Seepage Management Plan

Draft
September 2014

Subject to Revision

SAN JOAQUIN RIVER
RESTORATION PROGRAM

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List of Abbreviations and Acronyms

ASCE	American Society of Civil Engineers
BA	Biological Assessment
bgs	Below Ground Surface
BLSD	Below Land Surface Datum
BNLL	Blunt Nosed Leepard Lizard
CCC	Columbia Canal Company
CCID	Central California Irrigation District
CDEC	California Data Exchange Center
CDFG	California Department of Fish and Game
CDL	Cropland Data Layer
CEC	Categoircal Exclusion Checklist
CEQA	California Environmental Quality Act
CF	Cubic- Feet
CFR	Code of Federal Regulations
cfs	cubic-feet per second
CNDDB	California Natural Diversity Database
CVHM	Central Valley Hydrologic Model
CVRWQCB	Central Valley Regional Water Quality Control Board
dBA	A-weighted decibel
DEC	Design Estimates and Constructability
DMC	Delta-Mendota Canal
dS/m	decisiemens per meter
DTW	Depth to Water
DWR	Department of Water Resources
EA/IS	Environmental Assessment/Initial Study
EC	electrical conductivity
ECe	Electrical conductivity of soil-water extract
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
EM	Electromagnetic
EM38	Electromagnetic measurement device
EMh	Electromagnetic reading in the horizontal direction
EMv	Electromagnetic reading in the vertical direction
ESA	Endangered Species Act
ESBP	Eastside Bypass
ET	Evapotranspiration
ETM+	Enhanced Thematic Mapper Plus
FAO	Food and Agriculture Organization of the United Nations
FAPIIS	Federal Awardee Performance and Integrity Information System
FONSI	Finding of No Significant Impact
FSA	Farm Service Agency
GIS	Geographic information system

GPS	Global Positioning System
GW	Groundwater
HEC-RAS	Hydrologic Engineering Center's River Analysis System
HDPE	High-density polyethylene
ID	Identification
IDW	Inverse distance weighting
IGCE	Independent Government Cost Estimate
IRPGW	Local groundwater model near Sand Slough Control Structure
ITA	Indian Trust Asset
ITRC	Irrigation Training and Research Center
LiDAR	Light Detection and Ranging
LM	Local groundwater flow model
LOC	Level of Concern
LSJLD	Lower San Joaquin Levee District
LTAA	Likely to adversely affect
meq/100g	milliequivlevents per 100 grams
meq/L	milliequivelents per liter
MOA	Memorandum of Agreement
MODFLOW	Modular three-dimensional finite-difference groundwater flow model
mS/m	microseimen per meter
MW	Monitoring well
NA	Not available
NAIP	National Agriculture Imagery Program
NASA	National Aeronautics and Space Administration
NASS	National Agricultural Statistics Service
NAVD	North American Vertical Datum
NED	National Elevation Dataset
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NLTAA	Not likely to adversely affect
NPDES	National Pollution Discharge Elimination System
NRCS	National Resources Conservation Service
NRDC	National Resources Defense Council
NULE	Non-Urban Levee Evaluation
OLI	Operational Land Imager
OMB	Office of Management and Budget
OVS	Office of Valuation Services
pHp	pH paste
PVC	Polyvinyl chloride
PZ	piezometer
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
Reclamation	United States Bureau of Reclamation
RFP	Request for Proposal

RMC	Resource Management Council
ROD	Record of Decision
RPA	Reasonable and Prudent Alternatives
SJVAPCD	San Joaquin Valley Air Pollution Control District
SAR	Sodium Adsorption Ratio
SCTFG	Seepage and Conveyance Technical Feedback Group
SHPO	California State Historic Preservation Office
SJR	San Joaquin River
SJRRP	San Joaquin River Restoration Program
SJRRPGW	San Joaquin River Restoration Program Groundwater Model
SLCC	San Luis Canal Company
SLDMWA	San Luis Delta Mendota Water Authority
SMAQMD	Sacramento Metropolitan Air Quality Management District
SMP	Seepage Management Plan
SOW	Scope of Work
SSURGO	Soil Survey Geographic database
TEP	Temporary Entry Permit
TIRS	Thermal Infrared Sensor
TM	Technical Memorandum
TProGS	Transition Probability Geostatistical Software
USACOE	United Stated Army Corps of Engineers
USBR	United Stated Bureau of Reclamation
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VdB	Vibration decibels
WDL	Water Data Library
WSEL	Water Surface Elevation

