EXECUTIVE COMMITTEE MEETING | Agenda

JULY 13, 2020
FRIANT WATER AUTHORITY
854 N. HARVARD AVE, LINDSAY, CA 93247
CONFERENCE ROOM (DIRECTORS/STAFF ONLY)

8:30 AM (CLOSED SESSION)
The public may call-1-866-893-0375 Pin 5595626900# at 8:30 A.M. with any comments prior to Closed Session

9:30 AM (OPEN SESSION)
VIA WEBEX FOR ALL OTHERS: Video system or application Dial: Webex.com, join, 1334595344@friantwater.webex.com
Phone access dial 1-415-655-0001
MEETING ACCESS CODE 133 459 5344 Meeting password: myYv3P2RFn6 (69983727 from phones)

In accordance with the Governor’s Executive Order (N-29-20) and the declared State of Emergency, including social distancing directives as a result of the threat of the COVID-19 virus, Committee members and FWA staff will be participating in this meeting remotely. There will not be a physical location for this meeting. Members of the public may participate in the meeting in the following way:

1. Video System or Application Webex.com, join, Dial 1334595344@friantwater.webex.com
2. Phone: WEBEX TELECONFERENCE: 1-415-655-0001
   MEETING ACCESS CODE 133 459 5344 Meeting password: myYv3P2RFn6 (69983727 from phones)
   Email: You may submit comments on a specific agenda item via email to tmarie@friantwater.org.
   Please send your email at least one hour prior to the start of the meeting.
   If members of the public have any problems using the WebEx number during the meeting, please contact the FWA office at 559-562-6305. The Friant Water Authority thanks you for your understanding and for doing your part to prevent the spread of COVID-19.

At the discretion of the Board of Directors, all items appearing on this agenda, whether or not expressly listed for action may be subject to action by the Board. The order of agenda items is subject to change.

1. CALL TO ORDER/ROLL CALL – (TANTAU)
2. APPROVAL OF THE AGENDA – (TANTAU)
3. PUBLIC COMMENT ON CLOSED SESSION ITEMS – (DAVIS) (Public may call 1-866-893-0375 Pin 5595626900# at 8:30 A.M. with any comments.)
4. ADJOURN TO CLOSED SESSION
   Closed Session Items (90 min)
5. CONFERENCE WITH LEGAL COUNSEL - EXISTING LITIGATION
   (Government Code section 54956.9(d)(1))
   A. NRDC v. Murillo, U.S. District Court, Eastern District of California (Sacramento Division), Case
6. CONFERENCE WITH LEGAL COUNSEL - ANTICIPATED LITIGATION

(Government Code section 54956.9(d)(2))
Significant Exposure to Litigation: Two potential matters.

7. CONFERENCE WITH LEGAL COUNSEL-INITIATION OF LITIGATION

(Government Code section 54956.9(d)(4))
Initiation of Litigation: Two potential cases.

8. CONFERENCE WITH REAL PROPERTY NEGOTIATORS

(Government Code section 54956.8)
Property: Friant-Kern Canal facilities and right-of-way
Agency negotiator: CEO, COO, General Counsel
Negotiating parties: United States (Bureau of Reclamation)
Under negotiation: OM&R Transfer Agreement (price and terms of payment)

9. RECONVENE INTO OPEN SESSION (9:30 am)

Announce reportable action taken during closed session.

10. PUBLIC COMMENT / PUBLIC PRESENTATIONS – (TANTAU)

Public comment is welcome at this time on any matter within the jurisdiction of the Board that is not on the agenda. Under the State’s open meeting law - the Brown Act - no action may be taken on any item not on the agenda. Public comment on items on the agenda will be allowed at the time the Board considers the item.

11. ACTION ITEMS (5 MINUTES)

A. Approval of the Minutes – Executive Committee meeting of June 15, 2020.

12. BOARD RECOMMENDATIONS (60 MINUTES)

A. Water Quality Policy Proposal. (DeFlitch/Buck-Macleod)

B. Resolution Authorizing CEO and COO to Accept Real Property Interests Conveyed to FWA. (Davis)

13. DISCUSSION/DIRECTION (60 MINUTES)

A. FKC Middle Reach Capacity Correction Project Update. (DeFlitch/Davis/Phillips)
   i. Schedule
   ii. Funding

B. External Affairs Update. (Amaral/Biering/Villines)

C. Draft 2021 GM Budget. (Phillips/Willard)
D. CEO Report. (Phillips)

14. ADJOURNMENT

Public Participation Information

Agenda reports and other disclosable public records related to each Open Session agenda item are available on FWA's website under "Calendar" at Friantwater.org and at FWA's main office, 854 N. Harvard Ave., Lindsay, CA 93247, during regular business hours. Under the Americans with Disabilities Act, if you require a disability-related modification or accommodation to participate in this meeting, including auxiliary aides or services, please contact Toni Marie at 559-562-6305 at least 48 hours prior to the meeting.
EXECUTIVE COMMITTEE MEETING | Minutes

JUNE 15, 2020
FRIANT WATER AUTHORITY, 854 N. HARVARD AVE, LINDSAY, CA 93247
CONFERENCE ROOM (DIRECTORS/STAFF ONLY) VIA WEBEX FOR ALL OTHERS
8:30 AM (CLOSED SESSION) / 10:00 AM (OPEN SESSION)

1. CALL TO ORDER/ROLL CALL – Chair Chris Tantau called the meeting to order at 8:30 a.m. Committee members present: Tantau, Camp, Kisling, Erickson, Loeffler, Borges, Stephens; Staff present: DeFlitch, Marie, Biering, Willard, Phillips, Davis, Buck-Macleod, Amaral, Bezdek, Hunter, Hickernell, Faria. Others: Villines, Tomlinson, Luce, Limas, Quinley, Ewell, Collup, Dalke, Muhar, Wallace, Fukuda, Larsen, Geivet, Morrissey, Greci, Edwards, Doud, Wright, Welsh; Committee Members Absent: None

2. APPROVAL OF THE AGENDA – The agenda was approved. (Loeffler/Erickson); approved unanimously - Ayes – Tantau, Loeffler, Erickson, Camp, Kisling, Borges, Stephens; Nays – None; Absent – None

3. PUBLIC COMMENT ON CLOSED SESSION ITEMS – There was no comment from the public on closed session items.

4. ADJOURN TO CLOSED SESSION

Closed Session Items

5. CONFERENCE WITH LEGAL COUNSEL - EXISTING LITIGATION

(Government Code section 54956.9(d)(1))

A. NRDC v. Murillo, U.S. District Court, Eastern District of California (Sacramento Division), Case No. 88-cv- 01658-JAM-GGH

B. California Natural Resources Agency v. Ross, U.S. District Court, Eastern District of California (Fresno Division), Case No. 1:20-cv-00426-DAD-SKO

C. Tehama-Colusa Canal Authority, et al., v. California Department of Water Resources, et al.. Fresno County Superior Court, Case No. 20CECG01303

6. CONFERENCE WITH LEGAL COUNSEL - ANTICIPATED LITIGATION

(Government Code section 54956.9(d)(2)
Significant Exposure to Litigation: Two potential matters.

7. CONFERENCE WITH LEGAL COUNSEL-INITIATION OF LITIGATION

(Government Code section 54956.9(d)(4))
Initiation of Litigation: Two potential cases.
8. CONFERENCE WITH REAL PROPERTY NEGOTIATORS

(Government Code section 54956.8)
Property: Friant-Kern Canal facilities and right-of-way
Agency negotiator: CEO, COO, General Counsel
Negotiating parties: United States (Bureau of Reclamation)
Under negotiation: OM&R Transfer Agreement (price and terms of payment)

9. RECONVENE INTO OPEN SESSION (10:00 am)
There was one reportable action taken during closed session. The Executive Committee
unanimously voted to authorize special counsel to file a motion to intervene in the Tehama-Colusa
Canal Authority, et al., v. California Department of Water Resources, et al. Fresno County Superior
Court, Case No. 20CECG01303.

10. PUBLIC COMMENT / PUBLIC PRESENTATIONS
There was no public comment.

11. ACTION ITEMS

A. Approval of the Minutes – Executive Committee meeting of May 18, 2020 minutes were approved.
  (Loeffler/Erickson); approved unanimously - Ayes – Tantau, Loeffler, Erickson, Camp, Kisling,
  Borges, Stephens; Nays – None; Absent – None

12. BOARD RECOMMENDATIONS

A. One-year Trial Membership for Gravelly Ford Water District – The Executive Committee voted to
  recommend to the Board approval of a one-year trial membership for Gravelly Ford Water District
  as outlined in the agenda report. (Erickson/Loeffler); approved unanimously - Ayes – Tantau,
  Loeffler, Erickson, Camp, Kisling, Borges, Stephens; Nays – None; Absent – None

B. FY 2021/2022 OM&R Budget Review – The Executive Committee reviewed, discussed and
  accepted the proposed FY 2021 and FY 2022 O&M Budgets as presented and will recommend that
  the Board of Directors accept the budgets and direct Staff to submit them for a 60-day public
  review. (Loeffler/Kisling); approved unanimously - Ayes – Tantau, Loeffler, Erickson, Camp, Kisling,
  Borges, Stephens; Nays – None; Absent – None

C. Project Construction Contracting Options – CEO Phillips provided a summary on the project
  construction contracting options dependent on whether FWA or Reclamation was chosen as the
  contracting entity; he then introduced Richard Welsh, the Reclamation’s Deputy RD, who provided
  a proposed outline on how the project would be contracted and managed if the Bureau was
  chosen as the contracting entity. Mr. Welsh stressed that FWA and Reclamation would be jointly
  implementing the project with an integrated project management team. The Executive
  Committee took action to recommend that the Board approve Reclamation’s proposal for
  construction contracting and management as outlined and asked that Mr. Welsh present its
  proposal to the Board at the July 25, 2020 meeting. (Stephens/Kisling); approved unanimously -
  Ayes – Tantau, Loeffler, Erickson, Camp, Kisling, Borges, Stephens; Nays – None; Absent – None

D. Retention of Utility Coordination Firm (Overland Pacific Cutler) for FKC Middle Reach Capacity
  Correction Project Right of Way – General Counsel Davis discussed BRI’s need to retain Utility
  Relocation Coordination Services for the FKC Middle Reach Capacity Correction Project and increase
  the approved budget under the MSA with BRI by $441,320 to incorporate the cost of services as
  outlined in the agenda report. Funding for this additional work would be covered by the existing
  Project budget appropriations. The Executive Committee took action to recommend to the Board that
  the proposed Task Order 4 with BRI be approved as outlined. (Stephens/Loeffler); approved
unanimously - Ayes – Tantau, Loeffler, Erickson, Camp, Kisling, Borges, Stephens; Nays – None; Absent – None

13. DISCUSSION/DIRECTION

A. FKC Middle Reach Capacity Correction Project Update.
   i. Schedule – COO DeFlitch gave an update on the FKC Correction Project as outlined in the agenda report. He noted that the Draft EIS/EIR project milestone was achieved with a May 8th release for a 45-day public comment period. An on-line public meeting was conducted on June 8th and was attended by 52 people. No substantive comments were made at the meeting.
   
   ii. Funding – CEA Amaral gave an update on Project financing as outlined in the agenda report. He also said that a Request for Interest (RFI) was sent to contractors on June 5, 2020 to determine the level of interest to provide additional financing for the Project. RFI’s are due to FWA no later than July 2, 2020. A workshop is also being planned for June 19th to answer questions.

B. Revised Methodology for Calculating Warren Act OM&R Charges – CEO Phillips discussed the proposal for calculation of conveyance fees as outlined in the agenda report. The proposal to increase the fees to $18.54/acre-foot was tabled in order to address concerns from members who currently pay Warren Act charges as Lindsay-Strathmore I.D. noted (LSID). CEO Phillips said that this topic would be revisited and thanked LSID for their comments.

C. Ad Hoc Water Quality Committee Activities Update – WRM Buck-Macleod reported that a workshop will be held on Wednesday, June 17th to propose a Water Quality Policy through the Ad Hoc Water Quality Committee and hopes to have a recommendation for the Executive Committee at its July meeting.

D. External Affairs Update – CEA Amaral and Mike Villines provided an update on current activities of the External Affairs group as outlined in the agenda report. CEA Amaral reported that FWA submitted a comment letter to the Bureau of Reclamation related to the Del Puerto Canyon Reservoir Project Notice of Intent to prepare a NEPA/EIS which is also in the agenda report.

E. CVP and Friant Division Water Supply Allocations – WRM Buck-Macleod walked through current water operations activities as outlined in the agenda report. Class 1 allocation was increased from 55% to 60% for the Friant Division and Friant Class 2 remained at 0%.

F. San Joaquin Valley (SJV) Water Blueprint Update – Austin Ewell provided an update on the current activities of the SJV Water Blueprint as outlined in the agenda report. He reported that the SJV Water Blueprint website was expected to be finalized this weekend.

G. CEO Report – CEO Phillips reported that there would not be an Annual meeting this year due to COVID-19 concerns; however, the annual Board of Directors Retreat would be held in November and a Save-the-Date email would be issued shortly.

14. ADJOURNMENT

The meeting was adjourned at 12:55 p.m.
DATE: July 13, 2020
TO: Executive Committee
FROM: Ian Buck-Macleod, Water Resources Manager
SUBJECT: Friant-Kern Canal Water Quality Policy Proposal

SUMMARY:
In response to concerns regarding the implementation of programs and projects on the Friant-Kern Canal (FKC) which would introduce water of lesser quality, as compared to historic Millerton Lake water quality, the FKC Water Quality Ad Hoc Committee (Ad Hoc Committee) has developed a draft comprehensive water quality policy for implementation by the Friant Division. The proposed Draft FKC Water Quality Policy (Draft Policy) includes policy principles, Water Quality Mitigation Ledger, Water Quality Monitoring Plan, and Water Quality Model.

The Ad Hoc Committee presented the Draft Policy at a workshop on June 17, 2020. Representatives from Shafter-Wasco Irrigation District (SWID) continued to state that the Draft Policy does not meet SWID’s stated objectives in terms of irrigation practices and agricultural usage. All Ad Hoc Committee members except for SWID are in support of the Draft Policy.

The analysis used to support the mitigation curves proposed in the Draft Policy examined what irrigation management changes (i.e. mitigation measures) are necessary to prevent salts from accumulating in the crop root zone at potentially damaging levels. The mitigation curve approach does not advocate an irrigation management approach, but rather provides the general leaching requirements under the given irrigation water quality conditions.

Friant Water Authority (FWA) currently does not have authority to adopt water quality regulations on the FKC. As such, staff recommends that FWA work with Reclamation to update Reclamation’s 2008 Policy for Accepting Non-Project Water into the Friant-Kern and Madera Canals to incorporate the Draft Policy. FWA could also endorse or possibly adopt the Draft Policy as “guidelines” and then incorporate the provisions of a final policy into FKC pump-back projects and the Long-Term Recapture and Recirculation of Restoration Flows project. The Draft Policy would not exempt individual projects from performing project-level effects analyses for compliance with the National Environmental Policy Act (NEPA), California Environmental Quality Act (CEQA), and/or other regulatory requirements.

RECOMMENDED ACTION:
That the Executive Committee recommend to the Board that FWA staff work with Reclamation to implement the proposed Draft Friant-Kern Canal Water Quality Policy in the most expeditious and feasible manner.
SUGGESTED MOTION:
I move that the Executive Committee recommend to the Board that FWA staff work with Reclamation to implement the proposed Draft Friant-Kern Canal Water Quality Policy in the most expeditious and feasible manner.

BUDGET IMPACT:
Implementation costs related to working with Reclamation on implementation of the Draft Policy and the incorporation of its provisions into project-specific environmental compliance is being provided by existing grant funding sources. Annual administration and monitoring costs outlined in the Draft Policy are estimated to be $172,000 per year (2020 dollars) and would be recouped via a surcharge to contractors that introduce non-Millerton Lake water into the Friant-Kern Canal. A portion of this has been assumed in the FY 2021 O&M budget, assuming Policy implementation in early 2021.

DISCUSSION:
In response to concerns regarding the implementation of programs and projects on the Friant-Kern Canal (FKC) which would introduce water of lesser quality, as compared to historic Millerton Lake water quality, the Ad Hoc Committee has developed a comprehensive water quality policy for implementation by the Friant Division. This document is paramount to completion of the environmental documents for the Long-Term Recapture and Recirculation of Restoration Flows (LTRRRF) Project for the San Joaquin River Restoration Program, as well as or the FKC Reverse Pump-Back Project. The Ad Hoc Committee is made up of Friant Contractor directors and district managers from Arvin-Edison Water Storage District (AEWSD), Delano-Earlimart Irrigation District (DEID), Kern-Tulare Water District, Lindsay Strathmore ID (LSID), Lower Tule River ID, Pixley ID, Porterville ID (PID), Shafter-Wasco ID (SWID), Saucelito ID (SID), and Terra Bella ID (TBID).

The Ad Hoc Committee is proposing the implementation of the Draft Policy, which includes the Water Quality Mitigation Ledger, Water Quality Monitoring Plan, and Water Quality Model. The Water Quality Mitigation Ledger tracks and accounts for all inflows and diversions into and from the FKC in order to determine appropriate mitigation for impacted water quality (attributable to the introduction (Put) and corresponding distribution thereof (Take)), aiming to balance concerns related to long-term groundwater quality with a multi-layered assessment of agronomic impacts as a durable solution.

JUNE 17 PUBLIC WORKSHOP
The Ad Hoc Committee presented the Draft Policy at a workshop on June 17, attended by a mix of Friant district managers, directors, and farmers; consultants; and Reclamation (see attached meeting summary). In general, most questions were technical in nature regarding the proposed ledger, monitoring plan, and cost allocation. Representatives from Shafter-Wasco Irrigation District (SWID) continued to state that the Draft Policy does not meet SWID’s stated objectives in terms of irrigation practices and agricultural usage. All Ad Hoc Committee members except for SWID are in support of the Draft Policy. FWA requested additional comments to be provided by July 1 and only received one additional comment (see in attached meeting summary).

FWA appreciates the concerns expressed by SWID representatives. The analysis used to support the mitigation curves proposed in the Draft Policy examined what irrigation management changes (i.e. mitigation measures) are necessary to prevent salts from accumulating in the crop root zone to potentially...
damaging levels. The analysis looks at the most restricting water quality constituents and their impacts on
the most sensitive crops. The only way to prevent accumulation of salts, or any of its constituents, in the
rootzone is by leaching, which could take place during the irrigation season (maintenance leaching), or in
the late fall and winter months (reclamation leaching). The analysis performed addresses maintenance
leaching because it allows for a simple, steady-state approach to develop mitigation curves that provide
guidelines for excess water needed for salinity control; however, the Draft Policy does not advocate for a
particular irrigation management approach for individual growers.

SHAFTER WASCO IRRIGATION DISTRICT PROPOSAL AND CURRENT POLICY
On November 15, 2019, Shafter-Wasco Irrigation District (SWID) provided a written response to the
proposed program and negotiations being conducted by the FKC Water Quality Ad hoc Committee and
Small Group. SWID expressed that district landowners have historically relied on Millerton water quality in
coordination with deep well operation to meet agricultural demands. SWID detailed three requirements
that they desire to have included in the program’s operational criteria. The table below details SWID’s
requests and a description of how these requests were addressed or why they could not be included in the
Draft Policy.

<table>
<thead>
<tr>
<th>SWID Request</th>
<th>Draft FKC Water Quality Policy</th>
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</thead>
<tbody>
<tr>
<td>1. SWID will not protest non-Millerton supplies being introduced below and used below the FKC Shafter check.</td>
<td>No response required.</td>
</tr>
</tbody>
</table>
| 2. a) Non-Millerton supplies pumped over the FKC Shafter check and introduction of banked groundwater above the FKC Shafter check can occur when and if SWID is not taking water from the FKC, typically SWID winter maintenance during December-January (note SWID also had its FKC head gates closed during most of 2014 and 2015). | a) Existing and potential future pump-ins do and will occur in months outside of the months proposed by SWID. See discussion of Millerton-Only window below.  
b) All parties have been supportive of the ledger approach and “mitigation rating curve” as a method to quantify and track required mitigation.  
c) The Draft Policy indicates in Operations Criteria #2 that pump-in and pump-back programs will not be introduced to the FKC during Friant Division uncontrolled season, addressing concerns of receiving uncontrolled season flows especially for use in reclamation leaching. |
| b) Non-Millerton supplies pumped over the FKC Shafter check and introduction of banked groundwater above the FKC Shafter check SWID gets mitigation water per recent “small group” presentation | |
| c) Non-Millerton supplies pumped over the FKC Shafter check and introduction of banked groundwater above the FKC Shafter check Millerton water-only firm (not FKC committee decided) windows and FKC canal prism water quality per the following (i) Class 1 = 100% and/or Uncontrolled Season, no non-Millerton water (ii) Class 1 less than 100% - 4 month Millerton-water-only window, June-July and | |
| To address the Millerton Only window which SWID described was to cover irrigation practices during almond hull split periods in order to avoid hull rot, a deficit irrigation analysis was conducted. This analysis was based on agronomic principles and aimed at | |
September-October. Maximum constituents 322 mg/L TDS, 53 mg/L Cl, 38 mg/L Na. maintaining a critical constituent threshold that represented the most sensitive crops. Threshold limits for chloride were adjusted to provide protections for crop injuries.

Considering deficit irrigation and necessary water quality threshold adjustments, analysis was completed to understand how existing programs would be affected. The Draft Policy proposes three periods with varying threshold limits to provide flexibility for existing and future programs while considering agronomic principles and water quality limits.

No explanation was provided for the specific constituent limits provided by SWID. Constituent thresholds included in the Draft Policy are based on agronomic principles as detailed in Attachment A of the Draft Policy.

| 3. After 20 years if SWID determines this program adversely impacts SWID then non-Millerton supplies pumped over the FKC Shafter check and introduction of banked groundwater above the FKC Shafter check will cease unless new standards are agreed to. | Draft Policy Principle #7 addresses concerns for need of reopener. |

AGRONOMIC ANALYSIS CONSERVATIVE ASSUMPTIONS
Below is a list of conservative assumptions included in the agronomic analysis used to support the Draft Policy, including policy principles and operations criteria.

- The leaching requirement equation predicts similar leaching needs as the leaching fraction curves assuming ‘conventional’ irrigation. The result indicates that more leaching is required than is predicted under ‘high frequency’ irrigation.
- The leaching requirement equation assumes steady-state conditions, which tend to be overly conservative and overestimates soil salinity and, therefore, overestimates yield losses.
- The quantified leaching requirement does not account for leaching from rain or end of the season reclamation practices. Any rain or end of season leaching would decrease the leaching requirement.
- The mitigation curve is based on the water quality constituent that requires the most stringent leaching requirement (i.e. boron) for the most sensitive crop. Therefore, all other crops are protected from boron as well as other water quality constituents that could potentially damage the crop (e.g. EC or chloride).
- The mitigation curve approach is not advocating an irrigation management practice, but rather provides the general leaching requirements under the given irrigation water quality conditions.
• Operations criteria and mitigation curve accounts for regulated deficit irrigation of almonds as an irrigation management practice to minimize almond hull rot during hull split. Hull split typically lasts one to two weeks; however, regulated deficit irrigation analysis assumes an 8-week period to account for potential variances in hull split initiation in the Friant Division.

• Operations criteria flexibility is only provided when average water quality from March through June is well below the threshold for chloride (i.e. 70 mg/L as compared to 102 mg/L).

OUTSTANDING POLICY ITEMS
In addition to the Policy Principles and Operations Criteria, several programmatic challenges were identified that will continue to be evaluated and addressed, and are as follows:

• Identify all existing programs and pump-ins and determine which are exempt from the Policy (e.g., handling of City of Orange Cove flood flow pump-ins).

• FWAcannot independently adopt water quality regulations for the FKC (only Reclamation can), but could endorse or possibly adopt the Policy as “guidelines” and incorporate significant aspects of the proposed Policy as part of its CEQA approval for the Long-Term Recapture and Recirculation of Restoration Flows and FKC Pump-Back projects.

• Coordinate with Reclamation in updating the 2008 Policy for Accepting Non-Project Water into the Friant-Kern and Madera Canals and work with Reclamation regarding the potential adoption of the Policy.

• Define standard operating procedures to account for mitigation and its administration, including contractual requirements with Reclamation (e.g., transfer agreements, Warren Act contracts); Water Quality Mitigation Ledger; and water quality threshold management.

• Finalize the FKC Water Quality Monitoring Program and Water Quality Model.

ENVIRONMENTAL EFFECTS ANALYSIS
The proposed Draft Policy aims to balance short-term and long-term concerns for water quality and water supply reliability but would not exempt individual projects from performing project-level effects analyses for compliance with the NEPA, CEQA, and/or other regulatory requirements. The Policy should be evaluated as a management or mitigation measure for any proposed action under NEPA/CEQA.

ATTACHMENTS:

• June 17 Public Workshop Summary
• Draft FKC WQ Policy
  o Describes the Draft Policy in response to concerns regarding the implementation of programs and projects that could introduce water of a lesser quality to the FKC
• Attachment A – Agronomic Impacts and Mitigation
  o Describes agronomic effects, mitigation requirements, maximum water quality thresholds for key constituents developed for the FKC
• Attachment B – Water Quality Mitigation Ledger Example
  o Describes the process to quantify mitigation using the Water Quality Mitigation Ledger
• Attachment C – Water Quality Monitoring Plan
  o Describes key elements and actions required for implementation of a water quality monitoring plan
• Attachment D – Water Quality Policy Cost Allocation
  o Describes the estimated capital and annual costs to implement and administer the Draft Policy
Meeting Summary

DATE/TIME: JUNE 17, 2020 / 10:00 AM

SUBJECT: SPECIAL BOARD OF DIRECTORS MEETING, FRIANT-KERN CANAL WATER QUALITY POLICY WORKSHOP

PLACE: WEBEX

PURPOSE:
Inform and garner feedback from Friant Water Authority (FWA) board members, managers, landowners, and broader Friant Division of the Central Valley Project (Friant Division) water user community on a comprehensive Draft Friant-Kern Canal Water Quality Policy proposed for adoption by the Friant Division.

WORKSHOP:
Jason Phillips, FWA Chief Executive Officer, opened the meeting by providing a background of the issues, actions and events that have led to the development of the proposed Policy, emphasizing that FWA does not have authority to implement a water quality policy, but will work with the U.S. Department of the Interior, Bureau of Reclamation (Reclamation) to adopt and implement the proposed Policy.

Major components and key points of the following documents, provided as meeting materials, were reviewed.

- Draft Friant-Kern Canal Water Quality Policy
- Attachment A – Agronomic Impacts and Mitigation
- Attachment B – Water Quality Mitigation Ledger Example
- Attachment C – Water Quality Monitoring Plan
- Attachment D – Cost Allocation
- Friant-Kern Canal Water Quality Policy Development Schematic

Throughout the meeting, participants were requested to raise questions and provide comments or feedback on the proposed Policy and meeting materials. Additionally, participants were requested to submit questions and comments during the workshop, and after via email to waterquality@friantwater.org by July 1, 2020.

Table 1 provides a list of meeting attendees. Table 2 catalogs comments and questions received during the June 17, 2020 workshop, along with responses provided by FWA staff.

Table 1. List of June 17, 2020 Friant-Kern Canal Water Quality Policy Workshop Attendees

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
</tr>
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<tbody>
<tr>
<td>Aaron Fukuda</td>
<td>Tulare Irrigation District</td>
</tr>
<tr>
<td>Andy Safford</td>
<td>EKI Environment &amp; Water, Inc.</td>
</tr>
<tr>
<td>Bill Swanson</td>
<td>Stantec Consulting Services Inc.</td>
</tr>
<tr>
<td>Brandon Tomlinson</td>
<td>Chowchilla Water District</td>
</tr>
<tr>
<td>Chris Hunter</td>
<td>Friant Water Authority</td>
</tr>
<tr>
<td>Cliff Loeffler</td>
<td>Lindsay-Strathmore Irrigation District</td>
</tr>
<tr>
<td>Craig Wallace</td>
<td>Lindsay-Strathmore Irrigation District</td>
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<tr>
<td>David Hyatt</td>
<td>U.S. Bureau of Reclamation</td>
</tr>
<tr>
<td>Dana Munn</td>
<td>Shafter-Wasco Irrigation District</td>
</tr>
<tr>
<td>Don Roberts</td>
<td>Gravelly Ford Water District</td>
</tr>
<tr>
<td>Don Willard</td>
<td>Friant Water Authority</td>
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</tbody>
</table>
Table 1. List of June 17, 2020 Friant-Kern Canal Water Quality Policy Workshop Attendees (cont’d)

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>Doug DeFlitch</td>
<td>Friant Water Authority</td>
</tr>
<tr>
<td>Doug Gosling</td>
<td>Shafter-Wasco Irrigation District</td>
</tr>
<tr>
<td>Edwin Camp</td>
<td>Arvin-Edison Water Storage District</td>
</tr>
<tr>
<td>Eric Limas</td>
<td>Lower Tule River Irrigation District, Pixley Irrigation District</td>
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<tr>
<td>Eric Quinley</td>
<td>Delano-Earlimart Irrigation District</td>
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<tr>
<td>Fergus Morrisey</td>
<td>Orange Cove Irrigation District</td>
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<tr>
<td>Geordy Wise</td>
<td>Shafter-Wasco Irrigation District</td>
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<td>Jason Gianquinto</td>
<td>Semitropic Water Storage District</td>
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<tr>
<td>Jason Phillips</td>
<td>Friant Water Authority</td>
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<tr>
<td>Jeevan Muhar</td>
<td>Arvin-Edison Water Storage District</td>
</tr>
<tr>
<td>Jeffrey Papendick</td>
<td>U.S. Bureau of Reclamation</td>
</tr>
<tr>
<td>John Slater</td>
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<tr>
<td>Kaitlyn Allen</td>
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</tr>
<tr>
<td>Katie Duncan</td>
<td>Stantec Consulting Services Inc.</td>
</tr>
<tr>
<td>Kent Stephens</td>
<td>Kern Tulare Water District</td>
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<td>Mia Swenson</td>
<td>Friant Water Authority</td>
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<tr>
<td>Rain Emerson</td>
<td>U.S. Bureau of Reclamation</td>
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<tr>
<td>Ram Venkatesan</td>
<td>North Kern Water Storage District</td>
</tr>
<tr>
<td>Randy Bloemhoff</td>
<td>Bloemhof Farms and Harvesting (SWID)</td>
</tr>
<tr>
<td>Robert Diamond</td>
<td></td>
</tr>
<tr>
<td>Sean Geivet</td>
<td>Porterville Irrigation District; Terra Bella Irrigation District, Saucelito Irrigation District</td>
</tr>
<tr>
<td>Stephanie Hearn</td>
<td>GEI Consultants, Inc.</td>
</tr>
<tr>
<td>Steve Bloemhoff</td>
<td>Bloemhof Farms and Harvesting (SWID)</td>
</tr>
<tr>
<td>Steve Collup</td>
<td>Arvin-Edison Water Storage District</td>
</tr>
<tr>
<td>Steve Dalke</td>
<td>Kern-Tulare Water District</td>
</tr>
<tr>
<td>Steve Grattan</td>
<td>UC Davis</td>
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<tr>
<td>Steve Ottemoeller</td>
<td>Friant Water Authority</td>
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<tr>
<td>Taylor Faria</td>
<td>Friant Water Authority</td>
</tr>
<tr>
<td>Tom Weddle</td>
<td>Ivanhoe Irrigation District</td>
</tr>
<tr>
<td>Unidentified Attendees (5)</td>
<td></td>
</tr>
</tbody>
</table>
### Table 2. Comments, Questions, and Responses During June 17, 2020 Friant-Kern Canal Water Quality Policy Workshop

<table>
<thead>
<tr>
<th>Name</th>
<th>District/Agency/Other</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dana Munn</td>
<td>Shafter-Wasco Irrigation District</td>
<td>The Shafter-Wasco Irrigation District (SWID) does not believe that the mitigation program proposed by the Friant Water Authority (FWA) does not meet the long-term health and economics needs of the SWID. We anticipate that mitigation will be further studied in a CEQA process that the FWA will do prior to FWA Board action.</td>
<td>As a note, FWA is not taking direct action and so CEQA is not required for the Policy itself. Rather, FWA’s action is working with USBR to implement Policy. Individual programs would reference or include Policy requirements as part of environmental compliance.</td>
</tr>
<tr>
<td>Steve Collup</td>
<td>Arvin-Edison Water Storage District</td>
<td>Are any of the constituents measured at discharge points, or only in-canal? For example, if a well exceeds 123TCP standard can it still be discharged into the canal?</td>
<td>There will not be monitoring at discharge points, pump-ins are required to complete annual Title 22 testing and reporting. Monitoring program includes in canal measurements and lab testing. WQ Model will provide forecasting.</td>
</tr>
<tr>
<td>Aaron Fukuda</td>
<td>Tulare Irrigation District</td>
<td>Anticipated mitigation costs per AF</td>
<td>Found in Attachment D</td>
</tr>
<tr>
<td>Fergus Morrissey</td>
<td>Orange Cove Irrigation District</td>
<td>What is the frequency of calculation of the ‘volume of mitigation to be paid’ done (weekly)? How is the &quot;transfer&quot; of supply in Millerton handled by Reclamation and the Contractors?</td>
<td>Proposing tracking daily water quality, balanced on weekly time step, mitigation transfer on monthly time step. Logistics still need to be sorted as an SOP is established.</td>
</tr>
<tr>
<td>Stephanie Hearn</td>
<td>GEI Consultants</td>
<td>Have you developed a process for submitting sample results for pump-in wells? Will the results become public or available through a public database?</td>
<td>This has not (yet) been considered as part of the Policy development.</td>
</tr>
<tr>
<td>Fergus Morrissey</td>
<td>Orange Cove Irrigation District</td>
<td>Herculean effort on this monumental lift by Friant team and consultants and contractors. Great job on the road to consensus!</td>
<td>Comment noted.</td>
</tr>
</tbody>
</table>
Table 2. Comments, Questions, and Responses During June 17, 2020 Friant-Kern Canal Water Quality Policy Workshop (cont’d)

<table>
<thead>
<tr>
<th>Name</th>
<th>District/Agency/Other</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randy and Steve</td>
<td>Bloemhof Farms and Harvesting, Shafter-Wasco Irrigation District</td>
<td>FWA and Ad hoc committee acknowledge financial impacts associated with degraded water quality by including mitigation based on science of agronomic effects. Commenter suggested that science does not account for day-to-day farming practices. On-the-ground orchard management is much more complicated than just increasing leaching volumes. Because of increased salt concentrations, proposed leaching will cause more issues. Salt uptake has long-lasting effect on trees. Water quality goes beyond hull rot, as growers see effects during the entire season. Policy does not account or include compensation for yield loss or revenue loss. Oppose proposal.</td>
<td>The technical analyses on which the proposed Policy is based are not an admission or quantification of specific impacts, but rather an analysis of maintenance leaching for varying water quality on agricultural crops in the Friant Division, but the management strategy adopted by individual growers to achieve salinity control is a personal choice. The proposed Policy aims to balance concerns regarding water quality and future supply reliability. This Policy would allow for the expansion of infrastructure and projects that would benefit regional supply reliability and sustainability while assuring districts who are disproportionately affected by changes in water quality that water quality thresholds and mitigation will be implemented and that water quality in the canal will be monitored regularly and dependably communicated so that water users can make informed decisions for the use of available supplies. There is no current water quality policy for water supplies delivered via the Friant-Kern Canal, except for accepting Non-Project water into the Friant-Kern Canal (and Madera Canal) and Reclamation does not have an obligation to meet any specified water quality condition. FWA seeks to work with Reclamation to implement the proposed policy to create a path towards long-term and dependable water quality solutions for water users and move away from the historic and on-going litigation on individual project compliance. Ultimately, individual districts and water users must make management decisions based on their needs and best interests.</td>
</tr>
<tr>
<td>Steve Bloemhof</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
POST-WORKSHOP COMMENTS RECEIVED:
FWA has received one additional comment since the workshop shown below.

