

Definite Plan for the Lower Klamath Project

Appendix N – Groundwater Well Management Plan

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Table of Contents

1. Introduction	9
2. Management Plan	15
2.1 Database Search and Agency Coordination	15
2.2 Outreach to Land Owners and Residents	16
2.3 Installation of Groundwater Monitoring Wells	16
2.4 Groundwater Monitoring	16
2.5 Post-Dam Removal Outreach/ Notification of Findings	17
2.6 Proposed Actions	17
3. References	21

List of Figures

Figure 1	Identified Groundwater Wells within 2.5 Miles of J.C. Boyle Reservoir	10
Figure 2	Identified Groundwater Wells within 2.5 Miles of Copco Lake and Iron Gate Reservoir	11

Acronyms and Abbreviations

CDFW	California Department of Fish and Wildlife
DWR	California Department of Water Resources
OWRD	Oregon Water Resources Department
USBR	United States Bureau of Reclamation

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Chapter 1: Introduction and Purpose

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1. INTRODUCTION

The Project may impact groundwater levels in the immediate vicinity of the reservoirs. The United States Bureau of Reclamation (USBR) performed a desktop review of wells located within a 2.5-mile radius of the three main reservoirs (Iron Gate, Copco, and J.C. Boyle) of the Project and reported these well locations in the 2012 Final Environmental Impact Statement/Environmental Impact Report for dam decommissioning (USBR and CDFW 2012). The USBR concluded that additional monitoring work would be required before, during, and following dam decommissioning to better understand reservoir removal effects on the surrounding groundwater wells.

This Groundwater Well Management Plan identifies groundwater wells that the Project may adversely impact. If the Project adversely impacts groundwater wells, KRRC will take steps (e.g., well deepening) to return the production rate of any affected domestic or irrigation groundwater supply well to conditions prior to dam decommissioning. There are five steps in this plan:

1. Database Search and Agency Coordination
2. Outreach to land owners and residents
3. Installation of groundwater monitoring wells
4. Groundwater monitoring
5. Post-Dam removal outreach/notification of findings
6. Proposed actions to improve production rate