1 Introduction

This Seepage Management Plan (SMP) for the San Joaquin River Restoration Program (SJRRP) describes: (1) the U.S. Bureau of Reclamation's (Reclamation) monitoring and operating guidelines for reducing Interim or Restoration Flows to the extent necessary to address any material adverse impacts caused by Interim and Restoration Flows in the San Joaquin River identified by the SJRRP groundwater monitoring program and (2) the prioritization of potential seepage impact areas for projects to increase channel capacity. The geographic scope of the SMP, referred to as the Restoration Area, is the area within five miles of the San Joaquin River and associated bypass system along the 150-mile portion of the river from Friant Dam to the confluence with the Merced River. This 150-mile portion and associated defined reaches are shown in Figure 1-1.

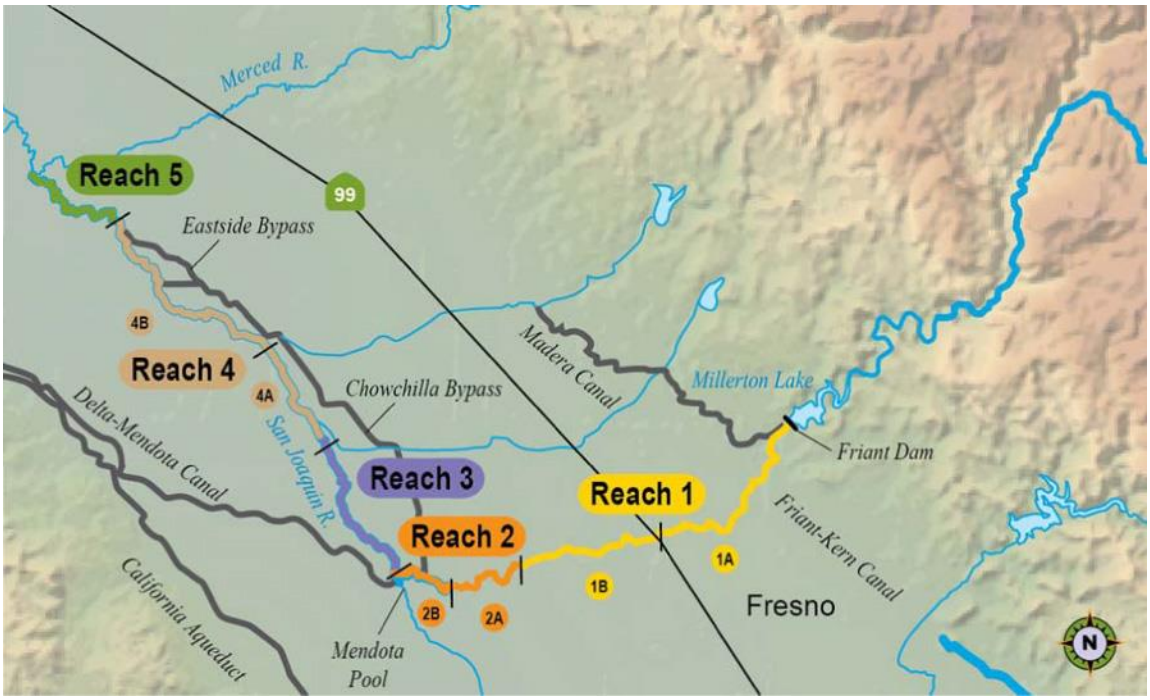

Figure 1-1.
San Joaquin River Restoration Program Area

The SMP is meant to be a dynamic and adaptive plan. Implementation of SJRRP activities over time will result in the development of new information. Reclamation anticipates subsequent revisions will be made to the SMP accordingly. The SMP provides the framework to facilitate this adaptive process. Stakeholder input and feedback has helped to shape this plan and will continue to improve the process.

The seepage-related effects considered in the SMP are related to the rising of the water table in areas where it is shallow and lateral flow through levees and associated seeps and rising of the water table in areas where it is shallow.

Two mechanisms may cause the water table to rise in association with Restoration Flows. These mechanisms differ depending on whether the river is losing or gaining at a particular area, as shown in Figure 1-2.

- Losing Reaches: Along reaches where the river/bypass water surface elevation (stage) is above the groundwater level, water flows from the river into the groundwater system. An increase in the river/bypass stage in losing reaches would cause additional water to flow into the groundwater system from the river. Increased seepage from the river/bypass system may result in increased groundwater levels.