Comment by Craig Fulwyler (Shafter-Wasco Irrigation District Board President)
Ian,

I wanted [to] make a few additional comments in regard to the proposed water quality mitigation program that Friant is working on. I am by no means a soil scientist, but simply a farmer who has 40 years of experience with soils in the SWID district. The concept of trying to mitigate the exchange of SWID’s Millerton water with lesser quality “pumped-in” water and CVC water, is very problematic. Any mitigation must take into consideration the water to be taken from SWID, “pure Millerton supplies”, and the proposed lesser quality water to be made available to SWID in exchange. Using constituent levels tolerable to crops as a baseline ignores the significant value of pure Sierra waters. This would be like telling some race car drivers that the premium fuel they have always relied upon in the past is to be allocated to other drivers in the race. But there is some lower quality fuel that we can sell you that will get you by and you can get an extra 10% of this fuel for free so you can burn a higher rate of fuel and you should get the performance you normally expect from your engine, initially. Then, as would be expected, degradation in performance and decreased engine life will result.

Growers in the SWID district have relied upon the pure Millerton water to blend with on-farm groundwater wells as a matter of practice to provide irrigation demands for crops grown here and manage salts accumulating in the soil. The soils in the SWID district are premium soils, highly productive and highly versatile, primarily due to this excellent source of water and ongoing management practices. Limiting supplies to the SWID district of it’s contracted Millerton supply will reduce the opportunity to properly manage our soils and will have significant economic impacts.

The concept of trying to balance the negative impact of applying the exchanged water containing higher sodium and chloride levels, by applying additional supplies of this same low quality water, to soils in the SWID district is impractical. Over the years irrigation practices have migrated from flood and furrow systems to micro-sprinkler systems and now predominately drip irrigation systems. These systems are designed to be very efficient and meet evapotranspiration demands of the crops while also allowing windows of opportunity for cultural practices. Increasing water applied during the growing season as a leaching component would not only be disruptive to good farming practices, but in many cases, unadvisable. Due to the predominance of minimum-till and no-till operations, soil permeability and infiltration rates are significantly limited in our soils with permanent crop plantings. Root and leaf diseases are already an issue in many locations due to high moisture and humidity levels. Also the micro-irrigation systems are not effective for leaching due to the fact that salts move laterally with these systems. The most effective leaching occurs in our soils in the winter months during periods of high rainfall. Additionally, I know of no one that would recommend the addition of sodium and chloride to increase the EC in order to facilitate permeability.

The exchange of water that precipitates the need for this water quality program is discriminatory and places an undue burden upon SWID growers.

Sincerely,
Craig Fulwyler

FWA Response to Craig Fulwyler Comment
Friant Water Authority appreciates the concerns detailed in Mr. Fulwyler’s comment. It is understandable that switching from high quality water sourced from Sierra Nevada snowmelt (i.e. Millerton Lake water) that has very little salt to an irrigation water with a slightly higher salt content raises concerns. Therefore, a detailed analysis of the potential negative impacts is needed before a grower or district feels comfortable with a decision to allow for irrigation water supplies with a slightly higher salt content. That is what is provided here with the water quality mitigation analysis.

Analysis described in Friant-Kern Canal Water Quality Policy, Draft Attachment A – Agronomic Impacts and Mitigation examines what irrigation management changes (i.e. mitigation measures) are necessary to prevent salts from accumulating in the crop root zone to potentially damaging levels. The analysis looks at the most restricting water quality constituents (i.e. electrical conductivity, chloride, sodium, and boron) and their impacts on the most sensitive crops to that constituent.

The only way to prevent the accumulation of salts, or any of its constituents, in the rootzone is by leaching (Ayers and Westcot, 1985; Wallender and Tanji, 2012). Leaching can take place in the late fall and winter months (reclamation leaching) or during the irrigation season (maintenance leaching). The analysis we used addresses maintenance leaching because it allows a simple, steady-state approach to develop mitigation curves that provide guidelines for excess water needed for
Transient state models are potentially more accurate for estimating leaching requirements, but are more complex, require many more inputs and assumptions, and often predict that irrigation waters of higher salinity can be used than what the steady-state approach would suggest. Our steady-state analysis does not account for rainfall nor use a root water-uptake weighted rootzone salinity to predict the negative impacts, both of which would suggest water of poorer quality can be used for irrigation (Letey et al., Corwin and Grattan, 2018). Therefore, our steady-state analysis is a very conservative approach to estimating leaching requirements. Moreover, the most sensitive crop for the most sensitive water quality constituents was used for the assessment. If that most sensitive crop is protected under the estimated leaching requirement conditions, then all other crops are most certainly protected.

The mitigation curve approach is not advocating an irrigation management approach to control salinity, but provides general leaching requirements under given irrigation water quality conditions. For example, if leaching cannot occur at each irrigation from a practical perspective, the mitigation curves would indicate that one could be falling behind on leaching (given the most sensitive crop, rootstock and water quality constituent) and such leaching would need to occur at another, more practical time.

It is understood that many successful growers rely on reclamation leaching as the practice of choice because of several of the points raised in this comment (e.g. infiltration difficulties during the season, excessive water promoting insect damage and fungal root diseases, etc.). This reclamation leaching approach during the winter is particularly attractive as growers in the region rely more and more on low-pressure systems, such as drip and mini-sprinklers, to irrigate their crops. These irrigation methods can cause salt build up between emitters and wetting patterns. Over time, this can be injurious to the crop. If winter rains are insufficient to leach the accumulated salts, hand-move sprinklers may be needed to provide reclamation leaching. Therefore, the mitigation curves developed for the Friant-Kern Canal Water Quality Policy are provided to estimate the additional water needed for salinity control assuming steady-state maintenance leaching, but the management strategy adopted by individual growers to achieve salinity control is a personal choice.

Many growers within the Friant Division of the Central Valley Project (Friant Division) rely on groundwater to supplement surface water deliveries from Millerton Lake to meet irrigation water requirements. Groundwater quality conditions within the Friant Division are higher in salinity than surface waters used for irrigation. For example, in Shafter-Wasco Irrigation District (SWID), depending upon the aquifer, the electrical conductivity (EC) of groundwater is 255-365 µmhos/cm. This is substantially higher than the average EC of water diverted from the California Aqueduct as measured at Check 21 (average of approximately 500 µmhos/cm). Therefore, growers in the Friant Division, including within the SWID, are already successfully managing irrigation water with higher salt content. Moreover, it is likely that the salinity concentration of local groundwaters within the Friant Division will continue to increase over time and leaching will be required to mitigate potential adverse effects from salinity conditions in irrigation supplies sourced from groundwater and/or surface water deliveries.

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1 Electrical conductivity values represent converted total dissolved solids (TDS) concentrations for Shafter-Wasco Irrigation District’s (SWID) upper aquifer, as provided by the district, and lower aquifer, sourced from CV-SALTS. A conversion factor of 0.640 was applied to convert TDS mg/L to EC umhos/cm based on guidance issued by USDA in Agricultural Handbook 60 (1954). This conversion factor also correlates to the average TDS/EC relationship of these water quality parameters as measured during 2016, 2018, and 2020 in groundwater wells by North Kern Water Storage District (NKWSD), located near SWID and within same groundwater basin.
Friant-Kern Canal Water Quality Policy

Draft
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### ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>µS/cm</td>
<td>microsiemens per centimeter (1 µS/cm = 1 µmhos/cm = 1/1,000 dS/m)</td>
</tr>
<tr>
<td>AF</td>
<td>acre-feet</td>
</tr>
<tr>
<td>Ad hoc Committee</td>
<td>Ad hoc Water Quality Committee</td>
</tr>
<tr>
<td>CV-SALTS</td>
<td>Central Valley Salinity Alternatives for Long-term Sustainability</td>
</tr>
<tr>
<td>EC</td>
<td>electrical conductivity</td>
</tr>
<tr>
<td>FKC</td>
<td>Friant-Kern Canal</td>
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<tr>
<td>Friant Division</td>
<td>Friant Division of the Central Valley Project</td>
</tr>
<tr>
<td>FWA</td>
<td>Friant Water Authority</td>
</tr>
<tr>
<td>mg/L</td>
<td>milligrams per liter</td>
</tr>
<tr>
<td>Policy</td>
<td>Friant-Kern Canal Water Quality Policy</td>
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<tr>
<td>TDS</td>
<td>total dissolved solids</td>
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<td>Reclamation</td>
<td>U.S. Department of the Interior, Bureau of Reclamation</td>
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<td>RWA</td>
<td>Recovered Water Account</td>
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**BACKGROUND**

The Ad hoc Water Quality Committee (Ad hoc Committee) is working to develop a comprehensive Friant-Kern Canal Water Quality policy (Policy) to be adopted by the Friant Division of the Central Valley Project (Friant Division). This Policy is in response to concerns regarding the implementation of programs and projects that could introduce water of a lesser quality to the Friant-Kern Canal (FKC), when compared to water quality of historic deliveries from Millerton Lake. This Policy would also be referenced in FKC projects as well as other projects that envision introducing water into the FKC. The Ad hoc Committee is composed of water district directors and managers from Arvin-Edison Water Storage District, Delano-Earlimart Irrigation District, Kern-Tulare Water District, Lindsay-Strathmore Irrigation District, Lower Tule River Irrigation District, Pixley Irrigation District, Porterville Irrigation District, Saucelito Irrigation District, Shafter-Wasco Irrigation District, and Terra Bella Irrigation District. The Ad hoc Committee is proposing a ledger mechanism to determine the required mitigation for introducing water of lesser quality into the FKC. This document describes the Draft Policy, which includes the Water Quality Mitigation Ledger, Water Quality Monitoring Program, and Water Quality Model.

**WATER QUALITY MITIGATION LEDGER**

The Water Quality Mitigation Ledger tracks and accounts for all inflows into and diversions from the FKC in order to determine appropriate mitigation for impacted water quality (attributable to the introduced water [or “Put”] and the corresponding distribution thereof [or “Take”]). The volume of additional surface water needed for mitigation, expressed as a percentage of the introduced water, or Put, is determined using an established mitigation rating curve. The mitigation rating curve is based on (1) constituent concentrations, and (2) agronomic principles that focus on leaching requirements in order to prevent constituent accumulation in the rootzone and resulting impacts on crops. This approach aims to balance concerns related to long-term groundwater quality with a multi-layered assessment of agronomic impacts as a durable solution. The process for developing the agronomic impacts evaluation and mitigation rating curve can be found in Attachment A – Agronomic Impacts and Mitigation.

The Water Quality Mitigation Ledger was developed utilizing a preliminary FKC water quality model that simulates water quality changes in the canal accounting for inflows, diversions, and various respective water quality conditions. A detailed example showing the ledger process is provided in Attachment B.

The principles of the Water Quality Mitigation Ledger and ledger process are detailed below:

1. The Water Quality Mitigation Ledger accounts for all inflows and diversions into and from the FKC, including diversions from Millerton Lake, groundwater and surface water pump-in and pump-back water, and all deliveries from the FKC.

2. The Water Quality Mitigation Ledger quantifies mitigation for Friant Division Long-Term Contractors that have an expectation to receive water consistent with quality conditions of Millerton Lake. Specifically, mitigation applies to the Take of Friant Division Class 1, Class 2, Recovered Water Account (RWA [Paragraph 16b]), and Unreleased Restoration Flows supplies. Friant Division Long-Term Contractors and third parties with supplies not delivered to the headworks of the FKC are not eligible to receive mitigation.

3. Mitigation is based on the water quality concentration of inflows above the established baseline. The mitigation rating curve is used to determine the volumetric percentage of introduced water, or Put, that each contractor that introduces water into the FKC, or “Contributor,” owes. The mitigation rating curve (Figure 1) was developed using agronomic leaching factors described in Attachment A. Existing FKC inlet drains are exempt from providing mitigation.

4. The established baseline is based on assumptions of current, minimum leaching practices by water users, or growers, in the region. Consistent with good agricultural practices, it is assumed that
growers are currently applying at least a 5 percent leaching fraction. Under the mitigation rating curve, this corresponds to an approximate electrical conductivity (EC) of 200 microsiemens per centimeter (μS/cm). It is assumed that growers are already managing the effects of applied water quality conditions up to 200 μS/cm of EC, and mitigation is only required for water quality conditions with incremental EC that exceed the baseline EC threshold of 200 μS/cm.

5. Mitigation volumes for each Put are distributed to each Friant Division Long-Term Contractor receiving an eligible Take, or “Taker,” downstream based on the volumetric proportion of the Take on a weekly basis.

6. Mitigation occurs in real time by the Contributor and offsets a like volume of each Taker’s supply at the end of a reporting period. Additional mitigation is not be required due to the water quality conditions of the mitigation.

7. Water quality conditions and flows are tracked daily. The ledger and required mitigation are balanced weekly and reported and transferred monthly.

Key:
μS/cm = microsiemens per centimeter (1 μS/cm = 1 μmhos/cm = 1/1,000 dS/m)

Figure 1. Proposed Mitigation Rating Curve based on Boron Sensitivity and Normalized to Electrical Conductivity

POLICY PRINCIPLES
The principles for the Policy are detailed below:

1. The Water Quality Mitigation Ledger will apply to all programs beginning upon U.S. Department of the Interior, Bureau of Reclamation (Reclamation) approval of the Policy.

2. Friant Water Authority (FWA) will appoint the Water Quality Committee of Friant Division Long-Term Contractors and include representatives of all Friant Division contractor Contributors and impacted parties. This advisory committee will provide recommendations to FWA and Reclamation on operations and monitoring requirements of the FKC.

3. When the Friant Division Class 1 contract allocation is less than or equal to 25 percent, the Water Quality Committee of Friant Contractors will evaluate the current year operations as they relate to the Water Quality Mitigation Ledger.
4. The value of additional surface water provided by the mitigation rating curve is inclusive of additional costs for any changes in soil amendments needed to manage the incremental difference of water quality conditions.

5. The costs to implement and manage the Policy, including the Water Quality Mitigation Ledger, Water Quality Monitoring Plan (Attachment C), and Water Quality Model will be paid by the Contributors as determined and charged by FWA. Detailed information regarding the costs to implement and manage the Policy can be found in Attachment D.

6. If a future regulatory cost or equivalent fee (including but not limited to any fees or assessments by the California Department of Water Resources or the State Water Resources Control Board via one of its programs such as CV SALTS) is imposed on impacted Friant Division Long-Term Contractors and a portion of such fee can reasonably be attributed to the incremental difference of water quality conditions due to the Contributor’s actions, then the Water Quality Committee of Friant Contractors will address the matter. The Water Quality Committee of Friant Contractors shall determine potential impacts due to the Policy and make as-needed adjustments to reflect the additional regulations.

7. Defined Policy requirements may be re-evaluated if there is significant, scientifically-based justification (e.g., agronomic effects) and three out of five southern contractors (Arvin-Edison Water Storage District, Shafter-Wasco Irrigation District, Delano-Earlimart Irrigation District, South San Joaquin Municipal Utility District, or Kern-Tulare Water District) agree to re-open discussions.

**OPERATIONS CRITERIA**

Pump-in and pump-back operations will be governed by the following criteria:

1. FKC in-prism water quality that exceeds any of the following thresholds will require systematic ceasing of pump-in and pump-back operations, prioritizing the greatest Contributors until water quality conditions are below the threshold:

   a. Title 22. The Domestic Water Quality and Monitoring Regulations specified by the State of California Health and Safety Code (Sections 4010-4037), and Administrative Code (Sections 64401 et seq.), as amended.

   b. Water quality thresholds defined in Table 1. Table 1 accounts for constituent thresholds of sensitive crops, leaching requirements, regulated deficit irrigation during almond hull split from July 1 through August 31, and also provides flexibility in the second half of the contract year depending on observed water quality from March 1 through June 30.

      i. Table 1 presents alternative water quality thresholds for Period 3 (September 1 – February 28) that are dependent on the measured water quality during Period 1 (March 1 – June 30). If the measured average chloride concentration for Period 1 exceeds 70 mg/L, the chloride threshold remains at 102 mg/L for Period 3a. If the measured average chloride concentrations for Period 1 are less than or equal to 70 milligrams per liter (mg/L), the allowable chloride concentration increases from 102 mg/L to 123 mg/L for Period 3b.

      ii. It is estimated that an average of one week is required for in-prism water quality to turnover. Prior to the onset of the defined hull split period requirements (July 1), FWA will evaluate current canal operations and water quality conditions to determine if this one-week period should be adjusted.
### Table 1. Friant-Kern Canal In-Prism Water Quality Thresholds

<table>
<thead>
<tr>
<th>Period</th>
<th>Salinity Threshold expressed as EC (μS/cm)</th>
<th>Chloride Threshold (mg/L)</th>
<th>Boron Threshold (mg/L)</th>
<th>SAR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Period 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>March 1 – June 30</td>
<td>1,000(^2)</td>
<td>102(^3)</td>
<td>0.4</td>
<td>3</td>
</tr>
<tr>
<td><strong>Period 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>July 1 – August 31</td>
<td>500(^4)</td>
<td>55(^4)</td>
<td>0.4</td>
<td>3</td>
</tr>
<tr>
<td><strong>Period 3a</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>September 1 – February 28</td>
<td>1,000(^2)</td>
<td>102(^3)</td>
<td>0.4</td>
<td>3</td>
</tr>
<tr>
<td><strong>Period 3b</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>September 1 – February 28</td>
<td>1,000(^2)</td>
<td>123(^5)</td>
<td>0.4</td>
<td>3</td>
</tr>
</tbody>
</table>

**Notes:**


For additional detail, see Attachment A - Agronomic Impacts and Mitigation.

When Friant-Kern Canal in-prism water quality conditions in this table are exceeded, Friant Division Long-Term Contractors will work together to seek 1:1, unleveraged, and cost-neutral exchanges for pump-in and pump-back programs. This does not apply to spot-market or third-party exchanges.

1 Grapes are used as a representative crop for boron sensitivity and are prevalent in the Friant Division. They are used as a surrogate for many other sensitive crop types such as apricots, figs, and grapefruits. Threshold assumes conventional irrigation with minimum 20 percent leaching fraction applied.

2 Threshold assumes minimum of 20 percent leaching requirement applied and adjusted to account for regulated deficit irrigation during almond hull split period (July 1 – August 31) in order to not exceed maximum EC\(_{et}\). Almonds on Nemaguard rootstock are used as a representative crop for salinity sensitivity and are prevalent in the Friant Division. They are used as a surrogate for many other sensitive crop types such as apples, cherries, pears, pistachios, and walnuts.

3 Threshold assumes minimum of 20 percent leaching requirement applied and then adjusted to account for regulated deficit irrigation during almond hull split period (July 1 – August 31) in order to not exceed maximum Cl\(_{et}\). Almonds on Nemaguard rootstock used as a representative crop for chloride sensitivity. They are used as a surrogate for other sensitive crops including cherries, pistachios, and walnuts.

4 Threshold applies to almond hull split period when regulated deficit irrigation is applied to avoid hull rot. This threshold is used assuming irrigation applications are reduced to 50 percent of the tree water requirement and subsequently thresholds applied for the remainder of the year have been adjusted to account for additional salt accumulation. This threshold was developed with consideration of existing program operations, historical water quality data, and absolute water quality thresholds.

5 If the measured average chloride concentration in Period 1 (March 1 – June 30) is less than or equal to 70 mg/L, the allowable chloride threshold for Period 3 (September 1 – February 28) is increased to 123 mg/L.

**Key:**

- \(\mu S/cm\) = microsiemens per centimeter (1 \(\mu S/cm\) = 1 \(\mu mhos/cm\) = 1/1,000 dS/m)
- \(EC\) = electrical conductivity of applied water
- \(EC_{et}\) = Soil salinity threshold for a given crop
- \(FAO\) = Food and Agriculture Organization of the United Nations
- Friant Division = Friant Division of the Central Valley Project
- mg/L = milligrams per liter
- SAR = sodium adsorption ratio
- TDS = total dissolved solids
2. Pump-in or pump-back programs will not be introduced to the FKC during the Friant Division uncontrolled season as declared by Reclamation unless the program can assist in alleviating an FKC prorate or is below the baseline and therefore does not require mitigation.

3. Friant Division Long-Term Contractors will cooperate to maximize conveyance of additional, beneficial surface water supplies while still meeting water quality requirements and thresholds in the FKC. When FKC in-prism water quality conditions in Table 1 are exceeded, Friant Division Long-Term Contractors will work together to seek 1:1, unleveraged, and cost-neutral exchanges for pump-in and pump-back programs. This does not apply to spot-market or third-party exchanges.

**ADDITIONAL IMPLEMENTATION REQUIREMENTS**

In addition to the Policy Principles and Operations Criteria described above, several programmatic challenges were identified that will continue to be evaluated and addressed, and are as follows:

1. Identify all existing programs and pump-ins and determine which are exempt from the Policy (e.g., handling of City of Orange Cove flood flow pump-ins).

2. Address FWA’s authority to implement the Policy. FWA’s role is limited to complying with Federal and State laws and cannot adopt its own regulations, but could endorse or possibly adopt the Policy as “guidelines” and incorporate significant aspects of the proposed Policy as part of its CEQA approval for the Long-Term Recapture and Recirculation of Restoration Flows and FKC Pump-Back projects.

3. Coordinate with Reclamation in updating the *2008 Policy for Accepting Non-Project Water into the Friant-Kern and Madera Canals* and work with Reclamation regarding the potential adoptions of the Policy.

4. Define standard operating procedures to account for mitigation and its administration, including contractual requirements with Reclamation (e.g., transfer agreements, Warren Act contracts); Water Quality Mitigation Ledger; and water quality threshold management.

5. Finalize the FKC Water Quality Monitoring Program and Water Quality Model.
Friant-Kern Canal Water Quality Policy
Draft Attachment A – Agronomic Impacts and Mitigation
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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>µmhos/cm</td>
<td>micromhos per centimeter (1 µmhos/cm = 1 µS/cm = 1/1,000 dS/m)</td>
</tr>
<tr>
<td>µS/cm</td>
<td>microsiemens per centimeter (1 µS/cm = 1 µmhos/cm = 1/1,000 dS/m)</td>
</tr>
<tr>
<td>Ad hoc Committee</td>
<td>Ad hoc Water Quality Committee</td>
</tr>
<tr>
<td>AEWSD</td>
<td>Arvin-Edison Water Storage District</td>
</tr>
<tr>
<td>ATP</td>
<td>adenosine triphosphate</td>
</tr>
<tr>
<td>AW</td>
<td>applied water</td>
</tr>
<tr>
<td>B</td>
<td>boron</td>
</tr>
<tr>
<td>Be</td>
<td>boron concentration of the saturated soil paste (rootzone boron)</td>
</tr>
<tr>
<td>Bet</td>
<td>maximum boron threshold of the saturated soil paste</td>
</tr>
<tr>
<td>Bw</td>
<td>boron concentration of applied irrigation water</td>
</tr>
<tr>
<td>Bsw</td>
<td>boron threshold for soil water concentration</td>
</tr>
<tr>
<td>Ca</td>
<td>calcium</td>
</tr>
<tr>
<td>Ca²⁺</td>
<td>calcium ion</td>
</tr>
<tr>
<td>CaCO₃</td>
<td>calcite or calcium carbonate</td>
</tr>
<tr>
<td>cfs</td>
<td>cubic feet per second</td>
</tr>
<tr>
<td>Check 21</td>
<td>Check Structure 21 at milepost 172.40 on the California Aqueduct</td>
</tr>
<tr>
<td>Cl⁻</td>
<td>chloride ion</td>
</tr>
<tr>
<td>Clo</td>
<td>chloride concentration of the saturated soil paste (rootzone chloride)</td>
</tr>
<tr>
<td>Clo₂⁻</td>
<td>maximum chloride threshold of the saturated soil paste</td>
</tr>
<tr>
<td>Clw</td>
<td>chloride concentration of applied irrigation water</td>
</tr>
<tr>
<td>CO₂</td>
<td>carbon dioxide</td>
</tr>
<tr>
<td>CO₃²⁻</td>
<td>carbonate ion</td>
</tr>
<tr>
<td>CVC</td>
<td>Cross Valley Canal</td>
</tr>
<tr>
<td>DEID</td>
<td>Delano-earlimart Irrigation District</td>
</tr>
<tr>
<td>dS/m</td>
<td>decisiemens per meter (1 dS/m = 1,000 µmhos/cm = 1,000 µS/cm)</td>
</tr>
<tr>
<td>EC</td>
<td>electrical conductivity</td>
</tr>
<tr>
<td>Ec</td>
<td>electrical conductivity of the saturated soil paste (rootzone salinity)</td>
</tr>
<tr>
<td>ECdw</td>
<td>electrical conductivity/salinity of irrigation drainage water</td>
</tr>
<tr>
<td>ECw</td>
<td>electrical conductivity/salinity of applied irrigation water</td>
</tr>
<tr>
<td>ET</td>
<td>evapotranspiration</td>
</tr>
<tr>
<td>Fc</td>
<td>concentration factor</td>
</tr>
<tr>
<td>FKC</td>
<td>Friant-Kern Canal</td>
</tr>
<tr>
<td>Friant Division</td>
<td>Friant Division of the Central Valley Project</td>
</tr>
<tr>
<td>FWA</td>
<td>Friant Water Authority</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>HCO$_3^-$</td>
<td>bicarbonate</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Water quality representing the average of California Aqueduct Check 21 and Cross Valley Canal water qualities</td>
</tr>
<tr>
<td>KTWD</td>
<td>Kern Tulare Water District</td>
</tr>
<tr>
<td>LF</td>
<td>leaching fraction</td>
</tr>
<tr>
<td>LR</td>
<td>leaching requirement</td>
</tr>
<tr>
<td>Mg$^{2+}$</td>
<td>magnesium ion</td>
</tr>
<tr>
<td>Mg</td>
<td>magnesium</td>
</tr>
<tr>
<td>meq/L</td>
<td>milliequivalents per liter</td>
</tr>
<tr>
<td>mg/L</td>
<td>milligrams per liter (equivalent to ppm)</td>
</tr>
<tr>
<td>Na$^+$</td>
<td>sodium ion</td>
</tr>
<tr>
<td>Na</td>
<td>sodium</td>
</tr>
<tr>
<td>pH</td>
<td>Measure of acidity or alkalinity</td>
</tr>
<tr>
<td>Policy</td>
<td>Friant-Kern Canal Water Quality Policy</td>
</tr>
<tr>
<td>ppm</td>
<td>parts per million (equivalent to mg/L)</td>
</tr>
<tr>
<td>RDI</td>
<td>regulated deficit irrigation</td>
</tr>
<tr>
<td>SAR</td>
<td>sodium adsorption ratio</td>
</tr>
<tr>
<td>SAR$_{adj}$</td>
<td>adjusted sodium adsorption ratio</td>
</tr>
<tr>
<td>SID</td>
<td>Saucelito Irrigation District</td>
</tr>
<tr>
<td>SSJMUD</td>
<td>South San Joaquin Municipal Utility District</td>
</tr>
<tr>
<td>SWID</td>
<td>Shafter-Wasco Irrigation District</td>
</tr>
<tr>
<td>TDS</td>
<td>total dissolved solids</td>
</tr>
</tbody>
</table>
BACKGROUND

The Ad hoc Water Quality Committee (Ad hoc Committee) is working to develop a comprehensive Friant-Kern Canal Water Quality Policy (Policy) to be adopted by the Friant Division of the Central Valley Project (Friant Division). This policy is in response to concerns regarding the implementation of programs and projects that could introduce water of a lesser quality to the Friant-Kern Canal (FKC), when compared to water quality of historic deliveries from Millerton Lake. This Policy would also be referenced in FKC projects as well as other projects that envision introducing water into the FKC. The Ad hoc Committee is composed of water district directors and managers from Arvin-Edison Water Storage District (AEWSD), Delano-Earlimart Irrigation District (DEID), Kern-Tulare Water District (KTWD), Lindsay-Strathmore Irrigation District, Lower Tule River Irrigation District, Pixley Irrigation District, Porterville Irrigation District, Saucelito Irrigation District (SWID), Shafter-Wasco Irrigation District, and Terra Bella Irrigation District. The Ad hoc Committee is proposing a ledger mechanism to determine the required mitigation for introducing water of lesser quality into the FKC. This attachment to the Policy describes agronomic effects, mitigation requirements, maximum water quality thresholds for key constituents developed for the FKC. The thresholds are specific to irrigation periods that correspond to the growing season and agricultural management practices during the year.

AGRONOMIC EFFECTS

When assessing the suitability of water for irrigation, three main hazards or “agronomic thresholds” are considered (Ayers and Westcot, 1985): (1) the salinity hazard (electrical conductivity of the applied irrigation water \( EC_w \)), (2) the hazard posed by specific ions (chloride \([Cl^-]\), boron \([B]\), and sodium \([Na^+]\)), and (3) the infiltration hazard (sodium adsorption ratio \([SAR]\) and \( EC_w \)). There are other parameters, such as acidity (pH) or alkalinity, sediments and nutrients that can affect calcite \((CaCO_3)\) deposits, emitter clogging, crop development, and corrosion, but these do not fall under “agronomic thresholds.”

The primary source of imported water is proposed to come from the Friant-Kern Canal Reverse Pump-Back Project. Water quality conditions from this project could range from existing conditions in the Cross Valley Canal (CVC) to that from the California Aqueduct, depending on respective canal operations. For the analysis presented herein, both CVC and California Aqueduct (measured at Check 21) water qualities were used, as well as a weighted average of those two sources (Intermediate) applied to show the range of potential imported water qualities. Source water quality concentrations are shown in Table 1 and Table 2.

Table 1. Average Concentrations of Various Irrigation Water Quality Constituents

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>TDS (/L)</th>
<th>( EC_w ) (µS/cm)</th>
<th>Boron (B) (mg/L)</th>
<th>Chloride (Cl\textsuperscript{-}) (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FKC\textsuperscript{1,2}</td>
<td>24</td>
<td>40</td>
<td>0.04</td>
<td>1.9</td>
</tr>
<tr>
<td>CVC\textsuperscript{1,3}</td>
<td>180</td>
<td>340</td>
<td>0.11</td>
<td>45.0</td>
</tr>
<tr>
<td>Intermediate\textsuperscript{4}</td>
<td>232</td>
<td>420</td>
<td>0.16</td>
<td>63.2</td>
</tr>
<tr>
<td>Check 21\textsuperscript{5}</td>
<td>283</td>
<td>500</td>
<td>0.21\textsuperscript{6}</td>
<td>81.3</td>
</tr>
</tbody>
</table>

Note:
1 Water quality data from AEWSD grab samples lab data from 2010 – 2019. Averages exclude months when mixing occurred.
2 Sample taken at terminus of FKC.
3 Sample taken at AEWSD CVC, Pumping Plant 6 or 6B Forebay.
4 Weighted average of CVC and Check 21 water quality.
5 California Aqueduct measured at Check 21 from 2009-2017.
6 Check 21 Boron measurements only available for years 1967 – 1976.

