Approach | Delta

- Delta conditions in the WSIP Baseline are classified into three categories:
    - Surplus
    - Surplus with restrictions
    - Balanced
- The WSIP Baseline controlling regulation is identified and assumed to be constant through each project adjustment:
    - EI ratio cap export control
    - OMR control
    - D-1641 April-May export cap control
    - D-1641 outflow control
    - D-1641 salinity control
    - SWP ITP export cut (April-May spring outflow)
- Delta surplus is reduced by WSIP projects until balanced conditions are met, then Delta surplus reductions are tracked as infeasible



Approach | Sites

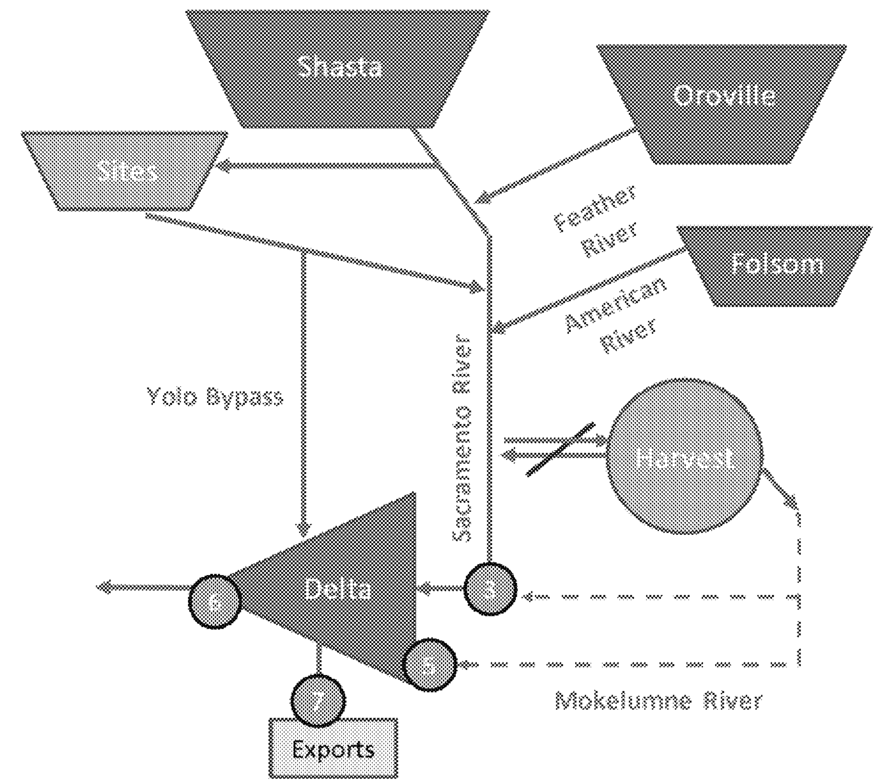
- Sites effects are modeled as a change at four locations (CalSim II variable indicated in parenthesis):
  - 3 Delta inflow from the Sacramento River at Hood (C400)
  - 4 Delta inflow from the Yolo bypass (C157)
  - 7 Banks exports (D419)
  - 6 Assumed Delta surplus (C407_SWP + C407_CVP)



- General Approach
  - Delta surplus is reduced by Sites reductions to Delta inflow and increases in Banks exports
    - Reductions to Delta inflow greater than the surplus available are tracked as ‘infeasible’
  - Increases to Delta inflow are not made available for export by other WSIP projects
  - Banks exports are increased/reduced by Sites
    - Modifications not allowable due to permit/regulatory constraints or health and safety minimums are tracked as ‘infeasible’

Approach | Harvest

- Harvest effects are modeled as a change at four locations (CalSim II variable indicated in parenthesis):
  - 3 Delta inflow from the Sacramento River at Hood (C400)
  - 4 Delta inflow from the Mokelumne River (C504)
  - 7 Banks exports (D419)
  - 6 Assumed Delta surplus (C407_SWP + C407_CVP)

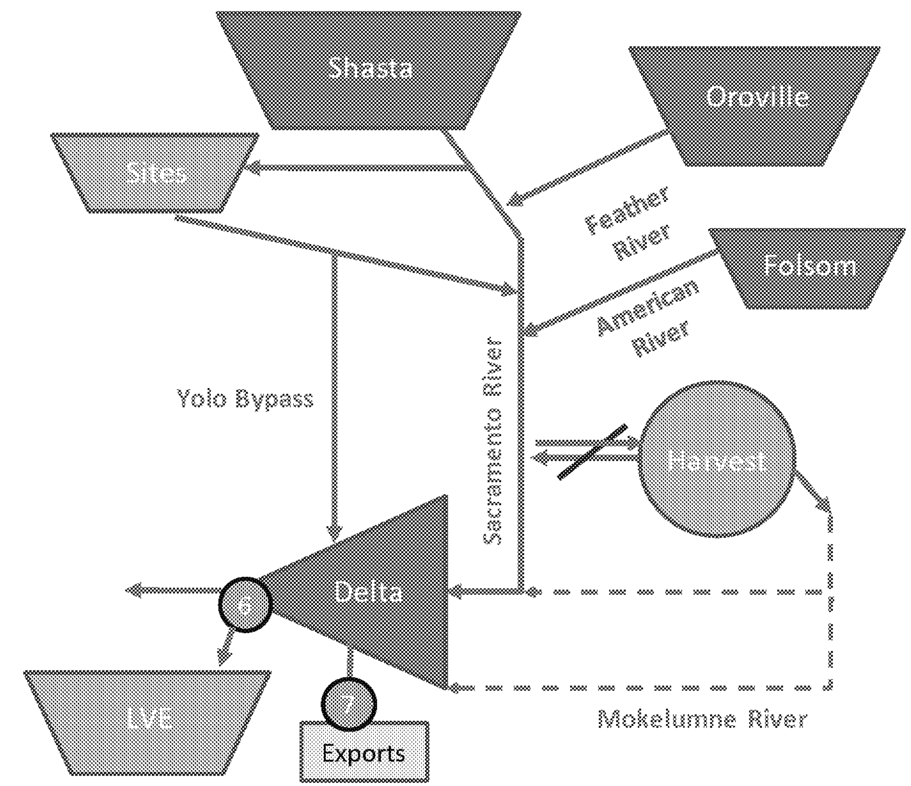


- General Approach
  - Calculate net difference between decreased releases and increased surface water return flow in Sacramento River
  - Calculate increase in surface water return flow in Mokelumne River
  - Adjust Delta surplus by net change in Delta inflow between Sacramento and Mokelumne Rivers
  - Adjust Banks exports if Delta surplus reduced below 0

Approach | LVE

- LVE effects are modeled as a change at two locations (CalSim II variable indicated in parenthesis):
  - 7 Banks exports (D419)
  - 6 Assumed Delta surplus (C407_SWP + C407_CVP)