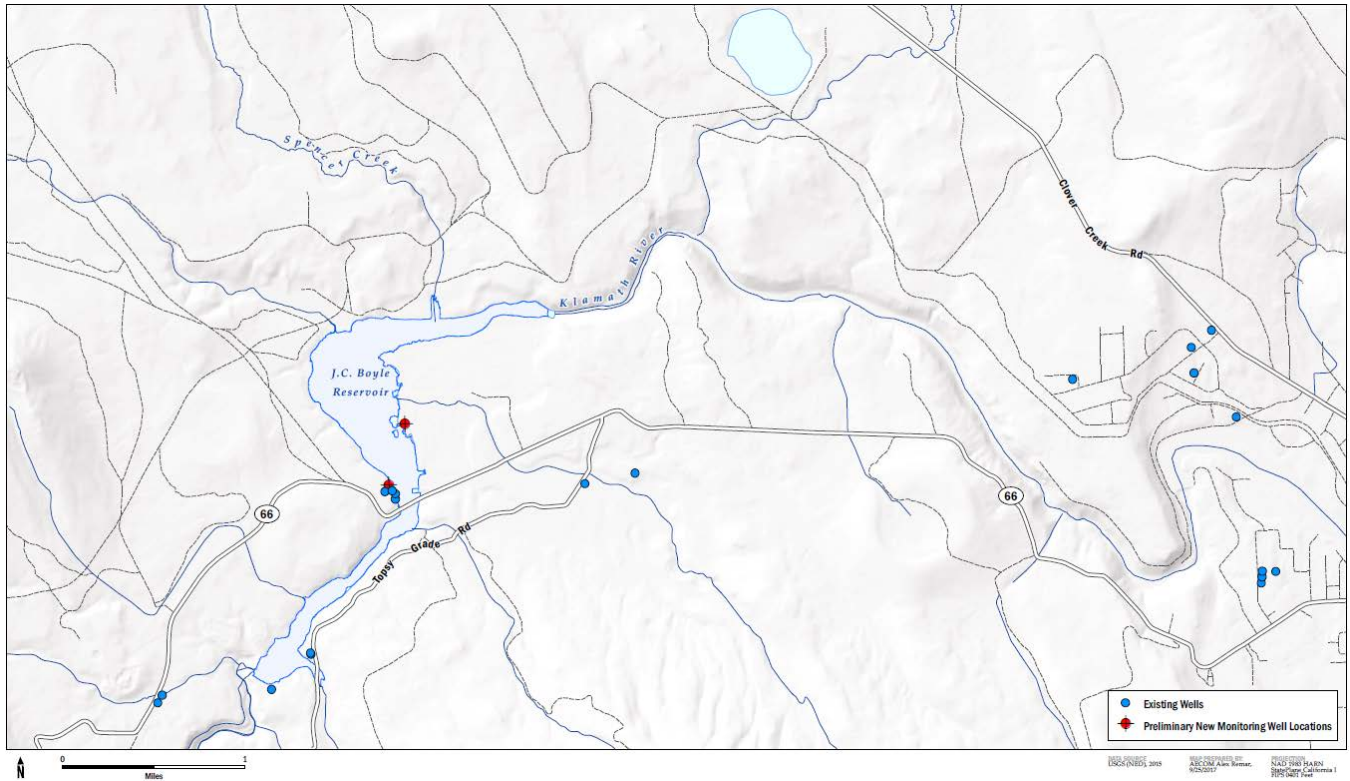


Figure 1 Identified Groundwater Wells within 2.5 Miles of J.C. Boyle Reservoir

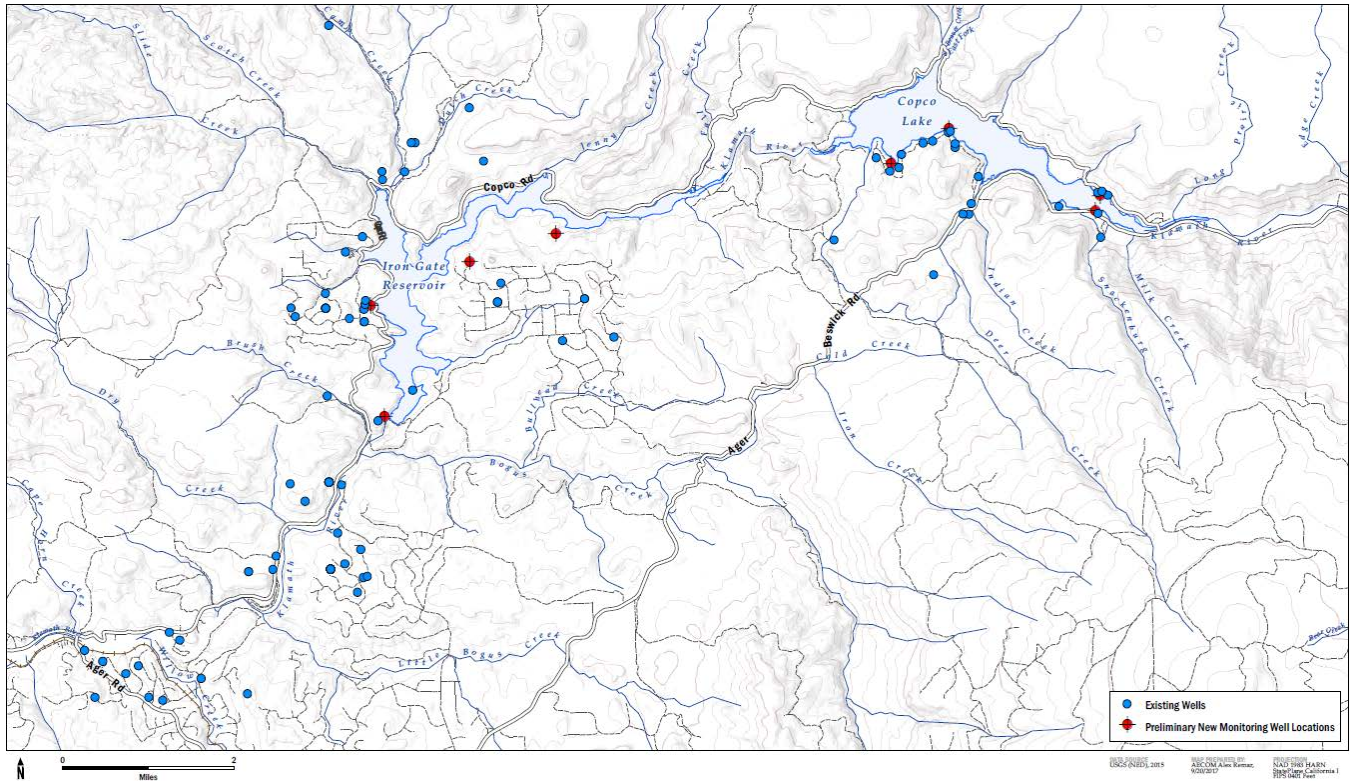


Figure 2 Identified Groundwater Wells within 2.5 Miles of Copco Lake and Iron Gate Reservoir

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Chapter 2: Management Plan

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2. MANAGEMENT PLAN

The following sections summarize the five steps in this plan:

1. Database Search and Agency Coordination
2. Outreach to land owners and residents
3. Installation of groundwater monitoring wells
4. Groundwater monitoring
5. Post-Dam removal outreach/notification of findings
6. Proposed actions to improve production rate

2.1 Database Search and Agency Coordination

The KRRC reviewed USBR’s database that identifies 124 existing wells located within a 2.5-mile radius of the project reservoirs. The KRRC attempted to verify the location of these wells and identified any new wells within this radius installed since 2012. The KRRC contacted Siskiyou County, the California Department of Water Resources (DWR), and Oregon Water Resources Department (OWRD) about the accessibility of their groundwater well data bases.

