

RECLAMATION

Managing Water in the West

Environmental Assessment

2016 Lower Klamath River Late-Summer Flow Augmentation From Lewiston Dam

EA-16-06-NCAO



U.S. Department of the Interior
Bureau of Reclamation

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Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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List of Acronyms and Abbreviations

AF	Acre-feet
CAA	(Federal) Clean Air Act
CARB	California Air Resources Board
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
Ceremony	2016 Yurok Tribe Boat Ceremony
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CNFRC	California Nevada River Forecast Center
<i>Columnaris</i>	<i>Flavobacterium columnare</i> (fish disease)
CVO	Central Valley Operations (division of US Bureau of Reclamation)
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
DPS	Distinct Population Segment
EA	Environmental Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EOS	End of September (reservoir storage volume)
EPA	United States Environmental Protection Agency
ESA	(Federal) Endangered Species Act (of 1973, as amended)
Ft	Feet
FONSI	Finding of No Significant Impact
GHG	Greenhouse gases
<i>Ich</i>	<i>Ichthyophthirius multifiliis</i> (fish disease)
IGD	Iron Gate Dam
ITA	Indian Trust Asset
KFHAT	Klamath Fish Health Advisory Team
KNK	Klamath River Near Klamath (USGS river flow gage)
MAF	Million Acre Feet
M&I	Municipal and Industrial
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
Reclamation	United States Bureau of Reclamation
ROD	Record of Decision
TAF	Thousand Acre Feet
Technical Team	Federal, State and Tribal biologists monitoring environmental conditions
TRD	Trinity River Division (of Reclamation's Central Valley Operations)
TRH	Trinity River Hatchery
TRMFR	Trinity River Mainstem Fisheries Restoration
TRRP	Trinity River Restoration Program
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

Section 1 Introduction

This Environmental Assessment (EA) examines the potential direct, indirect, and cumulative impacts to the affected environment associated with the Bureau of Reclamation (Reclamation) proposal to release supplemental flows from Lewiston Dam to improve water quality and reduce the prevalence and severity of fish disease in the lower Klamath River that could result in a large-scale fish die-off. The Proposed Action would be implemented in late summer of 2016 to support the health of salmonid fish, including species that return to the Trinity River Basin to reproduce. The area of potential effect includes Trinity Reservoir and the Trinity River from Lewiston Dam to the confluence with the Klamath River, and the Klamath River to the Klamath River estuary near Klamath, California. Additionally, the affected environment includes the Sacramento River Basin, as trans-basin diversions from Trinity Reservoir via Lewiston Reservoir and the Clear Creek Tunnel to the Sacramento River Basin have occurred historically and are planned to occur throughout the summer (see Figure 1). This EA was prepared in accordance with the National Environmental Policy Act (NEPA), Council of Environmental Quality (CEQ) regulation (40 CFR Parts 1500-1508), and Department of the Interior Regulations (43 CFR Part 46).

This EA is to serve as an interim environmental review document until the Environmental Impact Statement (EIS) that will examine the potential impacts associated with a Long-Term Plan to Protect Adult Salmon in the Lower Klamath River (Long Term Plan) is completed. Presently, the draft EIS is anticipated to be released for public review in late fall 2016.

1.1 Need for the Proposal

Concern for the health of adult fall-run Chinook salmon entering the lower Klamath River in late summer was brought forward in 2002. In that year, approximately 170,000 fall run Chinook salmon returned to the Klamath River when flows in the lower Klamath River averaged only 2,000 cubic feet per second (cfs) (Guillen 2003). A substantial number of adult salmonid deaths in the lower Klamath River were recorded in 2002. The U.S. Fish and Wildlife Service (USFWS) estimated the number of adult salmonid deaths at 33,500 (Guillen 2003), including an estimated 344 Coho salmon: a species listed as Threatened under both the Federal Endangered Species Act of 1973, as amended (ESA) and California Endangered Species Act (CESA). These deaths were attributed to: (1) pathogens *Ichthyophthirius multifiliis* (*Ich*) and *Flavobacterium columnare* (*Columnaris*); and (2) warm water temperatures, low water velocities and volumes, and; high fish density and long fish residence times that resulted in over-crowding and increased potential for disease transmission (Guillen 2003; Belchik et al. 2004; Turek et al. 2004).

Since the large-scale die-off of 2002, heightened concern of a disease outbreak and related large-scale adult salmon mortalities re-emerged in 2003, 2004 and 2012 through 2015. In response to this concern, Reclamation supplemented flows from Lewiston Dam. The volume of the increase ranged from 17.5 thousand acre-feet (TAF) in 2013 to 64 TAF in 2014, with an average volume of approximately 40 TAF. In all cases, no significant adult salmon mortalities occurred. During these years, however, there has been some evolution of the criterion used to determine when

flow augmentation is appropriate (Strange 2010a, TRRP 2012a, TRRP 2012 b, USFWS and NOAA 2013, USFWS 2015, Reclamation 2015).

The hydrological setting of the lower Klamath River basin is an important factor to consider in determining the risk of a die-off. The State of California continues to experience drought-like conditions, despite more favorable precipitation patterns in winter 2015 and early spring 2016. Water year 2016 is the first in five years to achieve an average snowpack that approaches normal. The April snow course measurements of the three major sub-basins (Shasta, Scott, and Trinity) in the Klamath Basin watershed below existing dams were between 93 and 100% of the historical average (http://cdec.water.ca.gov/cgi-progs/snow_ss/COURSES.04). However, despite this statistic, the lack of considerable precipitation since April and the overall effect of multiple years of drought have resulted in less than average stream flow conditions from unregulated tributaries within the Klamath Basin. As of August 10, the forecast tributary contributions and flows from regulated water sources (i.e. dams) indicate flows of the lower Klamath River Near Klamath (KNK) US Geological Survey (USGS) gage could fall at or below 2,000 cfs at the end of August through September. Placed in a historical context, this level of flow was similar to what occurred in early August of 2002, the year of the fish die-off, and it is considerably lower than the historical average flow for the month of August (approximately 3,100 cfs). Because of this predicted lower-than-average flow level of the lower Klamath River, again there is a concern that this level of flow may not be adequate to prevent a disease outbreak.

In response to the projected low flow in the lower Klamath River, Reclamation received two requests to prepare to supplement flows in 2016. Humboldt County submitted a letter dated July 19, 2016 to the Regional Director of Reclamation's Mid-Pacific Region requesting Reclamation prepare for potential late-summer flow augmentation releases from Lewiston Dam to improve fishery conditions in the lower Klamath River consistent with the County's contract amount of "not less than 50,000 acre-feet (AF)." In addition, on July 25, 2016, the Hoopa Valley Tribe submitted a written statement in support of Humboldt County's request to the Regional Director. The December 23, 2014 Solicitor's Opinion (M-37030) confirmed that the inclusion of the proviso in the Trinity River Division Central Valley Project Act of 1955 (1955 Act) requiring that "not less than 50,000 AF be released annually from the Trinity Reservoir and made available to Humboldt County and downstream water users," represents a separate and independent limitation on the integration of the Trinity River Division (TRD) in, and thus the diversion of water to, the Central Valley Project (CVP). Therefore, this proviso may require a separate release of water as requested by Humboldt County and potentially other downstream users from that already being made for fish restoration purposes under other provisions of the 1955 Act.

The Yurok Tribe reported the preliminary results of their August 18-21, 2016 *Ich* sampling events in technical memoranda dated August 19 and August 22, 2016. The memorandum for the August 18 sampling event indicates that 4 of 6 Chinook salmon captured in the "Blue Hole" thermal refugia near Blue Creek displayed severe levels of *Ich*: over 1,000 *Ich* per gill arch, a level higher than that recorded in the Yurok's final 2014 disease sampling results. Preliminary results of a subsequent Yurok Tribe sampling event in Blue Hole and Blue Creek on August 19 indicate that 8 of 13 Chinook salmon captured had mild *Ich* infections, 2 had severe infections and 3 had no infection. Preliminary results of a Yurok sampling event on August 21 in the South Slough area of the Klamath River estuary indicate that 1 of the 3 Chinook salmon captured had a

mild *Ich* infection; the other 2 Chinook were uninfected. Low numbers of fish were reported in the sampling events overall to date, which were largely limited to refugia. In addition, the Chinook sampled were most likely late spring run. However, the results indicate that fall run Chinook salmon entering the Klamath from the estuary are likely to encounter an elevated concentration of *Ich* in the river system. Factors which influence the fall run's response to this increase risk include the actual run size (which is predicted low and should reduce transmissivity potential) but also the timing of the fall run with respect to temperature and flow conditions; high temperature and low flow conditions could increase residence time in refugia where there may still be an over-crowding potential, and therefore an increased disease transmissivity potential.

Reclamation has completed this EA in response to mounting evidence of a potential need to supplement flows from Lewiston Dam in the late summer 2016 to avoid a significant die-off of adult fall run Chinook salmon. This EA will also serve to provide an interim environmental review while the EIS for the Long Term Plan is being completed.