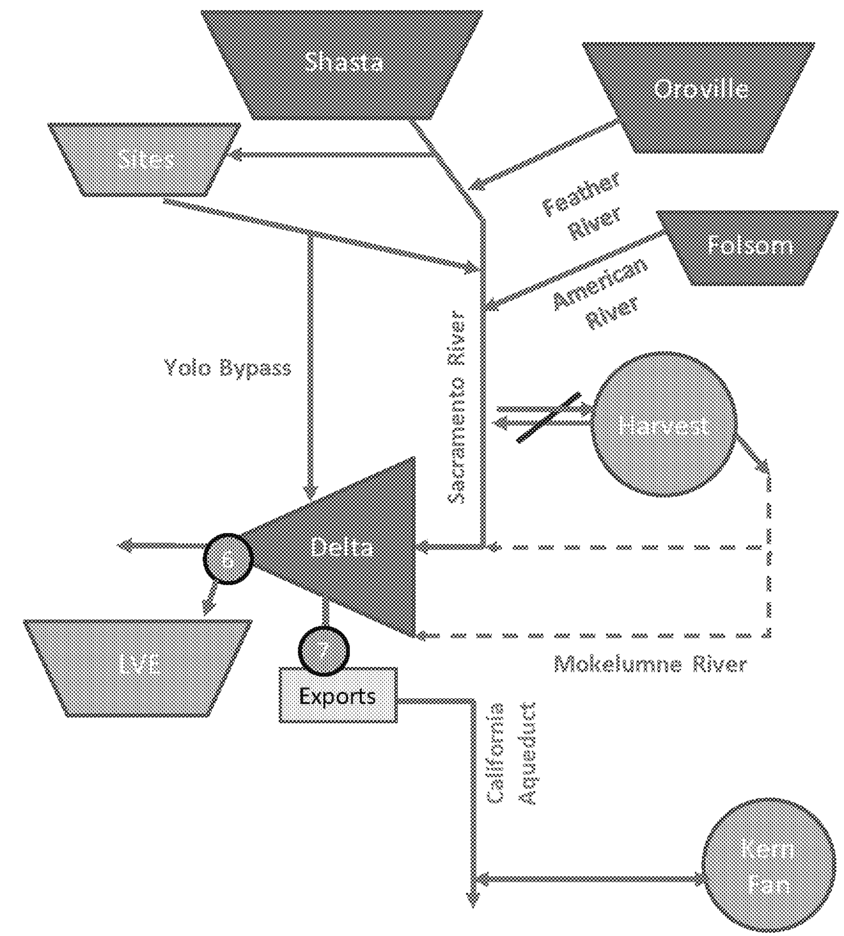
- General Approach
  - Delta surplus is reduced by LVE exports of Delta surplus
    - Reductions to Delta surplus when no surplus is available (either from the WSIP Baseline or due to Sites or Harvest) are tracked as 'infeasible'
  - Banks exports are increased/reduced by LVE
    - Modifications not allowable due to permit/regulatory constraints or health and safety minimums are tracked as 'infeasible'



Approach | Kern Fan Fill

- Kern Fan filling effects are modeled as a change at two locations (CalSim II variable indicated in parenthesis):
  - 7 Banks exports (D419)
  - 6 Assumed Delta surplus (C407_SWP + C407_CVP)

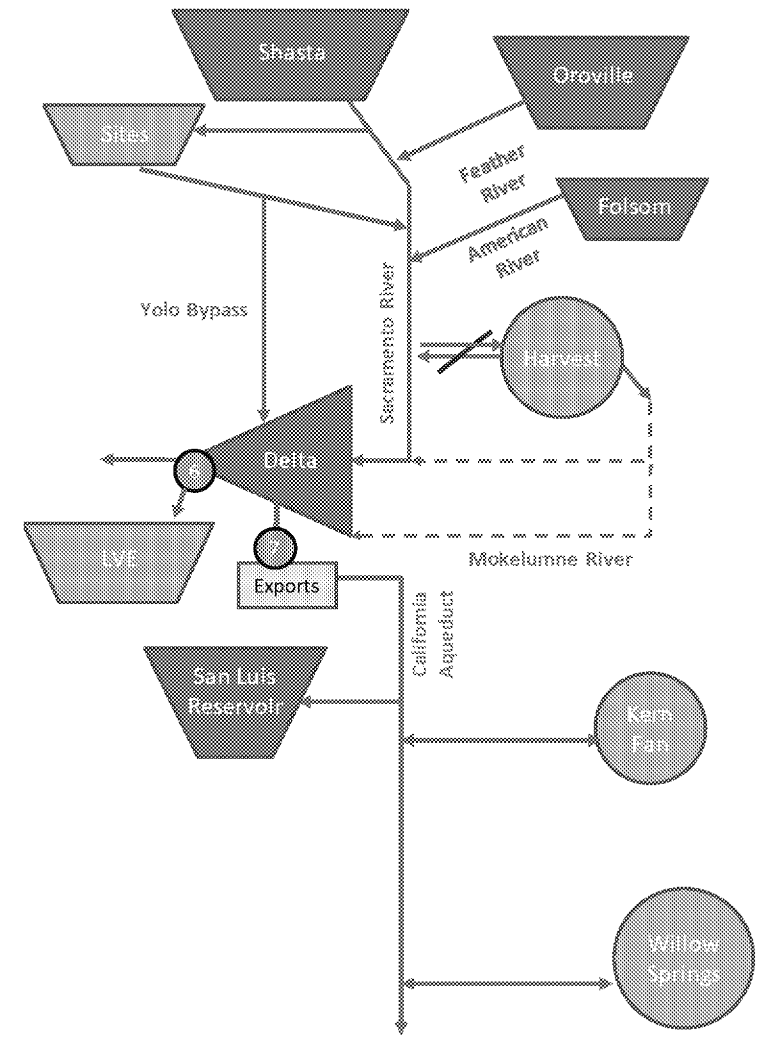
- General Approach
  - All constraints of spreadsheet model preserved
  - Kern Fan only exports Delta surplus as Article 21
    - To treat the two Article 21-dependent groundwater banks equally, Kern Fan has access to half of the available Delta surplus (Willow Springs has access to the other half)
  - Kern Fan splits fill between a 25 TAF environmental account and two other storage accounts (75 TAF total)
  - 18 TAF of Kern Fan environmental account is emptied following a pulse flow call (no partial delivery when called)