Siskiyou County did not provide any specific information on well locations or ownership due to insufficient staff resources. County staff stated that there are no shared water systems at the California reservoirs¹, so KRRC assumed that all reservoir residents utilize groundwater for domestic use. (Rick Dean, personal communication, July 27, 2017). Siskiyou County recommended that the KRRC contact DWR to verify previously recorded well locations and to identify any potential new well records.

The KRRC contacted DWR and was told that DWR’s policy does not allow the sharing of well ownership information (Benjamin Brezing, personal communication, August 8, 2017).

The KRRC contacted OWRD and was directed to use their public database to download well logs for those surrounding J.C. Boyle (Mary Graine, personal communication, August 23, 2017). Of the 17 well logs that KRRC identified and downloaded using the OWRD database search, only one provided a specific location..

Given the gaps in information discernable from these data bases,, the KRRC has proposed a broad land owner outreach program as described below.

¹ KRRC has since learned from residents that there is a shared spring water supply near Copco Lake that supplies a portion of the residences there.

2.2 Outreach to Land Owners and Residents

KRRC retained the locations reported by USBR in 2012 for further analysis. To fully understand and update this information, the KRRC will undertake an outreach effort in 2018-2019 to all residents and landowners within 2.5 miles of the project reservoirs to inquire about their groundwater wells.

The KRRC will develop and send an information and questionnaire mailer to property owners, residents, and businesses within 2.5 miles of each project reservoir in 2018. The mailer will include a request to monitor the well for water level prior to, during, and following dam decommissioning. The KRRC will also use its planned public meetings and meetings targeted at reservoir land owners to “spread-the-word” about the proposal to identify wells for monitoring within 2.5 miles of the reservoirs. The KRRC will identify as many well owners as possible that are willing to participate in the monitoring program. Initial information requested by the questionnaire will include:

- Description of the well monitoring program
- Request to participate in the well monitoring program
- Specific information requests:
 - + Property address and well location
 - + Current depth to groundwater
 - + Physical parameters of the well (casing size, well depth, screen interval, pump size)
 - + Historical groundwater well problems (quantity and quality)

2.3 Installation of Groundwater Monitoring Wells

The KRRC will identify a sufficient number of residential wells within the proximity of each reservoir to monitor the effects of reservoir drawdown on the groundwater aquifer (sentinel wells). Wells near the reservoirs (less than ¼ mile) are preferred, as the groundwater recharge effect from the reservoir decreases with distance from the reservoir. If an insufficient number of well owners agree to participate in the groundwater monitoring activity, the KRRC will install a minimum of 10 sentinel monitoring wells around the three reservoirs. KRRC will install the monitoring wells between residents and the reservoirs on PacifiCorp land. KRRC proposes to install up to four monitoring wells each at Iron Gate Reservoir and Copco Lake and two wells at J.C. Boyle Reservoir. Figures 1 and 2 show proposed monitoring well locations.

2.4 Groundwater Monitoring

KRRC will monitor sentinel wells belonging to participating landowners including any monitoring wells installed by the KRRC pre- and post-dam decommissioning to identify seasonal fluctuations in groundwater levels and any groundwater level changes that may be attributable to reservoir removal. KRRC will also monitor sentinel wells for general water quality parameters including pH, conductivity, and major anions and

cations. To establish baseline conditions, the KRRC plans to monitor sentinel wells monthly for a minimum of one year prior to dam decommissioning. Following dam decommissioning, KRRC will conduct groundwater monitoring monthly for up to one year or until such time that post-project groundwater levels and general water quality parameters have been determined (no discernable water level declines or changes in quality over a four-month period) or they mirror baseline conditions.

During the drawdown period, KRRC will install data loggers in the sentinel wells to continuously record groundwater levels and pH and conductivity. If KRRC identifies changes attributable to reservoir removal to water levels or quality that might indicate potential supply problems, the KRRC proposes to take the actions described in Section 2.6 to restore temporary and/or long-term water supplies.

2.5 Post-Dam Removal Outreach/ Notification of Findings

The KRRC will compile and summarize in writing the groundwater data collected prior to, during, and following dam decommissioning. KRRC will use these data to identify any trends or changes in groundwater water levels and quality that may be attributable to reservoir removal. The KRRC will prepare a report of findings and identify any areas where groundwater wells are determined to be vulnerable to groundwater levels or water quality declines resulting from reservoir removal. The KRRC will make the report available to all well owners in the study area. Well owners will have the opportunity to request an evaluation of their well to determine if there are changes in groundwater water levels and quality attributable to reservoir removal.

2.6 Proposed Actions

If the data collected during or following dam decommissioning indicates a loss of supply or adverse water quality to any potable or irrigation well, and that these circumstances are attributable to reservoir removal, then the KRRC will provide temporary water supplies until long-term measures such as motor replacement, well deepening, or full well replacement are identified and implemented as needed to return the production rate of any affected domestic or irrigation groundwater supply well to conditions prior to dam decommissioning .

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Chapter 3: References

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3. REFERENCES

USBR and CDFW 2012. U.S. Bureau of Reclamation and California Department of Fish and Wildlife. *Klamath Facilities Removal – Final Environmental Impact Statement/Environmental Impact Report*. December.

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