- Gaining Reaches: Along reaches where the river/bypass stage is below the groundwater level, water flows from the groundwater system into the river. An increase in the river stage in gaining reaches would reduce the water flowing from the groundwater system into the river. This reduction in flow back to the river/bypass could result in increased groundwater levels.

In response to either of these two mechanisms, the water table will rise until equilibrium with surface water is established. In this document, all effects caused by groundwater rise associated with changes in river/bypass stage, regardless of mechanism, are referred to as *seepage effects*.

The effects of Restoration flows to the structural integrity of the levees, which includes underseepage, through seepage, and stability, will also need to be addressed by the SJRRP. However, Restoration Flows are currently being kept in-channel (below the landside ground of the levee) to avoid impacts on the levees. Therefore, monitoring and operating guidelines for reducing impacts to levees are not included in the SMP. The California Department of Water Resources (DWR) is currently developing a strategy to assist the program in addressing impacts to levees and future versions of the SMP may incorporate these strategies.

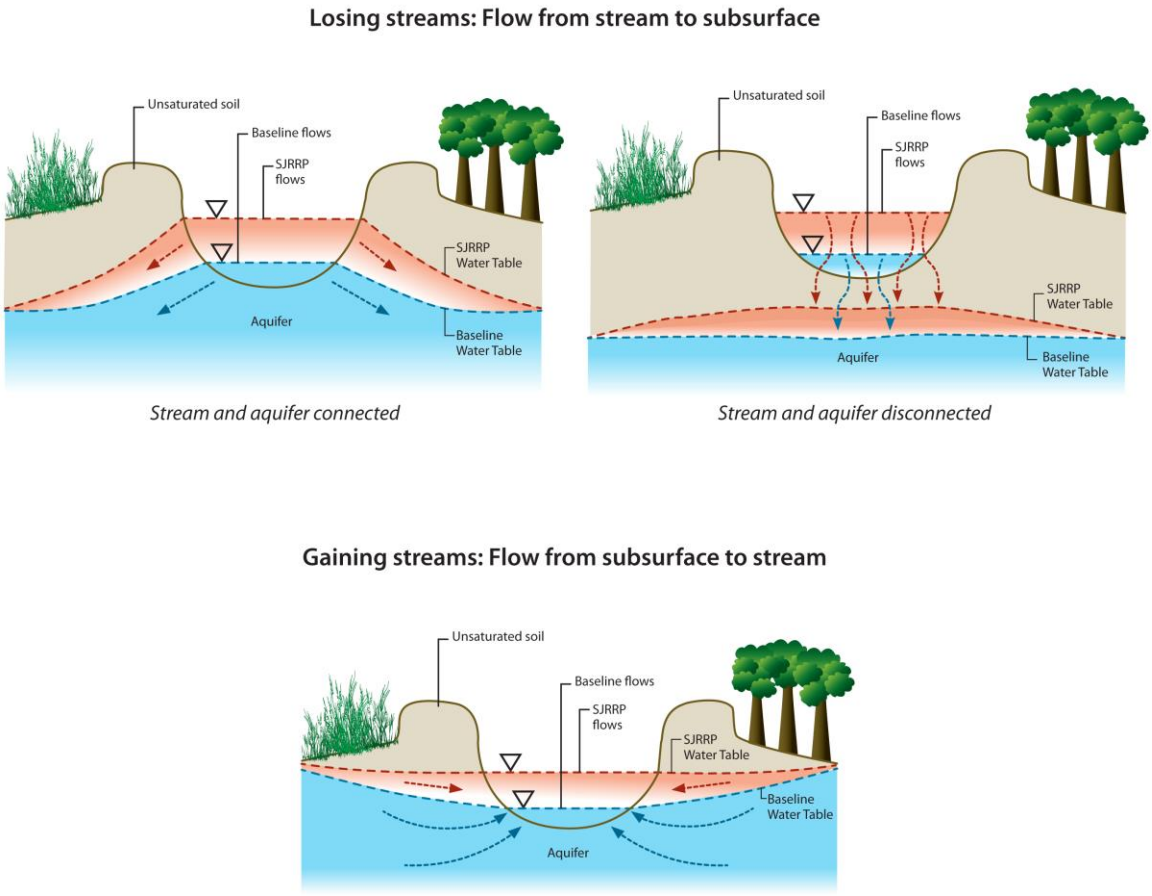

Figure 1-2.
Schematic Representation of Losing and Gaining Streams

The SMP provides a means to reduce or avoid risk of seepage impacts through a combination of monitoring and analyses to better understand and predict system response to Restoration activities, development of thresholds and response actions designed to reduce or avoid undesirable outcomes, and projects to prevent future impacts while allowing increased flows. Components of the SMP include:

- Purpose and Objectives: the purpose and intended outcomes of the SMP;
- Seepage Effects: description of undesirable outcomes and the processes that contribute to seepage.
- Locations of Known Risks: areas identified as at risk for seepage effects through landowner identified parcels, historical groundwater levels, the Central Valley Hydrologic Model (CVHM), and the current monitoring program.
- Operations Plan: procedures for assessing flow rates and responding to real-time concerns identified by monitoring and landowner feedback through making changes in flow releases.

- Monitoring Program: the data collection program including a series of telemetry, logged, and manually measured monitoring well transects and staff gages spaced roughly eight to ten miles apart with additional wells at locations identified by the SJRRP and landowners to document the hydrologic response to Interim and Restoration Flows, inform analyses, constrain modeling, and identify potential or actual seepage impacts. The SJRRP has currently installed over 200 monitoring wells and piezometers.

- Thresholds, Triggers, and Operational Criteria: groundwater levels that identify the potential for seepage effects, and events that result in increased scrutiny and provide operational criteria to restrict the magnitude, timing, or duration of flows.

- Site Visits and Response Actions: specific actions or alternative actions that will be implemented as necessary to meet operational criteria and avoid or reduce seepage impacts;

- Projects: potential modifications to reduce seepage effects and allow for higher flows that require independent, supplemental environmental documentation and regulatory review; and

- Revision Process: process for modifying and/or updating the SMP on the basis of information obtained during implementation of the SMP.

Data and tools to support the SMP include recent measurements, anecdotal evidence, hydrologic models, and analytical computations. Implementation of these tools requires a number of site-specific tasks to determine monitoring locations, install monitoring systems, establish thresholds, and prescribe response actions for various levels of SJRRP-induced changes. Local landowners can provide information to improve the effectiveness of the program including continued input through the Seepage and Conveyance Technical Feedback Group[1] (SCTFG) meetings. The main body of the SMP describes the components and interactions of operations to reduce or avoid seepage impacts. The following appendices contain supporting technical information:

A: Seepage Effects of Concern
B: Historic Groundwater Levels and Surface-Water Flow
C: Areas Potentially Vulnerable to Seepage Effects
D: Sediment Texture and Other Soil Data
E: Monitoring Network
F: Aerial Imagery, Remote Sensing Data
G: Soil Salinity Thresholds
H: Groundwater Level Thresholds
I: Groundwater Modeling

[1] The SCTFG is a group of interested stakeholders that includes Reclamation, members of the Settling Parties, landowners, and other interested entities. These meetings are open to the public. Meeting times and locations are posted on the SJRRP website at restoresjr.net.

J: Operations
K: Landowner Claims Process
L: Seepage Project Handbook
M: References Cited

The SMP is part of the project description for the SJRRP and the expected environmental impacts of implementing the SMP must comply with the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) criteria.

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2 Purpose and Objectives

The SMP will lead to conveyance of Restoration Flows while reducing or avoiding SJRRP-induced seepage impacts along the San Joaquin River and the Eastside and Mariposa Bypasses from Friant Dam to the confluence with the Merced River. The SMP addresses several components of the San Joaquin River Restoration Settlement Act, Public Law 111-11, which requires the Secretary of the Interior to:

1. Prepare an analysis that includes channel conveyance capacities and the potential for levee or groundwater seepage;
2. Describe a seepage monitoring program; and
3. Evaluate possible impacts associated with the release of Interim and/or Restoration Flows.

Though the plan does not assess flood impacts associated with the Restoration Flows with respect to the structural integrity of the levee, which include underseepage, through seepage, and stability, DWR is identifying potential strategies to assist the program in addressing flood impacts. As an initial step, DWR is identifying and prioritizing levees with the greatest impact from short term and long term restoration flows and performing geotechnical explorations. DWR will coordinate with SJRRP and provide data and analyses regarding the structural integrity of the levees for its consideration of incorporating management strategies in future versions of the SMP to address flood impacts.