Approach | Willow Springs Fill

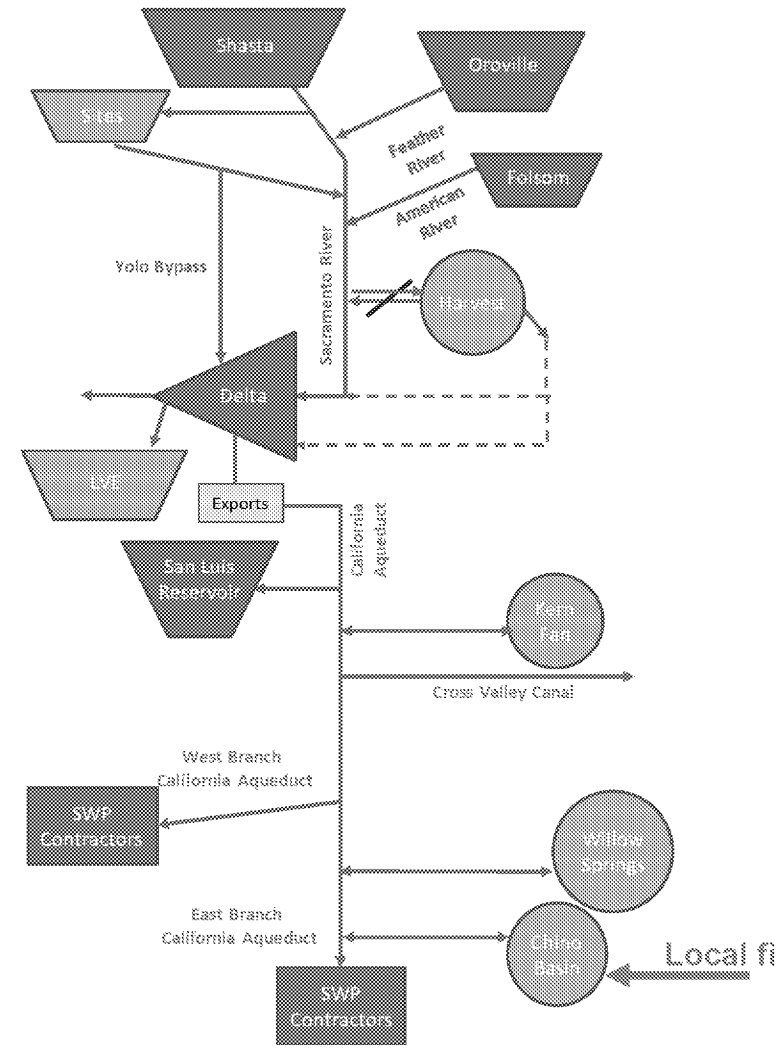
- Willow Springs filling effects are modeled as a change at two locations (CalSim II variable indicated in parenthesis):
  - 7 Banks exports (D419)
  - 6 Assumed Delta surplus (C407_SWP + C407_CVP)

- General Approach
  - All constraints of spreadsheet model preserved
  - Space opened up in San Luis Reservoir by pre-evacuation to Willow Springs Water Bank is used to store additional exports in periods when San Luis would have otherwise been full
    - Available Delta surplus split with Kern Fan
  - Total GW bank storage capacity of 560 TAF (no limit to the ecological benefit storage account)
  - Up to 28.6 TAF of Willow Springs ecological benefit storage account is emptied following a pulse flow call



Approach | Chino Basin Fill

- Chino Basin has no filling effects on the system as modeled in the post-processor.
  - Fill occurs with a constant supply of treated water using a time series consistent with the WSIP application

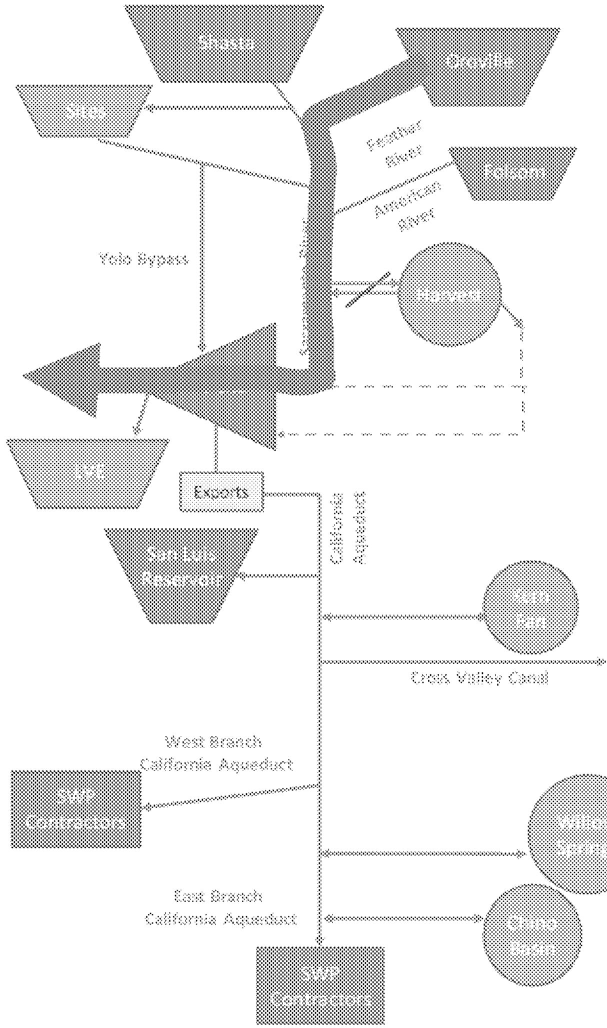


- General Approach
  - All constraints of spreadsheet model preserved
  - Total storage available is 150 TAF, total borrowing capacity (i.e., deliveries debited against other Chino Basin groundwater) is 100 TAF
  - Up to 50 TAF from Chino Basin is emptied in response to a pulse flow call
  - Chino Basin pulse flow operations are decoupled from releases to Partner Contractors – see documentation

Approach | Pulse Flow and Compensation

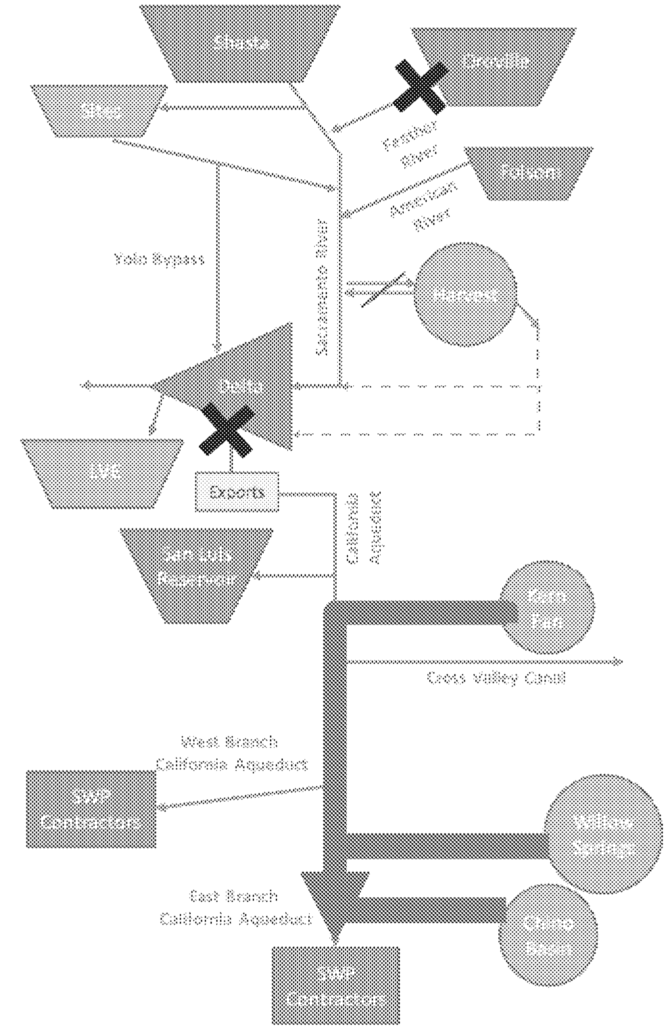
Pulse Flow Month (April)

- Up to 100 TAF in combined supplies from the three GW banks is indirectly exchanged for storage in Oroville to enable a spring pulse flow release from Oroville in April of Below Normal and Dry water year types



Compensation Months (Jul – Sep)

- Oroville releases are reduced to compensate (i.e., make Oroville whole by end of water year) for the pulse flow release
- Banks exports are reduced in response to reduced Oroville releases
- GW banks deliver compensation flow to State Water Contractors