Key:
AEWSD = Arvin Edison Water Storage District
Check 21 = Check Structure 21 at milepost 172,40 on the California Aqueduct
CVC = Cross Valley Canal
\( µS/cm = \) microsiemens per centimeter \((1 \mu S/cm = 1 \mu mhos/cm = 1/1,000 \text{ dS/m})\)
\( EC_w = \) electrical conductivity of applied water
FKC = Friant-Kern Canal
Intermediate = Water quality representing the average of California Aqueduct Check 21 and Cross Valley Canal water qualities
mg/L = milligrams per liter
TDS = total dissolved solids
Table 2. Average Monthly Electrical Conductivity, Chloride, and Boron Concentrations by Source and Year Type

<table>
<thead>
<tr>
<th>MONTH</th>
<th>CVC1</th>
<th>CHECK 212</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wet3</td>
<td>Average4</td>
</tr>
<tr>
<td>Average Monthly Electrical Conductivity Concentrations by Source and Year Type (μS/cm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>January</td>
<td>431</td>
<td>369</td>
</tr>
<tr>
<td>February</td>
<td>570</td>
<td>433</td>
</tr>
<tr>
<td>March</td>
<td>261</td>
<td>273</td>
</tr>
<tr>
<td>April</td>
<td>240</td>
<td>270</td>
</tr>
<tr>
<td>May</td>
<td>--</td>
<td>306</td>
</tr>
<tr>
<td>June</td>
<td>385</td>
<td>384</td>
</tr>
<tr>
<td>July</td>
<td>257</td>
<td>292</td>
</tr>
<tr>
<td>August</td>
<td>286</td>
<td>308</td>
</tr>
<tr>
<td>September</td>
<td>323</td>
<td>326</td>
</tr>
<tr>
<td>October</td>
<td>429</td>
<td>360</td>
</tr>
<tr>
<td>November</td>
<td>396</td>
<td>356</td>
</tr>
<tr>
<td>December</td>
<td>368</td>
<td>349</td>
</tr>
<tr>
<td>Average Monthly Chloride Concentrations by Source and Year Type (mg/L)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>January</td>
<td>74.5</td>
<td>54.4</td>
</tr>
<tr>
<td>February</td>
<td>104.0</td>
<td>63.0</td>
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<tr>
<td>March</td>
<td>21.0</td>
<td>21.8</td>
</tr>
<tr>
<td>April</td>
<td>19.0</td>
<td>21.4</td>
</tr>
<tr>
<td>May</td>
<td>--</td>
<td>31.4</td>
</tr>
<tr>
<td>June</td>
<td>48.5</td>
<td>46.1</td>
</tr>
<tr>
<td>July</td>
<td>28.5</td>
<td>33.7</td>
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<tr>
<td>August</td>
<td>39.6</td>
<td>40.7</td>
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<tr>
<td>September</td>
<td>53.0</td>
<td>48.4</td>
</tr>
<tr>
<td>October</td>
<td>76.0</td>
<td>55.0</td>
</tr>
<tr>
<td>November</td>
<td>68.5</td>
<td>54.8</td>
</tr>
<tr>
<td>December</td>
<td>55.5</td>
<td>46.7</td>
</tr>
<tr>
<td>Average Monthly Boron Concentrations by Source and Year Type (mg/L)8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>January</td>
<td>0.12</td>
<td>0.11</td>
</tr>
<tr>
<td>February</td>
<td>0.16</td>
<td>0.15</td>
</tr>
<tr>
<td>March</td>
<td>0.10</td>
<td>0.11</td>
</tr>
<tr>
<td>April</td>
<td>0.11</td>
<td>0.12</td>
</tr>
<tr>
<td>May</td>
<td>--</td>
<td>0.12</td>
</tr>
<tr>
<td>June</td>
<td>0.16</td>
<td>0.15</td>
</tr>
<tr>
<td>July</td>
<td>0.11</td>
<td>0.11</td>
</tr>
<tr>
<td>August</td>
<td>0.09</td>
<td>0.10</td>
</tr>
<tr>
<td>September</td>
<td>0.08</td>
<td>0.09</td>
</tr>
<tr>
<td>October</td>
<td>0.11</td>
<td>0.10</td>
</tr>
<tr>
<td>November</td>
<td>0.11</td>
<td>0.11</td>
</tr>
<tr>
<td>December</td>
<td>0.11</td>
<td>0.11</td>
</tr>
</tbody>
</table>

Note:
1 Water quality data from AEWSD grab samples lab data from 2010 – 2019.
3 CVC wet year averages represent the monthly average for San Joaquin Index year types below normal, above normal, and wet and excludes months where there is mixing.
4 Average concentrations shown represent the average of all year types and excludes months where there is mixing.
5 CVC dry year averages represent the monthly average for San Joaquin Index year types dry and critical and excludes months where there is mixing.
6 Check 21 wet year averages represent the monthly average for San Joaquin Index wet year types only.
7 Check 21 critical year averages represent the monthly average for San Joaquin Index critical years only.
8 Check 21 Boron measurements represent years 1967 – 1976 per available data.

Key:
-- = no available data. CVC water quality in wet years during May were only mixed water quality.
AEWSD = Arvin-Edison Water Storage District
Check 21 = Check Structure 21 at milepost 172.40 on the California Aqueduct
CVC = Cross Valley Canal
μS/cm = microsiemens per centimeter (1 μS/cm = 1 μmhos/cm = 1/1,000 dS/m)
mg/L = milligrams per liter
SALINITY EFFECTS ON CROPS

The effects of salinity on crops are due to two separate properties in the saline media that can impact the crop individually but more often collectively (Läuchli and Grattan, 2012): (1) Salinity increases the electrical conductivity (EC) of the soil solution which reduces its the osmotic potential and (2) specific ions (i.e. Cl⁻, Na⁺ and B) in the soil solution can potentially be toxic to certain crops.

Osmotic effects occur when the concentration of salt in the soil solution is too high to allow for normal for crop growth. Dissolved salts reduce the osmotic potential of the soil solution. Plants must adjust osmotically through either the absorption of ions from the soil solution, or the synthesis and/or accumulation of organic solutes in the root cells. The synthesis of compatible organic solutes allows a plant to adjust osmotically and survive, but at the expense of plant growth (Munns and Tester, 2008). The synthesis of organic solutes requires a considerable amount of metabolic energy (i.e., adenosine triphosphate (ATP)) that is used for cell maintenance and osmotic adjustment that could otherwise be used for growth. As a result, salt-stressed plants are stunted, even though they may appear healthy in all other regards. Both processes of adjustment (accumulation of ions and synthesis of organic solutes) occur but the extent by which one process dominates depends on the type of crop and level of salinity (Läuchli and Grattan, 2012). And in a cell, compartmentalization is critical to keep toxic ions away from sensitive metabolic processes in the cytoplasm (Hasegawa et al., 2000). Such compartmentation is controlled by transport processes in the plasma membrane and tonoplast (i.e., vacuolar membrane). The efficiency of ion transport processes, as well as metabolic costs for organic-solute synthesis, differ from crop to crop and even within a species giving rise to different salinity tolerances.

TOXIC ION EFFECTS

Specific ions (i.e., Na⁺, Cl⁻, and B) in the soil solution can cause direct injury to crops, causing further crop damage from what occurs from osmotic effects. Typically, toxic ion effects are commonly found in woody perennials, such as tree and vine crops, while most annual row crops remain injury free unless salinity stress is severe. Woody perennial crops have little ability to exclude sodium or chloride from their leaves, and the plants are long-lived; hence, they often suffer toxicities at even moderate soil salinities. Typically, toxic ion effects become more critical to sensitive tree and vine crops over the years.

Chloride

Chloride and sodium toxicity can damage a plant/tree physically, biochemically and physiologically. As sodium and chloride move in the transpiration stream, they are deposited in the leaves. Older leaves have more water transpire from them and consequently have higher concentrations of sodium and chloride. Once accumulated in a leaf, sodium and chloride typically do not remobilize to other tissues. As the concentration in that leaf increases, the salts can physically desiccate cells causing injury in the form of leaf burn. Necrotic leaves no longer photosynthesize and produce carbohydrates for the tree, which in turn, will impact growth and production. But even before salts accumulate in leaves to levels that cause physical injury, those salts can reduce the chlorophyll content in leaves (Dejampour et al., 2012) and interfere with enzymatic activities affecting key metabolic pathways in both respiration and photosynthesis (Munns and Tester, 2008).

Boron

Although not a main “salinizing” constituent in applied irrigation water, boron can also cause injury to the crop. Boron is an essential micronutrient for plants, but the concentration range of plant-available boron in the soil solution optimal for growth for most crops is very narrow. Above this narrow range, toxicity occurs (Grieve et al., 2012). Boron toxicity, including how and where it is expressed in the plant, is related to the mobility of boron in the plant. Boron is thought to be immobile in most species where it accumulates in the margins and tips of the oldest leaves where injury occurs. However, boron can be re-mobilized by some species due to high concentrations of sugar alcohols (polyols) where they bind with boron and carry it to younger tissues (Brown and Shelp, 1997). These boron-mobile plants include almond, apple, grape, and most stone fruits. For these crops, boron concentrations are higher in younger tissue than in older tissue, and injury is expressed in young, developing tissues in the form of twig die back, gum exudation, and reduced
bud formation. Boron-immobile plants such as pistachio, tomato, and walnut do not have high concentrations of polyols, and the boron concentrates in the margins of older leaf tissues. Injury in these crops is expressed as the classical necrosis on leaf tips and margins.

**Sodium**

Sodium can be problematic to a crop in several ways. It can be directly toxic to the plant, it can interfere with the nutritional status of the plant (e.g., Na\(^+\)-induced calcium [Ca\(^{2+}\)] deficiency), or it can indirectly affect the crop due to its adverse effect on soil structure. Some trees are very sensitive and can develop Na\(^+\) toxicity when concentrations of Na\(^+\) are as low of 5 milliequivalents per liter (meq/L) (115 mg/L) in the soil water. However, this observation was made before scientists realized the importance of adequate Ca\(^{2+}\) in the soil water for root membrane stability to maintain their selectivity for ion uptake. With adequate Ca\(^{2+}\), such as that provided by gypsum applications, sodium toxicity may never be observed in these sensitive trees at such low sodium concentrations. Therefore, rather than having a threshold for Na\(^+\) per se, the sodium-calcium ratio in the soil solution is a better indicator of Na\(^+\) toxicity. The SAR of the applied irrigation water has been used as a surrogate for the sodium-calcium ratio, and the general rule is an SAR < 3 is not problematic.

\[
SAR = \frac{Na^+}{\sqrt{(Ca^{2+} + Mg^{2+})/2}}
\]

Where Na\(^+\), Ca\(^{2+}\), and magnesium ion (Mg\(^{2+}\)) concentrations are expressed in meq/L.

This is different when assessing sodium’s indirect effect on soil structural stability (see the Infiltration Hazard section that follows). Table 3 shows critical SAR of the applied irrigation water above which can cause injury or nutritional distress in sensitive crops. Table 4 shows the seasonal average SAR for various water sources.

**Table 3. Critical SAR of Applied Irrigation Water**

<table>
<thead>
<tr>
<th>CROP(^1)</th>
<th>CRITICAL SAR OF APPLIED IRRIGATION WATER</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Crops</td>
<td>&lt; 3</td>
</tr>
</tbody>
</table>

Note:

\(^1\) Many tree crops are sensitive to Na\(^+\) toxicity after several years when sapwood converts to heartwood releasing Na\(^+\) from the root to the shoot. Most annual crops are insensitive to Na\(^+\) per se provided there is sufficient Ca\(^{2+}\) in the soil solution to maintain membrane integrity and ion selectivity. Hence, the ratio of sodium to calcium is more critical (Grattan and Grieve, 1992).

Key

Ca\(^{2+}\) = calcium ions
Na\(^+\) = sodium ions
SAR = sodium adsorption ratio
Table 4. Seasonal Average SAR for Various Water Sources

<table>
<thead>
<tr>
<th>VALUE(^1)</th>
<th>FKC(^2,(^3)</th>
<th>CVC(^2,(^4)</th>
<th>INTERMEDIATE(^5)</th>
<th>CHECK 21(^6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>0.46</td>
<td>1.68</td>
<td>1.99</td>
<td>2.27</td>
</tr>
<tr>
<td>Maximum</td>
<td>0.87</td>
<td>2.04</td>
<td>2.46</td>
<td>2.96</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.28</td>
<td>1.10</td>
<td>1.61</td>
<td>1.79</td>
</tr>
</tbody>
</table>

Note:
1 March through October period.
3 Sample taken at terminus of FKC.
4 Sample taken at AEWSD CVC, Pumping Plant 6 or 6B Forebay.
5 Weighted average of CVC and Check 21 water quality.

Key
AEWSD = Arvin Edison Water Storage District
Check 21 = Check Structure 21 at milepost 172,40 on the California Aqueduct
CVC = Cross Valley Canal
FKC = Friant-Kern Canal
Intermediate = Water quality representing the average of California Aqueduct Check 21 and Cross Valley Canal water qualities
SAR = sodium adsorption ratio

INfiltration Hazard

Sodium Adsorption Ratio

The SAR has been the standard used for assessing the infiltration hazard of applied irrigation water (Ayers and Westcot, 1985). But the actual infiltration hazard is assessed by balancing the opposite effects of salinity (EC\(_w\)) and sodicity (i.e., SAR) on aggregate stability. High salinity and low SAR are both important in maintaining adequate soil structure, which promotes better infiltration. Even though coarse-textured soils infiltrate faster than fine-textured soils, the hazard exists for all soil types. Typically, the adjusted SAR (SAR\(_{adj}\)) is used rather than the SAR as it more accurately accounts for CaCO\(_3\), precipitation, and dissolution processes in the soil solution near the soil surface that control the free Ca\(^{2+}\) concentration. Figure 1 shows the relationship between the EC\(_w\) of the applied irrigation water and the SAR\(_{adj}\) as it relates to zones of “likely reductions” in infiltration rates (red), “slight to moderate reductions” in infiltration rates (yellow) and “no reductions” in infiltration rates (blue), adapted from Hanson et al., 2006. The threshold value is, therefore, variable and is considered to be the line that separates the “blue” and “yellow” zones on Figure 1. It is very important to note that low EC\(_w\) concentration (i.e., EC\(_w\) < 200 µS/cm) causes a reduction in water infiltration regardless of the SAR. Figure 1 also compares this relationship with various water sources. Note that FKC water falls in the red "severe reduction in infiltration" zone because of its low EC\(_w\) concentration, while water from the CVC or mixed with CVC water falls in the yellow "slight to moderate reduction in infiltration" zone. The addition of gypsum to FKC water increases the EC\(_w\) concentration, moving the point to the right and away from the "severe reduction in infiltration" zone while slightly reducing the SAR.
Calcium-Magnesium Ratio

Calcium nutrition can be problematic under several conditions. Calcium deficiency can occur under low-saline conditions when the concentration of free calcium \([\text{Ca}^{2+}]\) is \(\leq 1\text{-}2\) millimoles/L in the soil solution. Deficiency can also occur under high sodic conditions where the SAR exceeds 10-15 in sensitive plants due to high sodium-calcium ratios or in alkaline conditions where \(\text{Ca}^{2+}\) precipitates out of the soil solution as it forms \(\text{CaCO}_3\). Due to competition in the plant between calcium and magnesium at the root membrane, calcium nutrition could potentially be compromised when the calcium-magnesium ratio is generally less than 1 (Rhoades, 1992). Table 5 shows the seasonal average calcium-magnesium ratio for various water sources. Note the ratios for both FKC and CVC water are considerably higher than 1, while the ratio at California Aqueduct Check 21 is very close to 1 but will likely increase in the soil solution as the infiltrating water dissolves existing gypsum in the soil from previous amendment use. Therefore, calcium deficiencies, using CVC or Check 21 water or any mixture of the two, are unlikely.
Table 5. Seasonal Average Calcium-Magnesium Ratio for Various Water Sources

<table>
<thead>
<tr>
<th>VALUE</th>
<th>FKC, CVC</th>
<th>INTERMEDIATE</th>
<th>CHECK 21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>3.54</td>
<td>4.37</td>
<td>1.55</td>
</tr>
<tr>
<td>Maximum</td>
<td>6.16</td>
<td>8.24</td>
<td>2.00</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.17</td>
<td>2.14</td>
<td>1.20</td>
</tr>
</tbody>
</table>

Note:
Based on molar or equivalent concentrations.
1 March through October period.
3 Sample taken at terminus of FKC.
4 Sample taken at AEWSD CVC, Pumping Plant 6 or 6B Forebay.
5 Weighted average of CVC and Check 21 water quality.

Key
AEWSD = Arvin Edison Water Storage District
Check 21 = Check Structure 21 at milepost 172.40 on the California Aqueduct
CVC = Cross Valley Canal
FKC = Friant-Kern Canal
Intermediate = Water quality representing the average of California Aqueduct Check 21 and Cross Valley Canal water qualities
SAR = sodium adsorption ratio

PH AND BICARBONATE EFFECTS

The pH of both the applied irrigation water and the soil solution are important factors that may affect either the suitability of water for irrigation or its effect on nutrient availability to the crop. And many of the adverse effects of pH are associated with combined high alkalinity (high concentrations of bicarbonate \([\text{HCO}_3^-]\) and carbonate \([\text{CO}_3^{2-}\])). In slightly alkaline waters (pH 7-8.3), the alkalinity is from bicarbonate. Only when the pH exceeds 8.3 does carbonate become present. The pH of the water is an indication of the activity of the hydrogen ion. The numerical pH value is expressed on a negative log scale such that a one-unit increase or decrease corresponds to a ten-fold increase or decrease in the hydrogen ion activity. Therefore, a change of soil pH from 6 to 8 corresponds to a hundred-fold decrease in the hydrogen ion activity.

The pH of applied irrigation water can affect irrigation equipment or cause calcite (i.e. lime) deposits on vegetation. Regarding irrigation equipment, the pH is one of several water quality factors than can influence corrosion of galvanized pipes or other metallic parts. The pH can also influence precipitation of calcite \((\text{CaCO}_3)\) at the orifices of drip emitters or minisprinklers which will affect the system’s overall performance. This can be problematic if alkaline irrigation water, combined with sufficiently high bicarbonate and calcium concentrations, is used over the long term without periodic acid flushes to reduce scale buildup. Calcite precipitation becomes more problematic if the pH of the applied irrigation water exceeds 8.5. In addition, if such water is sprinkler irrigated above the canopy, it can cause unsightly white deposits that form on leaves and fruit. While these deposits typically do not cause harm to the crop, they nonetheless can affect the aesthetic quality. Acid additions to the irrigation water will not only reduce the pH but will reduce the \([\text{HCO}_3^-]\), reducing the potential for \(\text{CaCO}_3\) precipitation. Acid additions convert bicarbonate to carbon dioxide \((\text{CO}_2)\) gas.

As the applied irrigation water infiltrates the soil, it interacts with the soil minerals. Therefore, the pH of the infiltrating water will change as it interacts with soil minerals, but soils are typically well buffered, as are soils in the FWA service area. Well buffered soils resist large changes in pH in the soil solution. The seasonal average pH of the irrigation water ranges from 7.1 to 8.4 depending upon the mixture of FKC water and California Aqueduct water. Because of the buffering capacity of the soil, this range in applied irrigation water pH will make little impact of the pH of the soil solution.

The pH of the soil solution has a profound influence on plant nutrient availability, nutrient uptake and ion toxicity to plants. The vast majority of soils that are cultivated for crop production around the world fall within the neutral, slightly acid and slightly basic pH range (i.e. pH 6-8). This is the general range where nutrient availability is optimal. However, there are those soils where the pH falls far from this normal range and these,
if not corrected to an adequate range, can pose adverse effects on crops. Soils that are highly acidic (pH < 5.5) or highly alkaline (pH > 8.5) present a spectrum of challenges for the plant including nutrient availability, ion toxicities, and nutrient imbalances influencing the ion relations and nutrition within the plant itself (Läuchli and Grattan, 2012).

Most nutrients are not equally available to plants across the pH spectrum (Epstein and Bloom, 2005). Several mineral nutrients are severely affected in these non-optimal pH soils, particularly calcium, potassium, phosphorus, and iron. The reactions of plants to these nutrient elements under extreme soil pH conditions can affect plant growth, physiological processes and their morphological development (Läuchli and Grattan, 2012). The majority of the soils irrigated with waters from districts within the FWA, however, fall in the slightly alkaline range with the pH in the rootzone between 7.5 and 8.3 (UC Davis Soilweb https://casoilresource.lawr.ucdavis.edu/gmap/). Therefore, these soils are slightly alkaline, based largely on the natural abundance of calcite in the soil, and are at the upper end of the optimal pH range. Depending on the alkalinity of the soil water and [Ca$^{2+}$], some of the Ca$^{2+}$ can precipitate out as CaCO$_3$ which decreases the calcium-magnesium ratio. Intermittent injection of acids in the applied irrigation water will reduce the pH and, consequently, the alkalinity of the water. Not only is this a maintenance measure to reduce calcite buildup on the orifices of drip emitters and minisprinklers, it drops the pH of the water which decreases bicarbonate, increases the [Ca$^{2+}$] and availability of other plant nutrients. Most growers in the San Joaquin Valley have some maintenance, acid-injection program in place. However, in Kern county, this may not be common practice in all districts. Acid applications, the residual gypsum in the soil and periodic applications of additional gypsum, are all a means of providing sufficient free Ca$^{2+}$ in soils in Kern country. Moreover, increasing the [Ca$^{2+}$] in the soil water simultaneously improves the calcium-magnesium ratio.

Sprinkler irrigated fruit and vegetable crops (approximately 20% of studied districts) could be susceptible to formation of white deposits on leaves and fruit, or “white wash,” and reduced marketability if bicarbonate concentrations, or [HCO$_3$], in applied irrigation water are too high (> 1.5 meq/L, leaving a white residue on the crop surface. Bicarbonate concentrations in the California Aqueduct water theoretically could cause “white washing” under sprinkler irrigation, especially during dry and breezy conditions. “White washing” is a concern to some growers and has been seen by growers occasionally in the study area; however, it is not known what the exact cause of the “white washing” was, whether it was from undiluted California Aqueduct water or some other source. Bicarbonate levels of 1.5 meq/L or 92 mg/L and higher may increase formation of white deposits. The seasonal average for [HCO$_3$] of CVC water is 78.5 mg/L. While this concentration is less than 92 mg/L, special management practices may be needed to mitigate or avoid “white wash” impacts during periods of elevated bicarbonate levels. These may include blending with higher quality sources or changing irrigation methods away from sprinklers that wet the foliage (Provost & Pritchard, 2012).

**CORROSION AND DEGRADATION OF MATERIALS**

The comparison of corrosion potential of California Aqueduct water and FKC water from Millerton Lake was performed by Provost & Pritchard in 2012 on several chemical constituents and calculated indices including: pH, Langelier Index, Ryzner Index, EC, resistivity, sulfates, and chlorides. This comparison generally showed that FKC water has a slight tendency to degrade concrete structures by leaching out minerals, but metallic corrosion will be low. Comparatively, California Aqueduct water will have a lower tendency to leach out minerals from concrete, and will have a more corrosive effect on metals, although there is only a slight difference between the two water sources in either case (Provost and Pritchard, 2012).

Materials such as brass, bronze, PVC, polyethylene, and stainless steel usually have a high corrosion tolerance, and therefore would not likely be affected by the exchange of source waters. The forecasted increase in corrosion from using more California Aqueduct water is likely manageable with the use of special coatings and proper selection of new materials and would likely result in minor increase in O&M costs (Provost and Pritchard, 2012).
AGRONOMIC LEACHING REQUIREMENTS

Agronomic leaching is the application of irrigation water in excess of the soil water holding capacity to neutralize the agronomic effects associated with increased salinity and ion toxicity in the crop rootzone. This approach aims to balance concerns related to long-term groundwater quality with a multi-layered assessment of agronomic impacts as a durable solution. The amount of leaching required, referred herein as maintenance leaching, depends upon the sensitivity of the crop to salinity and the irrigation water salinity. The higher the salinity of the applied irrigation water and the more sensitive the crop is to salinity, the greater the amount of leaching is required. This same leaching concept can also be applied to chloride and boron.

LEACHING FRACTION VS LEACHING REQUIREMENT

Often, leaching fraction (LF) and leaching requirement (LR) are used interchangeably. The two, in fact, are different. The LF is defined as the volume of water that drains below the rootzone divided by the volume of water that infiltrates the soil surface (equivalent to applied irrigation water assuming no surface runoff or evaporation). The LF can also be estimated based on the salinity of the applied irrigation water, or $[\text{EC}_w]$, and that of the drainage water, or $[\text{EC}_{dw}]$, where $\text{LF} = \text{EC}_w / \text{EC}_{dw}$. The crop roots extract water from the rootzone leaving the salts behind. If the crop rootzone is divided in quarters, typically the top quarter uses 40% of the water, the second quarter 30%, third quarter 20% and bottom quarter 10%. Therefore, the salt concentration increases with soil depth. The lower the LF, the more salts accumulate and concentrate at lower depths.

Figure 2 is a representation of this relationship under conventional irrigation. The relationship between irrigation water salinity ($\text{EC}_w$) and soil salinity ($\text{EC}_e$) is linear but the slopes of the relationships are dependent upon the LF. The slopes decrease with increasing LF. The higher the LF, the higher the irrigation water salinity can be to maintain the yield of a crop. In Figure 2, note the dashed lines along the y-axis indicating the general salt tolerant categories as the salinity of the applied irrigation water changes.

Key:
- $\text{dS/m} = \text{decisiemens per meter}$ ($1 \mu\text{S/cm} = 1 \mu\text{mhos/cm} = 1/1,000 \text{dS/m}$)
- LF = leaching fraction

*Figure 2. Relationship Between Soil Salinity ($\text{EC}_e$) and Salinity of the Applied Irrigation Water ($\text{EC}_w$) under a Series of Steady-State Leaching Fractions (0.05 to 0.80) (from Ayers and Westcot, 1985)*
The LF concept is attractive in that it allows predictions of average rootzone salinity (ECe) conditions from the applied irrigation water EC (ECw) and assumed LF. Knowing the scientifically determined salinity threshold value (ECet) for a particular crop, one can use this relationship to determine the maximum irrigation water salinity (ECw) for a given LF. The relationship between ECw, ECe, and LF also depends on irrigation management. That is, ECe = Concentration Factor (F.cwd) * ECw where ‘F.cwd’ depends not only on the LF but the type of irrigation method. Applicable F.cwd values for conventional irrigation methods such as furrow or flood, and high frequency irrigation methods, such as drip and minisprinklers, are provided in Table 6.

Table 6. Concentration Factor Values for Conventional and High Frequency Irrigation (adapted from Suarez, 2012)

<table>
<thead>
<tr>
<th>LEACHING FRACTION (LF)</th>
<th>CONCENTRATION FACTOR (F.cwd)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conventional Irrigation</td>
</tr>
<tr>
<td>0.05</td>
<td>2.79</td>
</tr>
<tr>
<td>0.10</td>
<td>1.88</td>
</tr>
<tr>
<td>0.20</td>
<td>1.29</td>
</tr>
<tr>
<td>0.30</td>
<td>1.03</td>
</tr>
<tr>
<td>0.40</td>
<td>0.87</td>
</tr>
<tr>
<td>0.50</td>
<td>0.77</td>
</tr>
</tbody>
</table>

The difference in F.cwd values between conventional and high frequency irrigation is largely based on how crop roots respond to the salinity in the rootzone. Under conventional irrigation, crops typically respond to the average rootzone salinity (i.e. the seasonal average of the four rootzone quarters of salinity). Under high frequency irrigation, crops respond to the water uptake weighted salinity (i.e. the salinity in the top quarter is weighted 40 percent, salinity in the second quarter is weighted 30 percent, and so on). Because the salinity in the top quarter is lower where evapotranspiration (ET) is higher and higher in bottom where ET is lower, the average rootzone salinity is lower under high frequency irrigation.

The LR, on the other hand, is the lowest LF needed to sustain maximum yield given the applied irrigation water salinity concentration, or [ECw], and yield threshold for the given crop. In other words, it is the minimum leaching needed, given the crop type and water quality, to maintain the salinity (or chloride or boron), at the maximum rootzone concentration in the rootzone that the crop can tolerate. Any increase in rootzone concentration above this maximum level will cause injury or yield reductions. LR is an attractive concept because, given an irrigation water quality and crop sensitivity, the minimum leaching needed to sustain the rootzone salinity ECe, rootzone chloride (Cl-e), or rootzone boron (Be) at levels that would avoid or reduce damage or yield losses can be estimated.

LR can be estimated using the following equation (Rhoades and Merrill, 1976; Ayers and Westcot, 1985):

\[
LR\% = \frac{EC_w}{5(EC_{et}) - EC_w} \times 100
\]

ECw = Electrical conductivity of irrigation water
ECet = Soil salinity threshold for a given crop

Note that the LR relationship can apply to chloride and boron by substituting their respective irrigation water concentrations (i.e. Clw or Bw) and their threshold values (Cl.et or B.et). The LR equation assumes that crops respond to an average rootzone salinity created by a 40-30-20-10% root water extraction pattern, similar to LF predictions using conventional irrigation. The difference is that LR predicts the minimal LF to achieve maximal yields whereas the LF approach assumes an LF first, then predicts what the ECe will be given the ECw of the irrigation water. Both are similar but solve the problem from different directions.
LIMITATIONS TO THE STEADY-STATE LEACHING CONCEPT

The leaching fraction or requirement is an attractive concept but has limitations. First, the leaching concept assumes steady-state conditions and thus has no time element. Therefore, there is no accounting for how long leaching will take, which will differ depending upon the permeability of the soils. Second, the evapotranspiration (ET) of the crop is assumed to be independent of the average rootzone salinity, but it is not (Letey and Feng, 2007). A salt-stressed crop will use less water than a non-stressed crop. Consequently, crop ET will be reduced, and leaching, with the same quantity of applied irrigation water, will be increased. And third, in drip irrigated fields, actual LFs are difficult to quantify because LF, soil salinity, soil water content, and root density all vary with distance and depth from the drip lines.

In light of these limitations, recent studies have shown that the EC$_w$ and EC$_e$ relations described by Ayers and Westcot (1985), which are based on steady-state LF conditions, tend to be too conservative and overestimate soil salinity and, therefore, overestimate yield losses in most cases (Corwin and Grattan, 2018; Letey et al., 2011). Transient-state models may more accurately predict soil salinity, as well as soil chloride, sodium and boron, but they are more complicated and require many more site-specific inputs and assumptions. Therefore, transient models are still too cumbersome and time consuming to replace steady-state models.

The LF and LR concepts are both steady-state, so they assume the amount of irrigation is not limiting. The amount of water needed for irrigation can be estimated as:

$$ AW = \frac{ET}{1-LR} $$

$AW =$ applied water
$ET =$ evapotranspiration or crop water requirement
$LR =$ leaching requirement

The units for applied water (AW) and ET or crop requirement are typically depths of water (i.e. inches or millimeters). But in many cases, the amount of water is limiting and therefore crops can be under-irrigated and therefore not achieve the required leaching. In this case, the salts in the crop rootzone will increase over time. At some point, depending upon the salinity of the imported water and crop sensitivity, the salt content (or chloride or boron) can exceed the threshold level. Because the threshold values are based on seasonal averages, exceedances above the threshold are allowed to some degree without experiencing a reduction in yield. For example, if the average Cl$_e$ was 100 mg/L for the first 2/3 the season and then reached 200 mg/L for the last 1/3 of the season due to insufficient leaching, almonds on “Nemaguard” rootstock would not be expected to be damaged because the seasonal average Cl$_e$ would be 133 mg/L given the Cl$_e$ threshold is 150 mg/L. Nevertheless, if the required leaching is not achieved, reclamation leaching would be required. Similarly, if the preseason soil salinity is over 150 mg/L and little to no leaching is applied during the season, injury would be expected to develop on almonds on “Nemaguard” rootstock. Therefore, the LR values for various crops and salinities are based on soils where the maintenance leaching fraction is achieved each irrigation. If the pre-existing soil salinity is initially high, then the soil is not at steady-state.

DIFFERENCE BETWEEN MAINTENANCE LEACHING AND RECLAMATION LEACHING

There is a distinct difference between maintenance leaching and reclamation leaching. Maintenance leaching occurs during each irrigation by applying more irrigation water than the soil can hold. This is the leaching fraction or requirement concept described above. Therefore, the AW is higher than the ET to accommodate the necessary leaching (see equation above). Reclamation leaching, on the other hand, occurs at the end of the irrigation season by applying excess irrigation water to flush the salts from the crop rootzone. Ideally, reclamation leaching would not be required if correct maintenance leaching is achieved each irrigation during the irrigation season. However, because some fields may not get the necessary leaching, salts can accumulate, and fields may require reclamation leaching at some time. In addition, low pressure systems such as drip and mini-sprinkler systems produce characteristic salt accumulation patterns in fields, even with sufficient downward leaching. Whether salts are building up in the rootzone or between drippers or
minisprinklers, reclamation leaching is a valuable preventative measure from time to time at the end of the irrigation season.

At the end of the irrigation season, salt can be removed by sprinkler irrigation (i.e. equivalent to intermittent ponding). Figure 3 shows the extent of leaching needed to address rootzone salinity. For example, if the average rootzone salinity (ECe) at the end of the season is 3000 μS/cm and the goal is to reduce the salinity in the soil down to 600 μS/cm the salinity needs to be reduced to 600/3000 = 0.2 (y-axis) or 20% of what it was before leaching. Then the amount of sprinkler irrigation water to apply is 0.5 ft (x-axis) for every foot of soil to reclaim. If the goal is to reduce the top 2 feet, then 0.5 x 2ft = 1ft of water would be needed. This assumes the combined rainfall and applied reclamation leaching water needed.

![Figure 3. Reclamation Leaching Function under Sprinkler Irrigation or Intermittent Ponding (Ayers and Westcot, 1985).](image)

The amount of reclamation leaching can be reduced by the amount of effective rainfall. To take advantage of rainfall, reclamation leaching should ideally take place after the rainfall season but before spring budding and leaf out begins, typically from October/November through March.

**LEACHING AND NITROGEN MANAGEMENT**

It is also important to address nitrogen management strategies combined with the salt leaching strategies. Unlike salts, nitrogen is very dynamic in the rootzone as it undergoes form changes from organic pools to inorganic fractions (primarily nitrate [NO$_3^-$] and ammonium [NH$_4^+$]). Ammonium, and particularly nitrate, are the forms primarily taken up by plants. Nitrate, being an anion, is relatively mobile in soils and is highly susceptible to leaching below the rootzone. Once nitrate leaches below the rootzone, chemical transformations are less likely to occur, and nitrate commonly continues leaching downward and eventually ends up in the aquifers. A 2002 study conducted by the Lawrence Livermore National Laboratory concluded that nitrate contamination in groundwater is “the number-one contaminant threat to California’s drinking water supply” (LLNL 2002).

Rootzone salinity control and nitrogen management is a conflicting problem. It is necessary to leach salt from the rootzone to avoid damage from salinity or ion toxicity, but nitrates will unavoidably be leaching below the
rootzone as well. If soil salinity is low at the beginning of the irrigation season (see reclamation versus maintenance leaching), then leaching at less than the critical LR is possible to avoid salt damage. Then, salinity in the profile will steadily build up over the season while soil nitrogen will be depleted due to crop uptake. At the end of the irrigation season, salinity will be the highest, and nitrate will be the lowest. Therefore, reclamation leaching can be implemented at the end of the irrigation season, and the process cycle repeats itself.