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3 Seepage Effects

The SMP identifies and evaluates a physical impact by describing the measurable impact mechanisms, processes, and thresholds where actual or pending seepage could cause damage. Impact mechanisms under the SMP include:

- Waterlogging of Crops: inundation of the root zone resulting in mortality or reduced crop yields;

- Root Zone Salinization: salinity increases resulting in mortality or reduced crop yields; or

- Levee Impacts: movement of water through or underneath levees, commonly appearing as boils or piping (seeps), that may saturate the levee or transport foundation materials and compromise the short- or long-term integrity of the levee. Since the SJRRP is keeping flows in-channel, the SMP does not identify or evaluate the seepage effects associated with levee impacts. Future versions of the SMP may include information on DWR's strategies to assist the program in addressing seepage impacts to levees.

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4 Locations of Known Risks

This plan represents potential risks by sites and areas of likely or known vulnerability to seepage effects on the basis of:

- Mapped depth to the water table using measured water levels;
- Problematic areas identified by landowners;
- Analysis of flow, precipitation, and water-level data; and /or
- Simulation results using a regional hydrologic model, particularly in areas where water-level data are sparse.

Appendix C, Areas Potentially Vulnerable to Seepage Effects, includes documentation of these data and analyses. The analysis of potential risks documents local knowledge, assists in siting monitoring stations, and prioritizes projects.

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5 Monitoring Program

Reclamation monitors the effects of SJRRP activities which informs identification of when, where, what, and how potential response actions may be implemented. Thresholds, discussed in Section 6, are groundwater levels that suggest the need for potential response actions and/or additional data collection needs. The monitoring program informs modeling and analysis to evaluate strategies for implementing response actions. See Appendix E, Monitoring Well Network Plan and Other Seepage-Related Monitoring, for details on the existing Monitoring Plan and future directions.

Areas underlain by a shallow water table, herein referred to as shallow (less than 20 feet bgs) groundwater areas, are of particular interest in the monitoring program. The SJRRP has installed over 200 monitoring wells and piezometers as of mid-2014. The monitoring program includes:

1. Well transects spaced at roughly every eight to ten miles with four to six shallow monitoring wells (representative of the water table aquifer), a staff gage measuring river stage, and one to two deeper monitoring wells (potentially representative of the underlying semi-confined or confined aquifer) at each transect;
2. Additional shallow wells located in known shallow groundwater areas that may be affected by seepage, in collaboration with local landowners and the Central California Irrigation District (CCID);
3. Soil sampling and soil salinity surveys using electromagnetic (EM) methodology, in collaboration with local landowners; and
4. Reporting from local landowners on visual crop health, levee seeps, and other observations.

Figure 5-1 shows the current network of wells in the SJRRP monitoring program. Information from monitoring, analysis, and local landowners will be used to determine well locations, subject to potential access limitations. New information may indicate that wells should be added, decommissioned, excluded from particular cross-sections or otherwise modified in the future. The Monitoring Well Atlas, available on the SJRRP website (restoresjr.net), contains details of the monitoring well network and will be updated periodically as additional information is gained and wells are installed or modified.