Approach | Pulse Flow Implementation

- GW Bank storage is tracked monthly
- A pulse flow call of 100 TAF is made every April of Below Normal and Dry water year types
- Oroville storage is reconciled on an annual basis
- The pulse flow magnitude delivered is based on the most restrictive of the following four variables:

1. Total GW bank storage available in pulse flow account (no negative storage allowed)

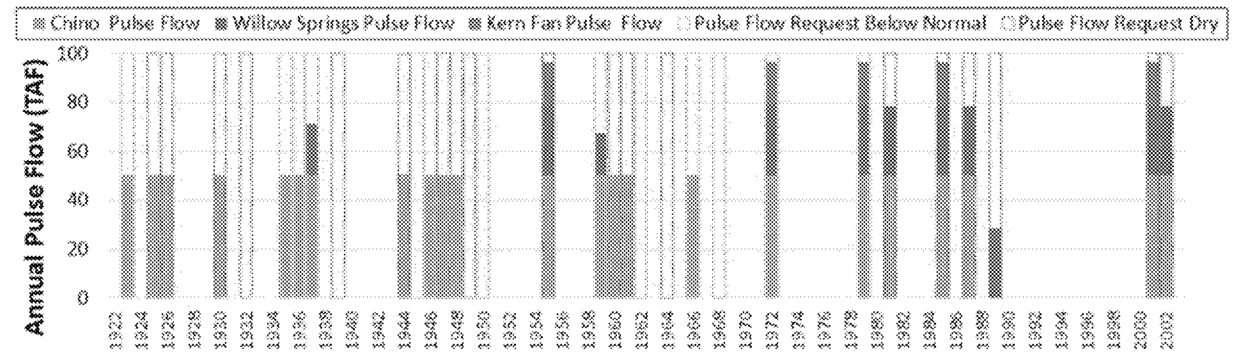
2. GW bank specific triggers and constraints
   - e.g., Chino Basin will only make a pulse flow for either 3 consecutive or 4 out of 10 years, and only if Lake Oroville storage and San Luis Reservoir storage are within minimum and maximum threshold values.
3. Volume of Feather River flow reductions required (Jul – Sep) to compensate for the pulse flow that would not place flows below the monthly minimum flow thresholds
   - Checked below Thermalito and at the at the junction with the Sacramento River
4. Volume of Banks export reductions needed to offset Oroville release reductions (Jul – Sep)
   - Cannot cut below 300 cfs health and safety minimum

Preliminary Findings

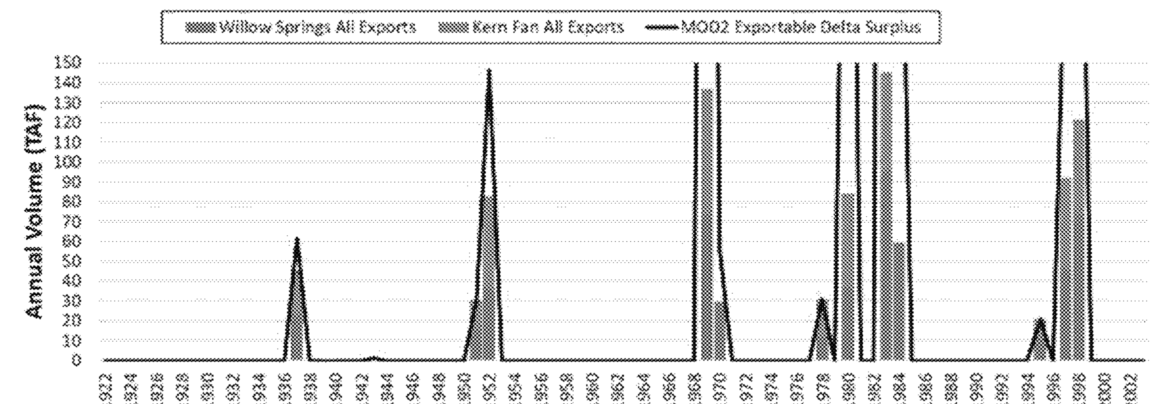
Ability to Support Pulse Flow Operations

- Out of 32 possible pulse flow delivery years (i.e., 32 total Below Normal and Dry years in the 82-year simulation period):
  - A full 97 TAF pulse flow is delivered in 5 years
  - A partial pulse flow averaging 53 TAF is delivered in 20 years
  - No pulse flow is delivered in 7 years
- Two main factors driving results:
  - Exportable Delta Surplus is limited in first half of hydrologic sequence – does not allow Kern Fan and Willow Springs to fill
  - Chino Basin pulse releases are limited in frequency to 3 consecutive or 4 out of 10 years – this is triggered several times

Annual Pulse Requested in Below Normal (dashed yellow line) and Dry (dashed red line) Years and Delivered by Each GW Project



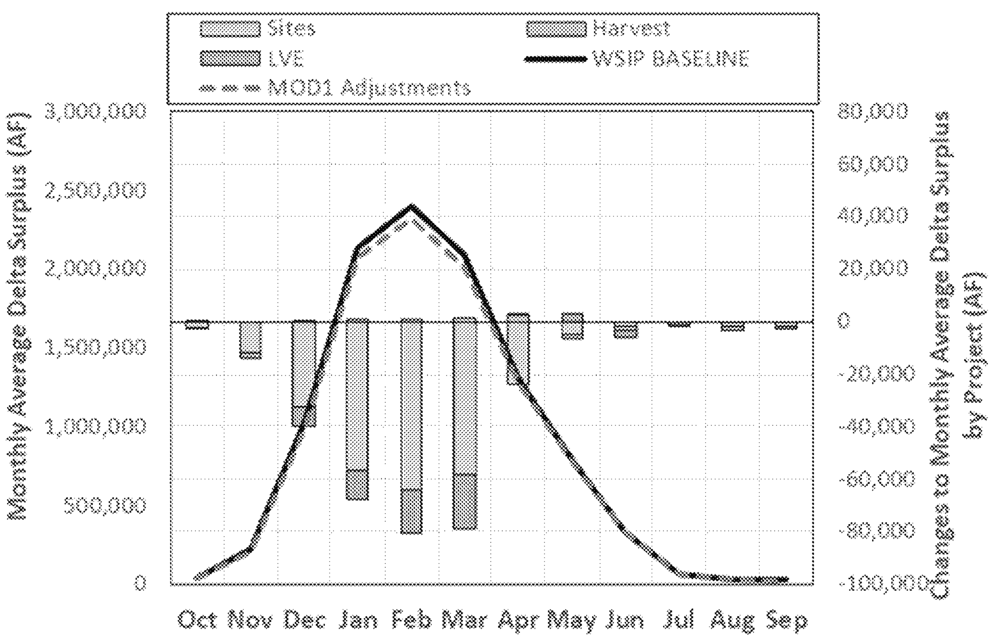
Annual Fill of Willow Springs and Kern Fan All Accounts and Delta Surplus Exportable as Article 21