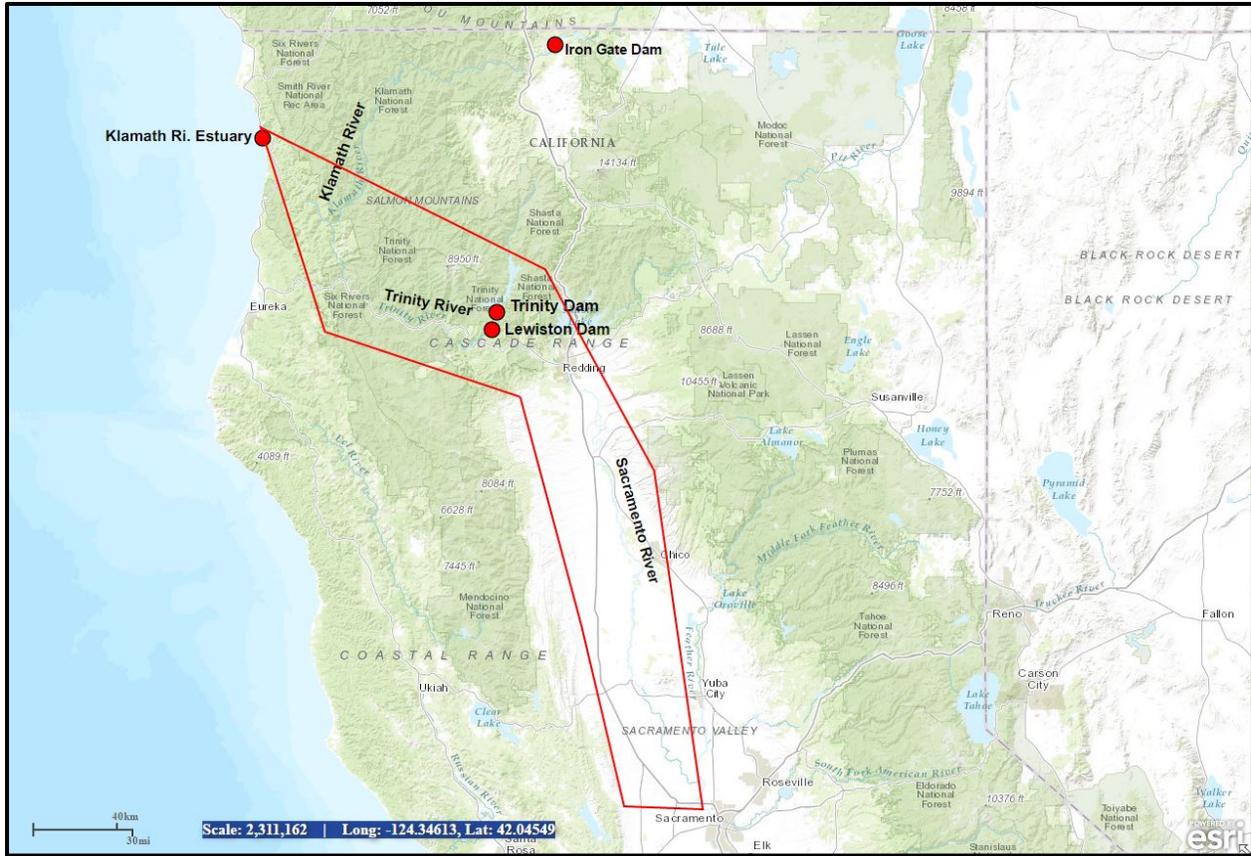


Figure 1. Geographic scope of the Proposed Action

1.2 Legal and Statutory Authorities

The Trinity River Division Central Valley Project Act of 1955 (P.L.84-386) provides the principal authorization for implementing the Proposed Action. Specifically, Section 2 of the 1955 Act limits the integration of the TRD with the rest of the CVP and gives precedence to in-basin needs including that “the Secretary is authorized and directed to adopt appropriate measures to insure preservation and propagation of fish and wildlife...” and “that not less than 50,000 acre-feet shall be released annually from the Trinity Reservoir and made available to Humboldt County and downstream users.”¹ The following are also authorities for the Proposed Action: the Trinity River Basin Fish & Wildlife Management Act of 1984 (Act of October 24, 1984 [P.L. 98-541]; as amended by the Act of October 2, 1992 [P.L. 102-377]; Act of November 13, 1995 [P.L. 104-46]; Act of May 15, 1996 [P.L. 104-143]) (directs the Secretary to restore the fish populations impacted by the TRD facilities); the Fish and Wildlife Coordination Act [16 USC 661] and section 3406(b)(1) of the Central Valley Project Improvement Act (CVPIA). In addition, the Proposed Action is also consistent with Reclamation’s obligation to preserve tribal trust resources. See Appendix A for a detailed discussion of Reclamation’s legal and statutory authorities to implement the Proposed Action.

1.3 Previous Environmental Analyses

Annual late-summer flow augmentations in support of avoidance of salmon fish die-offs were analyzed in EA’s in 2003, 2004, 2012, 2013, and 2015. Each of these EA’s resulted in the signing of a Finding of No Significant Impact (FONSI). One additional flow augmentation action was taken in the late summer of 2014, under emergency CEQ guidelines (40 CFR Part 1506.11).

The most recent EA and FONSI, completed in 2015 (Reclamation 2015) analyzed a tiered augmentation action consisting of a preventive flow augmentation (primary action), a preventive pulse flow (secondary action), and an emergency flow augmentation (tertiary action). Each of the three had established trigger criteria to initiate implementation. The Proposed Action for 2016 is generally modeled after that which was proposed in the 2015 EA (Reclamation 2015).

¹ For the actions implemented in 2012, 2013 and 2014, Reclamation relied primarily on the provision in section 2 of the Trinity River Division Authorization 1955 Act that authorizes and directs the Secretary to insure “the preservation and propagation of fish and wildlife” downstream of the TRD facilities. On October 1, 2014, the U.S. District Court for the Eastern District of California found that this provision of section 2 of the 1955 Act did not provide authority for the 2013 augmentation releases. A notice of appeal has been filed regarding this decision. In 2015, Reclamation added an explanation concerning the use of proviso 2 of the 1955 Act, in addition to proviso 1.

Section 2 Proposed Action and Alternatives

2.1 No Action Alternative

Under the No Action Alternative, Reclamation would not release supplemental flows from the Lewiston Dam in late summer 2016 to avoid a fish disease outbreak and subsequent fish die-off. Current late-summer releases from Lewiston Dam would remain at 450 cfs, as prescribed in the Record of Decision (ROD) for the Trinity River Mainstem Fisheries Restoration EIS/Environmental Impact Report {TRMFR EIS/EIR (U.S. Fish and Wildlife Service *et al.* 2000)}. Flow releases at Iron Gate Dam (IGD) on the Klamath River would be consistent with the 2013 National Marine Fisheries Service (NMFS) and USFWS biological opinion addressing operation of Reclamation's Klamath Project: approximately 900 cfs in August and 1,000 cfs in September. In addition, Reclamation is expected to provide a short-term increase in releases to provide for the Yurok Tribe's Boat Dance Ceremony (Ceremony) as is customary in even numbered years. The 2016 Ceremony is scheduled to occur on August 21st, ensuring a flow nearing 2,500 cfs, as measured at the Orleans USGS gage in the Klamath River above Weitchpec. This necessitates a peak flow of approximately 1,850 cfs from IGD to occur one day prior to the event to account for travel time from the dam to the ceremonial site (Figure 2). Flow adjustments (also called ramping rates) from the base flow of 900 cfs to the peak and down from the peak to 900 cfs followed. In total, the implementation of the ceremonial flow above the base flow of 900 cfs will result in an 8-day span of increased flow accounting for approximately 7,700 AF.

Reclamation used stream flow contributions from the California Nevada River Forecast Center (CNRFC), at the 50 percent exceedance level, combined with scheduled dam releases from IGD (900 cfs in August and 1,000 in September) and Lewiston (450 cfs in August and September) to forecast flow rates in the lower Klamath River (U.S. Geological Survey [USGS] Site #11530500; KNK gage) at the time of implementation for the Proposed Action. Using the CNRFC forecast obtained on August 1, flows at the KNK gage would be approximately 2,300 cfs at the end of August and through September (with the exception of the time period for the Ceremony pulse flow from IGD). However, as of August 10, 2016, the actual flow reported at the KNK gage had already declined to approximately 2,300 cfs; the CNRFC accretion forecasts were determined to be biased high by approximately 300 cfs. Updated river flow forecasts reflecting this error factor indicate that the forecasted flow at the KNK gage at the end of August in the No Action Alternative would be approximately 2,000 cfs, as depicted in Figure 2.

Diversion of water from the Trinity River Basin to the Sacramento River Basin via Lewiston Reservoir and the Clear Creek Tunnel would continue as scheduled for 2016. Based on the August 16, 2016 Central Valley Operations (CVO) forecast, 66 and 62 TAF will be diverted in August and September, respectively.

Due to regulatory-driven temperature targets in both the Sacramento and Trinity Rivers, flows may be released from the auxiliary bypass outlet on Trinity Dam. In other words, colder water from lower reservoir depths may be released directly into the river, bypassing hydroelectric power plant facilities. The use and timing of the bypasses will be determined by real-time

management and review of thermal regimes and changing river conditions. However, use of the auxiliary bypass outlet in 2016 is anticipated to be substantially less than in 2014 and 2015.