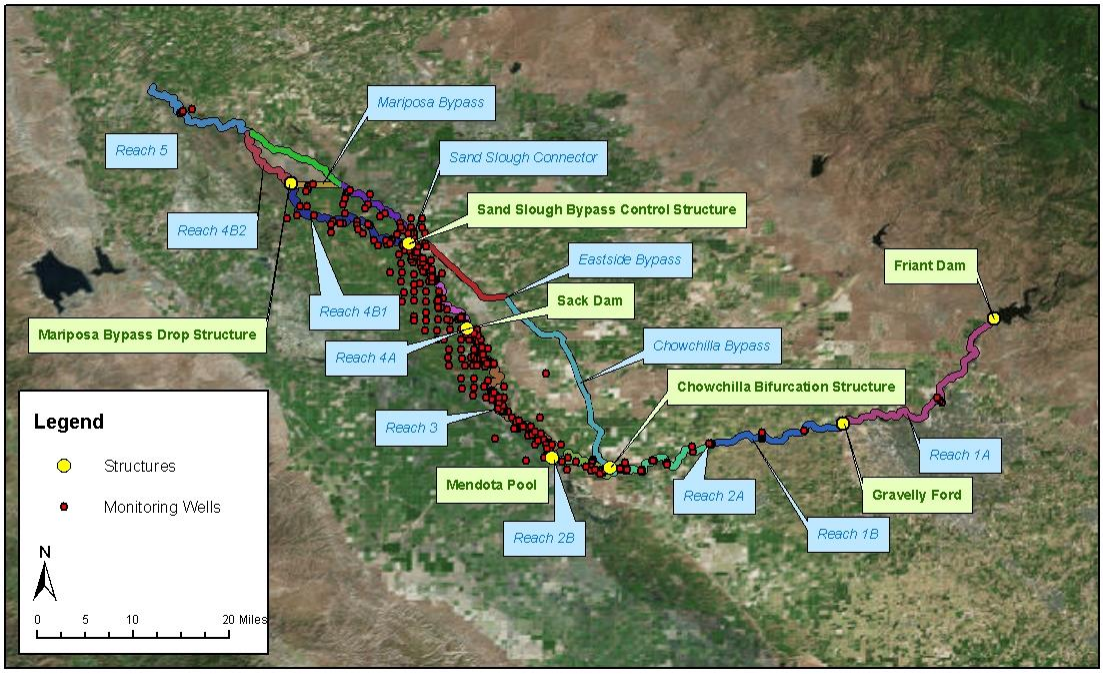

Figure 5-1.
SJRRP Monitoring Well Network, Including Stakeholder Wells

6 Thresholds

Thresholds identify transition points where seepage effects cross into a range that may cause damages. Thresholds also collect information before an impact occurs and provide time to initiate a response. Thresholds may take the following forms:

- Water Surface Elevation: measured elevation of the water surface in a well relative to a vertical datum.
- Depth to Water: measured vertical distance to the water surface in a well relative to the land surface.
- Root Zone Salinity: measured (using direct or indirect methods) salinity in the plow layer or root zone and/or distribution of salinity in soil profiles.

Groundwater levels shallower than a threshold indicates the potential for impacts in the absence of actions to avoid, minimize, rectify, reduce, or compensate for seepage impacts. Site-specific customization of specific thresholds will continue to be enhanced by coordination with local landowners and may depend upon characteristics such as:

- Local geology;
- Presence, design considerations, and state/condition of the levee system;
- Historical experience and areas of known historical seepage problems;
- Structures and operations;
- Soil salinity profile;
- Crop type; or
- Purpose of threshold.

Draft thresholds associated with the water table and monitoring thresholds for soil salinity in farmed shallow groundwater areas are shown in Table 6-1. The salinity thresholds apply only where current conditions are more favorable than the threshold values. If current conditions exceed threshold values, thresholds will be a specified change from current conditions.

Table 6-1.
Thresholds for Groundwater and Soil Salinity Underlying Agricultural Lands

Impact indicator	Threshold	Basis
Plow layer soil salinity (0-12 inches below land surface)	ECe[1] = 2.0 deciSiemens/m (ds/m) (See Appendix G)	Salinity affects germination or emergence of vegetable and other crops
Active root zone soil salinity (0-30 inches below land surface)	River-reach-specific; e.g., ECe[1] = 1.5 ds/m for reach 2B (See Appendix G)	Known salt tolerance for crops
Minimum depth to water table	Variable, depending on crop type, historical water levels, and local conditions (see Appendix H)	Waterlogging affects crop yields and increases soil salinity

[1] ECe is electrical conductivity of soil-water extract (saturation extract)

The SJRRP has identified specific groundwater thresholds for each well and priority wells for measuring groundwater thresholds in areas of known risk. There are two methods for determining the groundwater threshold. These include:

- Agricultural practices, and
- Historical groundwater conditions.

The thresholds are generalized, and adjustments may be required to account for on-site and/or seasonal conditions. Crop health can be affected by conditions unrelated to SJRRP activities, including various climatic conditions and other factors such as plant diseases. The procedures used for establishing thresholds are described in Appendix G, Development of Soil-Salinity Thresholds, and Appendix H, Development of Groundwater Level Thresholds.