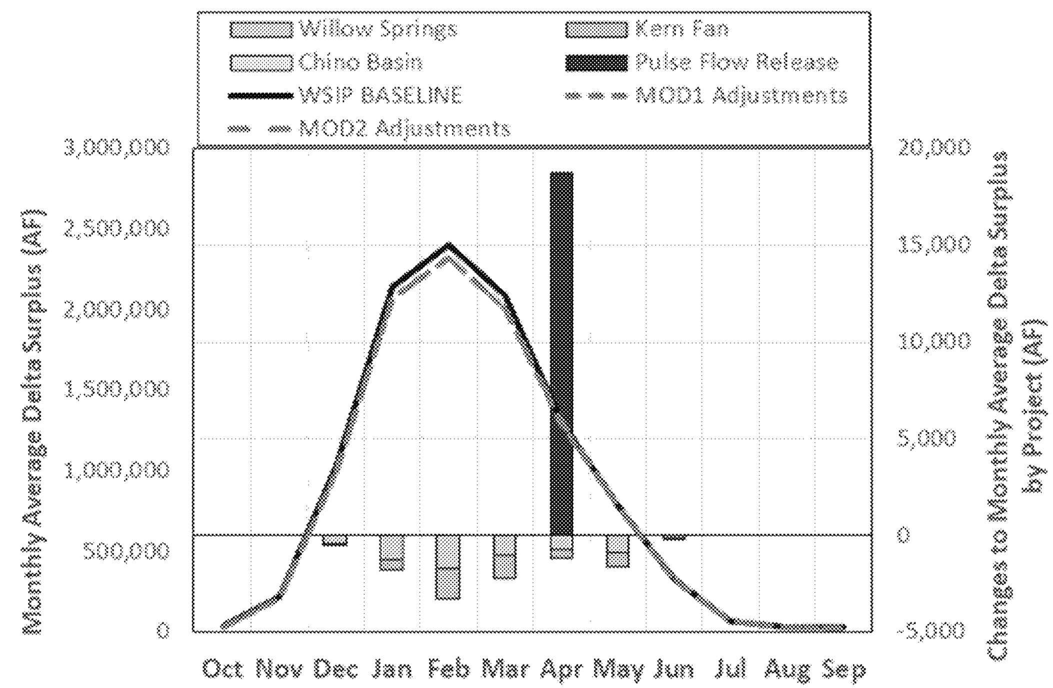
Cumulative Effects on Delta Surplus

- **MOD1:**
  - Delta surplus reduced primarily due to LVE Delta surplus exports and Sites Delta inflow reductions
- **MOD2:**
  - Delta surplus reduced primarily due to Willow Springs and Kern Fan exports
  - Delta surplus increased during pulse flow months

MOD1 Mean Monthly and Changes in Delta Surplus



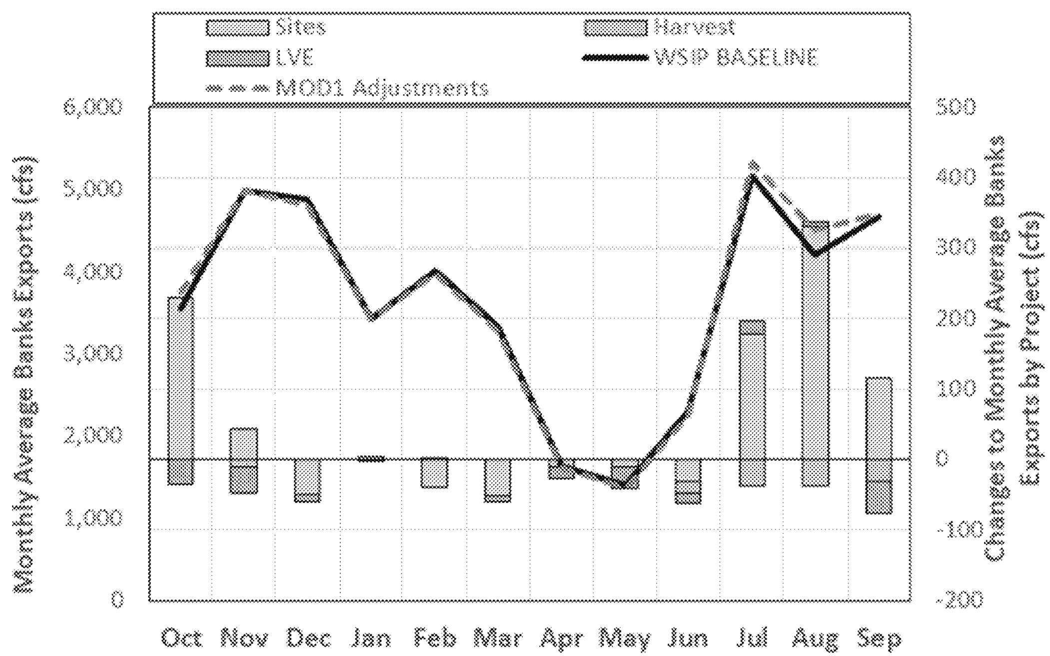
MOD2 Mean Monthly and Changes in Delta Surplus



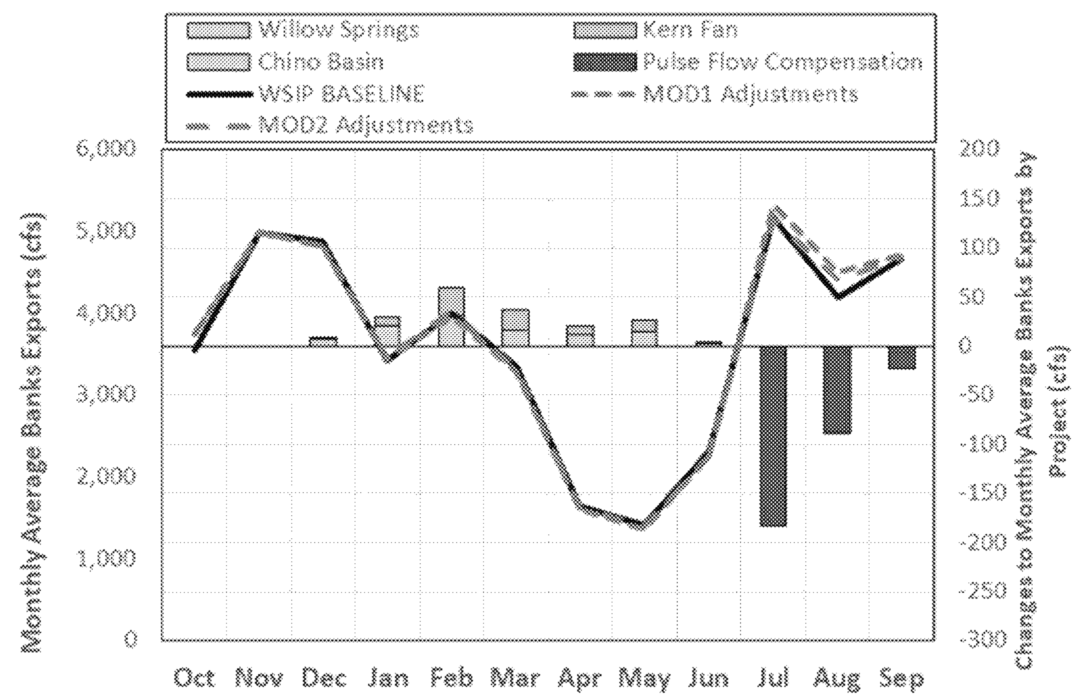
Cumulative Effects on Banks Exports

- **MOD1:**
  - Banks exports increased primarily due to Sites export of Sites releases
  - Minor Banks export cuts required in Summer (Jun – Sep) due to reduced Delta inflow from Harvest
- **MOD2:**
  - Banks exports increased primarily due to Willow Springs and Kern Fan export of Delta surplus in winter months
  - Banks exports decreased in Jul – Sep for pulse flow compensation