MITIGATION LEACHING REQUIREMENTS

ESTIMATING LEACHING REQUIREMENTS FOR MOST SENSITIVE CROPS

The most sensitive crops in the Friant Division were used for this analysis. Crops selected were based on their varied sensitivities to salinity, chloride, and boron. By using the most sensitive crops, all crops with higher tolerances should also be protected. The most salt-sensitive crops, or those with the lowest soil salinity threshold (EC<sub>et</sub>), are beans, carrots, onions (seed), melons, and strawberries. All have an EC<sub>et</sub> of 1000 μS/cm. For chloride, the most sensitive crops are almonds and other stone fruits on “Nemaguard” rootstock. The threshold Cl<sub>-et</sub> is estimated to be 150 mg/L. The relationship between boron in the applied irrigation water and the saturated soil paste is more complicated because of boron’s high affinity to adsorb onto the soil. Irrigation water with higher boron concentrations than predicted can be used until the boron saturates the soil adsorption sites. Because of this complexity, Ayers and Westcot (1985) concluded that the “…maximum concentration (of boron) in the irrigation water are approximately equal to these values (boron tolerance reported based on soil water bases) or slightly less,” suggesting that applied irrigation water tolerances would be 0.5 – 0.75 mg/L which would protect the most sensitive crops. However, over the long term (more than several years), boron will behave similarly to salts and chloride (D. Suarez, US Salinity Laboratory, personal communication). With the boron threshold for soil water ranging from 0.5 – 0.75 mg/L, the B<sub>et</sub> is equivalent to half of the soil water concentration, or 0.25 – 0.375 mg/L. For more information on conversions from saturated soil paste to soil water concentrations, see Ayers and Westcot (1985). To be conservative, and based on the above tree and vine crop sensitivities, the B<sub>w</sub> threshold is assumed to be 0.25 mg/L.

Table 7 shows the acreage and percentage of sensitive crops for representative water districts, and sensitivities to boron, chloride, and EC within each representative water district.

1 It is important to note that most ‘threshold’ values for chloride and boron reported in literature (e.g. Grieve et al., 2012) are based on the soil water concentration. The saturated soil paste concentration (i.e. Cl<sub>e</sub> or B<sub>e</sub>) for most mineral soils is about half this value over the long-term (Ayers and Westcot 1985).
### Table 7. Percentage and Area of Sensitive Crop Types within Representative Water Districts

<table>
<thead>
<tr>
<th>CROP TYPE</th>
<th>WATER DISTRICT</th>
<th>AEWSD</th>
<th>DEID</th>
<th>KTWD</th>
<th>SID</th>
<th>SSJMUD</th>
<th>SWID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>Acres</td>
<td>%</td>
<td>Acres</td>
<td>%</td>
<td>Acres</td>
</tr>
<tr>
<td>Boron Sensitive&lt;sup&gt;5&lt;/sup&gt;</td>
<td></td>
<td>15%</td>
<td>18,883</td>
<td>5%</td>
<td>2,842</td>
<td>30%</td>
<td>5,969</td>
</tr>
<tr>
<td>Berries&lt;sup&gt;1&lt;/sup&gt;</td>
<td></td>
<td>1%</td>
<td>761</td>
<td>2%</td>
<td>873</td>
<td>1%</td>
<td>200</td>
</tr>
<tr>
<td>Cherries</td>
<td></td>
<td>2%</td>
<td>2,196</td>
<td>&lt;1%</td>
<td>228</td>
<td>1%</td>
<td>160</td>
</tr>
<tr>
<td>Citrus</td>
<td></td>
<td>11%</td>
<td>15,024</td>
<td>2%</td>
<td>1,301</td>
<td>28%</td>
<td>5,609</td>
</tr>
<tr>
<td>Stone Fruits&lt;sup&gt;4&lt;/sup&gt;</td>
<td></td>
<td>1%</td>
<td>902</td>
<td>1%</td>
<td>440</td>
<td>n/a</td>
<td>2%</td>
</tr>
<tr>
<td>Chloride Sensitive&lt;sup&gt;6&lt;/sup&gt;</td>
<td></td>
<td>6%</td>
<td>7,593</td>
<td>22%</td>
<td>12,399</td>
<td>5%</td>
<td>1,040</td>
</tr>
<tr>
<td>Almonds (Nemaguard rootstock)</td>
<td></td>
<td>6%</td>
<td>7,593</td>
<td>22%</td>
<td>12,399</td>
<td>5%</td>
<td>1,040</td>
</tr>
<tr>
<td>EC Sensitive&lt;sup&gt;7&lt;/sup&gt;</td>
<td></td>
<td>7%</td>
<td>8,490</td>
<td>&lt;1%</td>
<td>175</td>
<td>n/a</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Carrots</td>
<td></td>
<td>3%</td>
<td>3,748</td>
<td>&lt;1%</td>
<td>100</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Melons&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
<td>1%</td>
<td>777</td>
<td>&lt;1%</td>
<td>74</td>
<td>n/a</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Onions&lt;sup&gt;3&lt;/sup&gt;</td>
<td></td>
<td>3%</td>
<td>3,961</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Strawberries</td>
<td></td>
<td>&lt;1%</td>
<td>4</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Source: Data compiled from California Department of Water Resources Land Use Viewer (2017) developed by LandIQ using 2014 land use data. Districts provided updates to 2017 land use data where appropriate. DEID data was provided by the District, and data gaps were filled with LandIQ data.

Notes:
- "n/a" indicates that there is zero amount of a crop type in a district.
- Data Source lists Berries as “Bush Berries”
- Data Source groups Melons with Squash and Cucumbers
- Data Source groups Onions with Garlic
- Stone Fruits include Apricots, Nectarines, Peaches, Plums, and Prunes
- Boron Sensitive Crops include Berries, Citrus, and Stone Fruits
- Chloride Sensitive Crops include Almonds
- EC Sensitive Crops include Carrots, Melons, Onions, and Strawberries

Key:
- % = percentage
- AEWSD = Arvin-Edison Water Storage District
- DEID = Delano-Earlimart Irrigation District
- KTWD = Kern-Tulare Water District
- n/a = not applicable
- SID = Saucelito Irrigation District
- SSJMUD = South San Joaquin Municipal Utility District
- SWID = Shafter-Wasco Irrigation District
DEVELOPING MITIGATION LEACHING CURVES

This section describes quantification of mitigation based on leaching requirements for sensitive crops. This approach does not directly address the physical characteristics or dynamic nature of the rootzone, but rather is specific to sensitive crop types grown in the region and implementing sufficient leaching volumes to prevent crop injury. In addition, the volumetric mitigation quantified through this approach is not specific to a water district but is representative of all crops grown in the Friant Division.

For salinity, EC<sub>et</sub> values were used to calculate LR values, as presented in Table 8 in percentages. For chloride or boron the same LR equation is used except irrigation water concentrations (i.e. Cl<sub>w</sub> and B<sub>w</sub>) in mg/L are used in place of EC<sub>w</sub> and respective threshold Cl<sub>e</sub> and B<sub>e</sub> are used in place of EC<sub>et</sub>. At each location, the quantified LR by water quality constituent is based on the most stringent LR, which assumes all water is applied to the most sensitive crop. Analysis shows a long-term LR between 5.2 and 19 percent, using the average, seasonal statistics for EC, chloride, and boron concentrations.

<table>
<thead>
<tr>
<th>MOST SENSITIVE CROP</th>
<th>CVC</th>
<th>INTERMEDIATE</th>
<th>CHECK 21</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC</td>
<td>Cl&lt;sup&gt;-&lt;/sup&gt;</td>
<td>B</td>
<td>EC</td>
</tr>
<tr>
<td>Carrots, onions, melons, strawberries</td>
<td>6.7%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Almonds (Nemaguard rootstock)</td>
<td>-</td>
<td>5.2%</td>
<td>-</td>
</tr>
<tr>
<td>Stone fruits, citrus, berries</td>
<td>-</td>
<td>-</td>
<td>8.0%</td>
</tr>
</tbody>
</table>

Key:
B = boron
Check 21 = Check Structure 21 at milepost 172.40 on the California Aqueduct
Cl<sup>-</sup> = chloride
CVC = Cross Valley Canal
EC = electrical conductivity
Intermediate = Water quality representing the average of California Aqueduct Check 21 and Cross Valley Canal water qualities

Figures 4 through 6 show mitigation rating curves based on LR percentages, source water quality, and constituents of concern. Each mitigation rating curve was extended to show the maximum observed concentration from historical water quality data for both CVC and California Aqueduct Check 21 sources.

The LR percentages presented in Table 8 and Figures 4 through 6 represent quantified volumetric mitigation that would be applied as maintenance leaching. Maintenance leaching occurs at each irrigation by applying more water than the soil can hold, or in other words, the applied irrigation water is more than the crop requirement to accommodate the necessary leaching. The quantified LR assumes long-term steady-state conditions and does not account for leaching from rain or end-of-season reclamation practices. Any rain or end-of-season leaching will decrease the presented values.

The quantified LR assumes mitigation water is delivered and applied at the same time as surface water delivery is taken. In addition, it assumes mitigation water is of the same water quality as the surface water delivery. Therefore, mitigation is only quantified for water of the same imported quality and not for both reverse flow pump-back and Millerton Lake supplies. If maintenance leaching practices are followed, reclamation leaching is unnecessary, except for in driest of years when surface supply does not meet irrigation demand or to leach salts that have accumulated between drip emitters and mini sprinklers. Using the most stringent LR, it is assumed all mitigation water is applied to the most sensitive crop.
Key:

Check 21 = California Aqueduct Check 21
CVC = Cross Valley Canal
EC = electrical conductivity
µS/cm = microsiemens per centimeter (1 µS/cm = 1 µmhos/cm = 1/1,000 dS/m)
Intermediate = Water quality representing the average of California Aqueduct Check 21 and Cross Valley Canal water qualities

Figure 4. Leaching Requirement for Electrical Conductivity

Key:

Check 21 = California Aqueduct Check 21
CVC = Cross Valley Canal
EC = electrical conductivity
Intermediate = Water quality representing the average of California Aqueduct Check 21 and Cross Valley Canal water qualities
mg/L = milligrams per liter

Figure 5. Leaching Requirement for Chloride
Key:
Check 21 = California Aqueduct Check 21
CVC = Cross Valley Canal
Intermediate = Water quality representing the average of California Aqueduct Check 21 and Cross Valley Canal water qualities
mg/L = milligrams per liter

Figure 6. Leaching Requirement for Boron

Leaching Requirement Normalization
In order to best understand the LR relationships amongst EC, chloride, and boron and to confirm the dominant constituent trend, individual rating curves were normalized to an EC concentration scale. The EC concentration was used as it can be easily measured in real-time. Figure 7 shows the stacked, normalized mitigation rating curves for all three constituents of concern. Boron is the dominant or driving constituent and has the highest LR, regardless of source water quality. The required leaching based on that curve would be sufficient to prevent crop injury due to increased EC or chloride concentrations in applied irrigation water, and, therefore, the boron curve is the proposed mitigation rating curve for the Water Quality Mitigation Ledger (Figure 8). The method for normalizing each constituent curve is described below.
Normalization Method

As the three constituent curves have differing concentration scales and they do not show direct correlations to each other, the constituents were normalized to a common scale using the below equation.

\[
X_{new} = \frac{X - X_{min}}{X_{max} - X_{min}}
\]
In the equation, $X$ represents the constituent concentration for EC, chloride, or boron. $X_{\text{min}}$ is the minimum average, seasonal, observed concentration for a given constituent from either California Aqueduct Check 21 or CVC water quality data. The maximum observed concentration corresponded with varying leaching requirements for each of the constituents. To ensure that all constituents were normalized to the same scale and the full range of possible constituent concentrations was considered beyond the highest observed concentration for California Aqueduct Check 21 water, $X_{\text{max}}$ represents the constituent concentration corresponding to a 25 percent LR. Figure 9 displays the normalized curves, and Table 9 presents the normalized data.

Normalized concentration values were then converted back to EC using the equation below, where $X_{\text{norm}}$ represents the normalized concentration for chloride or boron. LR curves were then replotted using an EC scale (Figure 7).

$$EC = X_{\text{norm}}(EC_{\text{max}} - EC_{\text{min}}) + EC_{\text{min}}$$
## Table 9. Constituent Normalization

<table>
<thead>
<tr>
<th>SOURCE WATER</th>
<th>ELECTRICAL CONDUCTIVITY</th>
<th>CHLORIDE</th>
<th>BORON</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Observed Concentration (μS/cm)</td>
<td>Normalized Value</td>
<td>Leaching Requirement</td>
</tr>
<tr>
<td>CVC</td>
<td>315</td>
<td>0.06</td>
<td>6.7%</td>
</tr>
<tr>
<td>Intermediate</td>
<td>397</td>
<td>0.17</td>
<td>8.6%</td>
</tr>
<tr>
<td>Check 21</td>
<td>479</td>
<td>0.29</td>
<td>10.6%</td>
</tr>
<tr>
<td>Maximum Observed</td>
<td>805</td>
<td>0.73</td>
<td>19.2%</td>
</tr>
<tr>
<td>Maximum normalization (25% Leaching Requirement)</td>
<td>1000</td>
<td>1.00</td>
<td>25.0%</td>
</tr>
</tbody>
</table>

Key:
- CVC = Cross Valley Canal
- μS/cm = microsiemens per centimeter
- mg/L = milligrams per liter

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June 2020 | Draft Attachment A – Agronomic Impacts and Mitigation
APPLIED AGRONOMIC THRESHOLDS

The Policy includes maximum water quality thresholds for the FKC. Although the mitigation rating curve quantifies mitigation water to account for appropriate maintenance leaching, FKC water quality thresholds for EC, chloride, boron, and SAR were developed and are proposed herein. These thresholds aim to (1) balance supply reliability, water quality concerns, and agricultural practices, such as regulated deficit irrigation (RDI); and (2) ensure that the EC<sub>et</sub>, Cl<sub>et</sub>, or B<sub>et</sub> limits are not exceeded for the most prevalent and sensitive crops in the Friant Division. The thresholds are specific to three irrigation periods that correspond to the growing season and agricultural management practices during the year:

- Period one represents the beginning of the growing season (March 1 – June 30);
- Period 2 represents timing of hull split and the duration of RDI practices in the Friant Division (July 1 – August 31); and
- Period 3 is inclusive of the remainder of the growing season and contract year (September 1 – February 28).

Table 10 shows the established water quality constituent thresholds for each period as defined in the Policy. The threshold variations in Period 3, shown as Periods 3a and 3b, are described in more detail in the Threshold Flexibility subsection below.

Sections below describe methods applied to account for annual RDI practices; development of water quality thresholds, including thresholds for RDI; and adjustments to water quality thresholds to accommodate flexibility for water management within the Friant Division.
**Table 10. Friant-Kern Canal In-Prism Water Quality Thresholds**

<table>
<thead>
<tr>
<th>Period</th>
<th>Salinity Threshold expressed as EC (μS/cm)</th>
<th>Chloride Threshold (mg/L)</th>
<th>Boron Threshold (mg/L)¹</th>
<th>SAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>March 1 – June 30</td>
<td>1,000²</td>
<td>102³</td>
<td>0.4</td>
<td>3</td>
</tr>
<tr>
<td>Period 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>July 1 – August 31</td>
<td>500⁴</td>
<td>55⁴</td>
<td>0.4</td>
<td>3</td>
</tr>
<tr>
<td>Period 3a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>September 1 – February 28</td>
<td>1,000²</td>
<td>102³</td>
<td>0.4</td>
<td>3</td>
</tr>
<tr>
<td>Period 3b</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>September 1 – February 28</td>
<td>1,000²</td>
<td>123⁵</td>
<td>0.4</td>
<td>3</td>
</tr>
</tbody>
</table>

**Notes:**


For additional detail, see Attachment A - Agronomic Impacts and Mitigation.

When Friant-Kern Canal in-prism water quality conditions in this table are exceeded, Friant Division Long-Term Contractors will work together to seek 1:1, unleveraged, and cost-neutral exchanges for pump-in and pump-back programs. This does not apply to spot-market or third-party exchanges.

¹ Grapes are used as a representative crop for boron sensitivity and are prevalent in the Friant Division. They are used as a surrogate for many other sensitive crop types such as apricots, figs, and grapefruits. Threshold assumes conventional irrigation with minimum 20 percent leaching fraction applied.

² Threshold assumes minimum of 20 percent leaching requirement applied and adjusted to account for regulated deficit irrigation during almond hull split period (July 1 – August 31) in order to not exceed maximum ECₑₑ. Almonds on Nemaguard rootstock are used as a representative crop for salinity sensitivity and are prevalent in the Friant Division. They are used as a surrogate for many other sensitive crop types such as apples, cherries, pears, pistachios, and walnuts.

³ Threshold assumes minimum of 20 percent leaching requirement applied and then adjusted to account for regulated deficit irrigation during almond hull split period (July 1 – August 31) in order to not exceed maximum Clₑₑ. Almonds on Nemaguard rootstock used as a representative crop for chloride sensitivity. They are used as a surrogate for other sensitive crops including cherries, pistachios, and walnuts.

⁴ Threshold applies to almond hull split period when regulated deficit irrigation is applied to avoid hull rot. This threshold is used assuming irrigation applications are reduced to 50 percent of the tree water requirement and subsequently thresholds applied for the remainder of the year have been adjusted to account for additional salt accumulation. This threshold was developed with consideration of existing program operations, historical water quality data, and absolute water quality thresholds.

⁵ If the measured average chloride concentration in Period 1 (March 1 – June 30) is less than or equal to 70 mg/L, the allowable chloride threshold for Period 3 (September 1 – February 28) is increased to 123 mg/L.

**Key:**
- μS/cm = microsiemens per centimeter (1 μS/cm = 1 µmhos/cm = 1/1,000 dS/m)
- ASCE = American Society of Civil Engineers
- Clₑₑ = maximum chloride threshold of the saturated soil paste
- EC = electrical conductivity of applied water
- ECₑₑ = Soil salinity threshold for a given crop
- FAO = Food and Agriculture Organization of the United Nations
- Friant Division = Friant Division of the Central Valley Project
- mg/L = milligrams per liter
- SAR = sodium adsorption ratio
- TDS = total dissolved solids

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**REGULATED DEFICIT IRRIGATION**

This section describes methods applied to account for annual RDI practices in the Friant Division for EC and chloride agronomic thresholds, specific to almonds. Note, grapes may also be deficit irrigated during the blooming period; however, the deficit irrigation period for grapes is not aligned with that of almonds, and grapes are most prone to boron toxicities. Consequently, a similar RDI analysis and threshold adjustment is unnecessary for grapes. See Boron Thresholds subsection in Water Quality Thresholds section for additional discussion on applied boron thresholds for grapes in the Friant Division.
Hull Rot Control

Hull rot is problematic in almond orchards in the San Joaquin Valley, and trees are particularly sensitive during the hull split period. Hull split is where 1 percent of the almonds exhibit split, and it typically lasts one to two weeks. The initiation of hull split depends on the almond variety, weather conditions, and tree stress. Although variety has the largest influence on hull-split timing, the temperature 90 days after flowering also affects the hull split initiation. Unseasonably cool temperatures delay hull split while unseasonably warm weather accelerates it.

Hull rot occurs due to infestation by one of two types of fungi, *Monilinia fructicola* or *Rhizopus stolonifera* (Holtz, 2009). Some almond varieties, particularly Nonpareil and Monterey, are more susceptible to fungal attack than are other varieties. High nitrogen application to an orchard combined with full irrigation, or irrigation to completely meet tree ET demands, at the time of hull split can make trees considerably more vulnerable to hull rot.

Hull rot can be largely controlled through a combination of nitrogen management, water management, and antifungal sprays. It is best controlled by RDI practices. A 2001 study showed that by cutting back irrigation to 50 percent of the trees’ water requirements between June 1 to July 31 (70 percent regulated) or July 1 to July 15 (85 percent regulated), hull rot was substantially reduced as evidenced by fewer dead leaf clusters and fewer dead spurs and branches (Teviotdale et al., 2001). Such mild to moderate water stress results in drier hull conditions, making trees less vulnerable to fungal attack. Many almond growers in the San Joaquin Valley have adopted RDI practices to help synchronize hull split timing and reduce potential for hull rot. To monitor the degree of tree stress, these growers have implemented the University of California recommendation of trying to maintain a stem water potential between -14 to -16 bars using pressure chambers by drying down the soil rootzone (B. Sanden, Personal communication, April 5-6, 2020). The more negative the number, the more stress the tree experiences. It could take between one to six weeks to achieve this stress level, depending on soil type and irrigation systems (B. Lampinen, personal communication, April 7, 2020). Growers should take care to not to stress trees too much because that could compromise kernel size as kernels continue to grow at the onset of hull split (Doll and Shackel, 2015). After almond harvest, irrigation is critical to maximize floral bud development for the subsequent season.

During the RDI period when there is no effective leaching, irrigation application is reduced to 50 percent of the tree water requirement, and some additional salts and chlorides accumulate in the rootzone. Absent leaching, the steady-state model breaks down because the salt content in the applied water would need to be zero to maintain the same rootzone salinity. In this situation, preseason irrigation management should target an adjusted soil salinity to maintain the appropriate soil salinity thresholds and avoid crop injury.

Regulated Deficit Irrigation Analysis

The RDI analysis applied a predictive model based on timing of flowering to estimate hull split for various types of almond varieties in different parts of the Central Valley (UC Fruit & Nut Research & Information Center, 2020). From the model and historical California Irrigation Management Information System (CIMIS) data from the AEWSD weather station, hull split was determined to typically initiate around the end of June or beginning of July and, depending upon the variety, continue through mid-August (B. Sanden, personal communication, April 6, 2020). To account for potential variances in hull split initiation in the Friant Division, an 8-week period (July 1 to August 31) was assumed for this RDI analysis. Determination of water quality thresholds during the RDI practices period, or Period 2, also considered effective rootzone depth, applied irrigation water quality, soil capacity, and irrigation requirements. The RDI analysis is considered to be conservative because: (1) rainfall was not considered; (2) surface irrigation was assumed, despite the fact that crops under high frequency drip irrigation (typical for most water districts in the Friant Division) are able to tolerate higher salinity for the same assumed LF; and (3) steady-state models typically overestimate rootzone salinity (Corwin and Grattan, 2018).

The RDI analysis was completed for both EC and chloride. Salt accumulation was quantified as a percentage increase, and then rootzone and applied irrigation water thresholds (assuming 20 percent maintenance leaching) were adjusted to maintain maximum EC$_{et}$ or Cl$_{et}$ through the season. Assuming steady-state
leaching, the analysis targeted maintenance of rootzone salinity at soil salinity thresholds of 150 mg/L for chloride, and 1,500 μS/cm for EC, resulting in adjustments to Cl<sub>w</sub> and EC<sub>w</sub> thresholds.

The RDI calculation assumed the effective rootzone to be between three and five feet (UC Almond Rootzone Workgroup, 2015). Soil was considered to be at field capacity meaning that volumetric soil moisture content was 25 percent, based on monthly average ET or irrigation water requirements for mature almonds in Kern County during months of July and August, 9.5 inches and 8.8 inches, respectively (Sanden, personal communication, April 6, 2020; Goldhamer 2012). The RDI calculation included soil water concentration thresholds of 300 mg/L for Cl<sub>sw</sub>, and 3,000 μS/cm for EC<sub>sw</sub>, or twice that of the thresholds expressed on a saturated soil paste basis.

During the RDI period, water was assumed to be applied at 50 percent ET<sub>c</sub>. The total amount of irrigation water required for 100 percent irrigation application, in inches, was calculated but then halved to account for 50 percent deficit irrigation. The amount of irrigation water during RDI periods was then multiplied by the irrigation water concentrations of salt and chloride to determine the percentage increase above the salt and chloride concentrations in the rootzone. Calculating the percentage increase of chloride in the rootzone meant first determining irrigation water and soil water amounts.

For example, 50 percent of the total ET for July and August was 9.1 inches, and the total water in the effective rootzone was 15 inches (rootzone depth (5 ft, or 60 inches) * 25 percent water content = 1.25 feet, or 15 inches). The 15 inches of soil water had 300 mg/L chloride at the beginning of the RDI period. After 9.1 inches of water was applied, adding salts to the soil water in the rootzone, the irrigation water concentration was 55 mg/L. The percentage of additional salt was determined by calculating the ratio of the salt added in the deficit irrigation water to that in the soil water, (9.1 inches x 55 mg/L) / (15 inches x 300 mg/L) = 11 percent. If the salt level in the rootzone remained at critical soil threshold levels at the end of the RDI period, the Cl<sub>sw</sub> at the beginning of RDI period would have needed to be proportionally lower than the critical soil salinity threshold of 150 mg/L, such that the 150 mg/L threshold concentration would be achieved at the end of the season. Thus, the Cl<sub>et</sub> is reduced to 122 mg/L and the corresponding Cl<sub>w</sub> becomes 102 mg/L.

**WATER QUALITY THRESHOLDS**

This section presents the RDI analysis-based chloride and EC thresholds, boron thresholds, and adjustments to water quality thresholds to provide water management flexibility in the Friant Division.

**Chloride and Electrical Conductivity Thresholds**

Tables 11a and 11b show the RDI analysis for a variety of applied irrigation water qualities for chloride and EC, respectively. In consideration of historical water quality data representative of Kern-Fan or CVC programs that currently introduce water into the FKC, as well as temporal water quality trends, an applied irrigation water threshold for the RDI period was selected to be 55 mg/L Cl<sub>w</sub>. The Cl<sub>w</sub> value of 55 mg/L during the RDI period correlated to an adjusted Cl<sub>w</sub> of 102 mg/L for the remainder of the year, assuming a three-foot (36 inch) effective rootzone – a conservative assumption as the effective rootzone is assumed to be three to five feet (Table 12a).

The same logic described above for Cl<sub>w</sub> thresholds was applied to determine RDI EC<sub>w</sub> and adjusted EC<sub>w</sub> thresholds. The chloride threshold for the RDI period (55 mg/L) was approximately 49 percent greater than the average historical water quality of representative Kern-Fan programs for all year types during months of July and August (37 mg/L). The average EC<sub>w</sub> during July and August for all year types representative of Kern-Fan programs was 300 μS/cm, and a 49 percent increase is 447 μS/cm. Rounding up, the RDI threshold for EC<sub>w</sub> is 500 μS/cm, and, in order to maintain an EC<sub>et</sub> of 1,500 μS/cm, the adjusted EC<sub>w</sub> for the remainder of the year was 1,000 μS/cm.
Table 11a. Regulated Deficit Irrigation Analysis for Chloride

<table>
<thead>
<tr>
<th>Cl&lt;sub&gt;w&lt;/sub&gt; (mg/L)</th>
<th>Effective Rootzone (in)</th>
<th>Sum ET&lt;sub&gt;c&lt;/sub&gt; Average (in)&lt;sup&gt;1&lt;/sup&gt;</th>
<th>RDI %</th>
<th>RDI Water (in)</th>
<th>Rootzone Water (in)&lt;sup&gt;2&lt;/sup&gt;</th>
<th>% Cl&lt;sup&gt;-&lt;/sup&gt; Increase</th>
<th>Adjusted Cl&lt;sub&gt;e&lt;/sub&gt; Needed (mg/L)</th>
<th>Adjusted Cl&lt;sub&gt;w&lt;/sub&gt; (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>36</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>9</td>
<td>3.4%</td>
<td>145</td>
<td>121</td>
</tr>
<tr>
<td>10</td>
<td>60</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>15</td>
<td>2.0%</td>
<td>147</td>
<td>122</td>
</tr>
<tr>
<td>20</td>
<td>36</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>9</td>
<td>6.8%</td>
<td>140</td>
<td>117</td>
</tr>
<tr>
<td>20</td>
<td>60</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>15</td>
<td>4.1%</td>
<td>144</td>
<td>120</td>
</tr>
<tr>
<td>30</td>
<td>36</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>9</td>
<td>10.2%</td>
<td>135</td>
<td>112</td>
</tr>
<tr>
<td>30</td>
<td>60</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>15</td>
<td>6.1%</td>
<td>141</td>
<td>117</td>
</tr>
<tr>
<td>40</td>
<td>36</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>9</td>
<td>13.6%</td>
<td>130</td>
<td>108</td>
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<tr>
<td>40</td>
<td>60</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>15</td>
<td>8.1%</td>
<td>138</td>
<td>115</td>
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<tr>
<td>50</td>
<td>36</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>9</td>
<td>16.9%</td>
<td>125</td>
<td>104</td>
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<tr>
<td>50</td>
<td>60</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>15</td>
<td>10.2%</td>
<td>135</td>
<td>112</td>
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<tr>
<td>55</td>
<td>36</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>9</td>
<td>18.6%</td>
<td>122</td>
<td>102</td>
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<tr>
<td>55</td>
<td>60</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>15</td>
<td>11.2%</td>
<td>133</td>
<td>111</td>
</tr>
</tbody>
</table>

Notes:
1 ET<sub>c</sub> averages from Sanden and Goldhamer based on water use of mature almond trees in Wasco area for July and August (Goldhamer and Girona 2012).
2 Rootzone at field capacity is 25 percent by volume.
Key:
Cl<sup>-</sup> = chloride
Cl<sub>e</sub> = chloride concentration in saturated soil paste or rootzone chloride
Cl<sub>w</sub> = chloride concentration in applied irrigation water
ET<sub>c</sub> = evapotranspiration or tree water use
in = inches
mg/L = milligrams per liter
RDI = regulated deficit irrigation

Table 11b. Regulated Deficit Irrigation Analysis for Electrical Conductivity

<table>
<thead>
<tr>
<th>EC&lt;sub&gt;w&lt;/sub&gt; (μS/cm)</th>
<th>Effective Rootzone (in)</th>
<th>Sum ET&lt;sub&gt;c&lt;/sub&gt; Average (in)&lt;sup&gt;1&lt;/sup&gt;</th>
<th>RDI %</th>
<th>RDI Water (in)</th>
<th>Rootzone Water (in)&lt;sup&gt;2&lt;/sup&gt;</th>
<th>% EC Increase</th>
<th>Adjusted EC&lt;sub&gt;e&lt;/sub&gt; Needed (μS/cm)</th>
<th>Adjusted EC&lt;sub&gt;w&lt;/sub&gt; (μS/cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>36</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>9</td>
<td>6.8%</td>
<td>1,400</td>
<td>1,120</td>
</tr>
<tr>
<td>200</td>
<td>60</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>15</td>
<td>4.1%</td>
<td>1,440</td>
<td>1,150</td>
</tr>
<tr>
<td>300</td>
<td>36</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>9</td>
<td>10.2%</td>
<td>1,350</td>
<td>1,080</td>
</tr>
<tr>
<td>300</td>
<td>60</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>15</td>
<td>6.1%</td>
<td>1,410</td>
<td>1,130</td>
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<tr>
<td>400</td>
<td>36</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>9</td>
<td>13.6%</td>
<td>1,300</td>
<td>1,040</td>
</tr>
<tr>
<td>400</td>
<td>60</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>15</td>
<td>8.1%</td>
<td>1,380</td>
<td>1,100</td>
</tr>
<tr>
<td>500</td>
<td>36</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>9</td>
<td>16.9%</td>
<td>1,250</td>
<td>1,000</td>
</tr>
<tr>
<td>500</td>
<td>60</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>15</td>
<td>10.2%</td>
<td>1,350</td>
<td>1,080</td>
</tr>
<tr>
<td>600</td>
<td>36</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>9</td>
<td>20.3%</td>
<td>1,200</td>
<td>960</td>
</tr>
<tr>
<td>600</td>
<td>60</td>
<td>18.3</td>
<td>50%</td>
<td>9.2</td>
<td>15</td>
<td>12.2%</td>
<td>1,320</td>
<td>1,050</td>
</tr>
</tbody>
</table>

Notes:
1 ET<sub>c</sub> averages from Sanden and Goldhamer based on water use of mature almond trees in Wasco area for July and August (Goldhamer and Girona 2012).
2 Rootzone at field capacity is 25 percent by volume.
Key:
μS/cm = microsiemens per centimeter
EC = electrical conductivity
EC<sub>e</sub> = electrical conductivity of saturated soil paste or rootzone salinity
EC<sub>w</sub> = electrical conductivity of applied irrigation water
ET<sub>c</sub> = evapotranspiration or tree water use
in = inches
RDI = regulated deficit irrigation
By adjusting the Cl\(\text{e}\) and EC\(\text{e}\) thresholds for non-RDI irrigation periods, LR volumes for the assumed 20 percent leaching were adjusted by default, as LR is a function of the saturated soil paste concentration. Adjusted LR volumes and constituent thresholds affect the mitigation curve slope for each constituent. The adjusted curves for chloride and EC were plotted and were below the governing line, so the mitigation curve remained unchanged and further confirmed the conservative nature of the mitigation curve in ensuring that all constituents would be sufficiently mitigated.

**Boron Thresholds**

Table 12 shows B\(\text{w}\) thresholds for tree and vine crops above which injury occurs under differing irrigation management practices, or LF values of 10 and 20 percent. Grapes have a boron tolerance of 0.4 mg/L when the LF is between 10 to 25 percent (Grattan et al., 2015). The actual boron threshold tolerance range is 0.3-0.5 mg/L if one considers different combinations of the soil water threshold (B\(\text{sw}\)) tolerance (0.5 - 0.75 mg/L) and LF (10 - 25%).

The maximum in-prism water quality threshold for boron was set at 0.4 mg/L for all three irrigation periods (Periods 1, 2, and 3). Grapes were used as the representative crop for boron sensitivity because of their prevalence in the Friant Division, serving as a surrogate for other sensitive crop types, such as apricot, fig, and most citrus. The applied threshold assumed conventional irrigation with a LF minimum of 20 percent applied. This threshold applied to the LF concept, rather than the LR concept that was used in development of the mitigation curves.