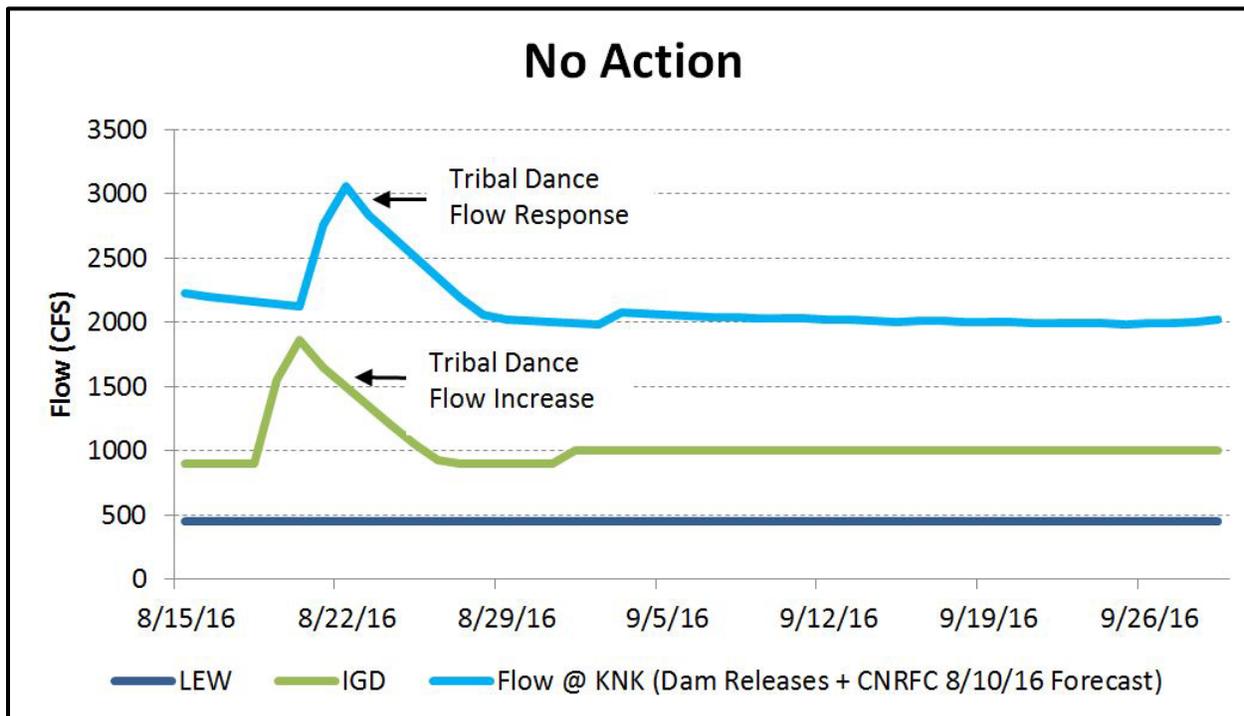


Figure 2. Hydrograph showing projected flows from Lewiston Dam on the Trinity River and the Klamath River Near Klamath (KNK) gage for the No Action Alternative

2.2 Proposed Action

Dry hydrologic conditions the previous four years and the need to augment flows in each of those years has prompted Reclamation to consider supplementing flows to the lower Klamath River in 2016 (Figure 3). *Ich*, the fish disease thought primarily responsible for the fish die-off in 2002, is thought to be perpetually present at background levels in the lower Klamath, and was confirmed on adult salmon in past years and preliminarily reported on adult salmon on August 19, 2016. The Proposed Action includes a three-tiered approach to avoid a significant die-off of adult salmon, which is similar to the action in 2015.

The total volume of the preventive flows with the emergency response would equal approximately 84 TAF. An adaptive management approach that incorporates real-time environmental and biological monitoring by Federal, State and Tribal biologists (Technical Team) would be used to determine if and when to implement any or all of these three components of the Proposed Action. The Technical Team would be monitoring flow in the lower Klamath River, water temperature, fish residence time, infectivity of fish, and the overall health and behavior of the fish in the river and coordinating on the findings on a weekly frequency.

Preventive Base Flow

The Preventive Base Flow would consist of a supplemental release of up to 40 TAF from Lewiston Dam over the course of approximately 30 days, beginning on or about August 22 (for assessment purposes), with the intent of meeting and/or maintaining a target of up to 2,800 cfs in the lower Klamath River (Figure 4). The 2,800 cfs flow target is anticipated to reduce average daily water temperatures from those above 23°C which may inhibit adult upstream migration (USFWS 2015).

Flows prior to the augmentation beginning August 23 would remain consistent with the No Action Alternative, including the release associated with the Ceremony. Diversions to the Sacramento River Basin in 2016 would also remain the same as the No Action Alternative, as would the use of the auxiliary bypass outlet at Trinity Dam to meet regulatory-driven temperature targets. As in the No Action Alternative, the schedule for needing the use of the auxiliary bypass outlet is subject to real-time management and review of thermal regimes and changing river conditions.

Although the tiered structure of the Proposed Action is retained from 2015, the trigger for implementation of the preventative flow augmentation has been broadened to include a suite of criteria due to varying conditions which include: improved baseline hydrologic conditions in comparison to 2015; the harvest component of the trigger being negated by the lack of tribal harvest in 2016, and; recognition of USFWS's 2015 recommendation to de-emphasize run-size as a primary indicator of disease risk.

Reclamation would make the determination to implement the initial component of action – the Preventive Base Flow - based on a weight-of-evidence that predicts a significant deterioration of seasonal environmental conditions. The recommendation of the Technical Team for Reclamation to implement the Preventive Base Flow would be made in consideration of one or a combination of the following conditions or other yet unforeseen factors that leads to an increased risk that a disease outbreak is likely and that a fish die-off may be imminent. The conditions are:

- Larger than forecasted run size
- Early detection of *Ich* on adult salmonids
- Low river flow
- Potential for water temperature to act as thermal barrier to migration
- High fish density in lower river thermal refugia
- Negative reporting of fish health by the Klamath Fish Health Assessment Team (KFHAT; <http://www.kbmp.net/collaboration/kfhat>)
- Other, unforeseen factors

For the purposes of impacts analysis, it is assumed that, in the event that the Preventive Base Flow component of the action is implemented, flow augmentation would continue to target a flow of up to 2,800 cfs in the lower Klamath River, as measured at the KNK gage, through September 19, 2016. The September 19 end date assumes that by this date the maintenance of the 23°C can be assured with relative certainty without flow augmentation support.

In previous years, the Preventive Base Flow was scheduled for implementation by August 22, or earlier in the event that the cumulative harvest of Chinook salmon in the Yurok tribal fishery in

the estuary met or exceeded a total of 7,000 fish and target flow rates in the lower Klamath River, based on flow forecasts at the Klamath River Near Klamath (KNK) USGS gage (http://waterdata.usgs.gov/ca/nwis/uv?site_no=11530500), would fall below 2,800 cfs at the time of peak migration. The 7,000 fish metric of this trigger is made defunct for 2016 by the current partial Yurok tribal fisheries closure. The approximate target date was selected based on historical harvest information in the estuary and the middle Klamath River area (as summarized in USFWS and NOAA 2013) and is retained as the implementation date for the 2016 action for the purposes of impacts analysis.

As of July 26, 2016, KFHAT elevated its alert level on the mainstem Klamath from green to yellow due to increased water temperatures (<http://www.kbmp.net/collaboration/kfhat>). As of August 19, *Ich* was reported on 68% or greater of Chinook sampled in the Blue Hole refugia and Blue Creek. It is expected that water quality (e.g. temperature, flow) conditions in the lower Trinity river will continue to deteriorate to some extent as the summer progresses. However, in consideration of 2016 baseline conditions that are less favorable for disease outbreak (comparably lower run size, higher flow accretion) than previous years, a lower volume augmentation, such as the minimum augmentation to 2,500 recommended by the TRRP in 2010 (TRRP 2010), could be effective at meeting the objective. Therefore, the maximum 2,800 cfs target flow at the KNK gage, and associated volume of release from Lewiston Dam to achieve this target, may be adjusted downward based on real-time observations and monitoring. Likewise, the Proposed Action may not be implemented if not supported by real time data confirming the need at the appropriate time for implementation (near the anticipated arrival of fall run Chinook in the lower Klamath River).

Preventive Pulse Flow

The Preventive Pulse Flow component of the action would consist of a supplemental, short term, temporary release from Lewiston Dam to achieve a peak of 5,000 cfs in the lower Klamath River. The Preventive Pulse Flow is estimated to be a 10 TAF release, approximately one-quarter that of the maximum for the 28-day Preventive Base Flow, over the course of 4 days, including ramp-up and ramp-down. The Preventive Pulse Flow, if implemented, is forecasted to occur approximately mid-way between the start and end of the Preventive Base Flow, at a time where the efficacy of the Preventive Base Flow toward achieving the objective of augmenting water quality conditions to avoid a large-scale fish die-off can be determined. The Preventive Pulse Flow would further improve water quality and facilitate movements of adult salmon and would carry the added benefit of enhancing flushing/dilution of the river of parasites when the bulk of fall run adults are likely to be the lower river.

The Preventive Pulse Flow was implemented in 2015, based on observations of low-level *Ich* infections following the implementation of the Preventive Base Flow. The Preventive Pulse Flow is included in the action with the intent of averting the need for an Emergency Flow augmentation, which would constitute the highest volume (approximately 40 percent of the total volume) component of the tiered approach.

The criteria that would determine the need for implementation of the Preventive Pulse Flow are:

- The presence of low level infections of *Ich* (less than 30 *Ich* per gill) on three or more fall-run adult salmon (of a maximum sample size of 60) captured in the lower Klamath

River in one day during the peak of fall run migration, anticipated as the first or second week of September.

- Forecasted precipitation level that, in consideration of real-time conditions, would be inadequate to fulfill the 5,000 cfs target necessary to avoid a fish die-off.

As with the 2,800 cfs target flow and associated 40 TAF release of the Preventive Base Flow, the 5,000 cfs target flow and associated 10 TAF of the Preventive Pulse Flow are maximums, used as planning estimates, and may be adjusted downward if real-time observations and monitoring suggest these maximums are superfluous to achieve the need. Fish sampling and confirmation of infections would follow the methods described in NOAA and USFWS (2013).

Emergency Flow

The Emergency Flow would consist of a supplemental release of up to 34 TAF from Lewiston Dam over the course of no more than 8 days (including ramp-up and ramp down), following the end of the Preventive Pulse Flow, on or about September 20. The intent of the Emergency Flow is to meet and/or maintaining a target of 5,000 cfs in the lower Klamath River to achieve the average daily water temperatures of equal or less than 23°C due to a confirmed, continued rate of *Ich* infection.

Qualifying criteria for the implementation of the Emergency Flow augmentation are:

- Diagnosis of severe *Ich* (30 or more parasites on a gill arch) infection of gills in 5 percent or greater of a desired sample of 60 adult salmonids confirmed by the USFWS Fish Health Center; or
- Observed mortality of greater than 50 dead adult salmonids in a 20 kilometer reach in 24 hours coupled with the confirmed presence of *Ich* by the USFWS Fish Health Center.