7 Operations Plan

The approach to operations is a conservative, iterative one. Prior to an increase in the targeted Friant Dam release, the SJRRP conducts a Flow Bench Evaluation. The purpose of the Flow Bench Evaluation is to avoid seepage impacts through checking factors and reducing or eliminating the proposed increase accordingly. The SJRRP will estimate a release from Friant Dam, Mendota Dam, and Sack Dam that avoids seepage impacts. The SJRRP will estimate non-damaging flows by linking thresholds to river stage through a conceptual model. The conceptual model initially (and conservatively) assumes one foot of increase in river stage causes one foot of increase in groundwater and there is no groundwater gradient. If the monitoring program identifies areas where the conceptual model predicts overly conservative flow limits, the SJRRP may update flow releases based on site specific information. When the SJRRP cannot estimate a higher release that will not exceed a threshold, the stage or flow rate in the river becomes an operational criterion. An operational criterion is a specific measurable or observable criterion (such as a river stage) that indicates impending impacts, is established based on site-specific analysis, and will limit flow releases.

Flow Bench Evaluations analyze the following:

1. Conveyance Capacity: The evaluation attempts to avoid levee instability by limiting flows to the rated conveyance capacity of the channel.
2. Flow Stability: The evaluation will account for travel time and potential changes that may not have materialized since the prior change in releases by allowing flows to stabilize before the next change in releases.
3. Groundwater Projections: The evaluation attempts to avoid seepage impacts by predicting groundwater level rise from the proposed increase either a one foot increase in river stage equates to a one foot increase in groundwater level or evaluating drainage conditions, ensuring groundwater levels above the threshold are able to drain to the river or bypass. If groundwater levels are predicted to rise above thresholds, this triggers a site visit, prior to the change in flow.
4. Groundwater Telemetry: Avoid seepage impacts by monitoring real-time groundwater wells and conducting a site visit if levels are near thresholds.
5. Groundwater Manual Measurements: Groundwater wells are measured weekly to identify and avoid potential seepage impacts. A site visit would be conducted if groundwater levels are near thresholds.
6. Mendota Pool Operations: The analysis will attempt to avoid infeasible operations through coordination with Mendota Pool operators, including potential concerns regarding exchange contractor demand, water quality, and Central Valley Project South of the Delta operations.
7. Landowner Feedback (Seepage Hotline): Gathering data from Seepage Hotline calls and subsequent site visits attempts to avoid seepage impacts.

8. Operations Feedback: Providing feedback on operations will avoid infeasible operations and levee instability through coordination with the CCID, San Luis Canal Company (SLCC), and Lower San Joaquin Levee District (LSJLD) on potential concerns with the proposed flow increase.

In addition to Flow Bench Evaluations, the SJRRP conducts Daily Flow Evaluations when flows are above 475 cfs. Daily Flow Evaluations include documentation of the checks on conveyance capacity, Mendota Pool operations, and landowner feedback as described above. Daily Flow Evaluations also trigger site visits if real-time or measured groundwater levels are near thresholds.

Flow Bench Evaluations and Daily Flow Evaluations help the SJRRP avoid seepage impacts and document decisions to increase flows. These evaluations also trigger site visits and response actions based on SJRRP's monitoring network. An example Flow bench Evaluation is shown in Appendix J, Operations.

8 Triggers

Triggers describe when the SJRRP will take action through site visits and flow management. There are three different types of triggers. Two of these triggers are SJRRP actions. The third trigger allows landowners observations to initiate SJRRP action. These triggers include:

1. Flow Bench Evaluations: A site visit and response action is triggered when groundwater levels are predicted to rise above thresholds.
2. Daily Flow Evaluations: A site visit and response action is triggered when measured groundwater levels are at monitoring thresholds.
3. Seepage Hotline Call: A site visit and response action is triggered when landowners observe seepage-related issues.

Following a trigger, the SJRRP will initiate a site visit. The SJRRP may re-evaluate the estimated flow rate and/or the threshold as a result of information collected at a site visit.

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9 Site Visits and Response Actions

Site visits triggered by Flow Bench Evaluations, daily flow evaluations, or seepage hotline calls, collect a variety of information to inform management response decisions. Site visits provide an initial assessment to determine the type of impact, description of the seepage, the relationship to interim flows, the immediacy of the response, a recommended real-time response action, and any needed follow-up regarding projects. Site visits may include collection of field data and conversation with the landowner to gather the following types of data:

1. Landowner input on seepage effects;
2. River stage;
3. Soil texture;
4. Hand auger groundwater levels (allows rapid response rather than waiting for backhoe procurement or well installation);
5. Soil salinity (EM38 evaluations);
6. Information about existing infrastructure (e.g., drains, pumps, canals);
7. Crop health; and
8. Photos.