**Table 12. Boron Tolerance of Various Crops**

<table>
<thead>
<tr>
<th>CROP</th>
<th>Leaching Fraction 10%</th>
<th>Leaching Fraction 25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa</td>
<td>2.0</td>
<td>2.8</td>
</tr>
<tr>
<td>Apricot</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Asparagus</td>
<td>4.8</td>
<td>6.7</td>
</tr>
<tr>
<td>Barley</td>
<td>1.4</td>
<td>1.9</td>
</tr>
<tr>
<td>Bean (kidney, lima, mung)</td>
<td>0.4</td>
<td>0.6</td>
</tr>
<tr>
<td>Bean, snap</td>
<td>0.5</td>
<td>0.6</td>
</tr>
<tr>
<td>Beet, red</td>
<td>2.0</td>
<td>2.8</td>
</tr>
<tr>
<td>Bluegrass, Kentucky</td>
<td>1.2</td>
<td>1.7</td>
</tr>
<tr>
<td>Broccoli</td>
<td>0.5</td>
<td>0.6</td>
</tr>
<tr>
<td>Cabbage</td>
<td>1.2</td>
<td>1.7</td>
</tr>
<tr>
<td>Carrot</td>
<td>0.7</td>
<td>0.9</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>1.6</td>
<td>2.2</td>
</tr>
<tr>
<td>Celery</td>
<td>3.8</td>
<td>5.3</td>
</tr>
<tr>
<td>Cherry</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Clover, sweet</td>
<td>1.2</td>
<td>1.7</td>
</tr>
<tr>
<td>Corn</td>
<td>1.2</td>
<td>1.7</td>
</tr>
<tr>
<td>Cotton</td>
<td>3.1</td>
<td>4.3</td>
</tr>
<tr>
<td>Cucumber</td>
<td>0.7</td>
<td>0.9</td>
</tr>
<tr>
<td>Fig, Kadota</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Garlic</td>
<td>1.7</td>
<td>2.4</td>
</tr>
<tr>
<td>Grape</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Grapefruit</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Lemon</td>
<td>&lt;0.3</td>
<td>&lt;0.4</td>
</tr>
<tr>
<td>Lettuce</td>
<td>0.6</td>
<td>0.8</td>
</tr>
</tbody>
</table>


Key:

mg/L = milligrams per liter
In addition, the applied $B_w$ threshold of 0.4 mg/L was far more conservative than those defined in literature by Ayers and Westcot (1985). This analysis indicated that $B_{sw}$ could be used as protective irrigation water thresholds ($B_e$) because of the complexities related to boron adsorption and equilibrium concentrations with the soil water. Historical water quality data also indicate that CVC or California Aqueduct water would be below this threshold.

**Threshold Flexibility**

In evaluating and comparing the developed, in-prism water quality thresholds with temporal water quality trends during Period 1 (March 1 to June 30), or prior to the RDI period (July 1 to August 31), observed average constituent concentrations were typically below the proposed thresholds. If water with lower constituent concentrations was applied to a crop for the first four months of the growing season, assuming that the rootzone concentration was properly maintained, the rootzone concentration would decrease below the threshold and, even with reductions in irrigation and LFs, could allow the application of higher irrigation water concentrations during the post-RDI period. The period following RDI, or Period 3 (September 1 to February 28), is often used for reclamation leaching; however, it is also the period in which new sources of water may be available for the Friant Division. Thus, having flexibility in the allowable irrigation water quality could be opportune for increasing supply reliability for the region.

Based on the RDI analysis and evaluation of water quality temporal trends, the Policy proposes an alternative water quality threshold for chloride for Period 3 to provide flexibility for irrigation management. Determination of whether the alternative chloride threshold for Period 3 is applied is based on the average chloride concentration of the irrigation water during Period 1. The alternative value was developed considering historical, temporal water quality trends and applying a weighted average calculation to meet the targeted rootzone chloride threshold. If the average measured chloride concentration for Period 1 is less than or equal to 70 mg/L, the allowable chloride concentration threshold increases from 102 mg/L to 123 mg/L for Period 3. If the measured average chloride concentrations for Period 1 exceed 70 mg/L, the chloride threshold remains at 102 mg/L for Period 3. Figure 10 shows the proposed thresholds compared to the chloride water quality trends for CVC and California Aqueduct water sources by year type.
Because the average water quality for Kern-Fan or CVC programs for Period 1 (March 1 to June 30) was approximately 30 mg/L (see Table 2), 70 mg/L was chosen as a midpoint between the adjusted Cl\(_w\) threshold determined in the RDI analysis and the average historic water quality. Using a weighted average approach, if 70 mg/L water was applied for the four months in Period 1, assuming an LR of 20 percent, the resulting Cl\(_e\) would be 84 mg/L. With the target weighted average for Cl\(_e\) of 122 mg/L, the necessary Cl\(_e\) for Period 3, the six months post-RDI (September 1 – February 28) was determined using the following equation:

\[
\frac{84 \text{ mg}}{L} \times 0.4 + \text{Cl}_w \times 0.6 = 122
\]

The resulting Cl\(_e\) was 147 mg/L, correlating to a Cl\(_w\) of 123 mg/L with an assumed 20 percent LR. This approach was conservative in that observed chloride concentrations for Kern-Fan programs were significantly lower than 70 mg/L, and these calculations did not consider rainfall or any reclamation leaching applied in addition to the assumed 20 percent maintenance leaching.

Note that adjusting the Cl\(_e\) thresholds for non-RDI irrigation periods (Period 1 and Period 3) would adjust the LR volumes for the assumed 20 percent leaching provided by the mitigation curve. Adjusted curves were plotted and it was confirmed that even with a reduced Cl\(_e\), the established mitigation curve would provide adequate mitigation.
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Friant-Kern Canal Water Quality Policy

Draft Attachment B – Water Quality Mitigation Ledger Example
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## ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>µmhos/cm</td>
<td>micromho per centimeter (1 µmhos/cm = 1 µS/cm = 1/1,000 dS/m)</td>
</tr>
<tr>
<td>µS/cm</td>
<td>microsiemens per centimeter (1 µS/cm = 1 µmhos/cm = 1/1,000 dS/m)</td>
</tr>
<tr>
<td>AF</td>
<td>acre-feet</td>
</tr>
<tr>
<td>Ad hoc Committee</td>
<td>Ad hoc Water Quality Committee</td>
</tr>
<tr>
<td>dS/m</td>
<td>deciSiemens per meter (1 dS/m = 1,000 µmhos/cm = 1,000 µS/cm)</td>
</tr>
<tr>
<td>EC</td>
<td>electrical conductivity</td>
</tr>
<tr>
<td>FKC</td>
<td>Friant-Kern Canal</td>
</tr>
<tr>
<td>Friant Division</td>
<td>Friant Division of the Central Valley Project</td>
</tr>
<tr>
<td>FWA</td>
<td>Friant Water Authority</td>
</tr>
<tr>
<td>Ledger</td>
<td>Water Quality Mitigation Ledger</td>
</tr>
<tr>
<td>mg/L</td>
<td>milligrams per liter</td>
</tr>
<tr>
<td>Policy</td>
<td>Friant-Kern Canal Water Quality Policy</td>
</tr>
<tr>
<td>TDS</td>
<td>total dissolved solids</td>
</tr>
<tr>
<td>Reclamation</td>
<td>U.S. Department of the Interior, Bureau of Reclamation</td>
</tr>
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<td>RWA</td>
<td>Recovered Water Account</td>
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BACKGROUND

The Ad hoc Water Quality Committee (Ad hoc Committee) is working to develop a comprehensive Friant-Kern Canal Water Quality policy (Policy) to be adopted by the Friant Division of the Central Valley Project (Friant Division). This Policy is in response to concerns regarding the implementation of programs and projects that could introduce water of a lesser quality to the Friant-Kern Canal (FKC), when compared to water quality of historic deliveries from Millerton Lake. As detailed in the Friant-Kern Canal Water Quality Policy, the Ad hoc Committee is proposing a ledger mechanism to determine the required mitigation for introducing water of lesser quality into the FKC. This attachment to the Policy describes the process to quantify mitigation using the Water Quality Mitigation Ledger (Ledger). The Ledger tracks and accounts for all inflows into and diversions from the FKC in order to determine appropriate mitigation for impacted water quality (attributable to the introduced water [or “Put”] and the corresponding distribution thereof [or “Take”]).

QUANTIFYING MITIGATION

Percent mitigation is based on the measured electrical conductivity (EC) of the non-Millerton Lake water introduced into the FKC, or Put. Using the developed mitigation rating curve (see Attachment A for additional information on development of the mitigation rating curve), a mitigation percentage is determined for each contractor that introduces water, or Put, into the FKC, or “Contributor.” Based on the total Put volume and mitigation percentage, a mitigation volume is calculated and then proportioned and distributed to downstream Takes. The sections below describe the six step process for calculating mitigation requirements. Table 1 provides definitions for variables used in quantifying mitigation requirements.

Table 1. Variable Definitions for Quantifying Mitigation

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC</td>
<td>Electrical conductivity, measured as µS/cm</td>
</tr>
<tr>
<td>MBaseline</td>
<td>Mitigation percentage for established baseline (5%)</td>
</tr>
<tr>
<td>MPut%</td>
<td>Mitigation percentage based on measured EC of Put</td>
</tr>
<tr>
<td>Madj%</td>
<td>Adjusted mitigation percentage to account for incremental impact above established baseline</td>
</tr>
<tr>
<td>Mvol,paid</td>
<td>Mitigation volume paid (AF)</td>
</tr>
<tr>
<td>Mvol, received</td>
<td>Mitigation volume received (AF)</td>
</tr>
<tr>
<td>Putvol</td>
<td>Volume of Put by district (AF)</td>
</tr>
<tr>
<td>RFvol</td>
<td>Volume contribution from reverse flow at the interface (AF)</td>
</tr>
<tr>
<td>TakePut%</td>
<td>Proportion by volume of each Take by Put district</td>
</tr>
<tr>
<td>Takevol</td>
<td>Total volume of the Take by district (AF)</td>
</tr>
<tr>
<td>Takevol,m</td>
<td>Volume of the Take that is eligible for mitigation (AF)</td>
</tr>
<tr>
<td>Takevol,nm</td>
<td>Volume of the Take that is not eligible for mitigation (AF)</td>
</tr>
</tbody>
</table>

Note:
1 Applicable water districts are represented by superscript letters following variables.

Key:
µS/cm = microsiemens per centimeter (1 µS/cm = 1 µmhos/cm = 1/1,000 dS/m)
AF = acre-feet
CALCULATING MITIGATION PAID

Step 1: Determine mitigation percentage based on measured electrical conductivity of Put

Using the mitigation rating curve (Figure 1), determine the required mitigation percentage on the y-axis based on measured EC of the Put on the x-axis.

Key:
µS/cm = microsiemens per centimeter (1 µS/cm = 1 µmhos/cm = 1/1,000 dS/m)

Figure 1. Mitigation Rating Curve, showing percent mitigation based on measured EC of the Put

Step 2: Calculate the adjusted mitigation percentage

The adjusted mitigation percentage represents the impact of the Put on the canal water quality above the established baseline. The established baseline water quality condition is an EC concentration of 200 µS/cm and represents a 5 percent maintenance leaching fraction (Figure 2). It is assumed that water users are already applying a 5 percent maintenance leaching fraction on all crops, regardless of type or sensitivity, so mitigation would only be required for impacts beyond the baseline condition.
Figure 2. Mitigation Rating Curve, showing established baseline and correlating percent mitigation

\[ M_{\text{Baseline}} = \text{Mitigation percentage for established baseline (5\%)} \]

\[ M_{\text{adj\%}} = \text{Adjusted mitigation percentage to account for incremental impact above established baseline} \]

\[ EC \]

\[ M_{\text{Put\%}} = \text{Mitigation percentage based on measured EC of Put} \]

\[ M_{\text{adj\%}} = M_{\text{Put\%}} - M_{\text{Baseline}} \]

**Step 3: Calculate mitigation volume paid**

Mitigation volume paid, or the volume of water owed by a Contributor based on the water quality of the introduced water, is calculated by multiplying the total volume of the Put (\( \text{Put}_{\text{vol}} \)) by the adjusted mitigation percentage (\( M_{\text{adj\%}} \)).

\[ M_{\text{vol,paid}} = \text{Mitigation volume paid (acre-feet)} \]

\[ \text{Put}_{\text{vol}} = \text{Volume of Put by district (acre-feet)} \]

\[ M_{\text{vol,paid}} = \text{Put}_{\text{vol}} \times M_{\text{adj\%}} \]

**CALCULATING MITIGATION RECEIVED**

Mitigation volumes paid by each Contributor are proportioned based on volume of Takes downstream from each Put. Proportion calculations are done in a sequential process to accurately determine the individual impact of each Put on the system. In addition, when the FKC is operating under reverse flow or pump-back conditions, the portions of the FKC operating in gravity flow, reverse flow, and the Interface, or location where gravity flow and reverse flow meet, are all calculated separately.

**Step 4: Determine the volume of Take to be mitigated**

Mitigation applies to the Take of Friant Division Class 1 and Class 2 deliveries, Recovered Water Account (RWA [Paragraph 16b]) supplies, and supplies from Unreleased Restoration Flows. Friant Division Long-Term Contractors and third parties whose supply is not delivered to the headworks of the FKC are not eligible to receive mitigation and, thus, the total volume of each contractor’s Take may not be fully mitigated if a portion of the Take is met by a water supply not eligible for mitigation. In addition, a water district that is both a contributor and recipient of an eligible Take, or “Taker,” is not required to mitigate themselves. The variable,
Take \( \text{vol,nm} \), represents the volume of a Take that is ineligible for mitigation. This variable represents any portion of the Take volume that represents supply not delivered to the headworks of the FKC or a volume of a district’s Take that is met by the volume of their own Put.

In order to calculate the volume of the Take eligible for mitigation (Take \( \text{vol,m} \)), the volume of water supply not eligible for mitigation (Take \( \text{vol,nm} \)) is subtracted from the total volume of the Take (Take \( \text{vol} \)).

\[
\text{Take}_{\text{vol,m}} = \text{Take}_{\text{vol}} - \text{Take}_{\text{vol,nm}}
\]

**Step 5: Determine volume proportion of each Take by Put**

The volume of each Take is proportioned based on its downstream location in relation to each Put. Take proportions are calculated in a stepwise process by individual Put, and then Take proportions by Put are multiplied by the contributed mitigation volume as shown in Step 6.

\[
\Sigma \text{Take}_{\text{vol,m}} = \text{Sum volume of all Takes eligible for mitigation in relation to each Put (acre-feet)}
\]

\[
\text{RF}_{\text{vol}} = \text{Volume contribution from reverse flow at the Interface (acre-feet)}
\]

\[
\text{RF}_{\text{vol}} = \frac{\text{Reverse Flow Put}_{\text{vol}} - \text{Reverse Flow Take}_{\text{vol}}}{\text{Interface Take}_{\text{vol}}} \times \text{Interface Take}_{\text{vol,m}}
\]

\[
\text{Take}_{\text{Put}}\% = \text{Proportion by volume of each Take by Put district (e.g., for the proportion by volume of Take A from Put A, Take}^A_{\text{Put}}\%^A).
\]

The proportion by volume calculation varies depending on the direction of flow in the canal at the location of the Take. The four equations below describe the necessary calculation depending on Take location and flow region. If the Take is located in a Gravity Flow region of the canal, equation 1 is used. If the Take is located in a Reverse Flow region, equation 2 is used. If the Take is located at the Interface of gravity and reverse flow, equations 3 or 4 are used depending on the volume proportion coming from each direction, respectively.

1. Take located in the portion of FKC operating in **Gravity Flow**:

\[
\text{Take}_{\text{Put}}\% = \frac{\text{Take}_{\text{vol,m}}}{\Sigma \text{Take}_{\text{vol,m}} - \text{RF}_{\text{vol}}}
\]

2. Take located in the portion of FKC operating in **Reverse Flow**:

\[
\text{Take}_{\text{Put}}\% = \frac{\text{Take}_{\text{vol,m}}}{\Sigma \text{Take}_{\text{vol,m}} + \text{RF}_{\text{vol}}}
\]

3. Take located at **Interface** (proportion from Gravity Flow region of FKC):

\[
\text{Take}_{\text{Put}}\% = \frac{\text{Take}_{\text{vol,m}} - \text{RF}_{\text{vol}}}{\Sigma \text{Take}_{\text{vol,m}} - \text{RF}_{\text{vol}}}
\]

4. Take located at **Interface** (proportion from Reverse Flow region of FKC):

\[
\text{Take}_{\text{Put}}\% = \frac{\text{RF}_{\text{vol}}}{\Sigma \text{Take}_{\text{vol,m}} + \text{RF}_{\text{vol}}}
\]

**Step 6: Determine volume of mitigation received by each Take**

Once the volume of each Take is proportioned by Put, Take proportions by Put are used to calculate the total volume of mitigation water received by each Take.

\[
\text{M}_{\text{vol,received}} = \text{Mitigation volume received (acre-feet)}
\]

\[
\text{M}_{\text{vol,received}} = \Sigma \text{Take}_{\text{Put}}\% \times \text{M}_{\text{vol,paid}}
\]
LEDGER EXAMPLE WITH CALCULATIONS

This section walks through an example scenario to illustrate the six steps to calculate mitigation requirements. This example is purely hypothetical and is included to show the process for calculating mitigation using the proposed Ledger. Table 2 provides example inputs including flow region, water quality conditions, and flow and volume for Puts and Takes. Figure 3 is a schematic of the example scenario showing Puts and Takes by district and location on the FKC.

Table 2. Ledger Example Inputs

<table>
<thead>
<tr>
<th>Milepost Location</th>
<th>District</th>
<th>Put/Take</th>
<th>Direction of Flow</th>
<th>Flow (cfs)</th>
<th>Put Water Quality (µS/cm)</th>
<th>Volume (AF)</th>
<th>Volume of Take Eligible for Mitigation (AF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>69.15 A</td>
<td>Put</td>
<td>Gravity</td>
<td>65</td>
<td>500</td>
<td></td>
<td>902</td>
<td></td>
</tr>
<tr>
<td>94.92 A</td>
<td>Take</td>
<td>Gravity</td>
<td>65</td>
<td>--</td>
<td></td>
<td>902</td>
<td>0</td>
</tr>
<tr>
<td>95.5 B</td>
<td>Take</td>
<td>Gravity</td>
<td>50</td>
<td>--</td>
<td></td>
<td>694</td>
<td>0</td>
</tr>
<tr>
<td>102.72 B</td>
<td>Put</td>
<td>Gravity</td>
<td>50</td>
<td>300</td>
<td></td>
<td>694</td>
<td></td>
</tr>
<tr>
<td>111.56 C</td>
<td>Take</td>
<td>Gravity</td>
<td>150</td>
<td>--</td>
<td></td>
<td>2,083</td>
<td>347</td>
</tr>
<tr>
<td>117.44 D</td>
<td>Take</td>
<td>Gravity</td>
<td>255</td>
<td>--</td>
<td></td>
<td>3,540</td>
<td>3,540</td>
</tr>
<tr>
<td>125 E</td>
<td>Take</td>
<td>Interface</td>
<td>100</td>
<td>--</td>
<td></td>
<td>1,388</td>
<td>347</td>
</tr>
<tr>
<td>137.17 F</td>
<td>Take</td>
<td>Reverse Flow</td>
<td>65</td>
<td>--</td>
<td></td>
<td>902</td>
<td>902</td>
</tr>
<tr>
<td>151.8 G</td>
<td>Take</td>
<td>Reverse Flow</td>
<td>100</td>
<td>--</td>
<td></td>
<td>1,388</td>
<td>1,388</td>
</tr>
<tr>
<td>151.8 C</td>
<td>Put</td>
<td>Reverse Flow</td>
<td>125</td>
<td>500</td>
<td></td>
<td>1,736</td>
<td></td>
</tr>
<tr>
<td>151.8 E</td>
<td>Put</td>
<td>Reverse Flow</td>
<td>75</td>
<td>500</td>
<td></td>
<td>1,041</td>
<td></td>
</tr>
</tbody>
</table>

Key:
AF = acre-feet
cfs = cubic feet per second
µS/cm = microsiemens per centimeter

This example scenario only includes calculations for District A. Pump-Back is operational in this example scenario. Mitigation for the portion of the FKC operating by gravity and the portion of the FKC operating in reverse flow is calculated separately using the same method demonstrated in this example scenario, but not shown in this example. When necessary, separate calculations are done for the Interface location as it is influenced by flows from both the upper (gravity flow) and lower (reverse flow) portions of the canal. On the following pages, the calculations completed for this example scenario are shown in green text.
Figure 3. Schematic of Puts and Takes by district and location on the Friant-Kern Canal.
CALCULATING MITIGATION PAID

Step 1: Determine percent mitigation based on measured EC of Put
Using the mitigation rating curve, the measured electrical conductivity of the Put is found on the x-axis and is used to find the correlating required mitigation percentage on the y-axis.

As shown in Table 2, Put A has a measured EC of 500 µS/cm. Using the Mitigation Rating Curve shown below, the measured EC corresponds to a mitigation percentage of approximately 12.5% (Figure 4).

![Mitigation Rating Curve](image)

Figure 4. Mitigation Rating Curve, showing percent mitigation based on measured water quality (EC) of the Put

Step 2: Calculate the adjusted mitigation percentage
As shown in Figure 2, the mitigation baseline (M_{Baseline}) is 5 percent, correlating the established baseline EC concentration of 200 µS/cm to a 5 percent maintenance leaching fraction. Using the required mitigation percentage based on measured EC of Put (M_{Put\%}) calculated in Step 1, 12.5 percent, and the below formula, the adjusted mitigation percentage (M_{adj\%}) for Put A is calculated.

The established baseline water quality condition is an EC concentration of 200 µS/cm and represents a 5 percent maintenance leaching fraction

\[ M_{adj\%} = M_{Put\%} - M_{Baseline} \]

\[ M_{adj\%} = 12.5\% - 5\% = 7.5\% \]

Step 3: Calculate mitigation volume paid
Mitigation volume paid (M_{vol,paid}) is calculated by multiplying the total volume of Put A (Put_{vol}) of 902 AF (see Table 2) by the adjusted mitigation percentage (M_{adj\%}) of 7.5 percent calculated in Step 2.

\[ M_{vol,paid} = Put_{vol} \times M_{adj\%} \]

\[ M_{vol,paid} = 902 \text{ AF} \times 7.5\% = 68 \text{ AF} \]
CALCULATING MITIGATION RECEIVED

For this example, only the proportion of mitigation volume for each Take downstream of Put A is calculated. The total mitigation received by each Taker is calculated by summing the proportion of mitigation volume for each Put. Proportional results for all other Takes in this example are provided in the Water Quality Ledger Example Summary section below.

Step 4: Determine the volume of Take to be mitigated

In this example, the Puts are from programs being implemented by different water districts to meet all or a portion of their Take. It is assumed that all Takes are eligible for mitigation and, thus, the Take volumes to be mitigated are only reduced if the water district is also a Contributor. In this example, Put A is a program implemented by District A at Take A. Using the volume of Take A (Take\textsubscript{vol}^A) of 902 AF and volume not eligible for mitigation (Take\textsubscript{vol,nm}^A) of 902 AF from District A, which, in this example is the same as Put A (Put\textsubscript{vol}^A) (see Table 2), the volume of Take eligible for mitigation for District A (Take\textsubscript{vol,m}^A) is calculated.

\[
\text{Take}_{\text{vol,m}}^A = \text{Take}_{\text{vol}}^A - \text{Take}_{\text{vol,nm}}^A
\]

Since District A is delivering an equivalent volume of their program at Put A, they have no volume of Take to be mitigated.

Step 5: Determine volume proportion of each Take by Put

For this example, the volume of each Take is proportioned based on its downstream location in relation to Put A. Takes A through D are downstream of Put A. Take E is the location of the Interface and influenced by both the gravity and reverse flow portion of the FKC (see Figure 3), thus Take F and G downstream of the Interface are removed from the proportion calculations. To complete the proportion calculations, the volume contribution from the reverse flow at the Interface (RF\textsubscript{vol}) is determined using the formula below. Values used for Put and Take volumes are found in Table 2.

\[
RF_{\text{vol}} = \frac{\sum\text{Reverse Flow Put}_{\text{vol}}^\text{Interface} - \sum\text{Reverse Flow Take}_{\text{vol}}^\text{Interface} \times \text{Interface Take}_{\text{vol,m}}}{\text{Interface Take}_{\text{vol}}^E + \text{Interface Take}_{\text{vol}}^G - \left(\text{Reverse Flow Take}_{\text{vol}}^F + \text{Reverse Flow Take}_{\text{vol}}^G\right) \times \text{Interface Take}_{\text{vol,m}}}
\]

\[
RF_{\text{vol}} = \frac{(1,041 \text{ AF} + 1,736 \text{ AF}) - (1,388 \text{ AF} + 902 \text{ AF})}{1,388 \text{ AF} \times 347 \text{ AF} = 122 \text{ AF}}
\]

The proportion by volume calculation varies depending on the direction of flow in the canal at the location of the Take. Since Takes A through D are located in the Gravity Flow region on the FKC, the equation below was used to calculate the proportion by volume of Takes A through D for Put A (Take\textsubscript{vol}^A). Please note that the volume of Take eligible for mitigation (Take\textsubscript{vol,m}) was only calculated for District A, but not B, C, and D in this example using Step 4, therefore the volume of Take eligible for mitigation (Take\textsubscript{vol,m}) for Districts B, C, and D are found in Table 2 and 3.
\[
\text{Take}_{\text{Put}}\% = \frac{\text{Take}_{\text{vol,m}}}{\sum \text{Take}_{\text{vol,m}} - R_{\text{vol}}}
\]

\[
\sum \text{Take}_{\text{vol,m}} = \text{Take}_{\text{vol,m}}^A + \text{Take}_{\text{vol,m}}^B + \text{Take}_{\text{vol,m}}^C + \text{Take}_{\text{vol,m}}^D + \text{Take}_{\text{vol,m}}^E
\]

\[
\sum \text{Take}_{\text{vol,m}} = 0 \text{ AF} + 0 \text{ AF} + 347 \text{ AF} + 3,540 \text{ F} + 347 \text{ AF} = 4,234 \text{ AF}
\]

\[
\text{Take}^A_{\text{Put}}\% = \frac{0 \text{ AF}}{(4,234 \text{ AF} - 122 \text{ AF})} = 0\%
\]

\[
\text{Take}^B_{\text{Put}}\% = \frac{0 \text{ AF}}{(4,234 \text{ AF} - 122 \text{ AF})} = 0\%
\]

\[
\text{Take}^C_{\text{Put}}\% = \frac{347 \text{ AF}}{(4,234 \text{ AF} - 122 \text{ AF})} = 8.4\%
\]

\[
\text{Take}^D_{\text{Put}}\% = \frac{3,540 \text{ AF}}{(4,234 \text{ AF} - 122 \text{ AF})} = 86.1\%
\]

Proportions representing gravity and reverse flow influences at the Interface are calculated separately.

Take E represents the Interface in this example. Because only Put A is being considered, the example only shows the calculation for the proportion of the Take at the Interface influenced by gravity flow. Table 3 shows all calculated proportions for Take E by each Put.

\[
\text{Take}^E_{\text{Put}}\% = \frac{(347 \text{ AF} - 122 \text{ AF})/(4,234 \text{ AF} - 122 \text{ AF})}{5.5\%}
\]

**Step 6: Determine volume of mitigation received by each Take**

Once the volume proportions for each Take are calculated for each Put, the mitigation volume received can be calculated using the formula below. For this step, the calculation is only shown for Take C. Please note that all the values required for this calculation have been determined in this example, with the exception of the 18 AF (\(M_{\text{vol,paid}}\)) value that would have been determined using Steps 1-3.

\[
M_{\text{vol,received}} = \sum \text{Take}_{\text{Put}}\% \times M_{\text{vol,paid}}
\]

\[
M_{\text{vol,received}}^C = (\text{Take}^C_{\text{Put}}\% \times M_{\text{vol,paid}}^A) + (\text{Take}^C_{\text{Put}}\% \times M_{\text{vol,paid}}^B)
\]

\[
M_{\text{vol,received}} = 8.4\% \times 68 \text{ AF} + 8.4\% \times 18 \text{ AF} = 7.3 \text{ AF}
\]

**WATER QUALITY LEDGER EXAMPLE SUMMARY**

Table 3 provides calculated values for each Put and Take in the Water Quality Ledger example.
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### Table 3. Water Quality Ledger Example Summary

<table>
<thead>
<tr>
<th>Milepost</th>
<th>District</th>
<th>Put/ Take</th>
<th>Flow Region</th>
<th>Put Volume (Put(\text{vol})) (AF)</th>
<th>Take Volume (Take(\text{vol})) (AF)</th>
<th>Put EC ((\mu)S/cm)</th>
<th>Mitigation percentage based on measured EC of Put ((M_{\text{put}}%)) (%)</th>
<th>Adjusted Mitigation Percentage ((M_{\text{adj}}%)) (%)</th>
<th>Mitigation Volume Paid ((M_{\text{vol, paid}})) (AF)</th>
<th>Volume of Take Not Eligible for Mitigation (Take(\text{vol, nm})) (AF)</th>
<th>Volume of Take Eligible for Mitigation (Take(\text{vol, m})) (AF)</th>
<th>Portion of Put A Mitigation (Take(\text{vol, a}))</th>
<th>Portion of Put B Mitigation (Take(\text{vol, b}))</th>
<th>Portion of Put C Mitigation (Take(\text{vol, c}))</th>
<th>Portion of Put E Mitigation (Take(\text{vol, e}))</th>
<th>Mitigation Volume Received ((M_{\text{vol, received}})) (AF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Step 2</td>
<td>Step 3</td>
<td>Step 4</td>
<td>Step 5</td>
<td>Step 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>69.15 A</td>
<td>Put</td>
<td>Gravity</td>
<td>902</td>
<td>NA</td>
<td>500</td>
<td>12.5%</td>
<td>7.5%</td>
<td>68.0</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>94.92 A</td>
<td>Take</td>
<td>Gravity</td>
<td>NA</td>
<td>902</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>902</td>
<td>0</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>95.5   B</td>
<td>Take</td>
<td>Gravity</td>
<td>NA</td>
<td>694</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>694</td>
<td>0</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>102.72 B</td>
<td>Put</td>
<td>Gravity</td>
<td>694</td>
<td>NA</td>
<td>300</td>
<td>7.6%</td>
<td>2.6%</td>
<td>18.0</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>111.56 C</td>
<td>Take</td>
<td>Gravity</td>
<td>NA</td>
<td>2,083</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1,736</td>
<td>347</td>
<td>8.4%</td>
<td>8.4%</td>
<td>7.3</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>117.44 D</td>
<td>Take</td>
<td>Gravity</td>
<td>NA</td>
<td>3,540</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>3,540</td>
<td>86.1%</td>
<td>86.1%</td>
<td>--</td>
<td>--</td>
<td>74.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>125    E</td>
<td>Take</td>
<td>Interface</td>
<td>NA</td>
<td>1,388</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1,041</td>
<td>347</td>
<td>5.5%</td>
<td>5.5%</td>
<td>5.0%</td>
<td>5.0%</td>
<td>15.1</td>
<td></td>
</tr>
<tr>
<td>137.17 F</td>
<td>Take</td>
<td>Revers e Flow</td>
<td>NA</td>
<td>902</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>902</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>37.4%</td>
<td>37.4%</td>
<td>77.9</td>
<td></td>
</tr>
<tr>
<td>151.8 G</td>
<td>Take</td>
<td>Revers e Flow</td>
<td>NA</td>
<td>1,388</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1,388</td>
<td>--</td>
<td>--</td>
<td>57.6%</td>
<td>57.6%</td>
<td>120.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>151.8 C</td>
<td>Put</td>
<td>Revers e Flow</td>
<td>1,736</td>
<td>NA</td>
<td>500</td>
<td>12.5%</td>
<td>7.5%</td>
<td>130.2</td>
<td>--</td>
<td>--</td>
<td>--</td>
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<td>--</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>151.8 E</td>
<td>Put</td>
<td>Revers e Flow</td>
<td>1,041</td>
<td>NA</td>
<td>500</td>
<td>12.5%</td>
<td>7.5%</td>
<td>78.1</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key:
- AF = acre-feet
- \(\mu\)S/cm = microsiemens per centimeter (1 \(\mu\)S/cm = 1 umhos/cm = 1/1,000 dS/m)
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Friant-Kern Canal Water Quality Policy

Draft Attachment C – Water Quality Monitoring Plan
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TABLES

Table 1. Check Structure Locations for Real-Time Measurements of Electrical Conductivity........................................... 2

ACRONYMS

µmhos/cm micromhos per centimeter (1 µmhos/cm = 1 µS/cm = 1/1,000 dS/m)
µS/cm microsiemens per centimeter (1 µS/cm = 1 µmhos/cm = 1/1,000 dS/m)
Ad hoc Committee Ad hoc Water Quality Committee
dS/m deciSiemens per meter (1 dS/m = 1,000 µmhos/cm = 1,000 µS/cm)
CVC Cross Valley Canal
EC electrical conductivity
FKC Friant-Kern Canal
Friant Division Friant Division of the Central Valley Project
FWA Friant Water Authority
IOS Intellisite Operation System
Policy Friant-Kern Canal Water Quality Policy
Reclamation U.S. Department of the Interior, Bureau of Reclamation
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BACKGROUND

The Ad hoc Water Quality Committee (Ad hoc Committee) is working to develop a comprehensive Friant-Kern Canal (FKC) water quality policy to be adopted by Friant Division of the Central Valley Project (Friant Division) Long-Term Contractors in response to concerns regarding the implementation of programs, which would introduce water of a lesser quality when compared to water quality of historic deliveries from Millerton Lake. For the purpose of measuring and classifying water quality of “introduced water” within the FKC, this attachment to the FKC Water Quality Policy (Policy) describes key elements and actions required for implementation of a water quality monitoring plan. The water quality monitoring plan would be inclusive of water quality monitoring and testing for “introduced” water and FKC in-prism water, real-time reporting, and a FKC blending model (i.e. FKC Water Quality Model).

WATER QUALITY MONITORING

Water quality monitoring and testing for “introduced” water and FKC in-prism water will support implementation of the Policy and would be conducted in addition to existing and ongoing FKC water quality monitoring programs.