An established protocol will be used to share and confirm real-time information used to inform the decision to implement the Emergency Flow augmentation:

- Key staff members will be on high alert during the flow augmentation action and will receive timely on the ground monitoring results.
- The USFWS Fish Health Center will provide a pathology report documenting the findings of diagnostics survey to Reclamation, the Technical Team, and KFAT.
- An emergency release will be considered by Reclamation on receipt of a positive pathology report.

As with the target flows and associated release quantity of the preventative components of the Proposed Action, the 5,000 cfs target flow and associated 34 TAF of the Emergency Flow augmentation are maximums used as planning estimates and may be adjusted downward if real-time observations and monitoring suggest these maximums are superfluous to meeting the need. Figure 3 depicts the Area of Concern for the Proposed Action. Figure 4 contains graphical depictions of the flows associated with the augmentation components at the point of release/ Lewiston Dam and the corresponding anticipated response in the lower Klamath River at the KNK gage.

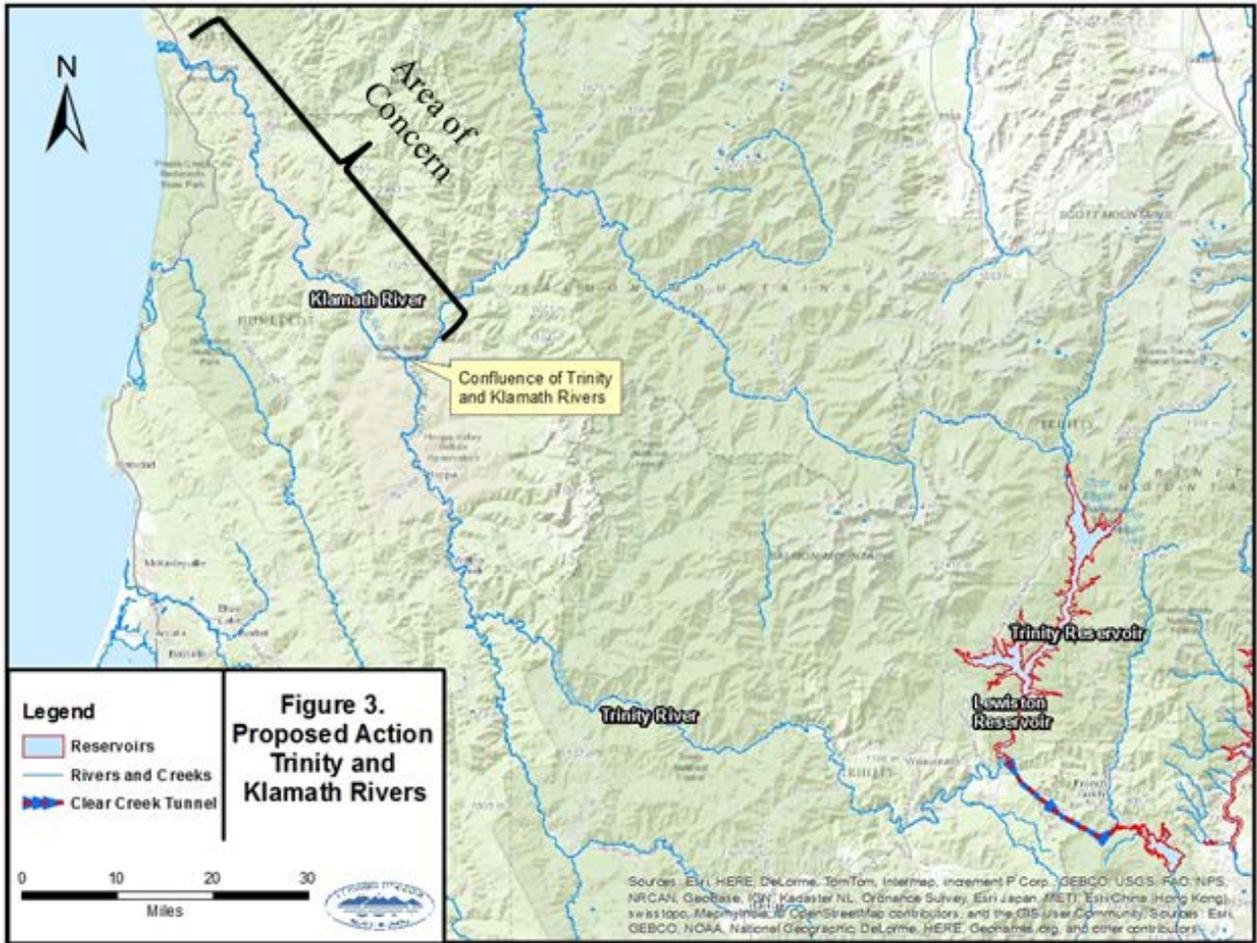


Figure 3. Proposed Action Area of Concern - Trinity and Klamath Rivers

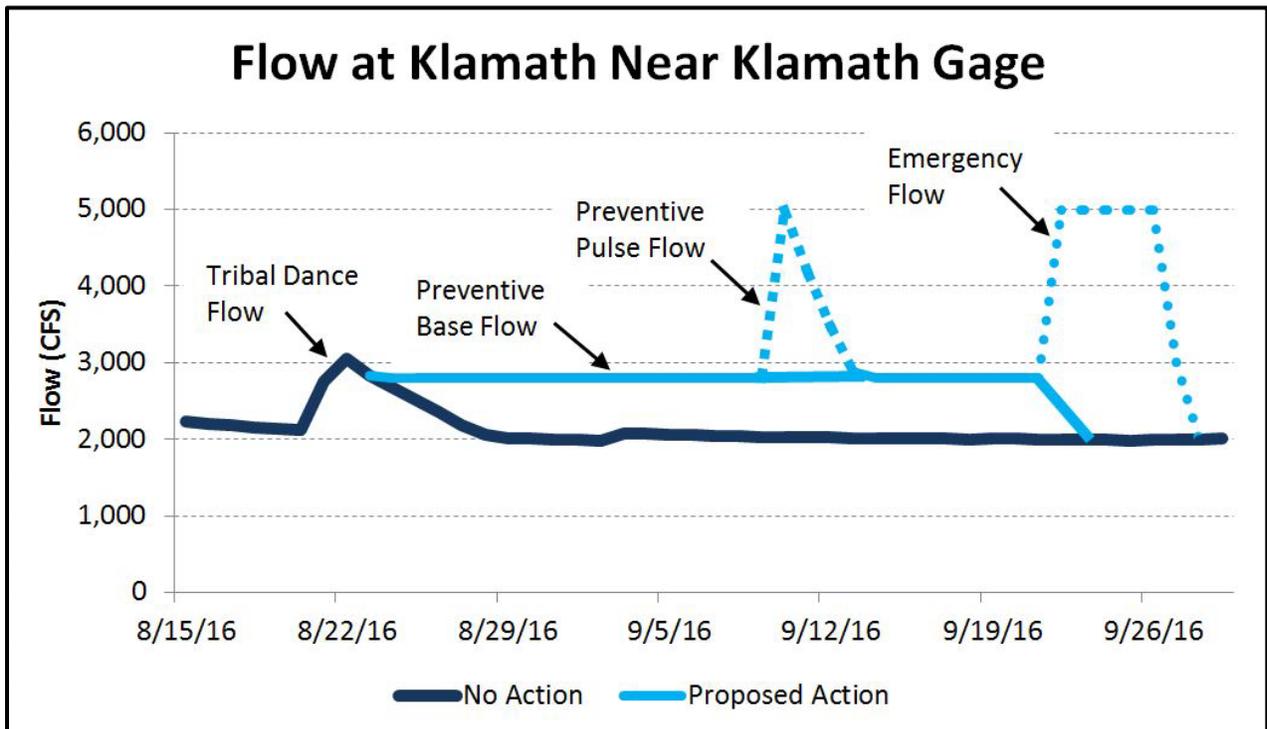
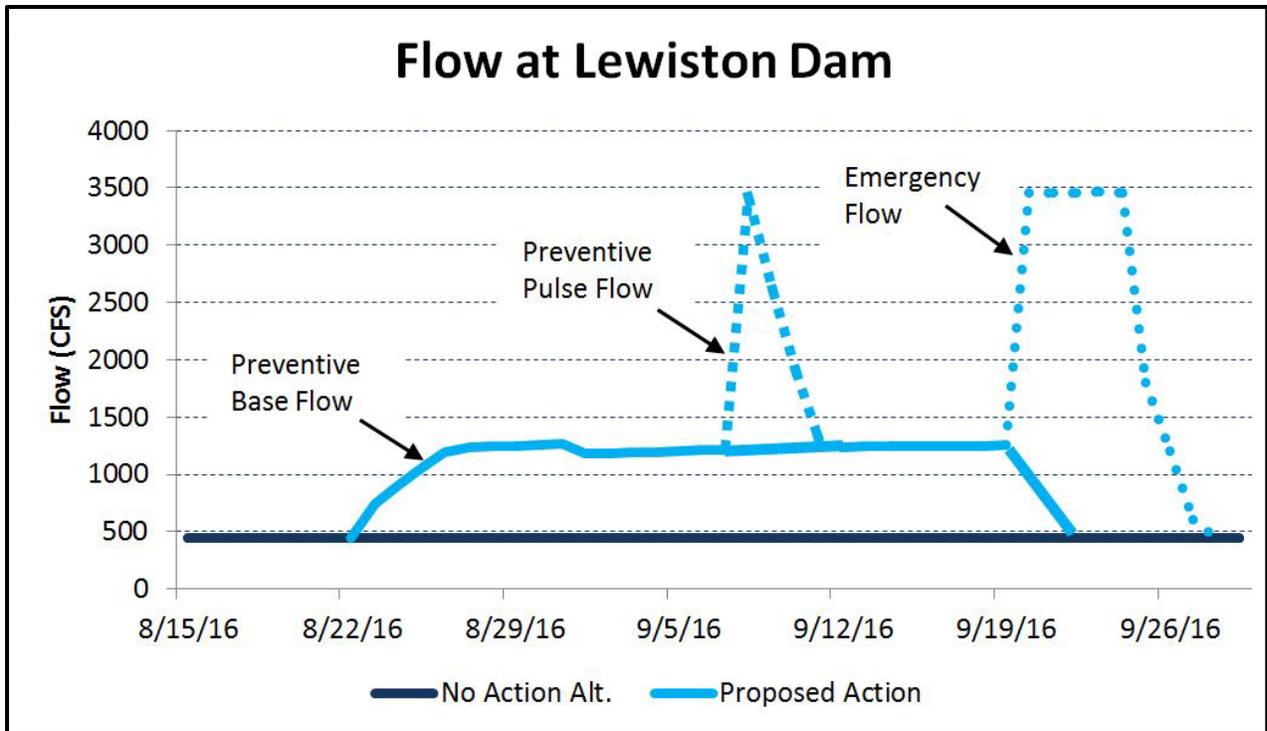