MOD1 Mean Monthly and Changes in Banks Exports



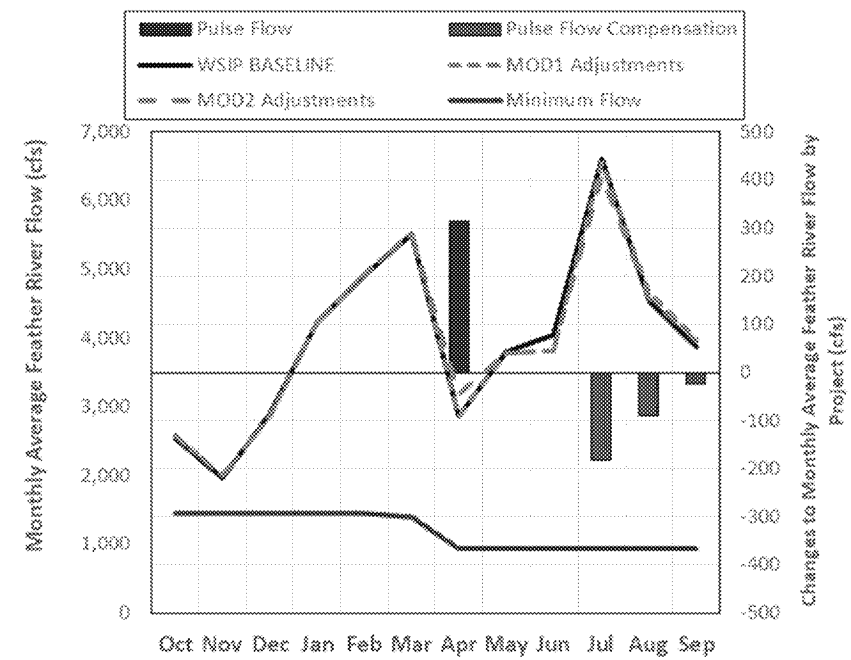
MOD2 Mean Monthly and Changes in Banks Exports



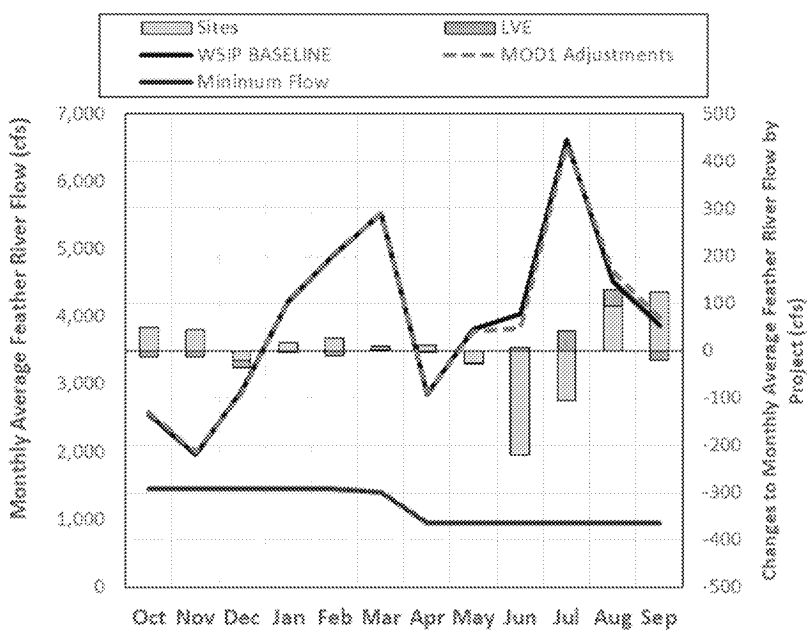
Cumulative Effects on Feather River

- **MOD1 (flow below Thermalito):**
  - Reductions primarily due to Sites
- **MOD2 (flow below Thermalito):**
  - Increase in April due to pulse flow
  - Decreases in Jul – Sep for pulse flow compensation

MOD2 Mean Monthly and Changes in Feather River Flows



MOD1 Mean Monthly and Changes in Feather River Flows



CalSim II Hydrology and Initial Storage

- The availability of Delta surplus is highly dependent on CalSim II hydrology, which starts relatively dry for first few decades
- Starting each GW bank at 0 TAF initial storage may artificially suppress GW bank contributions to pulse flows
- The effect of initial storage used in the analysis was analyzed as a sensitivity:
  - Starting Willow Springs with 50 TAF and Kern Fan with 25 TAF of initial storage
  - Annual pulse flow delivered increased from 18.7 TAF per year to 19.2 TAF per year
  - Number of pulses provided by Kern Fan (5 to 7) and Willow Springs (13 to 14)
- From a viewpoint of providing pulse flows, the initial storage seems to have limited effects