The Bureau of Reclamation’s (Reclamation) Policy for Accepting Non-Project Water into the Friant-Kern and Madera Canals (2008) includes requirements for monitoring water quality conditions for specific constituents to demonstrate compliance with California drinking water standards (Title 22), plus other constituents of concern recommended by the California Department of Health Services. According to this Reclamation policy, water quality conditions for pump-in programs (not including reverse-flow, pump-back) are required to be tested once per year. Friant Water Authority (FWA) is not proposing additional testing for pump-in programs at this time. However, in addition to reporting results of water quality conditions to Reclamation for review, these results are required to be reported to the FWA for use as inputs to the FKC Water Quality Mitigation Ledger and FKC Water Quality Model. FWA will use water quality data and these tools to effectively manage water quality thresholds and determine required mitigation as defined in the FWA Policy.

FWA will monitor existing groundwater quality data from existing data sources, which include:

- State Water Resources Control Board’s Groundwater Ambient Monitoring and Assessment Groundwater Information System;
- United States Geological Service’s National Water Information System;
- California Department of Water Resources Sustainable Groundwater Management Act Data Viewer; and,
- Groundwater Sustainability Agencies.

FWA will also coordinate with Kern County Water Agency on a weekly basis on Cross Valley Canal (CVC) operations and associated CVC water quality.

The following sections describe continuous, real-time monitoring of conductivity in the FKC; reverse-flow, pump-back operations event-based sampling and measurement of specific water quality constituents; and procedures for reporting and integrating water quality data into the FKC Water Quality Mitigation Ledger and FKC Water Quality Model for forecasting water quality conditions.

SURFACE WATER QUALITY MONITORING

FWA staff will implement continuous, real-time monitoring of in-prism water quality conditions in the FKC. Additionally, event-based water quality sampling and analysis will be performed during reverse-flow, pump-back operations. Measured water quality data will be reported weekly to Friant Contractors and used as inputs for the FKC Water Quality Mitigation Ledger and FKC Water Quality Model.
In-Prism Conductivity Measurements

Conductivity meters (or sondes) will measure and record real-time in-prism electrical conductivity (EC), measured as microsiemens per centimeter (µS/cm), every 15 minutes at the FKC check structures and corresponding mileposts shown in Table 1. Collected EC data will be uploaded to FWA’s Intellisite Operation System (IOS) in real-time. These continuous, in situ measurements of electrical conductivity will provide real-time data on incremental water quality changes and mixing in the canal and will assist in water quality threshold management.

Table 1. Check Structure Locations for Real-Time Measurements of Electrical Conductivity

<table>
<thead>
<tr>
<th>Check Structure</th>
<th>Milepost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little Dry Creek</td>
<td>5.50</td>
</tr>
<tr>
<td>Kings River</td>
<td>28.52</td>
</tr>
<tr>
<td>Sand Creek</td>
<td>46.04</td>
</tr>
<tr>
<td>Dodge Ave</td>
<td>61.03</td>
</tr>
<tr>
<td>Kaweah River</td>
<td>71.29</td>
</tr>
<tr>
<td>Rocky Hill</td>
<td>79.25</td>
</tr>
<tr>
<td>Fifth Ave</td>
<td>88.22</td>
</tr>
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<td>Tule River</td>
<td>95.67</td>
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<tr>
<td>Deer Creek</td>
<td>102.69</td>
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<tr>
<td>White River</td>
<td>112.90</td>
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<td>Reservoir (Woollomes)</td>
<td>121.51</td>
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<tr>
<td>Poso Creek</td>
<td>130.03</td>
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<tr>
<td>Shafter</td>
<td>137.20</td>
</tr>
<tr>
<td>Kern River</td>
<td>151.81</td>
</tr>
</tbody>
</table>

In addition, FWA staff will perform electrical conductivity measurements using hand-held conductivity meters as-needed, such as during:

- servicing of real-time monitoring equipment;
- unexpected real-time monitoring equipment outages;
- confirmation of real-time monitoring equipment measurements; and,
- targeted in-prism measurements.

Sampling and Laboratory Testing During Reverse-Flow, Pump-Back Operations

During reverse-flow, pump-back operations, weekly water quality sampling will be performed within the CVC near the FKC/CVC Intertie. Grab samples will be collected by FWA staff and provided to a Reclamation approved, third-party laboratory for testing. At a minimum, grab samples collected during reverse-flow pump-back operations will be analyzed for the following agronomic constituents of concern:

- Bicarbonate
- Boron
- Calcium
- Chloride
- Electrical Conductivity
- Iron
- Magnesium
- Manganese
- Nitrate
- pH
- SAR
- Sodium
- Total Dissolved Solids
Samples will be tested for constituents required by Title 22 standards during initiation of pump-back activities and/or if it is anticipated that operations within the CVC will significantly change mixed water quality conditions (i.e. influence from California Aqueduct, Kern River, Kern Fan).

**FRIANT-KERN CANAL WATER QUALITY MODEL**

Implementation of the water quality monitoring plan and collection of water quality data will be accompanied by the FKC Water Quality Model, a volumetric mass-balance model of the entire FKC. The FKC Water Quality Model will serve as a water quality forecast tool to assist Friant Division Long-Term Contractors in making real-time operation decisions. The calibration and operation of this model will require compilation of surface water quality data collected, as described above, as well as forecasts of water orders. The model output will initially be manually reported, with eventually integrated with IOS.

**WATER QUALITY REPORTING AND COMMUNICATIONS**

IOS will report real-time, continuous FKC in-prism electrical conductivity measurements. In addition, FWA staff will provide a weekly summary report to Friant Division Long-Term Contractors on:

- FKC current and forecasted operations;
- FKC current in-prism monitoring and forecasted water quality conditions; and,
- pertinent pump-in programs’ operations and water quality conditions.

**WATER QUALITY MONITORING COSTS**

The following section includes the scope and estimate of capital and annual costs for the components of the water quality monitoring plan. Detailed budget information for all components and implementation of the FKC Water Quality Policy can be found in Attachment D.

FWA staff-specific monitoring duties will include:

- Bi-weekly maintenance and calibration of real-time water quality monitoring equipment
- Performance of water quality sampling during pump-in operations and coordination of laboratory testing of water quality samples
- Coordination with Friant Division Long-Term Contractors on water quality data monitoring and analysis
- Management of water quality and operations database
- Performance of weekly water quality reporting and forecasting using the FKC Water Quality Model

**Water Quality Testing Equipment**

FWA staff will perform only in-prism electrical conductivity measurements, whereas all other water quality constituent testing will be conducted by a third-party laboratory.

FWA will install fourteen (14) Seametrics CT2X conductivity meters at each FKC check structure identified in Table 1 for continuous, real-time water quality monitoring. Costs for purchase and installation of the real-time water quality monitoring equipment, including integration with IOS, is approximately $51,500 ($1,612 per unit cost and total of $28,880 for installation). It is assumed the useful life of a Seametrics CT2X conductivity meter is about 10 years. Additionally, FWA staff will maintain two (2) existing handheld Hanna DIST5 conductivity meters.

Real-time water quality monitoring equipment and handheld conductivity meters will be calibrated and maintained according to manufacturer recommendations. Costs for maintenance of equipment is estimated to be about 10% of the capital cost ($5,150 annually).
Laboratory Testing

BSK Associates Laboratory Fresno was contacted to provide estimate of representative costs per sample for laboratory testing of collected grab samples. Processing and analysis was estimated to be approximately $1250 per sample for testing Title 22 organics and inorganics, excluding dioxin and TCPs. This estimated cost assumes a turnaround time of 5 business days, which is required to quantify total dissolved solids. For the purposes of this cost estimate, it is assumed laboratory testing will occur for six months per year, or an average of 26 samples taken annually at the CVC intertie. To account for the possibility of extended operations or any other additional needs for laboratory testing, a ten percent contingency was added to the anticipated annual costs for laboratory testing. The total estimated annual cost for laboratory testing is $35,750.
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CAPITAL AND ANNUAL COSTS .................................................................................................................................. 1
Friant Water Authority Staff .................................................................................................................................. 1
Water Quality Testing Equipment and Laboratory Testing ...................................................................................... 1
COST ALLOCATION ................................................................................................................................................... 1
ACRONYMS
$/acre-foot  dollar per acre-foot
Ad hoc Committee Ad hoc Water Quality Committee
FKC Friant-Kern Canal
Friant Division Friant Division of the Central Valley Project
FWA Friant Water Authority
O&M operations and maintenance
Policy Friant-Kern Canal Water Quality Policy
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BACKGROUND
The Ad hoc Water Quality Committee (Ad hoc Committee) is working to develop a comprehensive Friant-Kern Canal (FKC) water quality policy to be adopted by the Friant Division of the Central Valley Project (Friant Division) in response to concerns regarding the implementation of programs, which would introduce water of a lesser quality, when compared to water quality of historic deliveries from Millerton Lake. This attachment to the FKC Water Quality Policy (Policy) describes the estimated capital and annual costs to implement and administer the Policy, including Water Quality Monitoring Plan, Water Quality Mitigation Ledger, Water Quality Model.

CAPITAL AND ANNUAL COSTS
This section includes the scope and estimate of capital, replacement, and annual costs for the components of the Policy.

FRIANT WATER AUTHORITY STAFF
For implementation of the Policy, one full-time equivalent additional Friant Water Authority (FWA) staff person will be required to:

- Maintain and calibrate conductivity meters on a bi-weekly basis
- Perform water quality sampling during pump-in operations
- Coordinate laboratory water quality testing
- Coordinate with Friant Division Long-Term Contractors on water quality data monitoring and analysis
- Manage water quality and operations database
- Perform weekly water quality reporting and forecasting using FKC Water Quality Model
- Perform weekly analysis to determine mitigation and distribution to respective Friant Division Long-Term Contractors using the FKC Water Quality Mitigation Ledger
- Coordinate with U.S. Department of the Interior, Bureau of Reclamation’s South-Central California Area Office on water quality reporting, mitigation, and contractual requirements
- Coordinate and facilitate FWA committee on water quality

Compensation, or cost, for this one full-time additional staff is assumed to be about $100,000 per year (including salary and benefits). Additionally, about $25,000 per year is assumed to be required by the FWA Executive Team and Operations and Maintenance (O&M) Management and Administration team to implement and administer to the Policy.

Total additional cost for FWA staff implementation of the Policy is estimated to be $125,000 per year.

WATER QUALITY TESTING EQUIPMENT AND LABORATORY TESTING
As described in Attachment C – FKC Water Quality Monitoring Plan, initial capital and annual maintenance costs for water quality testing equipment are estimated to be about $51,500 and $5,150, respectively. Water quality testing equipment, specifically, Seametrics CT2X conductivity meters, are assumed to require replacement every 10 years. Annual costs for laboratory testing costs are estimated to be $35,750.

COST ALLOCATION
Costs for implementation and administration of the Policy will be paid initially by the subset of Friant Division Long-Term Contractors who pay for FKC O&M to the FWA and subsequently will be reimbursed by contractor’s that introduce water (Put) into the FKC (Contributor). The Contributor will pay a dollar per acre-foot ($/acre-foot) surcharge, or ‘Policy Surcharge,’ that will be credited back to the Friant Division Long-Term Contractors who pay for O&M to the FWA. The Policy Surcharge is based on an estimate of total annual costs divided by average annual deliveries of pump-in programs into the FKC. The Policy Surcharge will be applied to all introduced water even if it is not required to provide mitigation as defined in the Policy.
Total annual costs are estimated to be $172,000 per year, and include:

- Interest and amortization of capital costs for water quality testing equipment ($51,500), assuming 3% interest over 10-year useful life (i.e. replacement every 10 years), $6,040 per year
- Annual maintenance and laboratory testing costs, $40,900 per year
- FWA staff, $125,000 per year

Pump-in programs are estimated to deliver 75,000 acre-feet per year to the FKC. This estimate includes existing programs and a portion of potential future programs.

Based on this, the initial Policy Surcharge is $2.29 per acre-foot and will be escalated 3% per year. Annual costs and deliveries will be reassessed every year and compared to estimates provided in this attachment to determine if any adjustments are required to the Policy Surcharge.
DATE: July 13, 2020

TO: Executive Committee

FROM Donald M. Davis, General Counsel
Nicholas Muscolino, Esq.

SUBJECT: Resolution Authorizing Acceptance of Interests in Real Property

SUMMARY:
Before deeds and other instruments conveying property to FWA can be recorded, the Board must adopt a resolution authorizing designated officer(s) to execute certificates of acceptance. To satisfy this requirement, the Board will need to adopt a resolution authorizing the CEO or the COO to execute certificates of acceptance for real property interests conveyed to FWA.

RECOMMENDED ACTION:
The Executive Committee recommend that the Board adopt a resolution authorizing the CEO and the COO to execute certificates of acceptance for real property interests conveyed to FWA.

SUGGESTED MOTION:
I move that the Executive Committee recommend that the Board adopt a resolution authorizing the CEO and the COO to execute certificates of acceptance for real property interests conveyed to FWA.

DISCUSSION:
California law prohibits County Recorders from recording any instruments conveying any interest in real property to a government agency for public purposes without the consent of the public entity. (Gov. Code § 27281.) Per statute, that consent must be evidenced by a certificate of acceptance attached to or printed on the deed.

Historically, FWA has not owned any real property in its own name. However, FWA anticipates acquiring property in its own name in connection with the FKC Middle Reach Capacity Correction Project prior to reconveying such interests to the Bureau of Reclamation. Therefore, before any deeds and other instruments conveying property interests to FWA can be recorded, the Board must adopt a resolution authorizing designated officer(s) to execute certificates of acceptance. To satisfy this requirement, a resolution has been prepared authorizing the CEO or the COO to execute certificates of acceptance for real property interests conveyed to FWA.

ATTACHMENTS:
Draft Resolution & Form of Certificate of Acceptance
RESOLUTION NO. 2020-01

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE FRIANT WATER AUTHORITY AUTHORIZING THE CHIEF EXECUTIVE OFFICER AND CHIEF OPERATING OFFICER TO EXECUTE CERTIFICATES OF ACCEPTANCE FOR DEEDS AND GRANTS RELATING TO THE CONVEYANCE OF REAL PROPERTY INTERESTS TO THE FRIANT WATER AUTHORITY FOR PUBLIC PURPOSES

BOARD OF DIRECTORS OF THE FRIANT WATER AUTHORITY RESOLVES AS FOLLOWS

Section 1. Findings. The Board finds as follows:

A. Government Code section 27281 provides that deeds, grants and other instruments conveying any interest in or easement upon real estate to public entities for public purposes will not be accepted for recordation without the consent of the grantee public entity evidenced by a certificate or resolution of acceptance.

B. Government Code section 27281 provides that public entities by resolution may authorize one or more officers or agents to accept and consent to such deeds or grants of interest in real property.

C. The Board desires to authorize each of the Chief Executive Officer and Chief Operating Officer to execute certificates of acceptance relating to the acquisition of property interests for public purposes.

Section 2. Authorization to Execute Certificates of Acceptance. The Chief Executive Officer and the Chief Operating Officer are hereby each authorized to execute Certificates of Acceptance for deeds or grants conveying any interest in, or easement upon, real property to the Friant Water Authority for public purposes.

Section 3. Form of Certificate of Acceptance. The form of Certificate of Acceptance used by the Authority will be substantially in the form set forth in Government Code section 27281 as the statute may be amended from time to time.

APPROVED AND ADOPTED on ______________, 2020.

__________________________
Chris Tantau, Chair of the Board of Directors

ATTEST:

__________________________
Cliff Loeffler, Secretary of the Board
I, Cliff Loeffler, Secretary/Treasurer of the Friant Water Authority, certify that Resolution No. 2020-__ was duly adopted by the Board of Directors of the Friant Water Authority at a regular meeting held on ___________, 2020, by the following vote:

AYES:

NOES:

ABSTAIN:

ABSENT:

Cliff Loeffler, Secretary/Treasurer
Friant Water Authority
CERTIFICATE OF ACCEPTANCE

This is to certify that the interest in real property conveyed by the deed or grant dated _____, 202_ from _________ to the Friant Water Authority, a California joint powers authority ("Grantee"), is hereby accepted by the undersigned officer pursuant to authority conferred by Resolution No. ___ of Grantee’s Board of Directors adopted on July __, 2020, and the Grantee consents to recordation thereof by its duly authorized officer.

FRIANT WATER AUTHORITY, a California Joint Powers Authority

By: ______________________________
Its: ______________________________
Date: ______________________________
DATE:    July 13, 2020
TO:   Executive Committee
THROUGH:  Douglas DeFlitch, Chief Operating Officer
FROM:  Janet Atkinson and Bill Swanson, Stantec
SUBJECT: Friant-Kern Canal Capacity Correction Project Update

SUMMARY:
The FKC Capacity Correction Project (Project) is to correct the conveyance capacity problems caused by subsidence and original Project design deficiency from MP 88 (Fifth Avenue Check) to MP 121.5 (Lake Woollomes Check). The Board of Directors (BOD) selected the proposed alternative that consists of a parallel or realigned canal along with enlargement of certain segments of the existing canal (Canal Enlargement & Realignment – “CER”) at the April 25, 2019 BOD meeting for continued design development, environmental compliance and permitting. Current work items include 1) final design; 2) environmental compliance/permitting activities; and 3) land acquisition program.

DISCUSSION/UPDATE: The following is a summary of the work completed since the last BOD update:

Reclamation Schedule Update and Coordination Meetings – Several working group meetings were conducted (Environmental, Right-of-Way, Design, and Project Management). Provided below is the current milestone implementation schedule.

<table>
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<th>Milestone</th>
<th>Date</th>
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<tr>
<td>NOI/NOP Published</td>
<td>December 2, 2019</td>
</tr>
<tr>
<td>Feasibility Report provided to OMB</td>
<td>January 28, 2020</td>
</tr>
<tr>
<td>30-Percent Design Report - Final</td>
<td>February 24, 2020</td>
</tr>
<tr>
<td>NOA/Draft EIS/EIR Published</td>
<td>May 08, 2020</td>
</tr>
<tr>
<td>Biological Opinion Issued</td>
<td>July 13, 2020</td>
</tr>
<tr>
<td>Project Section 106 Complete</td>
<td>July 30, 2020</td>
</tr>
<tr>
<td>100-Percent Bid Issue Design Completion</td>
<td>October 20, 2020</td>
</tr>
<tr>
<td>NOA/NOD/FEIS/EIR Published</td>
<td>September 18, 2020</td>
</tr>
</tbody>
</table>
The above is a fairly aggressive schedule that the team is committed to meeting. It is anticipated that it will take several months after the ROD is published to finalize activities such as permit acquisition, right-of-way acquisition and funding program. It is estimated that a construction contract award would occur in the first half of FY 2021.

**Significant Project milestone achieved** – Reclamation and FWA released the Draft EIS/EIR on May 8th for a 45-day public review period that closed on June 22nd. The public review period is now closed, and the team is preparing responses to comments received and preparing the final EIS/EIR.

**Feasibility Report** – Reclamation submitted the Administrative Draft Feasibility Report to OMB on January 28th. This represents a significant milestone in the Project’s implementation schedule.

As reported previously, Reclamation notified FWA that an Ability to Pay (ATP) analysis will need to be provided with the Administrative Draft Final Feasibility Report to demonstrate financial feasibility in order to seek reimbursable Federal funding under the WIIN Act. Stantec has continued to progress the ATP analysis and has begun coordination with FWA to describe the elements of the project financing plan. Stantec is also coordinating with Reclamation and FWA staff to identify Friant Division contractors from which financial information will be required.

**Environmental Compliance, Cultural Resources and Permitting**. Following is a description of NEPA/CEQA compliance and Permitting activities for the Project.

- Continued weekly calls with Environmental team to discuss progress on NEPA/CEQA and permitting, continued bi-weekly calls with the Project Management Group to discuss progress with Management Group.
- Reviewed comment letters on Draft EIS/R, identified individual comments and began developing responses.
- Continued preparation of Final Draft EIS/R including the draft Mitigation Monitoring and Reporting Plan (MMRP) for the Project.
- Continued to conduct check-in meetings with the United States Army Corps of Engineers regarding permitting, their involvement as a cooperating agency, and status of their review of the wetland delineation.
- Discussed the status of the 401-certification application with the Regional Water Quality Control Board.
- Made minor revisions to the Section 106 Report.
- Continued preparation of draft CDFW Section 1600 Streambed Alteration Agreement application.
- Conducted second nesting Swanson’s hawk and raptor survey within the project area.
Engineering and Design

- Conducted 4th Tulare County coordination call to progress the design coordination and steps to further a Memorandum of Understanding (MOU) for the project. Several details were discussed; including temporary road closures and detours during construction, traffic control, permanent elimination of road connectivity at Avenue 120 and Avenue 32, and design standards. MOU discussion items included type of encroachment permit and other issues such as whether FWA would need a license or easement for proposed siphon roadway crossings within the County Right-of-Way (ROW). Discussion also included follow-up to County’s request to establish a reimbursement process to address County staff time spent supporting the project (i.e. reviews, etc.). Regularly scheduled coordination meetings are planned in order to effectively progress the coordination items.
- Conducted a coordination call with CALTRANS regarding State Highway 190 crossing of the new parallel canal. Provided 60 percent submittal for CALTRANS review.
- Conducted design review submittal meetings with Friant Division Contractors to discuss design elements and obtain input on turnout delivery designs and irrigation delivery lines relocations.
- Continued development of hydraulic, engineering and cost analyses to support construction bid packaging recommendations.
- Received Reclamation review comments for the 60-percent Opinion of Probable Construction Cost (OPCC) for the Project and prepared response to comments.
- Continued structural, electrical, mechanical, and civil designs including development of turnout drawings, check structures, canal plan and profiles, and roadway crossings.
- Continued preparation of draft technical specifications.
- Conducted field survey work.
- Continued to update utility tracking logs, updated mapping files with utility information and developed potholing plan.
- Conducted a meeting with Reclamation to discuss the Draft Geotechnical Interpretive Report and started additional analyses.
- Received comments on the draft Geotechnical Road Crossing Siphons Report.
- Conducted design and construction bid packaging briefings with Reclamation.
- Prepared updated cash flow analysis.

Land Acquisition

- Continue to make progress on the action items established during joint Friant, BOR, Stantec bi-weekly meetings.
- BRI continues to work with the Federal Appraisal Valuation Service Office (AVSO) to complete the standard template for all appraisals. AVSO has revisited some the same sections of the appraisals that have been agreed on before, which has slowed progress. BRI continues to explore ways to streamline the process as changes are finalized.
- BRI has submitted 12 appraisals to AVSO for review, this includes 15 APN’s. Two (2) appraisals have been approved.
• BRI has plans to make two (2) First Written Offers after the purchase agreement template for the Project is approved by BOR Solicitors.

• BRI has submitted an updated Right of Way schedule to FWA for final approval to send to BOR. The updated schedule also addresses the utility relocation milestones, and a second set of acquisition dates to track new utility parcels and other miscellaneous parcels.

• The final three (3) ASTM 1527-13 Phase 1 Environmental Site Assessments (Phase 1 ESA) will be reviewed and accepted by the end of July.

• FWA and BRI have reviewed all the Phase 1 reports with Phase 2 recommendations. Ongoing review and determination of the number of necessary Environmental Site Assessments (Phase 2) will continue with FWA and BOR, final determination will be made by the end of July.

• BRI continues to work with the County of Tulare to determine the best way to acquire property rights over county roads. The final determination with maps is on target to be delivered by end of July to the County of Tulare and BOR for approval.

• The utility relocation coordinator, OPC, has completed a tour of the project area to facilitate identification of utility conflicts.

• OPC directly participates in ROW group meetings on matters related to utility issues/rights/easements determination.

• OPC continues to work with Stantec to develop accurate conflict mapping for all utility owners. Focus will be SCE submittals of conflict maps.

• OPC attended meetings with Stantec with various irrigation district owners to discuss the resolution of Project conflicts with their facilities.

• OPC has sent Relocation Claim Letters and Stantec identified conflicts to SCE and all other conflicting utility owners.

• OPC will continue research and review of prior rights documents.

Landowner Coordination and Outreach

• The June 22-23 raptor survey found no effect to Swanson’s Hawk with a quarter mile of the facility. The survey was followed by an inspection of native vegetation in the Deer Creek and White River channels for nesting habitat. No native trees suitable for raptor nesting were identified within a quarter mile.

• Coordinated and facilitated weekly Right-of-Way Team meetings with FWA, Reclamation, BRI and Stantec staff to coordinate landowner engagement, appraisal and real estate activities, and design coordination.

• Held a Utility Potholing conference call with Reclamation’s Environmental Team, OPC, BRI and Stantec staff on July 1 to discuss the potential conduct of up to 35 excavations to confirm the location and depth of buried utilities. Reclamations staff said the work would need to complete NEPA and take approximately five months to finish. Staff recommended that the work be incorporated to the existing environmental documents and be authorized when Reclamation signs the Record of Decision. Conduct of the Utility Potholing would be coordinated shortly after execution of the ROD and its findings included in the Project’s construction bid package.
Held a coordination meeting with the County of Tulare Department of Public Works, FWA, BRI and Stantec on July 1 to discuss reimbursement agreements, permits, design coordination, road closures and vacates, and retention of existing county bridges in the Area of Potential Effect. FWA presented plans to retain the bridges in an as-is condition after project completion to provide flexibility for potential future use of the existing structure for water delivery and storage and as a cost-saving tactic. Some County staff have raised concerns over sustained operation and maintenance costs. Reclamation has requested a meeting the week of July 13 to discuss bridge retention consistency with the agency’s design standards. Coordination meetings with the County are held the first and third Wednesdays at 2 p.m.

Staff have held discussions with the Tulare County Surveyor to the processes to vacate a portion of Avenue 32 between Roads 184 and 192 and a bridge over the FKC at Avenue 120 to a private farm road. The vacation effort seeks to remove siphons at each of these locations, resulting in a project saving of approximately $10 million. Staff have initiated initial contacts with potentially effected landowners and is researching options to continue ingress/egress rights for landowners in the event of the vacate.

The video of the June 8 online public meeting for the FKC Public Draft EIS/R (posted to FWA’s YouTube Channel) has been viewed 65 times by 49 unique visitors. Google analytics indicate the vast majority of site visits were generated through direct outreach by Project staff (i.e. email to landowners and other interested parties, and FWA’s weekly Water Supply Update).

**RECOMMENDED ACTION:**

None.

**SUGGESTED MOTION:**

None.
BACKGROUND:

On June 5, 2020, Friant Water Authority distributed a Request for Interest (RFI) to Friant Contractors to help determine the Contractors potential interest in providing funding for the Middle Reach Capacity Correction Project (Project), in exchange for capacity/priority in the additional capacity funded by these voluntary payments. FWA is actively pursuing funding sources, including from the state and federal government, as well as the Tule Sub-basin Groundwater Sustainability Agencies. Staff is developing a Finance Plan to fund the Project, envisioning different levels of funding sources associated with different phases of construction. The RFI is the first step in determining the level of potential voluntary funding from Friant Contractors to assist in fully funding the Project construction costs. These voluntary payments in combination with other sources would determine the ultimate capacity of the completed Project.

SUMMARY:

FWA received five responses to the RFI from the following agencies:

a. Arvin-Edison Water Storage District  
b. Kern-Tulare Water District  
c. Madera Irrigation District  
d. A combined response from Porterville Irrigation District, Saucelito Irrigation District, and Terra Bella Irrigation District on behalf of the Eastern Tule GSA and the Renewable Resources Group  
e. Delano-earlimart Irrigation District and Southern San Joaquin Municipal Utility District  

Of the five responders, only Madera indicated they did not seek to fund capacity. DEID/SSJMWD did not provide a specified level of funding but indicated interest in supporting funding necessary to restore capacity to provide flow rates that protect historical delivery levels, with a buffer. The other three entities provided levels of interest ranging from $10 million for Kern-Tulare up to $140 million for Arvin-Edison (at the high end of their stated range.) The combined response of Porterville, Saucelito, and Terra Bella noted interest up to $130 million.

The RFI noted that none of the expressions of interest were binding or a commitment to funding, and each of the responders described issues that would need to be addressed over the next several months as funding is solidified. These issues include:
1. Identifying the amount of Zone 2 funding to help set the amount of Zone 3 capacity available (and the resulting amount of funding required).

2. Clarification of the “rules” and operating procedures for Zone 3 capacity and priority.

3. Address “upstream constraints” needed to deliver the full Project restored capacity.

4. Ensure that those agencies that might pay through a GSA weren’t also required to pay through a contribution to FWA – effectively paying twice.

5. Ensuring that contributions for Zone 3 funding could result in a capacity interest or other asset that can be recognized on the balance sheet.

6. Funding would likely require a Proposition 218 process for additional revenues as there was not enough funding available in some agencies’ existing budgets.

Staff will continue to work with the group of Contractors who have expressed interest to address these concerns, develop the Finance Plan, and finalize the amount of funding needed from Zone 3 voluntary payments.
DATE: July 13, 2020

TO: Executive Committee

FROM Alex Biering, Government Affairs and Communications Manager
Johnny Amaral, Chief of External Affairs

SUBJECT: External Affairs Update

SUMMARY:
Update on State and Federal legislation and communications activities.

RECOMMENDED ACTION:
None; informational only.

SUGGESTED MOTION:
None; informational only.

DISCUSSION:
State Affairs

On June 29, Governor Newsom signed the FY 20/21 California Budget. It Includes $202 billion in spending. In negotiations between the Governor and Legislature, they came to an agreement to replace the $14 billion in cuts he’d originally proposed with other “gimmicks” such as delayed payment plans, borrowing from internal funds, more optimistic tax revenue estimates, and withdrawing almost $8 billion from the state’s $16 billion rainy day fund. Since California moved its tax deadline to July 15 this year, there may be some additional adjustments made to the budget once the Governor and members have a better sense of how tax revenues look. There will also likely be a number of trailer bills passed to specify how the budget is spent. As of now, it does not appear that the Legislature will proceed with a natural resources bond in 2020, and the Governor has dropped his plans for one as well.

August 31 is the deadline for bill passage and the Legislature has seven weeks to consider 700 bills before then. However, complicating matters, on July 7 six members of the Assembly or their staff tested positive for COVID-19, and the Capitol was shut down until further notice. As a result, whereas both houses of the Legislature were set to return to session on July 13, the Assembly announced that it would not be returning. As of July 8 the Senate had not announced plans for whether they intend to return on July 13.
Federal Affairs

The House and Senate were in recess last week, but the House held “Committee Work Days” all week. No votes are scheduled in either chamber until the week of July 20.

The House Appropriations Committee (HAC) began considering FY 2021 appropriations bills. As this report was written, according to the HAC markup schedule, all 12 FY 2021 appropriations bills were scheduled to be marked up in subcommittee by 7/9. The full committee was scheduled to consider subcommittee allocations on 7/9 and markup five of the 12 FY 2021 bills on 7/9 and 7/10. The remaining seven bills are expected to be considered in full committee the week of 7/13. The House is aiming to pass all 12 FY 2021 appropriations bills by the end of the month, but leaders have yet to release a floor schedule. Progress on appropriations in the Senate continues to be delayed due to partisan disagreements.

The House Energy and Water Development Appropriations Subcommittee released their FY 2021 E&W bill on July 7. In their bill, the House majority proposes that the Bureau of Reclamation would receive about the same as FY 2020 and the Friant-Kern Canal was listed in the WIIN Act list but the bill states it would not release any funding until Interior requests WIIN Act funds for water reuse and recycling and desalination projects, which could come soon. But, at the end of the bill starting on page 69, the subcommittee appropriates an additional $3 billion to Reclamation in emergency funding (COVID-19) to include, among other things, the following provisions:

- (3) not less than $200,000,000 shall be for construction activities, for which the Federal share of the cost shall not be more than 50 percent and for which the non-Federal share of not less than 50 percent may be provided in cash or in-kind, related to projects found to be feasible by the Secretary of the Interior and which are ready to initiate for the repair of critical Reclamation canals where operational conveyance capacity has been seriously impaired by factors such as age or land subsidence, focusing on those that would imminently jeopardize Reclamation’s ability to meet water delivery obligations;

- (11) $200,000,000 shall be for Section 10004 of the Omnibus Public Land Management Act of 2009 (Public Law 111–11) – San Joaquin River Settlement Act

While it is still unclear what will come of this emergency funding in the Senate, it bears watching as it appears the Friant Kern Canal would receive the lion’s share of the “not less than” $200M 50-50 funding. The total earmarked funding is about $836M less than the $3B, which would allow Reclamation to add even more funding if needed. There is nothing in the language that indicates whether or not the funds are non-reimbursable. Both the regular and the emergency funding provisions include language that restricts the use of federal funds on the study or construction of the Shasta Reservoir Raise.

**BUDGET IMPACT:**

None.