Figure 4. Hydrograph showing flows at Lewiston Dam (USGS Station #11525500)(top figure) and Klamath River Near Klamath (USGS gage #11530500)(bottom figure) for the Proposed Action and No Action alternatives.

2.3 Alternatives Considered But Eliminated From Further Consideration

Reclamation considered one potential alternative source of supplemental water for the lower Klamath River in the late summer. This was water from the Klamath River at IGD.

Reclamation determined that the Klamath water out of IGD is warmer and generally of lower temperature quality than water from Trinity Reservoir. This can be attributed to the series of four small dams on the Klamath that allow continual warming of the water. While water from IGD could provide a dilution benefit and increase water turnover rates in the lower Klamath River similar to water from Lewiston Dam, the water from Lewiston Dam provides a temperature benefit (temperature reduction in the lower Klamath River) that is not available from water released from IGD; water released from IGD would not be significant to meeting the purpose and need for action.

Section 3 Affected Environment

3.1 Water Resources

3.1.1 Trinity River Division

Reclamation stores water for several purposes in Trinity and Shasta Reservoirs. These facilities and other CVP facilities are operated in a coordinated fashion to satisfy a number of geographically-diverse flood control and environmental requirements, as well as provide water to satisfy water delivery and water rights responsibilities and to generate hydroelectric power. This coordinated, or integrated, operation is subject to certain limitations that require water originating from the Trinity River to remain in the Trinity River Basin.

Trinity Reservoir is the primary water storage facility in the TRD of the CVP (Figure 5). At capacity, it stores approximately 2.5 million acre-feet (MAF) of surface water, and receives an average annual inflow of approximately 1.2 MAF. Water released from Trinity Reservoir flows to Lewiston Reservoir, a re-regulating reservoir formed by Lewiston Dam. From Lewiston Reservoir, water can be diverted for use in the Sacramento River Basin via the 10.7-mile Clear Creek Tunnel, or pass through Lewiston Dam to flow 112 miles before entering the Klamath River at Weitchpec. The Klamath River then flows approximately 43 miles before entering the Pacific Ocean. The Trinity River Hatchery (TRH), located at the base of Lewiston Dam, also diverts a small quantity of water from Lewiston Reservoir in support of fish hatchery operations.

Water flowing through Clear Creek Tunnel enters the Judge Francis (J. F.) Carr Powerhouse to Whiskeytown Reservoir, which also serves as a re-regulating reservoir. Water stored in this reservoir is released through Whiskeytown Dam where it serves to: meet environmental requirements in Clear Creek; generate hydropower by Redding Electric Utility, and; provide water for downstream irrigation, and municipal and industrial (M&I) needs. Alternatively, water from Whiskeytown Reservoir can also be diverted through Spring Creek Tunnel to Spring Creek Powerplant, Spring Creek, then into Keswick Reservoir. Keswick Reservoir combines water from the Trinity River with water from Shasta Reservoir, which is then discharged through the Keswick Powerplant to the Sacramento River (Figure 5).

Trinity Reservoir storage is used to meet the needs of the cold-water fish resources in the Trinity River, the Sacramento River, and areas within the Sacramento River Basin, including Clear Creek, which is fed from Whiskeytown Reservoir. These needs include meeting certain temperature requirements in both systems for several fish species. Meeting these temperature requirements relies in part on trans-basin diversions from Lewiston Reservoir to the Sacramento River basin that reduce the warming potential for water of both Lewiston and Whiskeytown Reservoirs. In turn, this continuous flow of water through these re-regulating reservoirs ensures suitably cold water remains available for release to each of the outflow points during the warmer months of the year.

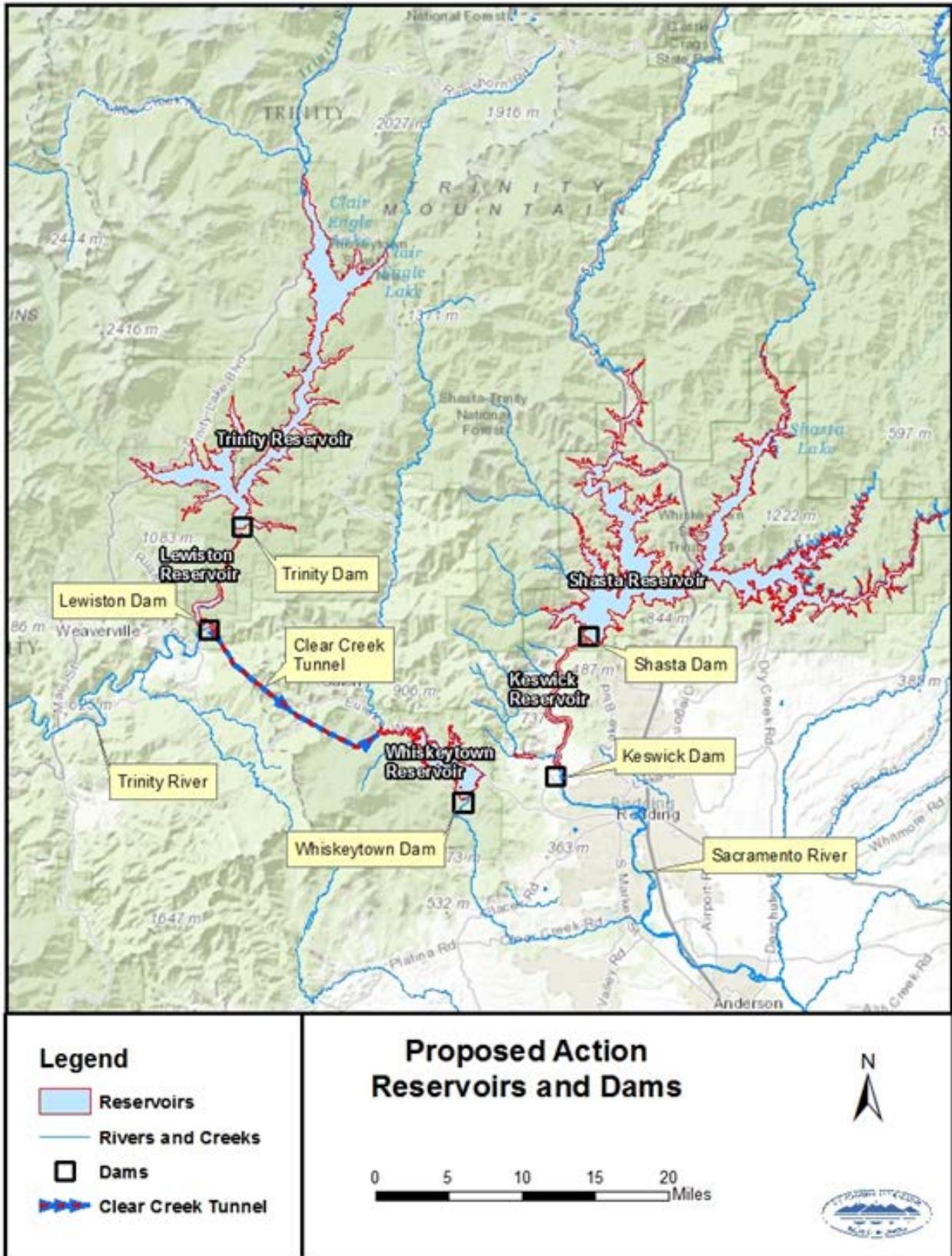


Figure 5. Water resource areas of Trinity River Division. (Due to the scale of the map, Spring Creek Tunnel and Power Plant are not shown.)

Water from the Trinity Reservoir, by way of Lewiston Reservoir, is released to the Trinity River year-round, as prescribed by the TRMFR EIS/EIR ROD. Releases from the deep portions of the reservoir assure release of suitably cold water throughout the year in support of fishery restoration goals as well as assuring suitably cold water is diverted to meet the cold water needs of fish species in the Sacramento River Valley that are Federally-listed as Threatened or Endangered under the ESA.

In even years, such as 2016, the Yurok Tribe requests a release to support their ceremonial needs. However, the release for the Ceremony originates from IGD, located on the upper mainstem of the Klamath River near the Oregon/California border. Water released from IGD at this time of the year is generally warm, only providing perhaps a slight temperature benefit to cold water species below the dam. Therefore, although it would provide a flushing benefit, a release from IGD is typically not expected to provide secondary ecological benefits to the lower Klamath River that would be as significant as those from a comparable volume release from Lewiston Dam.