The operations for releasing Restoration Flows are designed to safely convey flows without triggering the need for response actions. If site visits are triggered, response actions will be evaluated and implemented as soon as practicable to avoid or reduce seepage impacts. Flood operations supersede SJRRP releases and may occur irrespective of groundwater monitoring. Potential response actions include:

1. Continue with Planned Releases. No seepage impacts are anticipated at the site based on the planned release schedule. Anticipated releases can occur.
2. Increased Monitoring. No seepage impacts are anticipated at the site for the near-term anticipated releases; however, an increased monitoring frequency will gather additional information to assist in evaluating the potential seepage impacts of future releases.
3. Flow Rate Adjustment. The conceptual model linking thresholds to river stage may be adjusted based on information gathered at the site visit. This may or may not create a new restriction on maximum release.
4. Threshold Adjustment. Information gathered at the site visits regarding crops, historical groundwater conditions, or drainage suggest the threshold(s) at the site be adjusted. The adjustment will be done in collaboration with the landowner.

5. Flow Response Actions: An immediate or future change in flows is needed to prevent material adverse seepage impacts. Potential flow response actions include:

    a. Restrictions on Maximum Release. Flow rates in each reach will be established below documented historical rates known to cause seepage impacts, to be accomplished through a combination of releases from Friant Dam, infiltration, and agreements with diverters.

    b. Restrictions on Ramping Rates and Duration. Limits on the incremental increases in flow rates provide the ability to evaluate the system response through the monitoring program while limiting the volume of upstream water if an impending impact is observed, measured, or predicted through simulation.

    c. Reduction of Restoration Flow Releases at Friant Dam. Reductions in Restoration Flows released from Friant Dam will limit the amount of water available to cause seepage impacts. Reductions at Friant Dam would need to consider travel time and the associated delay in response.

    d. Redirection of Flows at Chowchilla Bifurcation Structure. Directing flow into the bypass system at the Chowchilla Bifurcation Structure will provide a faster response for downstream reaches compared to Friant Dam operational changes. This response requires coordination with the LSJLD for such operations.

    e. Delivery of Flows to Exchange Contractors and Refuges at Mendota Pool. Delivery of water to Mendota Pool will reduce flows in Reach 3 and downstream. Use of diversion into Mendota Pool to reduce downstream flows requires coordination with the CCID and the San Luis Delta-Mendota Water Authority (SLDMWA).

    f. Delivery of Flows to Exchange Contractors and Refuges at Sack Dam. At times when the SLCC has canal conveyance capacity, additional water diversions at Sack Dam can assist with reducing potential seepage impacts in Reach 4A and downstream. Use of the Sack Dam response requires coordination with the SLCC.

    g. Redirection of flows at Sand Slough Control Structure. Currently, Restoration Flows will not be directed into Reach 4B of the San Joaquin River channel. In subsequent years, water causing concerns in Reach 4B may be diverted into the Eastside Bypass (ESBP). Use of the ESBP requires coordination with the LSJLD.

10 Projects

Potential future actions may be needed if meeting Settlement goals through specified Restoration Flows is sufficiently compromised by seepage-related constraints. Such actions may include real estate actions or structural additions. These actions likely would require landowner agreements and initiation of project-specific environmental documentation to comply with NEPA, CEQA, and other regulatory requirements. Potential future actions may include:

1. Easements and/or compensation for seepage effects;
2. Acquisition of lands;
3. Cut-off walls between the river/bypass and seepage-impacted lands to reduce water-table response to increased surface-water stage;
4. Seepage plugs to protect against levee failure;
5. Drainage interceptor ditches to lower the water table;
6. Interceptor drains to lower the water table;
7. Operation of new drainage and/or existing irrigation wells to lower the water table;
8. Building up the land surface; and/or
9. Conveyance improvements such as sand removal.

The SMP will not include design, environmental compliance, or construction of potential projects, but will assist in identifying such actions.

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11 Revisions

Updates to the SMP may include changes derived from data obtained through the monitoring program, results from improved modeling and analysis tools, modified objectives or thresholds, and/or identification of additional concerns that arise through SMP implementation. The steps for revising the SMP include:

1. Stakeholders may submit recommendations to the SJRRP Program Manager at any time;
2. The SJRRP Program Manager will acknowledge and respond to recommendations; and
3. A periodic review of the SMP through the SCTFG meetings may incorporate changes, including any new information such as the findings of a peer review panel.

The revision process sets the expectations for stakeholder and management participation. The SJRRP may not be able to commit to specific recommended actions, but all comments and recommendations will be considered.

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