**ATTACHMENTS:**

Legislative tracker (July 8, 2020); Family Farm Alliance Executive Director’s Report (July 2020); News release: “McCarthy Applauds Final Feasibility Report on Repairs to the Friant-Kern Canal” (July 6, 2020).
# Legislative Tracker

**FRIANT WATER AUTHORITY**

**July 8, 2020**

## State Bills

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<tr>
<td>AB 1839</td>
<td>Economic, environmental, and social recovery: California COVID-19 Recovery Deal (Bonta) – 5/7/20 version</td>
<td>Would enact the California COVID-19 Recovery Deal. The bill would make a series of legislative findings and declarations pertaining to the coronavirus (COVID-19) pandemic and various economic, environmental, and social conditions in the state. The bill would state the intent of the Legislature that the state adopt a policy framework with principles and goals committed to accomplish specified economic, environmental, and social objectives and priorities as part of the state’s COVID-19 recovery spending. The bill would state that the Legislature establishes various spending rules for the COVID-19 recovery, including adopting spending measures that prohibit businesses, organizations, or agencies from accepting public funds for any long-term projects that prolong the emission of greenhouse gases or lead to the expansion of fossil fuel projects and ensuring that recovery spending includes specific measures for California populations and communities most negatively impacted by COVID-19.</td>
<td>NYC</td>
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<td>AB 2482</td>
<td>Agriculture: environmental farming programs and grants (Stone) – 2/19/20 version</td>
<td>Would require the Department of Food and Agriculture, upon appropriation by the Legislature of additional funds, to administer the State Water Efficiency and Enhancement Program (grant program) to provide grants to agricultural operations to implement irrigation systems that reduce greenhouse gases and energy use and increase water use efficiency, as prescribed. The bill would also require the department to fund culturally competent training on irrigation and nutrient management, authorize the department to contract with qualified third parties to measure grant program outcomes, and require the department to adopt guidelines for the grant program.</td>
<td>NYC</td>
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1 Updates since the last version are included in **bold text**.
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<td>AB 2502</td>
<td>Groundwater sustainability plans: impacts on managed wetlands (Quirk) – 2/19/20 version</td>
<td>The act prescribes that GSPs contain certain required contents and requires that plans contain, where appropriate and in collaboration with the appropriate local agencies, additional analyses or components, including, among others, control of saline water intrusion, wellhead protection areas and recharge areas, a well abandonment and well destruction program, well construction policies, and impacts on groundwater dependent ecosystems. This bill would add impacts to managed wetlands, as specified, to the additional analyses or components that a plan is required to contain when appropriate.</td>
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<td>AB 2518</td>
<td>Voluntary stream restoration landowner liability (Wood) – 2/19/20 version</td>
<td>Would exempt a landowner who voluntarily allows land to be used for such a project to restore fish and wildlife habitat from civil liability for property damage or personal injury resulting from the project if the project is funded, at least in part, by a state or federal agency that promotes or encourages riparian habitat restoration, unless the property damage or personal injury is caused by willful, intentional, or reckless conduct of the landowner or by a design, construction, operation, or maintenance activity performed by the landowner.</td>
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<td>AB 2642</td>
<td>Department of Conservation: Multibenefit Land Conversion Incentive Program (Salas) – 5/5/2020 version</td>
<td>Would require the Department of Conservation to establish and administer a program named the Multibenefit Land Conversion Incentive Program for purposes of providing grants to groundwater sustainability agencies or counties, or other specified entities designated by groundwater sustainability agencies or counties, for the development or implementation of local programs supporting or facilitating multibenefit land conversion at the basin scale. The bill would establish procedures for the department’s administration of the program and would require the department to develop guidelines to implement the program and to exercise its expertise and discretion in awarding program funds to eligible applicants.</td>
<td>PRO: Audubon California, Environmental Defense Fund, California Association of Resource Conservation Districts, California Habitat Conservation Planning Coalition</td>
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<td>NYC Support if Amended Dead</td>
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<td>AB 2720</td>
<td>California Environmental Quality Act: negative declarations and mitigated negative declarations: groundwater recharge projects (Salas) – 2/20/20 version</td>
<td>Would require the lead agency, for a groundwater recharge project on agricultural land fallowed as a result of management actions required by a groundwater sustainability plan, to prepare a negative declaration or a mitigated negative declaration if there is substantial evidence in the record that a project or a revised project would not have a significant environmental impact. Because a lead agency would be required to determine whether there is substantial evidence in the record that a project would not have a significant environmental impact, this bill would impose a state-mandated local program.</td>
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<td>AB 3054</td>
<td>California Environmental Quality Act: judicial challenge: litigation transparency: identification of contributors (Salas) – 2/21/20 version</td>
<td>Would require a plaintiff or petitioner, in an action or proceeding brought pursuant to the California Environmental Quality Act, to disclose the identity of a person or entity that contributes $1,000 or more, as specified, toward the plaintiff’s or petitioner’s costs of the action or proceeding. The bill also would require the plaintiff or petitioner to identify any pecuniary or business interest related to the project or issues involved in the action or proceeding of those persons or entities. The bill would authorize a court to, upon request of the plaintiff or petitioner, withhold public disclosure of a contributor if the court finds that the public interest in keeping that information confidential clearly outweighs the public interest in disclosure.</td>
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<td>AB 3256</td>
<td>Wildfire Prevention, Safe Drinking Water, Climate Resilience, Drought Preparation, and Flood Protection Bond Act of 2020 (Garcia) – 6/8/20 version</td>
<td>Would enact the Wildfire Prevention, Safe Drinking Water, Climate Resilience, Drought Preparation, and Flood Protection Bond Act of 2020, which, if approved by the voters, would authorize the issuance of bonds in the amount of $6,980,000,000 pursuant to the State General Obligation Bond Law to finance projects for a wildfire prevention, safe drinking water, climate resilience, drought preparation, and flood protection program.</td>
<td>PRO: Environmental NGOs, land trusts, RCDs, flood control districts</td>
<td>NYC</td>
<td>Favor if Amended</td>
<td>Referred to Rules Committee 6/8.</td>
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<td>AB 3279</td>
<td>California Environmental Quality Act: administrative and judicial procedures (Friedman) – 7/1/20 version</td>
<td>(1)The California Environmental Quality Act (CEQA) requires a lead agency, as defined, to prepare, or cause to be prepared, and certify the completion of an environmental impact report (EIR) on a project that it proposes to carry out or approve that may have a significant effect on the environment or to adopt a negative declaration if it finds that the project will not have that effect. CEQA also requires a lead agency to prepare a mitigated negative declaration for a project that may have a significant effect on the environment if revisions in the project would avoid or mitigate that effect and there is no substantial evidence that the project, as revised, would have a significant effect on the environment. This bill would instead require that a court, to the extent feasible, commence hearings on an appeal within 270 days of the date of the filing of the appeal. This bill contains other related provisions and other existing laws.</td>
<td>PRO: Property management groups, commercial real estate groups, business groups and chambers of commerce, PCL, timber groups OPP: Center on Race, Poverty &amp; the Environment, Sierra Club California, State Building and Construction Trades Council of California, Physicians for Social Responsibility - Los Angeles, Communities for a Better Environment, California Environmental Justice Alliance, Leadership Counsel for Justice &amp; Accountability</td>
<td>NYC</td>
<td>Support if Amended</td>
<td>Currently in Assembly Env. Quality Committee.</td>
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<td>ACA 3</td>
<td>Clean Water for All Act (Mathis) – 3/20/19 version</td>
<td>Would require, commencing with the 2021–22 fiscal year, not less than 2% of specified state revenues to be set apart for the payment of principal and interest on bonds authorized pursuant to the Water Quality, Supply, and Infrastructure Improvement Act of 2014; and for water supply, delivery, and quality projects administered by DWR, and water quality projects administered by the SWRCB, as provided. Funds would be continuously appropriated and distributed as follows: 5% to pay down Prop. 1; 57% to be disbursed by DWR for water supply, delivery, and quality projects, including for conveyance, recharge, subsidence abatement, and storage; 38% to the SWRCB for water quality projects. DWR would be required to give priority to projects that address deferred maintenance; the SWRCB couldn’t use the funding to address water quality enforcement actions.</td>
<td>PRO: San Gabriel Valley Water Authority, Howard Jarvis Taxpayers Association, Friant Water Authority</td>
<td>Support</td>
<td>Watch</td>
<td>Failed passage in Water, Parks &amp; Wildlife on 4/30; reconsideration granted.</td>
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<td>SB 559</td>
<td>California Water Commission: Friant-Kern Canal conveyance restoration (Hurtado) – 7/3/19 version</td>
<td>Would appropriate $400 million from the General Fund for actions to restore conveyance capacity on the Friant-Kern Canal. Amended to remove appropriation, leaving policy in place but requiring funding in the budget. Also amended to require cost-share, establish California Water Commission as disbursing agency, and require public briefings.</td>
<td>PRO: Association of California Water Agencies, Western Growers Association, Arvin-Edison Water Storage District, Friant Water Authority, Tulare County, Tulare County Farm Bureau, Kern County, Kern County Hispanic Chamber of Commerce, Pixley Irrigation District, Tea Pot Dome Water, District, South Valley Water Association, Fresno County Kern-Tulare Water District, Fresno Farm Bureau, Lower Tule River Irrigation District, Shafter-Wasco Irrigation District</td>
<td>Sponsor</td>
<td>Favor</td>
<td>Now likely to be heard in Assembly Appropriations in August.</td>
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<td>SB 931</td>
<td>Local government meetings: agenda and documents (Wieckowski) – 4/2/20 version</td>
<td>Would require, if the local agency has an internet website, a legislative body or its designee to email a copy of, or website link to, the agenda or a copy of all the documents constituting the agenda packet if the person requests that the items be delivered by email. The bill would require, where the local agency determines it is technologically infeasible to send a copy of all documents constituting the agenda packet or a website link containing the documents by electronic mail or by other electronic means, the legislative body or its designee to send by electronic mail a copy of the agenda or a website link to the agenda and mail a copy of all other documents constituting the agenda packet in accordance with the mailing requirements. By requiring local agencies to comply with these provisions, this bill would impose a state-mandated local program.</td>
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<td>SB 974</td>
<td>California Environmental Quality Act: small disadvantaged community water system: exemption (Hurtado) – 6/18/20 version</td>
<td>Would, with certain specified exceptions, exempt from CEQA certain projects that primarily benefit a small disadvantaged community water system by improving the small disadvantaged community water system’s water quality, water supply, or water supply reliability, by encouraging water conservation, or by providing drinking water service to existing residences within a disadvantaged community where there is evidence of contaminated or depleted drinking water wells. The bill would also define various terms for purposes of this exemption. Because a lead agency would be required to determine whether a project qualifies for this exemption, this bill would impose a state-mandated local program.</td>
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<td>Currently in Assembly Committee on Nat'l Resources.</td>
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<td>SB 1028</td>
<td>Agriculture: Cannella Environmental Farming Act of 1995: Environmental Farming Incentive Program (Dodd) – 3/19/20 version</td>
<td>Would require the Advisory Panel on Environmental Farming to assist government agencies to incorporate the conservation of natural resources and ecosystem services practices into agricultural programs. The bill would require the Department of Food and Agriculture, with advice from the panel, to establish and administer the California Environmental Farming Incentive Program, subject to an appropriation by the Legislature. The bill would require the program to support on-farm practices seeking to optimize environmental benefits while supporting the economic viability of California agriculture by providing incentives to farmers or ranchers who want to pursue adopting management practices that contribute to wildlife habitat and result in on-farm activities that provide multiple conservation benefits, as prescribed.</td>
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<td>SB 1101</td>
<td>Water and Climate Science Advisory Board (Caballero) – 3/25/20 version</td>
<td>Would require the Department of Water Resources to convene a Water and Climate Science Advisory Board to consist of 5 members with certain qualifications appointed by the department, the agency, and the State Water Resources Control Board, as provided. The bill would require board members to serve 3-year terms. The bill would require the department to consult with the board when initiating, reviewing, or expanding policies or guidelines regarding impacts of climate change on water resources. The bill would require the department to establish an internal process for department review of and comment on the work of the board, which shall be made publicly available.</td>
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<td>SB 1188</td>
<td>The California Water Plan (Stern) – 4/8/20 version</td>
<td>Current law requires the Department of Water Resources to update every 5 years the plan for the orderly and coordinated control, protection, conservation, development, and use of the water resources of the state, which is known as The California Water Plan. Current law requires the department to include a discussion of various strategies in the plan update, including, but not limited to, strategies relating to the development of new water storage facilities, water conservation, water recycling, desalination, conjunctive use, water transfers, and alternative pricing policies that may be pursued in order to meet the future needs of the state. This bill would require the department to include in the plan update, instead of a discussion of various strategies, a discussion of various strategies for increasing regional water resilience, as defined.</td>
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<td>SB 1320</td>
<td>Climate change: California Climate Change Assessment (Stern) – 6/18/20 version</td>
<td>Would require the Office of Planning and Research to develop the California Climate Change Assessment, in coordination with the Natural Resources Agency, the State Energy Resources Conservation and Development Commission, and the Strategic Growth Council, and in consultation with partner public agencies designated by the office. The bill would require the office to conduct the assessment every 2 years and to publish the assessment in October of each odd-numbered year. The bill would require the assessment to assess and report the impacts and risks of climate change and identify potential solutions to inform legislative policy, as provided. The bill would require the assessment to include sector-specific liability projections that assess the impacts of climate change under varied emissions scenarios for the years 2025, 2030, 2050, and 2100.</td>
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<td>Currently in Assembly Committee on Nat’l Resources.</td>
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<td>SB 1356</td>
<td>Groundwater sustainability agency: financial authority (Borgeas) – 2/21/20 version</td>
<td>The Sustainable Groundwater Management Act authorizes a groundwater sustainability agency to impose fees to fund the costs of a groundwater sustainability program and requires a groundwater sustainability agency to hold at least one public meeting prior to imposing or increasing a fee. The act requires that a groundwater sustainability agency make the data upon which the proposed fee is based publicly available at least 10 days prior to the meeting. This bill would make nonsubstantive changes to the provisions authorizing groundwater sustainability agencies to impose fees.</td>
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MEMORANDUM

TO: BOARD OF DIRECTORS AND ADVISORY COMMITTEE
FROM: DAN KEPPEN, EXECUTIVE DIRECTOR
SUBJECT: EXECUTIVE DIRECTOR’S REPORT
DATE: JULY 6, 2020
CC: MARK LIMBAUGH, NORM SEMANKO

This executive director’s report (EDR) is intended to keep you apprised as to what is happening behind the scenes on policy issues the Alliance is engaged in, some of which we will discuss on our next joint teleconference of the Board of Directors and Advisory Committee, scheduled for Friday, July 10, at noon (Pacific, including Arizona) 1:00 p.m. (Mountain); 2:00 p.m. (Central), 3:00 p.m. (Eastern). In the past month, our efforts have focused on the federal response to COVID-19, multiple water infrastructure developments in Congress, a new climate change report released by House Democrats, and Klamath “takings” litigation and public relations related to that litigation. These issues and other matters important to our members are further discussed in this EDR.

This report is intended for your use, but I understand that you may wish to share this information with your local board members and close associates. I would ask that you be circumspect when you distribute this, however.

FEDERAL RESPONSE TO COVID-19 PANDEMIC

Hopes of a summer-time decline in the spread of COVID-19 were dashed in the weeks following Memorial Day when the number of reported infections surged again in the past month. The New York Times reports the U.S. surpassed 50,000 new coronavirus cases in a single day for the first time on July 2. At least eight states reported single-day case records including California, and Montana in the West. At a recent Bloomberg event, Treasury Secretary Steve Mnuchin said he expects “a spectacular rebound” of the economy in the third quarter, predicting the U.S. will be out of a recession by the end of the year. Secretary Mnuchin’s comments contradict those of Federal Reserve Chair Jerome Powell, who said in recent testimony to the Senate Banking Committee that “significant uncertainty remains about the timing and strength of the recovery.”
U.S. workers filed another 1.5 million new applications for jobless benefits in the third week of June, as the coronavirus pandemic continued to upend the labor market, the Labor Department reported. More than 19.5 million people remain on unemployment rolls.

1. **Impacts to Western Agriculture and Rural Communities**

Western U.S. agriculture is facing one of its biggest crises since the Great Depression, as the COVID-19 pandemic has impacted markets, disrupted the food supply chain, collapsed commodity prices, and intensified labor challenges. Rural communities on average were more vulnerable to the public health and economic crisis after a decade of slower recovery from the last recession, compared with more populated areas. They are also more reliant on industries like agriculture, mining, and manufacturing.

The Western Governors’ Association (WGA) last month released its [Reimagining the Rural West Initiative report](#) with a dozen recommendations to drive economic development efforts in the West, as businesses and towns try to recover from the pandemic. The initiative, led by WGA Chair and Governor Doug Burgum (NORTH DAKOTA), follows a series of workshops hosted by Republican and Democratic governors over the past year, including one last summer in Vail (COLORADO), which Farm Alliance president Patrick O’Toole and I attended. I also participated in a panel discussion in Vail – moderated by Governor Burgum - on areas where constructive environmental funders and Western farmers and ranchers can engage.

The WGA proposes focusing on advantages like better access to outdoor recreation and higher quality of life that “can serve to attract new residents, or entice young people to stay or return to their rural hometowns.” That includes changing the metrics and requirements for federal programs that support rural development, including loans and grants from the Agriculture and Commerce departments. The plan also focuses on improving food and water access in the West, noting the higher distribution costs and logistical challenges in more remote communities that can make it harder to supply fresh and healthy foods.

2. **Paycheck Protection Program**

The Paycheck Protection Program (PPP) was extended an additional five weeks until August 8. President Trump [signed](#) the bill into law on Saturday. Nearly $130 billion remains available for loans, and PPP loans will be forgiven provided participants abide by certain rules, which were recently eased. The Small Business Administration has announced that it plans to resume accepting applications today (July 6).

3. **Federal Farm Rescue Payments**

The U.S. Department of Agriculture (USDA) has already distributed a quarter of its $16 billion in farm rescue payments in the last month. However, several ag sectors – including apple and potato growers - are still appealing to be included in the program. Rep. Dan Newhouse (R-WASHINGTON), and twenty-five other lawmakers, sent a letter to USDA Secretary Sonny Perdue urging that America’s apple growers be included in the USDA’s economic relief efforts.
The Members argue the coronavirus has drastically damaged apple growers and noted “these producers are often the backbones of rural communities.”

4. Coronavirus Food Assistance Program Applications

USDA’s Farm Service Agency (FSA) will now accept applications for the Coronavirus Food Assistance Program (CFAP) through an online portal, expanding the options available to producers to apply for this program, which helps offset price declines and additional marketing costs because of the coronavirus pandemic. FSA is also leveraging commercial document storage and e-signature solutions to enable producers to work with local service center staff to complete their applications from home. Through the portal, producers with secure USDA login credentials—known as eAuthentication—can certify eligible commodities online, digitally sign applications and submit directly to the local USDA Service Center. Producers who do not have an eAuthentication account can learn more and begin the enrollment process at farmers.gov/sign-in. The digital application is only available to sole proprietors / single-member business entities.

5. Cutting Regulations to Aid Economic Recovery

In a memo last month, the White House Office of Management and Budget asked federal agencies to prepare lists of regulations that may inhibit economic recovery during the pandemic. The lists are to include temporary regulatory actions agencies have taken in response to the COVID-19 pandemic that warrant the issuance of a permanent measure to promote economic recovery. Potentially targeted regulatory actions could include labor, energy, and environmental regulations, but the impacts of the memo on these regulations are currently uncertain. President Trump’s Executive Order 13924 orders federal agencies to roll back or change regulations “that may inhibit economic recovery” in order to boost the economy impacted by the COVID-19 pandemic. The order does not provide specific instructions but is a blanket message across the U.S. government to help the economy recover by easing regulation.

6. Response by Congress

While Democrats and Republicans, along with the White House, agree on the need to enact more COVID-19 relief before the August recess, the next round of relief seems likely to be much more focused. GOP leaders have generally called for economic, education and public health related relief, along with legal immunity for small businesses as the country experiences an increase in COVID-19 cases nationwide as the economy reopens. White House officials also are calling for more targeted relief for small businesses and to properly equip schools to reopen in the fall. They also are looking at more direct payments to individuals to continue economic recovery. Democrats are pushing their $3 trillion "Health and Economic Recovery Omnibus Emergency Solutions (Heroes) Act” passed by the House last month which contains trillions in funds for state and local governments. GOP leaders, while stating that they are less than enthusiastic about rewarding poorly run states with more stimulus money, seem to support assistance to localities (such as cities and counties) suffering from lost tax revenues due to the pandemic.
7. **Alliance Actions**

Our representatives in Washington, D.C. – Mark Limbaugh, and The Ferguson Group (TFG)- have been closely monitoring the federal response to the pandemic. In recent months, I’ve participated in several briefings, describing how Western agriculture has been impacted by the government response, and summarizing the Alliance’s work, advocating that any infrastructure stimulus package include Western water provisions, and our efforts to ensure that the irrigation industry be considered “essential”. Briefings have been provided in ZOOM sessions hosted by the Idaho Water Users Association, Tri -States (IDAHO, OREGON, and WASHINGTON), Pacific Power community liaisons (OREGON) and a group of federal and state conservative policy interests and think tanks, including the Heritage Foundation.

**TRUMP ADMINISTRATION ACTIONS**

8. **Appointments**

President Trump plans to formally nominate William Pendley as Director of the Bureau of Land Management (BLM). Mr. Pendley must be confirmed by the Republican-controlled Senate, but that is not guaranteed given election year politics and his somewhat controversial positions on federal management of public lands. He will certainly face fierce opposition from Senate Democrats, but it is not certain that moderate Republicans up for reelection this year will support his nomination. Mr. Pendley, as the former president of the conservative Mountain States Legal Foundation, was a sharp critic of BLM and other federal land management agencies. He has served as acting BLM director since July 2019.

Sen. Joni Ernst (R-IA) announced that she will vote in Committee against Mr. Doug Benevento, President Trump's nominee for the Environmental Protection Agency’s (EPA) Deputy Administrator over uncertainty in EPA’s management of the ethanol and biodiesel renewable fuel standard (RFS). Sen. Ernst is a member of the Senate Environment and Public Works (EPW) Committee which has jurisdiction over EPA nominations, and her one GOP vote could stop the nomination from reaching the Senate floor if all EPW Democrats remain united in their opposition. In recognizing Mr. Benevento's nomination does not have enough support, EPW Chairman John Barrasso (R-WY) decided the panel would not take up his nomination.

9. **Department of Interior (DOI): Funding Request for Water Storage Projects**

Interior Assistant Secretary for Water and Science Timothy Petty last month requested $108.7 million in funding for surface water storage infrastructure projects in the western United States, including $15 million for the Shasta Dam enlargement project in northern California. In order for surface water storage infrastructure projects to be funded under Section 4007 of the Water Infrastructure Improvements for the Nation (WIIN) Act, DOI must send Congress a letter requesting project funding by name and amount. Congress then must include these projects in the annual Energy and Water Development and Related Agencies Appropriations Act in order to fund these projects. DOI last sent a letter requesting funds for surface water storage infrastructure projects in February 2019. Congress funded almost all of these projects in the Fiscal Year 2020
Energy and Water appropriations bill, which was included in Public Law 116-94. However, Congressional Democrats blocked the requested funds for the Shasta Reservoir Enlargement Project, which is almost ready for construction.

The Alliance for nearly two decades has advocated to mitigate for the high costs associated with reallocating water to the environment and away from agriculture and municipal needs by restoring certainty to critical irrigation and city water supplies and meeting environmental needs in the process. That certainty can be provided by building new water supply enhancement projects that can help keep pace with growing Western water demands. The Alliance in 2014 published a report provides answers to frequently asked questions about these types of projects.

10. DOI, Bureau of Reclamation

a. Title Transfers

DOI in the past month has used new authority provided by the “John D. Dingell, Jr. Conservation, Management, and Recreation Act” to transfer for the first time the title to federal water projects to the local non-federal operating entities in Utah and North Dakota. The two Reclamation projects transferred from Utah were the Emery County Project and the Uintah Basin Replacement Project. Both provide irrigation water, as well as serve some recreation, municipal and other industrial purposes. Such a transfer of federal property previously would have taken years and required Congress to pass a specific law codifying the move, but the Dingell Act, which was signed into law last year included provisions that streamlined the title transfer process. Reclamation also last week sent a notice to Congress announcing its intent to transfer federal ownership of the Oakes Test Area located near Oakes, North Dakota, to the Dickey-Sargent Irrigation District.

As you know, title transfer is a voluntary conveyance of ownership for water projects including dams, canals, laterals, and other water-related infrastructure to the beneficiaries of those facilities. Transfers are one of several positive means of strengthening control of water resources at the local level. However, despite the benefits, local water agencies are many times discouraged from pursuing title transfer because the process is expensive and slow. Moreover, until recently, every title transfer currently requires an act of Congress to accomplish, regardless of whether the project covers 10 acres or 10,000 acres.

Congress provided the authority for these and other qualified title transfers in Title VIII of P.L. 116-9, the Dingell Act. As required by the Act, Reclamation’s action is a written notification that begins a 90-day congressional review, after which the Department will complete the ownership transfer unless Congress enacts a joint disapproval resolution within that time period. The Family Farm Alliance in 2019 worked closely with Reclamation on the Directive & Standard for title transfers that do not require Congressional authorization. Alliance Advisory Committee member Tom Knutson (NEBRASKA) and I both testified before a House subcommittee in the last Congress in support of title transfer legislation. It is encouraging to see the quick progress the local water organizations made using this new streamlined process. I will continue to urge other Western water managers to work with Interior and Reclamation to do the same, where possible, while we have such high-level political attention being paid to this issue.
b. WaterSMART Grant Funding Opportunities

Reclamation is launching the 2021 WaterSMART Water and Energy Efficiency Grant funding opportunity that supports water management organizations developing projects that result in quantifiable and sustained water savings, increase the production of hydropower, and support broader water reliability benefits. Applications for these grants are due on Sept. 17, 2020, at 4 p.m. MDT. Reclamation is also extending the deadline for the 2021 Drought Resiliency Projects funding opportunity while raising the maximum federal award for each of the two groups of projects. These Reclamation grant programs support the Department of the Interior’s commitment to meeting the President’s Memorandum on Promoting the Reliable Supply and Delivery of Water in the West. Earlier today, I shared with you a chart that Reclamation prepared for Congress that describes all WaterSMART programs.

For the Water and Energy Efficiency Grants, funding is available in two groups. This program provides up to $500,000 per agreement for projects that can be completed in two years and up to $2 million per agreement for projects that can be completed in three years. Recipients must match the funding with a minimum 50% cost-share. Learn more about this available grant at www.grants.gov by searching for grant number BOR-DO-21-F001. Learn more about the Water and Energy Efficiency Grants at www.usbr.gov/WaterSMART/weeg.

The Drought Resiliency Projects funding opportunity announced on May 4, 2020, is being extended until August 5, 2020, at 4 p.m. MDT. The funding available for each project has been increased up to $500,000 for projects that can be completed in two years and up to $1.5 million for projects that can be completed in three years. The funding opportunity is available at www.grants.gov by searching funding opportunity number BOR-DO-20-F002. Learn more about the Drought Program at www.usbr.gov/drought. Eligible applicants for funding include states, tribes, irrigation districts, water districts or other organizations with water and power delivery authority located in the western U.S. or territories. Alaska and Hawaii are also eligible to apply.

11. Department of Agriculture (USDA): New Steps to Curb Wildfire Risks

U.S. Secretary of Agriculture Sonny Perdue last month issued a memorandum to Forest Service Chief Vicki Christiansen providing direction that will serve as a blueprint to help modernize the agency’s systems and approaches to ensure national forests and grasslands continue to meet the needs of the American people. This announcement follows an April decision by Secretary of the Interior David Bernhardt to construct and maintain a system of up to 11,000 miles of strategically placed fuel breaks to control wildfires within a 223 million-acre area in portions of California, Idaho, Nevada, Oregon, Utah, and Washington. Secretary Perdue’s direction will encompass four areas of the agency’s work:

- Increasing the productivity of national forests and grasslands;
• Valuing grazing heritage and the national grasslands;
• Increasing access to national forest system lands; and
• Expediting environmental reviews to support active management.

A priority Family Farm Alliance initiative in recent years has been to advocate for active forest management that could potentially increase water yield, improve water quality, provide for jobs, and reduce the cost of firefighting, while increasing forest resiliency.

12. U.S. Army Corps of Engineers (Corps): Levee Safety

The Corps has extended the comment period for its draft agency guidance, Engineer Circular (EC) 1165-2-218: *U.S. Army Corps of Engineers Levee Safety Program*, through July 27. It establishes internal policy for understanding, prioritizing, and managing flood risks. Most levees in the Corps Levee Safety Program are operated and maintained by non-federal levee sponsors. This guidance lays a path forward for the Corps and levee sponsors to partner in managing levee-related flood risks. The EC will be temporary. After two years, the Engineer Circular will either be revised, rescinded, or converted to an Engineer Regulation, which does not expire. Mark Limbaugh and I are reviewing the EC to make sure concerns we had regarding this program several years ago do not re-emerge. Comments should be directed to [www.regulations.gov](http://www.regulations.gov), Docket #COE-2020-0003. Also, see [Https://www.usace.army.mil/Missions/Civil-Works/Levee-Safety-Program/](https://www.usace.army.mil/Missions/Civil-Works/Levee-Safety-Program/).

13. EPA: Endangered Species Act Consultation Process for Pesticides

EPA earlier this month, in collaboration with federal partners, met a congressional commitment by submitting its second report to Congress highlighting the progress achieved to date with creating a more efficient and effective review process regarding pesticide impacts under the Endangered Species Act (ESA). Highlights of the report include:

• How a new method announced in March 2020 for conducting biological evaluations under the ESA will assure that pesticide registration review actions under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) do not jeopardize endangered species;
• How incorporating recent revisions to regulations associated with the ESA consultation process helps with efficiency across agencies; and,
• What the agencies are doing to improve communications and outreach, and how they are actively soliciting stakeholder feedback and engagement during the consultation process.

The ESA is a proven and critical tool for ensuring the recovery and protection of the nation’s most vulnerable species and habitats. However, for decades EPA’s approach for assessing pesticides risks to endangered species resulted in costly, time-consuming litigation and delays in pesticide registration decision-making. As directed by Congress through the 2018 Farm Bill, EPA, DOI, U.S. Department of Commerce, USDA, and the White House Council on Environmental Quality established an interagency working group (IWG) in 2018 tasked with providing recommendations and implementing a strategy to improve the ESA consultation process for pesticides. The first report from the IWG was submitted to Congress last December and identified several proposals to
improve the ESA consultation process for pesticide registration and registration review, plans for implementation of those proposals, and areas of consensus and continuing topics of debate.

EPA’s decision was questioned by some environmental organizations but welcomed by many agricultural groups, including the Alliance. EPA in the Northwest had previously failed to establish clear procedures for its pesticide effects determinations and subsequent actions consistent with 1988 amendments to the ESA. This had resulted in unnecessary restrictions without any indication that Pacific Northwest salmon would benefit.

**14. EPA / Corps: Clean Water Act “Waters of the U.S.” Litigation**

Attorneys with Clean Water Act (CWA) resumes are a busy lot these days, as courts across the country wrangle with legal interpretations of the landmark environmental law, which turns 50 in two years. The new Trump Administration “waters of the U.S.” (WOTUS) rule is the target of much of the litigation, while implications of an important recent Supreme Court CWA groundwater case are only now becoming more fully realized. A federal judge in San Francisco last month denied a motion by a coalition of Democratic state attorneys generals to issue a nationwide injunction of the Trump Administration’s new regulation over which “waters of the U.S.” are protected under the CWA. In his ruling, U.S. District Court Richard Seeborg found that the plaintiffs did not show they had a strong enough challenge to the Navigable Waters Protection Rule to warrant a preliminary injunction. Hours later, a different federal judge in Colorado granted that state's request to put implementation of the WOTUS rule on hold in the state. U.S. District Court Judge William Martinez concluded that the state was likely to succeed in proving that the Trump Administration's definition of WOTUS violated the Rapanos ruling and would ultimately be struck down. The new WOTUS rule is in effect in 49 states as of June 22.

The number of parties battling over the controversial rule is growing, and appears to span the political spectrum. Conservative private property interests, environmental groups, industry, and tribes have all joined the fray over the new WOTUS rule. With all these various parties and with court actions scattered across the country, uncertainty will abound, particularly in the near-term. The litigation will undoubtedly run beyond Election Day, so the future of this WOTUS rule likely depends on whether Trump wins a second term. However, Judge Seeborg’s decision to date is likely the one that has greatest bearing in the coming months. Alliance General Counsel Norm Semanko believes Judge Seeborg’s decision is the most significant development so far. It means there will be no nationwide preliminary stay on the Trump Rule while the litigation proceeds. The Alliance spent considerable time as the Navigable Waters Protection Rule was being developed, and provided multiple formal comment letters to the federal agencies over the past three years. Overall, we are supportive of the new rule.

**15. White House: NEPA Overhaul**

The White House Office of Information and Regulatory Affairs within OMB has completed its review of the Trump Administration’s recent overhaul of regulations implementing the National Environmental Policy Act (NEPA). The proposed plan would, among other things "streamline"
environmental impact statements (EIS) under NEPA by setting two-year time limits on federal agency analyses and limiting EIS documents to 150-pages. The proposal would also remove consideration of a project's "cumulative" impacts on the climate and proposes to remove "conflict of interest" provisions for those conducting environmental reviews. The final rule could be released by the Council on Environmental Quality (CEQ) any time.

DEVELOPMENTS IN CONGRESS

Mark Limbaugh reports that the Senate has limited time until the August recess to take up another COVID-19 stimulus bill, deal with 12 FY 2021 appropriations bills, and consider pent up energy and climate legislation, along with moving the confirmations of a list of Trump Administration nominees to head up federal agencies and fill empty federal judgeships. Senate GOP leaders have yet to begin negotiations on yet another COVID-19 stimulus, but with the Administration and congressional Democrats clamoring for more pandemic relief for state and local governments, individual stimulus checks, unemployment extensions and possibly more small business aid, we believe bipartisan, bicameral stimulus talks with the White House may begin again sometime in July. Senate appropriators are still deadlocked over potentially controversial Democrat riders on FY 2021 spending bills but talks continue to break the log jam in order to move some or all of these bills prior to the August recess. House Appropriations Subcommittees are scheduled to begin marking up their FY 2021 spending bills after the July 4 break, with the goal of passing the bills on the House floor before August. The House and Senate are in recess this week, but the House will be holding “Committee Work Days” all week. No votes are scheduled in either chamber until the week of July 20.

16. Appropriations

Mark Limbaugh reports that The House Appropriations Committee has set a frantic schedule in July for subcommittee markups of FY 2021 spending bills, with Interior–Environment (Interior Dept./EPA) and Energy–Water (Army Corps/Bureau of Reclamation/Energy Dept.) bills to be released today along with several other House spending bills. House Leadership plans to pass all 12 FY 2021 spending bills by the end of the month. Mark believes it is likely that the House will move the spending bills in multiple packages, known as minibuses, or a single package of legislation, known as an omnibus. FY 2021 funding levels are set at similar levels to the current fiscal year, with only a $5 billion total increase across the government above current spending levels.