In years of relatively low storage at the end of the summer (i.e., between 750 TAF to 1 MAF), water released from Trinity Reservoir may be released through the use of the auxiliary bypass outlet (elevation 1,999 ft) in lieu of the penstock (elevation 2,100 ft), which allows access to the deeper water that is typically much colder. This type of operational change typically only occurs at the end of summer or early fall: a time of minimum pool. As in 2015, the auxiliary bypass may be used in 2016 to access this cold water source. The degree to which it is used, if at all, is dependent on the volumetric need because the capacity is limited to approximately 2,000 cfs.

3.1.2 Fall Flow Augmentation Actions to the Lower Klamath River

In some years, most notably in dry years when flows in the lower Klamath are projected to be low, Trinity Reservoir water has been sought to augment flows to prevent a significant die-off of adult salmon, as occurred in 2002. Years in which flow augmentation from Trinity Reservoir occurred to reduce this risk included 2003, 2004, and 2012-2015. The average quantity of water used from the Trinity Reservoir in those five years was 40 TAF. The largest flow augmentation action from Trinity Reservoir occurred in 2014 when 64 TAF was released for both a preventive, and the first time use of an emergency, flow action. Additionally, in 2014, another 16 TAF was released from IGD in October. While other water sources have been sought to augment flows in years when augmentation actions have occurred, it was only in 2014 that flows from IGD were used. In all years of an augmentation action, the timing of the need has been focused on the August and September time periods, with diminishing concern occurring in October and later in the year. Greater detail on past flow augmentation actions are provided in the document *Long Term Plan for Protection of Adult Salmon in the Lower Klamath River* (Reclamation 2015).

3.1.3 2016 Water Storage and Diversions from Trinity

Water storage in Trinity Reservoir is influenced by the balance of inflow and outflow throughout the year. During the summer months, storage typically decreases rapidly as inflow rapidly decreases due to lack of precipitation. Release(s) from Trinity Dam are used to meet a variety of needs in both the Trinity and Sacramento River basins in this timeframe. Minimum storage in Trinity Reservoir typically occurs in October or November of each year. The historic (1961 through 2015) average storage for the end of September is approximately 1.62 MAF. In comparison, at the 90 percent exceedance level, the water storage projection for the end of

September 2016, as forecasted on August 16, 2016, is 977 TAF. In October and November under the same forecast, the anticipated storages are 917 and 906 TAF.

3.2 Biological Resources

3.2.1 Trinity and Klamath River Basins

Several anadromous (migratory) fish species use the lower Klamath River and the Trinity River to complete their lifecycles. The life stages of species of interest for this EA include Coho salmon (*Oncorhynchus kisutch*), a species listed as Threatened under both the ESA and CESA, as well as non-listed fish, including the North American green sturgeon (*Acipenser medirostris*), and spring- and fall-run Chinook salmon (*O. tshawytscha*), which have tribal, recreational, and commercial value. One or more life stages of each of these species are present in the area of influence of the Proposed Action. The Pacific eulachon, while listed as Threatened under the ESA, is not evaluated further because no life stages of this species would be present in freshwater during the period of effect from the Proposed Action. Greater detail on life history timing of considered species follows.

Coho salmon populations in the Klamath River Basin are severely reduced from historical levels and are listed as Threatened under both CESA and the ESA as part of the NMFS’ Southern Oregon/Northern California Coasts Evolutionarily Significant Unit. Life history timing for Coho salmon in the Klamath River are provided in Table 1.

Table 1. Life-history timing of Coho salmon in the Klamath River Basin downstream of IGD. Peak activity is indicated in black. (Table, and associated references, are from Stillwater Sciences, 2009)

Life stage (citations)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Incubation												
Emergence ^{1,2,3}												
Rearing ⁴												
Juvenile redistribution ⁵												
Juvenile outmigration ^{6,7,8,9,10}												
Adult migration ⁹												
Spawning ^{9,11}												

¹ CDFG (2000, unpubl. data, as cited in NRC 2004); ² CDFG (2001, unpubl. data, as cited in NRC 2004); ³ CDFG (2002, unpubl. data, as cited in NRC 2004); ⁴ Sandercock (1991); ⁵ T. Soto, Fisheries Biologist, Yurok Tribe, pers. comm., August 2008; ⁶ Scheiff et al. (2001); ⁷ Chesney and Yokel (2003); ⁸ T. Shaw (USFWS, unpubl. data, 2002, as cited in NRC (2004)); ⁹ NRC (2004); ¹⁰ Wallace (2004); ¹¹ Maurer (2002)

The number of adult fall-run Chinook salmon predicted to return to the Klamath River has been an important factor in assessing the risk of a die-off and potential need for supplemental water. However, based upon recent experiences, run size has been deemphasized in a memorandum from the USFWS to Reclamation (USFWS 2015). According to this memorandum, “while run-size has been used as an indicator of the potential need for a flow augmentation action, it should not be used a binary (yes/no) trigger. A number of factors such as the timing of the run, flow, water temperatures, in-river fisheries, etc., can contribute to large congregations of adult salmonids holding for extended periods of time that could potentially trigger an *Ich* epizootic, and these factors are independent of run size.” CDFW states that, while it agrees with USFWS’s assertion that run size should not be a binary trigger for flow augmentation, “the size of the run can potentially influence the level and density of fish congregations and should remain a factor considered in overall risk assessment” (CDFW 2016). Taking this into account, even though the

predicted fall run size in 2016 is the smallest since the early 1990's, with 52,100 adult fish predicted to return to the lower Klamath River (PFMC 2016), a concern for a potential disease outbreak exists.

Green sturgeon in the Klamath River Basin are included in the Pacific-Northern Distinct Population Segment (DPS), which also includes coastal spawning populations from the Eel River north to the Klamath and Rogue rivers. While not listed formally under the ESA as Threatened or Endangered, they are presently designated as a Species of Concern (NMFS 2006). Life-history timing for the various life stages in freshwater are provided in Table 2.

Table 2. Life-history timing of green sturgeon in the Klamath River Basin downstream of IGD. Peak activity is indicated in black. (Table, and associated references, are from Stillwater Sciences, 2009)

Life stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Incubation/emergence ¹												
Rearing ^{1,2,3}												
Juvenile outmigration ^{4,5,6,7,8}												
Adult migration ^{1,2,9,10,11,12,13}												
Spawning ^{1,3,4,13}												
Post-spawning adult holding ¹³												

¹ CALFED ERP (2007), ² NRC (2004), ³ FERC (2006), ⁴ Emmett et al. (1991, as cited in CALFED ERP 2007), ⁵ CH2M Hill (1985), ⁶ Hardy and Addley (2001), ⁷ Scheiff et al. (2001), ⁸ Belchik (2005, as cited in CALFED ERP 2007), ⁹ KRBFTF (1991), ¹⁰ Moyle (2002), ¹¹ PacifiCorp (2004), ¹² Van Eenennaam et al. (2006), ¹³ Benson et al. (2007)

Chinook salmon of the Klamath River Basin are comprised of two runs or races, the spring-run that immigrates during the spring and early summer, and the fall-run that immigrates in the late summer and early fall. Adults of each race use similar habitat areas in the basin, largely separated by timing of use. Adult fall-run immigration into the Klamath River estuary and lower Klamath River can be subjected to environmental stressors that can result in premature mortality, as was documented in 2002. Greater details on life-history timing of the spring- and fall-run are provided in Tables 3 and 4.

Table 3. Life-history timing of spring-run Chinook salmon in the Klamath River Basin downstream of IGD. Peak activity is indicated in black. (Table, and associated references, are from Stillwater Sciences, 2009)

Life stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Type I</i>												
Incubation ¹												
Emergence ^{1,2}												
Rearing												
Juvenile outmigration ¹												
Adult migration in mainstem ^{1,5,11}												
Adult entrance into tributaries ^{1,11}												
Spawning ^{7,8}												
<i>Type II</i>												
Rearing												
Juvenile outmigration ^{1,9,10,11}												
<i>Type III</i>												
Rearing												
Juvenile outmigration ^{1,10,11}												

¹ Olson (1996); ² West 1991; ³ Tuss et al. (1990, as cited in Olson 1996); ⁴ NAS (2004, as cited in FERC 2006); ⁵ Barnhart (1994); ⁶ NRC (2004); ⁷ Dean (1995a); ⁸ Sartori 2006a; ⁹ Sullivan (1989); ¹⁰ Dean (1994); ¹¹ Dean (1995)

Table 4. Life-history timing of fall-run Chinook salmon in the Klamath River Basin downstream of IGD. Peak activity is indicated in black. (Table, and associated references, are from Stillwater Sciences, 2009)

Life stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Type I</i>												
Incubation												
Emergence ¹												
Rearing												
Juvenile outmigration ^{3,3,4,5}												
Adult migration ^{6,7,8}												
Spawning ^{9,10,11,12}												
<i>Type II</i>												
Rearing												
Juvenile outmigration ^{2,13}												
<i>Type III</i>												
Rearing												
Juvenile outmigration ^{2,13}												

¹USGS (1998, as cited in NRC 2004); ²Scheiff et al. (2001); ³Chesney 2000; ⁴Chesney and Yokel 2003; ⁵Voight and Gale 1998; ⁶NAS (2004, as cited in FERC 2006); ⁷USGS (1998, as cited in NRC 2004); ⁸Strange (2007); ⁹Shaw et al. (1997); ¹⁰Magneson (2006); ¹¹Lau (CDFG, pers. comm., 1996, as cited in Shaw et al. 1997); ¹²Hampton (2002); ¹³Wallace 2004

The riparian corridor of the Trinity River, as well as the lower Klamath River system, are used by numerous species of amphibians, reptiles, and birds.

3.2.2 Sacramento River Basin

Several anadromous fish species of special concern use the waterways in the Sacramento River Valley to which some Trinity River water is diverted for use. Species of potential concern include the following Federally-listed ESA species: Central Valley steelhead (*O. mykiss*), spring- and winter-run Chinook salmon, and the Southern DPS population of North American green sturgeon (*Acipenser medirostris*).