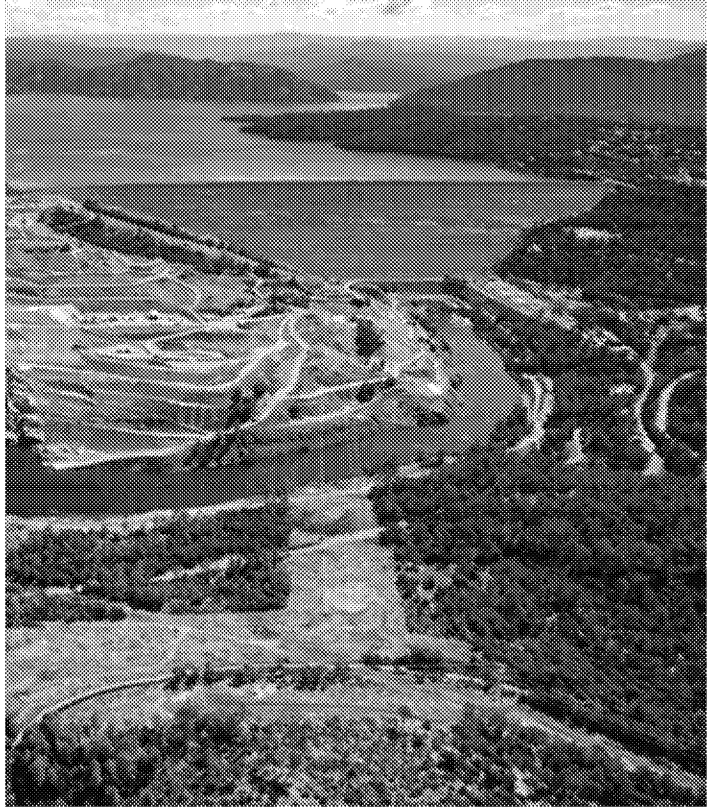
Known Limitations

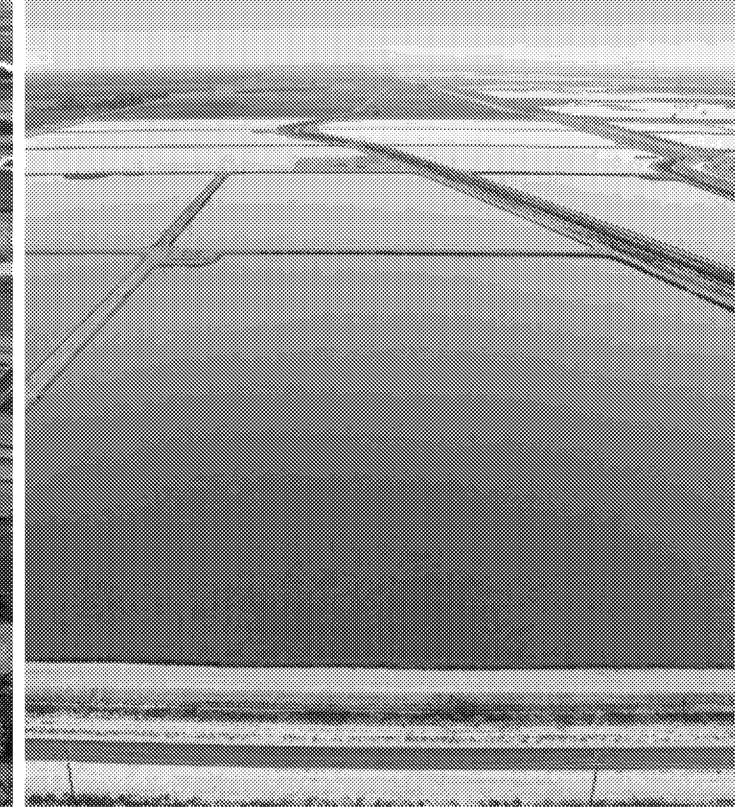
Known Limitations

- The post-processor represents the operations of individual projects as effects at individual locations, based on existing models with differing baselines that were developed independent of each other – certain processes and interactions cannot be simulated or analyzed
- Results of the analysis may be dependent on an arbitrary order of project implementation that was required to develop the post-processor tool (e.g., Sites, then Harvest, then LVE, then GW banks)
- Some conflicts have been identified based on incompatibilities between the individual project baseline and the WSIP baseline
- Banks export cuts during flow compensation months when Banks is exporting releases from Sites should be reviewed
- Not explicitly modeling Oroville and San Luis Reservoir
- Carriage water savings from Banks export cuts in summer not taken into account

Known Required Model Updates

- Feather River minimum flow lookup during compensation months
  - *Update*: Look to individual months for compensation reduction constraint, in addition to the total volume of the entire period from July to September.
  - *Likely effect*: Reduce pulse flow call in three years from 100 TAF to between 85 TAF – 90 TAF.
- Include Feather River flow reductions from Sites in compensation flow lookup
  - *Update*: Feather River flows in the WSIP Baseline serve as the basis for compensation flow volume limits. Sites reduces Feather River flows in some summer months – this reduction should be included in the compensation flow volume constraint for additional precision.
  - *Likely effect*: May reduce pulse flow call volume in certain years.
- Banks export cuts during compensation months
  - *Update*: Adjust to only cut SWP exports, not transfers or wheeling for CVP.
  - *Likely effect:* May reduce pulse flow call volume in certain years.
- Refine Willow Springs model to include California Aqueduct constraints
  - *Update*: Constrain Willow Springs fill based on California Aqueduct capacity.
  - *Likely effect:* Minor reduction in pulse flow provided by Willow Springs, large reduction in Willow Springs ending total storage.