To help move things along this summer, House leadership has called for most amendments or riders on FY 2021 spending bills to be settled in committee rather than in a partisan floor fight that could stall progress on all spending bills. Controversial riders have in the past stalled legislative progress, and there appears to be several areas where that could happen again this year, such as potential riders over confederate flags, environmental or climate policies, and funding for continued construction of the wall at the Mexican border. Top Democratic and Republican appropriators have had success in moving spending bills through committee in the past by agreeing to leave out such partisan provisions.
As House markups get underway, the Senate has already stalled on their work on FY 2021 spending bills over a partisan dispute with Democrats saying they want to offer provisions related to the pandemic, which the GOP says should be considered as part of separate emergency spending legislation. Regardless of what progress is made, it is widely expected Congress will need to pass a stopgap continuing resolution (CR) to avert a shutdown when the new fiscal year begins, and current funds run out on October 1. Mark expects the CR to run at least through the elections and perhaps until the next presidential inaugural, potentially leaving it to a new Administration and Congress to wrap up FY 2021 spending work.

ALLIANCE INITIATIVES

17. 2021 Annual Conference Location

The board of directors in May authorized the Alliance to enter into a contract with the Silver Legacy in Reno (NEVADA) for our February 2021 Annual Conference. I executed that contract on behalf of the Alliance last week.

18. Western Water Infrastructure

Several legislative vehicles are emerging to carry a series of Western water infrastructure bills introduced in the 116th Congress, including a $1.5 trillion infrastructure and stimulus bill that was passed by the floor of the House of Representative before the July 4 recess. These developments are discussed further below.

a. H.R. 2 – “Moving Forward Act”

Last week, in a near party line vote, the House passed an aggressive $1.5 trillion infrastructure package, the Moving Forward Act (H.R. 2). Going beyond routine highway and surface transportation funding, the legislation provides $500 billion in highway and transit funds, $100 billion for schools, $100 billion for affordable housing, $100 billion for broadband, $70 billion in investments in the electric grid, $30 billion for hospitals, and $25 billion for the Postal Service. The measure also includes $82.49 billion for water infrastructure, including $10 billion for the Corps construction account, $750 million for Reclamation’s storage account, $700 million for water management improvements, $500 million for water recycling, $200 million for desalination and $150 million for environmental restoration, watershed health and drought preparedness.

i. Water Right Settlement Provisions of H.R. 2

Division L of the bill- “Public Lands, Tribal Communities, and Resilient Natural Infrastructure” - includes a water resources infrastructure title with provisions for tribal water settlements, water management and restoration activities, water resources research, and groundwater recharge planning. The Senate earlier in June approved a package of tribal water settlement bills similar to those included in Division L, including S.886, from Sen. Tom Udall (D-NM). The Indian Water Rights Settlement Extension Act would extend the Reclamation Water Settlements Fund
established in the Omnibus Public Land Management Act of 2009 (P.L. 111-11) for 20 years. In early 2019, the Alliance conditionally supported the intent of this legislation, since water rights settlements will continue to move forward, with or without the fund. Future settlements that are authorized by Congress will hit the Bureau of Reclamation’s budget even harder.

**ii. Western Water Infrastructure and Drought Resiliency Provisions**

Subtitle B of this division is the *FUTURE Drought Resiliency Act*, an updated version of a discussion draft bill crafted by Rep. Jared Huffman (D-CALIFORNIA) and released for public comment in January 2020. This subtitle provides approximately $3.5 billion for Western water infrastructure and drought resiliency measures, including $750 million for sustainable, multi-benefit water storage projects; $500 for water recycling and reuse projects; and $260 million for innovative water desalination projects. Significant investment and support are also provided for important water infrastructure projects and measures intended to address fish and wildlife species decline in areas of the West. It includes numerous bills approved by the Committee on Natural Resources during the 116th Congress, including H.R. 4891 (Torres Small – NEW MEXICO), H.R. 3723 (Levin – CALIFORNIA), H.R. 5347 (Cox – CALIFORNIA), and H.R. 1162 (Napolitano – CALIFORNIA), as well as western water infrastructure priorities publicly requested and informed by numerous stakeholder organizations, including major water utilities, cities, water districts, conservation organizations, and tribes.

The water subtitle builds on the oversight work of the House Water, Oceans and Wildlife (WOW) Subcommittee chaired by Rep. Huffman in the 116th Congress. In 2019, the Subcommittee held several hearings to inform the development of “sustainable water policy”. Alliance representatives testified at several of those hearings. We reviewed the discussion draft and, working with our members, developed a detailed comment letter for Subcommittee staff earlier this year. Certain provisions in the legislation raise concerns, while others address matters important to our members. As previously reported, the Alliance supported two of the proposed amendments to H.R. 2, one offered by Rep. John Garamendi (D-CALIFORNIA) and the other by Rep. Jim Costa (D-CALIFORNIA). Neither was included in the package that was debated by the House last week. TFG prepared a detailed memo breaking down the 2,300+ page bill, including the nearly 400 amendments, which I shared with you earlier today. President O’Toole, Mark Limbaugh, and I later this week will discuss putting together a summary of what we like and do not like about H.R. 2, which we will share with you for your input.

**iii. Stakeholder Reaction to H.R. 2**

Several urban water agencies and conservation groups have expressed support for all or part of the *FUTURE Drought Resiliency Act* or the draft legislation it is based on. The urban entities are likely interested in the $500 million H.R. 2 provides for recycling programs and $260 million for desal projects, among other provisions. Conservation groups support the overall climate change focus of H.R. 2 and billions of dollars provided for fish and wildlife conservation programs. However, industry groups including the American Farm Bureau Federation, Agricultural Retailers Association and American Petroleum Institute took issue with provisions to increase limits on the electric vehicle credits and expand infrastructure like charging stations, among others. They
argued that Congress should “maximize investment dollars in infrastructure that benefit all Americans, not a small subset of the automobile fleet.”

iv. The Fate of H.R. 2

While both Senate Republicans and the White House have expressed desire to pass a bipartisan infrastructure package, the White House issued a veto threat for the bill in its current form. The package is “heavily biased against rural America,” the White House said. Senate Majority Leader Mitch McConnell deemed it "dead on arrival" calling it a "multi-thousand-page cousin of the Green New Deal masquerading as a highway bill." In Congress, lawmakers seek “payfors” to offset spending or tax cuts contained in bills. A “payfor” is necessary under “paygo” rules that do not allow legislation to be financed through deficit spending. In the past, “paygo” rules have been suspended for certain emergency legislation. The bill would still need to be reconciled with infrastructure legislation from the Republican-controlled Senate moving forward. So, right now, it is unclear how much of the bill will ultimately be enacted.

That said, the package will serve as a starting point for negotiations with Senate Republicans on reauthorizing surface transportation programs, which expire on September 30, as well as negotiations on further coronavirus recovery funding or stimulus programs. It will also certainly serve as a template for Democrats' action on climate change (see related discussion under Item 18) in the next Congress, should they capture the White House and Senate.

b. Water Resources Development Act (WRDA) of 2020

While Democrats and Republicans have disagreements over the House infrastructure bill, we have been told there is bipartisan consensus regarding WRDA. House Transportation and Infrastructure (T&I) Chairman Peter DeFazio (D-OREGON) has included GOP Members in drafting the water legislation and expects the bill to be released sometime this month. Meanwhile, the Senate EPW Committee has approved two water bills (America’s Water Infrastructure Act and Drinking Water Infrastructure Act) and a transportation bill on a bipartisan basis, and has floated the idea of combining all three in an infrastructure package. Congress has made it a priority to pass a WRDA bill every two years, with a Senate version (the America’s Water Infrastructure Act (AWIA)) already approved by the EPW Committee for a future Senate floor vote. WRDA is a biennial piece of legislation that is the main vehicle for authorizing water projects to be studied, planned, and developed by the Corps. It is also the legislative vehicle for implementing policy changes with respect to the Corps’ water resource projects and programs. As such, this legislation is important to the rural communities of the Western United States.

Family Farm Alliance President Pat O’Toole in September 2019 testified before the EPW Committee, which held a brainstorming hearing on ideas for the 2020 WRDA. The Alliance also developed a comment letter that was transmitted to the EPW Committee before the markup. Our position assumes that the Senate WRDA under consideration will not necessarily be a Corps-centric bill, but could provide a vehicle to address other national and Western water resources challenges, as well. This has happened in past Congresses, with the passage of the WIIN Act of
2016 and AWIA of 2018. We believe a Western water title of the bill could provide a vehicle for several other water bills currently being considered in Congress, although recent indications suggest that will be an uphill battle.

c. Wyden – Merkley Water Bill

U.S. Sens. Ron Wyden and Jeff Merkley (D-OREGON) last week introduced legislation intended to help communities in Oregon and across the West experiencing high levels of drought. Their bill is intended to improve water access for agriculture and conservation by funding projects that improve dam safety, create more resilient watersheds, and benefit agricultural and urban water users. We had some constructive conversations with Senator Wyden’s staff as that bill was being drafted, and we definitely influenced the WaterSMART provisions. However, we also have some of the same concerns as we do with some of the environmental provisions of H.R. 2 (above), which we shared with the Wyden shop. I was quoted in the Merkley-Wyden press release on this matter, and noted that we appreciated Senator Wyden’s leadership and look forward to closely working with the Senator to “improve specific provisions to ensure the bill’s effectiveness and purpose is achieved in a way that works for all water users”.

d. Public Lands Bill

Last month, the Senate voted 73-25 to pass S. 3422, the “Great American Outdoors Act” (GAOA), that would permanently and fully fund the Land and Water Conservation Fund for the first time since it was created in 1964 at $900 million annually, paid for by offshore oil and gas revenue. The bill would also create a five-year trust fund to draw down some of the $20 billion backlog of deferred maintenance projects at national parks and other public lands around the country that are managed by DOI. Senate Leadership decided not to allow any amendments to be considered on the bill during final debate. One of those proposed amendments, crafted by Senator McSally (R-ARIZONA), would have provided financing provisions to help the Bureau of Reclamation – the nation’s largest wholesale water provider – address aging infrastructure challenges.

The Alliance and several other Western water interests sent letters requesting support from Majority Leader McConnell and Minority Leader Schumer for the inclusion of Senator McSally’s amendment in S. 3422. “GAOA provides direct funding for deferred maintenance for every federal asset management agency within the Department of the Interior, except Interior’s primary water management agency – Reclamation,” the Alliance letter stated. The Alliance shared the letter with Western Senate Members, encouraged them to support this amendment, and urged association members to send similar letters to their Senators. We had an opportunity to address pressing maintenance needs within all of the resource management agencies at Interior, including Reclamation. Unfortunately, no amendments on the GAOA were allowed by Senate leadership.

The bill now moves to the House, where a bipartisan majority stands ready to pass the bill and move it to the President’s desk, who has indicated he would sign the legislation. Interior Secretary David Bernhardt sent House Natural Resources Chairman Raúl Grijalva (D-ARIZONA) a letter,
urging quick passage of a “clean bill”. House Minority Leader Kevin McCarthy (R-CALIFORNIA) has also endorsed the bill. The bill will go through the House Rules Committee before coming to the floor, potentially allowing members to file amendments they would like to see made to the final bill. However, there has been no indication from House Democratic leadership as to whether such amendments will be allowed, similar to the Senate process. If amendments are considered, we will work with our allies to mount an effort similar to what we attempted in the Senate.

e. Other Alliance Efforts

The Alliance - working with the California Farm Bureau and Western Growers Association – in April sent similar letters to Congress and the White House, urging that aging Western water infrastructure be addressed as further measures are considered to help the U.S. economy recover from the ongoing coronavirus crisis. The letters were signed on to by over 150 Western water and agricultural interests. The Alliance recently worked with its member irrigation districts to compile a list of such projects West-wide. It is staggering in its breadth, and amounts to $6.8 billion dollars. Most districts are struggling to find affordable financing to get these projects done.

Last month, the Alliance widely circulated an opinion piece co-signed by National Water Resources Association President Christine Arbogast and Alliance President O’Toole, advocating that the time is now for Congress to invest in Western water infrastructure. Pat and Christine have been invited to participate in a podcast interview with the International Real Estate, Inc., whose real assets advisor saw the column in the Reno Gazette. This podcast would appear on the Institutional Investing in Infrastructure website (https://irei.com/institutional-investing-infrastructure/), as well as on iTunes, Stitcher and Podomatic. The Alliance last month also distributed a video that underscores the importance of investing in Western water infrastructure, prepared by Alliance member Farmers Conservation Alliance. Finally, I briefed the Intermountain West Joint Venture (IWJV) Government Relations Committee on June 19 on some of the key water infrastructure bills in Congress. IWJV understands that sustaining agricultural irrigation is absolutely critical to meeting the needs of waterfowl and other wetland-dependent migratory birds.

19. Climate Smart Agriculture

The Alliance continues to engage and discuss potential effects and impacts of climate change in the West, building upon the interest created by the Alliance’s report on climate change that was issued in 2007 and active engagement addressing climate change on Capitol Hill. The Alliance board of directors at its 2020 annual meeting supported its long-time policy of using climatic extremes and findings from its climate change report to advocate for “climate-smart” agriculture and needed changes in Western water policy. Through our involvement on the Steering Committee of the North American Climate Smart Agriculture Alliance (NACSAA), we have been monitoring United National global climate talks over the past two years and bringing the voice of North American producers and land managers to the discussion table. NACSAA believes public policy should provide incentives for climate-friendly and common-sense farm improvements.
NACSAA last month submitted a detailed set of policy and program recommendations to the Senate Democrats' Special Committee on the Climate Crisis. The submission, which was made in response to the Committee's request for input from agriculture and rural leaders, represents a collaborative effort by NACSAA's partners to call attention to the profound and critical role agriculture plays in bridging gaps in policy arenas - from food security and nutrition, to energy and national security, to rural development and job creation, to environmental protection and climate mitigation. The Family Farm Alliance later this summer will likely play a key role in crafting the water recommendations for a white paper that NACSAA will drop into United Nations Food and Agriculture Organization global climate change discussions.

Much of the Alliance’s recent work in the climate arena is done through our involvement with Solutions from the Land (SfL), which was created seven years ago as an ambitious undertaking to advance land-based solutions to global challenges. SFL’s vision is that, by 2030, America's farms, ranches and forests are at the forefront of resolving food system, energy, environmental and climate challenges and achieving global sustainable development goals.

a. House Democrats Select Committee on the Climate Crisis Report

Many see H.R. 2 (see related discussion, Item 17a, above) as a messaging document from Democratic leadership, similar to the Select Committee on the Climate Crisis report released last week. This committee is charged with delivering ambitious climate policy recommendations to Congress, in order to achieve substantial and permanent reductions in pollution and other activities that contribute to the climate crisis. The long-awaited document, which runs 538 pages, was crafted largely without input from Committee Republicans and is widely seen as a climate guide for Democrats if they win control of government in 2021. Amid widespread protests over racial inequality, environmental justice is a focus throughout the report. That includes an environmental justice enforcement push at EPA and a new proposed amendment to the Civil Rights Act to protect victims of environmental and climate injustice. The full report can be accessed here and a one pager on the ag chapter can be seen here.

In a statement released last week, SfL applauded the House climate change report's authors for recognizing the critical role America's farmers, ranchers and foresters can play in providing valuable climate and ecosystem services. Among the noteworthy recommendations are proposals to boost conservation technical and financial assistance funding; provide crop insurance discounts to producers who adopt climate smart agriculture practices such as no-till and cover crops; implement a low carbon fuel standard to enable the full potential of biofuels to be realized; increase funding for agricultural research and USDA's Climate Hubs; and incentivize farmers and ranchers to incorporate energy efficiency and generate renewable energy.

Still, a number of provisions will require additional review, possibly with an eye toward what might be more reasonable and effective means by which the sector can take on the ever-growing crisis. While the report calls for investments in water storage and infrastructure, it falls short in its consideration of how water should be allocated, especially given the increasing demand placed on water resources by expanding metropolitan areas at the expense of rural and agricultural needs. While consideration is given by the report for the water needs of fish and wildlife, it appears to
come at the expense of the needs of U.S. farmers, who, without adequate access to water, could not maintain their status as the providers of food, feed, fiber, clean energy and a host of ecosystems services. With a focus on the negative environmental impacts of dams, the report undercuts the multiple benefits and essential nature of dams to Western irrigated agriculture and rural communities.

Many other industry groups that did weigh in on the report were not especially enthusiastic. The National Cattlemen’s Beef Association, for example, said the plan was “unfortunately the product of partisan discussions that failed to encompass important constituent communities across the country.” We are still digesting the full report, and would welcome your feedback on the report.

b. Other Efforts in Congress

Most pieces of the climate blueprint are not likely to go anywhere during this Congress, considering Republicans widely oppose the plan and lawmakers are more focused on managing the pandemic and recession. But there is some bipartisan interest in advancing climate-friendly farm policies. Rep. Josh Harder (D-CALIFORNIA) will introduce a bill that would set up a $2.5 billion grant fund to help farmers invest in more fuel efficient vehicles, sequester carbon in their soil, and make other changes aimed at cutting greenhouse gas emissions, according to POLITICO. The bill is backed by both ag and environmental groups. Co-sponsors include California Democrat Representatives T.J. Cox and Jim Costa. A bipartisan group of senators, including Senate Agriculture ranking member Debbie Stabenow (D-Mich.), introduced a measure aimed at legitimizing carbon markets in the ag sector. The bill is backed by the American Farm Bureau, as well as a long list of food companies and other corporations interested in carbon offsets.

20. **County of Maui v. Hawai'i Wildlife Fund**

As previously reported, the 9th U.S. Circuit Court of Appeals has remanded *County of Maui v. Hawai'i Wildlife Fund* back to the U.S. District Court for the District of Hawaii, which earlier determined that Maui County violated the CWA with its discharges of a pollutant to groundwater. The Alliance signed on to an amicus brief that was submitted to the Court for this case. In deciding the case, the U.S. Supreme Court last month determined that federal permits would be required for discharges to groundwater if it is the “functional equivalent of a direct discharge”, yet another litmus test for CWA jurisdiction over discharges of a pollutant. The high court sent the decision back to the 9th Circuit to revisit its conclusion that a CWA permit was required for a Maui County wastewater reclamation facility discharge of effluent to the groundwater, asserting that the polluted effluent that traveled through groundwater to the ocean was “fairly traceable” to the facility.

While individual States must be allowed to exercise primacy and make future NPDES permitting decisions, it falls to EPA to provide guidance to the States and the regulated community regarding discharges to ground water, particularly any exemptions that may apply. However, it appears that EPA is grappling with its options for providing policy “clarity” to the Supreme Court’s decision, including potential rulemaking, guidance, and other measures. Recent comments by a regional administrator for EPA suggests the agency may be thinking of passing the buck to the states for
determining what a “functional equivalent” is rather than doing guidance or rulemaking on the
ground water conduit issues, at least in the immediate future. We will continue to dig into this and
work with our allies to find ways to best influence this matter.

WESTERN HOT SPOTS

21. Colorado River
There’s been growing recent media coverage about recent farmland acquisitions being made in
Colorado’s Grand Valley by Water Asset Management, a New York City-based hedge fund with
deep pockets, including this story, which ran in the May edition of “Inside Climate News”. This
coverage is generating concerns from others on the West Slope, who fear that speculators are
buying farmland in the Grand Valley, hoping to make money by sending the water downstream to
California. Check out the guest column by Greg Walcher, president of the Natural Resources
Group and a Western Slope native, which appeared in the Grand Junction Sentinel.

The University of Arizona Water Resources Research Center last month hosted its virtual annual
meeting in Tucson. Former Arizona Governor and U.S. Interior Secretary Bruce Babbitt and
Bureau of Reclamation Commissioner Brenda Burman were the two keynoted speakers. Mr.
Babbitt in May publicly rolled out his “better, more equitable pathway” for reducing the Colorado
River water deficit. It involves retiring several hundred thousand acres of irrigated agriculture,
mostly alfalfa and forage crops, which he claims consume more than 80% of total water use in the
Basin. He believes USDA’s Conservation Reserve Program could be employed to contract with
landowners to retire marginal and environmentally sensitive agricultural lands in exchange for
rent. Governor Babbitt at the meeting focused on the important, growing, and contentious issue of
water transfers, from within Arizona’s allocation, off the Colorado River to serve the urban areas
of central Arizona. He highlighted the problem that Arizona water law and policy have
“historically been an insider game,” that has not included all the important stakeholders necessary
to create robust solutions. He suggested that the legislature create a statutory committee with
representatives from all stakeholder groups tasked with developing legislation.

Commissioner Burman focused on the incredible progress made over the past 25 years in
managing the Colorado River, and the important role that the State of Arizona has played.
Reclamation is reviewing the effectiveness of the 2007 guidelines that address shortages and
surpluses of water, and efforts to conserve water in Lake Mead along the Nevada-Arizona border.
A draft is expected in August, and a final report in December.

Mark Limbaugh and I last month also worked with Senate Energy and Natural Resources
Committee staff on draft legislation that would address Department of Energy desal research,
modeling and other desal activities in the Lower Colorado River Basin. As drafted, the bill seemed
pretty benign to us.

22. California’s Central Valley
In a big win for Central Valley agriculture and water users and the Trump Administration, U.S.
District Court Judge Dale A. Drozd last month denied the motion for a preliminary injunction filed
by environmental groups as to Shasta Dam operations. This positive ruling is welcome news as it relates to the Administration's 2019 biological opinions and implementing the Bureau of Reclamation’s updated plan for the long-term operation of the Central Valley Project and the State Water Project. The tweet from the Interior Department can be seen here.

23. Klamath Basin (CALIFORNIA / OREGON)

The U.S. Supreme Court last month denied a petition requesting that it review a lower court decision that ruled Klamath Project irrigators were not entitled to compensation for the reallocation of water under the Endangered Species Act (ESA) in 2001. Klamath Project facilities divert and deliver water from Upper Klamath Lake and the Klamath River to approximately 175,000 acres straddling the Oregon – California border. The case arose after Reclamation precluded water deliveries in 2001 in order to maintain water elevations in Upper Klamath Lake for sucker species in Upper Klamath Lake that are ESA-listed as endangered and provide flows for coho salmon in the Klamath River. The plaintiffs in the case asserted that because water rights are property under state law, the federal government was required, under the Fifth Amendment to the U.S. Constitution, to pay compensation for taking the rights. The case, originally filed in the U.S. Court of Federal Claims in the fall of 2001, has had an extremely long history. A trial took place in the Court of Federal Claims in 2017. Ultimately, last year, the U.S. Court of Appeals for the Federal Circuit agreed with the trial court that the plaintiffs were not entitled to compensation because there existed senior, tribal rights for lake levels and flows in at least as great amounts as were required under the ESA. That logic meant that no property was actually taken, according to the trial court.

The petition for review to the Supreme Court – known as a petition for writ of certiorari – focused on fundamental misunderstandings and misapplications of Western water law by the federal courts, both of which are located in Washington, D.C. A multitude of public and private parties, including the Alliance, filed briefs supporting that the Court accept the case for review. The Alliance board of directors in March agreed to support the irrigator plaintiffs again as this case went before the Supreme Court. The Alliance and KWUA co-hosted two webinars to further brief interested parties on this matter in April.

In an effort to maximize public relations associated with the Supreme Court’s consideration the Klamath takings case, we worked with other amicus parties to maximize exposure of the takings case in the time period leading up to the hearing. Part of that effort included conversations with Kimberly Strassel, a member of the editorial board for The Wall Street Journal, which ultimately declined to weigh in on the matter. We generated quite a bit of other press in the weeks leading up to the SCOTUS decision, including a blog post on Water Wrights, a story in DTN Progressive Farmer, a guest column in Western Farmer Stockman magazine, and a guest editorial co-authored by Congressmen Greg Walden (R-OREGON) and Doug LaMalfa (R-CALIFORNIA) that appeared in the Washington Examiner.

The disappointing move by the Supreme Court was somewhat offset by last week’s announcement that the Senate had passed a critically needed fix to the 2018 WRDA that will provide relief to
Klamath Basin irrigators who have been hard-hit by drought. In 2018, WRDA included language that was essential for irrigators in the Klamath Basin to effectively use $10 million in drought relief funds that the lawmakers had previously secured. The new technical correction provides clear flexibility in how the relief may be used, enabling irrigators to access the funding when there is a severe shortage of water, like there is this summer. Senator Jeff Merkley (D-OREGON) used his seat on the Senate EPW Committee to include the language in the Senate’s WRDA reauthorization. With WRDA stalled, Senator Merkley pivoted and introduced the language with Senator Ron Wyden (D-OREGON) as a stand-alone bill. Rep. Walden introduced companion legislation in the House. With the bill’s passage in the Senate, the next step for it to be passed by the U.S. House of Representatives.

24. Columbia and Snake River Basins

The U.S. EPA issued a long-awaited CWA proposal to limit water temperatures along 900 miles of the Columbia and Lower Snake rivers, in Oregon and Washington, intended to protect endangered salmon from overheating. Actions to achieve the standards will likely center on operational changes at the 15 hydropower dams in the target area, as well as enhancements to cold-water flows from tributary rivers. Water managers believe bringing down water temperatures across such a large river system will be difficult.

ADMINISTRATIVE AND MISCELLANEOUS

- Jessica Fox, the senior technical executive with the Electric Power Research Institute has connected the Alliance with the coordinator for the National Alliance for Water Innovation (NAWI), who will reach out and invite us to participate in an interview focused on agriculture water issues. Jessica, who serves on the NAWI agriculture subgroup advisory committee, spoke at our 2020 conference, and was impressed with our organization.

- Rep. Scott Tipton (R-COLORADO) was defeated in a primary election last week by Lauren Boebert, a conservative restaurateur and gun-rights activist. Boebert — whose Rifle, Colo., restaurant advertises the fact that its wait staff open-carries firearms — hit Tipton for his record on immigration and co-sponsoring coronavirus legislation that would give aid to local governments. Mr. Tipton, a fifth-term congressman from Colorado’s Western Slope, has been a strong ally of the Alliance, and we worked with his office closely on low-head hydropower legislation that was signed into law by President Obama in 2013. Boebert will face Democrat Diane Mitsch Bush, who lost to Tipton in 2018 by 8 percentage points, in the November general election.

I appreciate all the helpful input I have received from many of you in the past month. Please do not hesitate to contact me if you have any questions about this report.
Today, the U.S. Bureau of Reclamation sent Congress the final Feasibility Report under Section 4007 of the Water Infrastructure Improvements for the Nation (WIIN) Act for the Friant-Kern Canal Middle Reach Capacity Correction Project. This marks a critically important step forward in restoring lost water capacity to the communities served by eight irrigation and water districts along the Friant-Kern Canal.

“Water is the lifeblood that supports our communities and the food we grow on the eastside of the Central Valley,” said McCarthy. “However, subsidence on the Friant-Kern Canal is adversely impacting many communities’ ability to get the water they contract and pay for through the canal, including in Kern and Tulare Counties.

“I want to commend Interior Secretary David Bernhardt and Bureau of

Page 13.B.29
Reclamation Commissioner Brenda Burman for their work on finalizing this feasibility report, which under the WIIN Act now makes this project eligible to receive construction funds from Congress. I also want to thank Friant Water Authority Chairman Chris Tantau, CEO Jason Philips, and other local stakeholders for their support and commitment to advancing this project.

“There is still work to be done, but Reclamation’s actions today represent a significant milestone in supporting the more than one million acres of farmland that provide sustenance to the United States and across the globe.”

The following statements were also issued on the feasibility report:

“Thanks to President Trump and Leader McCarthy, today’s resulting action furthers the Trump Administration’s commitment to America’s hardworking farmers who need water to feed our nation. Earlier this year, President Trump and I joined Leader McCarthy and other elected officials in the House in Bakersfield where the President [signed](https://www.whitehouse.gov) the ‘Memorandum on Developing and Delivering More Water Supplies in California,’ directing the Department to invest in western water infrastructure and provide water to California’s communities and farms.” – Interior Secretary David Bernhardt

“Addressing reliable water and power delivery in the west is a top priority for the Trump Administration, and the 50-year old Friant-Kern Canal is front and center. Restoring the capacity along the middle stretch of the canal is critical to providing reliable water supplies to one of the most agriculturally-productive regions in the nation. Thank you Leader McCarthy and colleagues for your strong support for the Friant-Kern Canal Middle Reach Capacity Correction Project.” – Reclamation Commissioner Brenda Burman

“On behalf of Friant Water Authority and its members, I want to thank Secretary
Bernhardt, Commissioner Burman, Leader McCarthy, and our other federal partners and congressional representatives who have helped maintain momentum for reaching this critical milestone. The nearly 15,000 farms and dozens of communities who rely on the Friant-Kern Canal are deeply appreciative of your leadership and support for this project, which is absolutely critical to maintaining jobs and economic prosperity for our agricultural communities in the San Joaquin Valley.” – Friant Water Authority Chairman Chris Tantau

“For nearly three years, Friant Water Authority staff and team of consultants have been working in partnership with the Bureau of Reclamation to assess the magnitude of the Friant-Kern Canal’s conveyance challenges, and developing alternatives for addressing it. This final study not only affirms that this project is feasible, but that it provides a high value for investment by local and federal partners.” – Friant Water Authority CEO Jason Philips

“As the southernmost district on the Friant-Kern Canal, the cumulative effects of the canal’s constriction land at our doorstep. And, as the single largest Class 2 water contractor, we live and die by our ability to recharge groundwater aquifers using canal supplies. With the feasibility study now complete, we can move forward to repairing the canal and restoring needed water supplies for our farmers and small communities who rely on the recharge water it delivers.” – Arvin-Edison Water Storage District President Edwin Camp

“Even if your job doesn’t have anything to do with agriculture, if you live in the San Joaquin Valley, water matters to your quality of life. Today’s milestone is a critical step in implementing a project that will help our region thrive as we work towards long-term groundwater sustainability.” – Porterville Irrigation District Chairman Eric Borba
“The full utilization of our existing water conveyance infrastructure, which includes the Friant-Kern Canal, is paramount to the long-term economic viability of production agriculture in the San Joaquin Valley. The Kern County Farm Bureau, its Board of Directors and members, and the communities it serves depend on accessibility to surface water supplies in order to maintain one of the most productive agricultural regions in the world. Therefore, the Kern County Farm Bureau is in full support of restoring the capacity of the Friant-Kern Canal, and is encouraged by Bureau of Reclamation’s development of the final feasibility report that will help make this into a reality.” – Kern County Farm Bureau President John Moore

“This repair is an essential project so that growers serviced by the Friant-Kern Canal can continue the essential service of producing food. As SGMA groundwater restrictions loom, every gallon of surface water provided is one less gallon of groundwater extracted.” – Tulare County Farm Bureau President John Guthrie

Background

- Built between 1939 and 1944, the Friant-Kern Canal is 152 miles long, delivering water from Millerton Lake to the eastern side of the Central Valley for irrigation and conjunctive use purposes, and terminates near Bakersfield, California.
- In 2017, the Friant Water Authority discovered significant subsidence (up to 2 feet in some areas) along 33 miles of the Friant-Kern Canal in Tulare and Kern Counties. The subsidence has reduced the canal’s capacity to deliver water by 60% to the Arvin-Edison Water Storage District, Delano-Earlimart Irrigation District, Kern Tulare Water District, Sausalito Irrigation District, Shafter-Wasco Irrigation District, South San
Joaquin Municipal Utility District, Tea Pot Dome Water District, and Terra Bella Irrigation District.

- In 2017, one of the wettest years in recent history, 300,000 acre-feet of water could not be delivered through the Friant-Kern Canal to those who contract and pay for it due to subsidence.

- In 2016, the bipartisan Water Infrastructure Improvements for the Nation (WIIN) Act, which was championed by McCarthy, was signed into law. Section 4007 of the law created a process by which water infrastructure projects, like the Friant-Kern Canal Middle Reach Capacity Correction Project, can be authorized by Congress and provided Federal funds of up to 50% of total project costs. With the U.S. Bureau of Reclamation (BoR) issuing a final feasibility report for the Friant-Kern Canal Middle Reach Capacity Correction Project, funds can now be requested by the U.S. Department of the Interior (DOI) and subsequently appropriated by Congress for construction of this project.

- The Friant-Kern Canal Middle Reach Capacity Correction Project Feasibility Report is the first such report to be sent by the DOI and BoR to Congress following enactment of the WIIN Act in 2016.

- Prior to the feasibility report being finalized, Congress already provided $4,550,000 to this project for studies and pre-construction work at the request of the DOI.

- The BoR estimates the Friant-Kern Canal Middle Reach Capacity Correction Project will cost $500,000,000, which will be financed through a combination of Federal and non-Federal funds. Specifically, this project will repair subsidence on the canal between Mile Posts 88.2 and 121.5.
DATE: July 13, 2020
TO: Executive Committee
FROM: Jason Phillips, CO; Don Willard, Business Administration Manager
SUBJECT: FY 2021 Draft GM Budget

SUMMARY:
Staff has developed a draft of the General Member Budget needs for FY 2021. The current FY 2021 Draft GM Budget, at $2,291,500, reflects an increase of $177.5 from FY 2020, at $2,114,000. This is an 8.40% increase overall.

The following categories reflect the larger increases or decreases being proposed.

**Special Counsel:**
For FY 2021 the Special Counsel category has increased $299.5K. This increase is the result of FWA’s actions in support of the litigation of the BiOps, (California vs. Ross), and CEQA, (TCCA / SWP Operation Plan), issues. The engagements with Kaplan, Kirsch Rockwell and Stoel Rives are the major additions to this category.

**Professional Support – Operations:**
This category is forecasted to have a $98K decrease for FY 2021 due to a reduced forecast in needs from consultants.

**Dues Fees and Contributions:**
For FY 2021 there is an increase of $26.5. This is the result of an anticipated increase of in the application fee to SWRCB, (Area of Origin application), of $15.5K, an estimated increase of in CVPWA dues, which is based on the number of FWA General Members and a $5K increase in TFRA contributions based on their approved budget.

**RECOMMENDED ACTION:**
Discussion item only, no action necessary.

**ATTACHMENTS:**
Draft FY 2021 General Member Budget.
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<td>SJV Blueprint</td>
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<td>Consulting for Settlement Discussions</td>
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<td>Science Funding (MBK)</td>
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<td><strong>Total Special Projects</strong></td>
<td>273,000</td>
<td>211,517</td>
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<td><strong>Total Budgets</strong></td>
<td>2,627,500</td>
<td>2,605,148</td>
<td>2,114,000</td>
<td>2,104,500</td>
<td>2,291,500</td>
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