3.3 Indian Trust Assets

Indian Trust Assets (ITA) were described and considered in the TRMFR EIS/EIR and the associated ROD. Specifically relevant to the No Action Alternative and the Proposed Action considered in this EA are the tribal trust fisheries in the Klamath and Trinity Rivers. Multiple court rulings have established the important “Indian purpose” for the Hoopa Valley Indian Reservation. In addition, the Yurok Indian Reservation is to reserve tribal rights to harvest fish from the Klamath and Trinity Rivers. The Hoopa Valley Indian Reservation is located on the Trinity River. The Yurok Reservation is on the Klamath at its confluence with the Trinity. Numerous and varied trust assets exist in the vicinity of the Proposed Action, including fish, riparian plants and wildlife. The primary ITAs with the potential to be affected by the Proposed Action are tribal fishing rights. These fishing rights are held in trust by the United States for the benefit of Indians. While the Hoopa and Yurok Tribes are mentioned here, there are also others within the region including, but not limited to, the Karuk and Klamath tribes, Resighini Rancheria, and Quartz Valley Indian Tribe.

3.4 Environmental Justice

The Trinity and Klamath Rivers flow through rural areas including Trinity County. In general, Trinity County is a lower-income population and recreational fishing is an important source of revenue. Additionally, these rivers both run through the Hoopa Valley Tribe and Yurok Tribe Reservations. Generally speaking, the Reservations’ populations are lower-income and traditionally rely on salmon and steelhead as an important part of their subsistence.

Water from the Trinity Division of the CVP goes in part to farms in the Sacramento River Basin that support low income and/or migrant populations.

3.5 Socioeconomic Resources

Klamath Basin stocks provide a basis for socioeconomic resources that include commercial, recreational, and tribal salmon and steelhead fisheries. These activities occur in either the Pacific Ocean or in the estuary or Klamath River Basin. Trinity Reservoir supports tourism, recreation, and fishing. Also, water from Trinity Reservoir is exported to the Central Valley for consumptive use and generation of hydroelectric power.

3.6 Power Generation

The TRD has the capacity to generate substantial hydroelectric power per acre-foot of water diverted because of the elevational difference between where it originates in Trinity County to the locations it is delivered. Diversions to the Sacramento River Basin provide for gravitational flow to generate hydropower at several power plants that result in a higher than average rate. In addition to generating power at Trinity and Lewiston Dams in the Trinity River Basin, hydropower is also generated at J. F. Carr and Spring Creek Powerplants, then at Keswick Powerplant (part of the Sacramento River Division). In total, operations of the TRD alone can

account for as much as 30 percent of the total power generation capability of the CVP (TRMFR EIS).

Power generation at Trinity Dam is dependent on available capacity in water storage as well as downstream needs for cold water. Water is released through the penstock during periods of higher storage to allow cold water to be withdrawn. In contrast, when the storage gets low enough to entrain water of an unsuitable temperature into the powerplant, Reclamation must switch to use of the auxiliary bypass outlet.

Section 4 Environmental Consequences

4.1 Resources Considered

This EA will analyze the affected environment of the Proposed Action and No Action Alternative in order to determine the potential impacts and cumulative effects to the following environmental resources:

- Water Resources
- Biological Resources
- Indian Trust Assets
- Environmental Justice
- Socioeconomic Resources
- Power Generation
- Global Climate

Impacts to the following resources were considered and found to be minor or absent. Brief explanations for their elimination from further consideration are provided below:

- **Cultural Resources:** The Proposed Action would not produce any ground disturbances, would not result in the construction of new facilities or the modification of existing facilities, and would not result in changes in land use. Neither the Proposed Action nor the No Action Alternative have the potential to cause effects to historic properties, assuming such historic properties were present, pursuant to 36 CFR § 800.3(a)(1). (See Appendix B for Reclamation's determination.)
- **Indian Sacred Sites:** There would be no impact to the Indian Sacred Sites under the No Action Alternative as conditions would remain the same as existing conditions. Similarly, the Proposed Action would not inhibit access to, or ceremonial use of, an Indian Sacred Site, nor would the Proposed Action adversely affect the physical integrity of such sacred sites. The release of flows from Lewiston Dam would be within the normal release flow range of water levels along the Trinity River and would not exceed the historic range of flows.
- **Air Quality:** Section 176 (C) of the Clean Air Act (CAA; 42 U.S.C. 7506 [C]) requires any entity of the Federal Government that engages in, supports, or in any way provides financial support for, licenses or permits, or approves any activity to demonstrate that the action conforms to the applicable State Implementation Plan (SIP) required under Section 110 (a) of the Federal CAA (42 U.S.C. 7401 [a]) before the action is otherwise approved. There would be no impacts to air quality under the No Action Alternative as conditions would remain the same as existing conditions. Under the Proposed Action, no impacts to air quality would be expected.

4.2 Water Resources

For purposes of the effects analyses that follow, hydrological forecast information for both short-term and long-term are included. However, hydrologic forecasts can be fairly accurate in the short term but become less so with larger time frames. As such, the long-term forecast information (1 year) provided herein is speculative in nature; considerable uncertainty is likely associated with these values, although they are the best available information.

4.2.1 No Action Alternative

Under the No Action, IGD releases would follow Biological Opinion flows of 900 cfs in August and 1,000 cfs in September. In addition, a special supplemental flow from IGD would occur in late August for ceremonial needs of the Yurok Tribe. The Ceremonial release would increase flow from IGD from 900 cfs to approximately 1,550 cfs with ramp up on August 19th, peaking at approximately 1,850 cfs on August 20th, and decreasing approximately 150 cfs on average daily thereafter for ramp-down until returning to 900 on August 26th. These supplemental flow releases are timed to account for travel time of this water to meet the ceremonial need on August 21st in the lower Klamath River.

Flow from Lewiston Dam would remain at 450 cfs, consistent with the prescription of the Trinity ROD. Based on the August 10th, 2016 California Nevada River Forecast Center (CNRFC) predictions and travel time of the supplemental ceremonial flow, the arrival of the supplemental flows from IGD would result in a flow at KNK between 2,700 and 3,100 cfs for three days. Thereafter, and barring any precipitation events that may increase flow in the lower Klamath River, flow of the lower Klamath River could continually drop at or slightly below 2,000 cfs during the late summer, which is comparable to the flow experienced in 2002, the year of the fish die-off.

4.2.1.1 Coldwater Storage Availability and Water Temperatures

Based on the August 16, 2016 90% exceedance forecast, the storage in Trinity Reservoir would be approximately 977 TAF at the end of September (EOS). This projected storage level is substantially greater than the previous two years when EOS storage values were at 606 and 546 TAF, respectively (Table 5). Placing the forecasted EOS storage volume for 2016 in context, it would be the third highest storage volume of the previous 8 years of drought observed since 1977. These flows and storage volumes are consistent with the existing condition; therefore, there would be no new effects to cold water resources.

There would be no impacts anticipated within the Sacramento River Basin from selection of the No Action Alternative. The quantity and quality (i.e. water temperature) of flow would remain suitable for trans-basin diversions to Whiskeytown Reservoir in 2016, representing the source of water for the Clear Creek and Spring Creek diversions to Keswick Reservoir.

The auxiliary bypass may be used opportunistically to ensure suitably cold water can be released from Trinity Reservoir for downstream beneficial uses. This is a routine operation in years of lower storage. The storage volume is substantially larger than the past two years. As a

consequence, the use of the auxiliary outlet in 2016 is anticipated to be substantially less than in 2014 and 2015.

Table 5. Storage Projections (TAF) of Trinity Reservoir

Drought Year	End of July Storage (TAF)	End of September Storage (TAF)
1977	535	242
1991	1,048	670
1992	958	838
2009	1,149	919
2012	2,078	1,799
2013	1,590	1,303
2014	865	605
2015	834	546
2016	1,139	977 ^a

a – Storage is based on the August 16, 2016 forecast at 90% Probability of Exceedance and the No Action Alternative.

4.2.2 Proposed Action

Under the Proposed Action, flow from Lewiston Dam would be the same as the No Action Alternative until approximately August 23rd after which a supplemental flow releases from Lewiston may be used, if warranted by deteriorating environmental conditions, to improve the environmental conditions of the lower Klamath River. Based on the projected flow levels in the lower Klamath River in late August, it is anticipated that Lewiston Dam releases could increase between 300 and 800 cfs would be required to meet the target of up to 2,800 cfs in the lower Klamath River. This increase would result in raising Lewiston releases from 450 up to about 1,250 cfs over the Preventive Base Flow period, which extends through September 19 in the lower Klamath River. Flows of this magnitude or higher from Lewiston Dam have been observed in the recent past, largely from prior augmentation actions directed at averting a die-off in the lower Klamath River, but also for the support of Tribal ceremonial needs of the Hoopa Valley Tribe in odd numbered years. Accounting for travel time, the flow from Lewiston would revert to base flow of 450 cfs on the 19th of September. If only this preventive component of the Proposed Action is used, the anticipated volume to be used would be 50 TAF.

If real-time monitoring results indicate that conditions are met to implement a Preventive Pulse Flow, Lewiston releases would increase immediately following the confirmation of *Ich* on at least three adult salmon having low level infections of *Ich* (less than 30 *Ich* parasites on one gill arch) during the first or second week of September. The 4-day pulse (including ramping up and down) anticipated to peak from Lewiston at approximately 3,400 cfs to meet the target of 5,000 cfs in the Lower Klamath River, which would occur during the first two weeks of September. The benefit of the pulse is to enhance flushing of the river of parasites while also facilitating movement of adult salmon. The Preventive Pulse Flow would constitute a volume of approximately 10 TAF over that which is used to meet the Preventive Base Flow target of 2,800 cfs. As with the Preventive Base Flow, flows of this magnitude or higher from Lewiston Dam have been observed in the recent past, largely from prior augmentation actions directed at averting a die-off in the lower Klamath River. Combined, the total volume that would be needed

to implement the preventive base and preventive pulse components of the action would be approximately 50 TAF.