Questions and Discussion

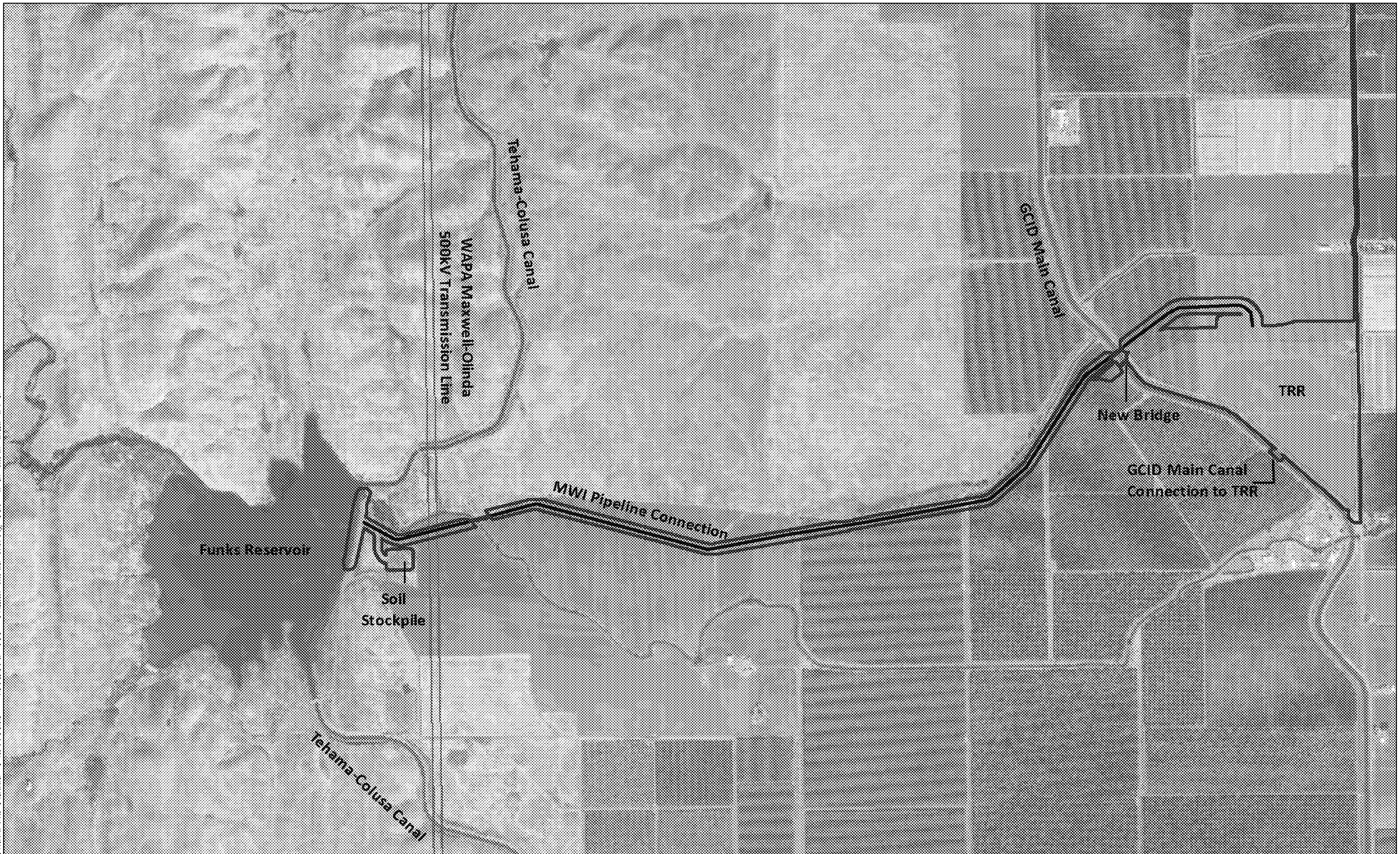


Figure 3.7-1a
Area of Potential Effects

Project Study Area / Area of Potential Effects
TRR Pipeline
Reservoir

N
0 0.25 0.5
Miles

Horizon

Maxwell Intertie Project

Attachment A

Figure 3.7-1b

Area of Potential Effects

Project Study Area / Area of Potential Effects

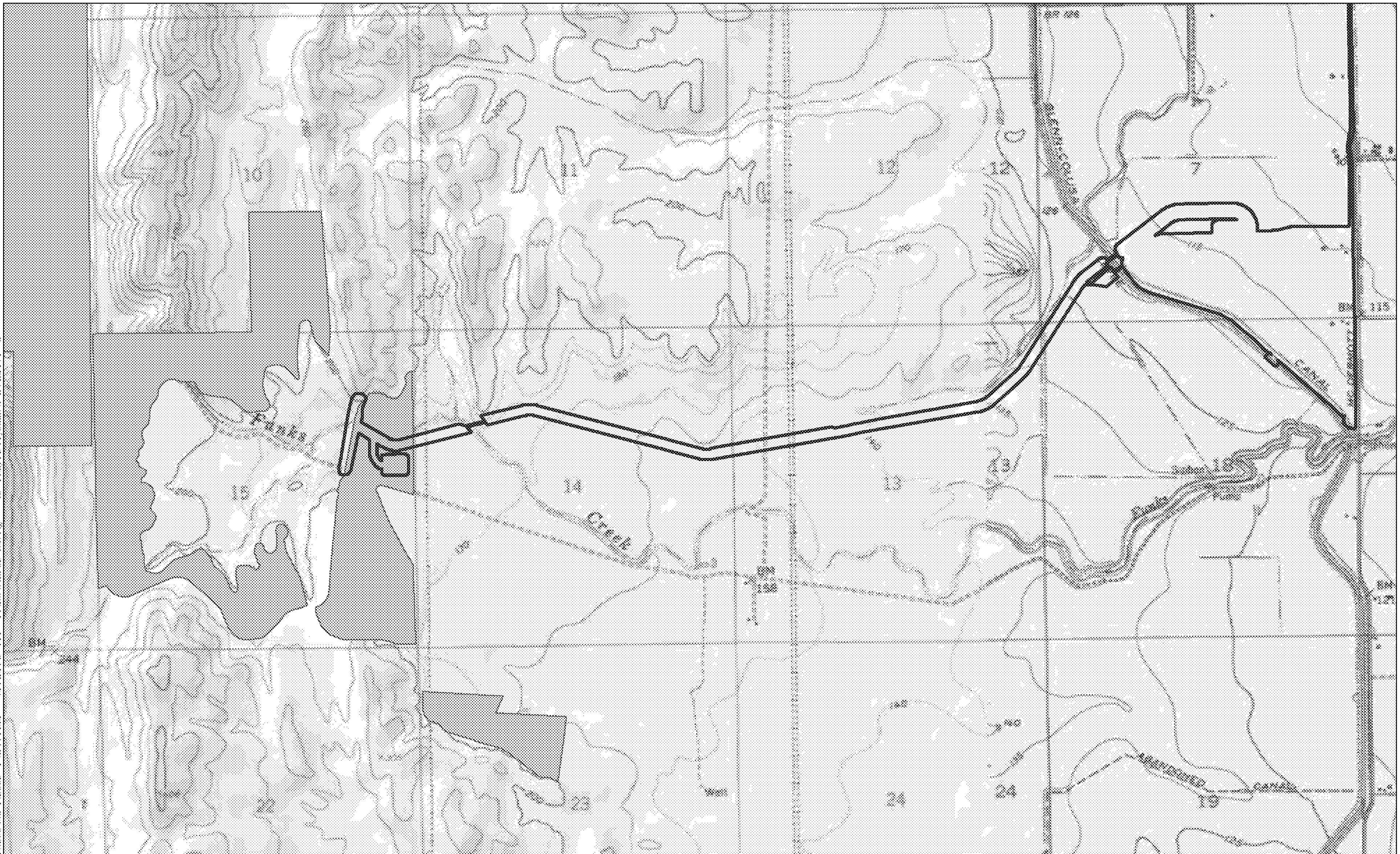
TRR Pipeline

Reservoir

Horizon

Maxwell Intertie Project

Attachment B



Basemap Sources: Copyright© 2013 National Geographic Society, i-cubed

N

0 0.25 0.5
Miles

Figure 3.7-2
Previously Surveyed Areas

Project Study Area / Area of Potential Effects

Previously Surveyed Areas

Horizon

Maxwell Intertie Project

Attachment C

From: Herrin, Jeff [jeff.herrin@aecom.com]
Sent: 8/30/2022 10:22:52 AM
To: Luu, Henry [Henry.Luu@hdrinc.com]
CC: Smith, Michael (orange) [michael.g.smith@aecom.com]; Wisniewski, Jeffrey [jeffrey.wisniewski@aecom.com]; JP Robinette [jrobinette@sitesproject.org]
Subject: Early Construction Alternatives

Henry,

We are thinking about alternatives for an early start on Golden Gate Dam. Originally, we planned to access the dam from the west side (Peterson property side). The dam is actually on the Jensen property, but accessing the foundation from the east would require access for construction vehicles through the Funks Creek canyon to the dam foundation site. The EIR/S did not include construction access from this side (it is more difficult and will result in some increase in cost). I'm assuming we would prefer to include an alternative that does not require access to the Peterson property if possible (I'm still not sure it can work). I think it would be helpful if you could check with the Environmental Team to find out whether accessing the dam foundation from the east is really viable. I don't think they will like running construction vehicles up the narrow canyon adjacent to the creek; however, my initial impression is that we cannot find a way to access the property from the west without crossing Peterson land.

If we move forward with this option, I think we should also get early input from the LMC as well. Otherwise, this may be a waste of effort.

Jeff Herrin

VP, Water Resources Planner - Northern California Region, US West Water
M +1-916-432-0956
jeff.herrin@aecom.com

AECOM
aecom.com

Fishery Group Discussion #4 Agenda

Affordable Water, Sustainably Managed

Our Core Values – Safety, Trust and Integrity, Respect for Local Communities, Environmental Stewardship, Shared Responsibility and Shared Benefits, Accountability and Transparency, Proactive Innovation, Diversity and Inclusivity
Our Commitment – To live up to these values in everything we do

Meeting Information:

Date:	September 1, 2022	**Location:**	Microsoft Teams link in invite Or call in (audio only) (833) 255-2803,,317767211#
Start Time:	12:00 p.m.	**Finish Time:**	1:00 p.m.
Purpose:	Overview and discussion of the changes to the diversion criteria and fisheries analysis since the release of the 2021 Revised Draft EIR/Supplemental Draft EIS		

Meeting Invitees:

Sites Project staff, key consultants and interested NGO and community members

Agenda:

Discussion Topic	Topic Leader	Time Allotted
1. Meeting Norms	John Spranza	5 mins
2. Updated Diversion Criteria	John Spranza	15 min
3. Updated Exchanges	Steve Micko	10 min
4. Updated Modeling	Steve Micko	15 mins
5. Open Topics	Group	15 min
6. Adjourn		