In the event that the emergency portion of the action is implemented, flow from Lewiston Dam could increase up approximately 3,500 cfs any time after September 19th to meet a target flow in the lower Klamath River of 5,000 cfs. The duration of this flow would be 8 days and would be subject to Federal biological review of the information at hand, including forecasted meteorology and fish disease monitoring results (See Section 2.2. Proposed Action). Implementation of the emergency component of the Proposed Action could occur later in September, if needed. However, based on past augmentation actions, the need for an augmentation beyond early October diminishes as day length decreases, ambient air temperature cools and chances of precipitation increase. The precursory implementations of the Preventive Base Flow targeting 2,800 cfs, and the Preventive Pulse Flow targeting 5,000 cfs, in the lower Klamath River, respectively, lower the likelihood that the need for an emergency component would arise. However, real-time monitoring would be used to inform Reclamation as to whether or not an *Ich* epizootic outbreak was occurring, the severity of the occurrence, and the necessity of implementing this component of the action. If implemented, this component would use approximately 34 TAF. Combined with the preventive base and preventive pulse, the total volume needed for the Proposed Action would be up to 84 TAF.

Implementing the Emergency Flow component of the Proposed Action would require rapid planning by Reclamation and other agencies and tribes to ensure a timely response. The need for a rapid response is based on the potential for rapid spread of disease during an outbreak of severity sufficient to trigger the emergency component of the Proposed Action and the approximate 2-day travel time of water from Lewiston Dam to the lower Klamath River. The frequency of communications in the information-sharing protocol would increase following the implementation of the Preventive Pulse Flow to ensure a timely decision on implementation of the Emergency Flow, if and when it is appropriate.

4.2.2.1 Coldwater Storage Availability and Water Temperatures

Under the Proposed Action, assuming all three components of the Proposed Action are implemented, the volume of water that would remain as EOS storage in 2016 is estimated at 893 TAF. This volume is substantially greater than the previous two years and provides a greater buffer of suitably cold water for use this year.

Water temperatures for water released from Lewiston Dam for the Proposed Action are anticipated to be slightly lower than the No Action alternative. This is because the implementation of any component of the Proposed Action results in an overall net increase of flow through Lewiston Reservoir. While it maintains the trans-basin diversion schedule, it also increases total flow (by up to 800 cfs for the Preventive Base Flow) through Lewiston Reservoir, an after bay to Trinity Reservoir that decreases the transit time of water flowing through Lewiston Reservoir. This higher flow-through rate also results in a reduction in temperature of water that is then discharged from Lewiston Dam to the Trinity River, or diverted to Whiskeytown Reservoir through Carr Tunnel intake, located at the downstream end of Lewiston Reservoir. However, while the effects of a decreased transit time may be immediately notable (and beneficial from a temperature reduction standpoint) to the release from Lewiston Dam to the Trinity River, the effects of this slight reduction in water temperature through the Carr

Tunnel into Whiskeytown could be masked at least to some degree by the large storage volume of Whiskeytown Reservoir (241 TAF) from which it will at least partially be blended. In turn, this masking would likely make the change to outflow temperatures from Whiskeytown Reservoir, which includes those through Whiskeytown Dam to Clear Creek or through Spring Creek tunnel that flows to Keswick Reservoir, less appreciable. The other components of the Proposed Action (Preventive Pulse and/or Emergency Flow), would likely have even a greater influence on the Trinity River, but, again, the influence on the Sacramento side is uncertain.

As in the No Action alternative, the auxiliary outlet at Trinity Dam may be used opportunistically to ensure suitably cold water can be released from Trinity Reservoir for downstream beneficial uses in the Proposed Action. However, the degree to which its use could reduce the need for implementation of the Preventive Base Flow is uncertain; the complexities and need for the use of the auxiliary outlet cold water releases are dependent upon the flow-through rate of Lewiston Reservoir, the temperature of water that would go through the powerhouse, and meteorology. If the Emergency Flow and/or Preventive Pulse Flow is necessary, releases from the powerhouse would be anticipated; the volumetric need to meet the target release from Lewiston (approximately 3,400 cfs) and the volume that would be diverted (approximately 1,000 cfs) surpass that which can be acquired from the auxiliary outlet, which has a capacity of approximately 2,000 cfs, alone. Implementation of any of the components of the Proposed Action would assist toward ensuring that temperature control in the reach of concern (the approximate 20 river miles between Lewiston Dam and Douglas City) is met.

The Preventive Base Flow would provide a temperature decrease to the lower Trinity River as compared to the No Action Alternative. The effects, however, would be not as pronounced as in the previous years when dam releases were a more dominant source compared to tributary contributions. This year, the accretions from unregulated tributaries are slightly larger than they were in the past two years which serves to dilute the cold-water releases from Lewiston to some extent. If, however, the Emergency Flow and/or Preventive Base Flow are implemented, a stronger temperature benefit to the lower Trinity River and the lower Klamath River would be expected.

If Trinity Reservoir fills to capacity during water year 2017, there would be no effects to water resources available for all potential purposes in the next water year. In contrast, if Trinity Reservoir does not fill in water year 2017, some water volume, up to the amount released for supplemental flows, would not be available for other potential purposes.

Implementation of the Proposed Action would not affect water supply allocations managed as part of the CVP in 2016, or water operations within the Central Valley. Water allocations for irrigation and M&I deliveries have already been determined for 2016. As a consequence, the supplemental release(s) would not affect the projected volume of water to be exported to the Sacramento River Basin. In turn, there are no anticipated changes to the thermal regime of water that is diverted. The extent that the flow augmentation releases would affect the 2017 water supply and water allocations is dependent on the water year 2017 baseline hydrology and operational objectives. However, long range predictions of the 2017 hydrology are not expected to be accurate enough at the time of writing for this document to be meaningful. This is especially true considering the forecast spans a time when rainfall typically occurs.

Implementation of the full Proposed Action would result in use of approximately 84 TAF of additional water from storage that would potentially be unavailable for diversion to the Sacramento River Basin. Direct effects of this loss could include reduced amounts of suitably cold water if the drought continues. For example, with a dry forecast (August 16, 2016 forecast at 90 percent exceedance), the end of June storage in 2017 could be as low as 1,006 TAF. In this case, and based on the diversion patterns and quantities that were included in this forecast volume, there would still be an adequate supply of cold water to meet the needs within the Trinity River Basin and those outside of the basin (i.e. Sacramento River Basin) in 2017 and no need to alter operations in the Trinity River Division (TRD), including altered diversion patterns and schedules to ensure an adequate supply of suitably cold water is available to meet in-basin needs. However, the determination of whether or not such altered management strategies might be needed, and the corresponding degree, would largely depend on future hydrology that is very difficult to accurately predict.

Significant recreational activities on the Trinity River include pleasure rafting, boating and recreational fishing. Bank- and boat-based fishing as well as boating opportunities along the entire river are not expected to be adversely affected. The slightly greater quantity of water in the lower river may afford greater powerboat access to a larger section of the Klamath River, thereby expanding fishing opportunities for many. The short-term, temporary surges in river flow, should the Emergency and/or Preventive Pulse Flow components be implemented, are expected to result in complementary short-term and temporary inaccessibility to banks for bank-based fishing. Entrance and egress opportunities for un-powered boats may be similarly limited. Reclamation would issue advisories to maintain public safety during times of significantly increased flow prior to implementation of the Emergency and/or Preventive Pulse Flow releases.

Implementation of the full Proposed Action would result a decrease in the EOS 2016 elevation of Trinity Lake, from 2,253 ft (approximately 977 TAF of storage) to 2,243 ft (approximately 893 TAF), which is a decrease in elevation of approximately 10ft. This reduction in elevation would not further affect access to Trinity Lake by its many boat ramps, compared to the No Action Alternative. Minersville and Cedar Stock ramps are operational at elevations of approximately 2,230 ft or lower and would still be operational under the Proposed Action.

Overall, recreational activities at Trinity Reservoir in 2016, would not be expected to change to any considerable extent from the implementation of the Proposed Action.

4.3 Biological Resources

4.3.1 No Action Alternative

Due to the projected minimum flow of the lower Klamath River being similar to conditions of 2002, and suspected continued presence of *Ich* infections of adult salmon in the river system, there could be an increased risk for a fish die-off in the lower Klamath River in 2016. While the temporary increase in flow for the Ceremony from IGD could provide some degree of temporary relief for stressed fish in the lower Klamath River, the short duration of this action, and the lower quality of the water that will be released (in comparison to Lewiston releases), make the benefit to the environmental conditions in the lower Klamath River negligible and fleeting. The effects of

the Ceremonial pulse on flow are forecasted to span 8 days in comparison to the month-long period of concern (late-August to late-September). The Ceremonial pulse flow would occur very early in the fall Chinook salmon run, which typically does not begin until the last week of August and does not peak until the second week in September. Similarly, the Ceremonial pulse flow would have no lasting effect from which the Federally-listed Coho, typically entering the Klamath River Basin in September, may benefit. In 2014 levels of *Ich* infection didn't spike until mid-September, necessitating an emergency release.

In the event of a large fish die-off, akin to the one that occurred in 2002, the brood and subsequent Cohorts from that brood of salmon could be diminished. The consequences could also prevent the Trinity River Restoration Program (TRRP) from meeting natural fall-run Chinook salmon escapement goals.

4.3.2 Proposed Action

4.3.2.1 Trinity and Klamath River Basins

The difference in flow from implementation of the Proposed Action is not anticipated to affect wildlife species that use riparian corridors along the Trinity and Klamath rivers. This is based on experience and observations from past augmentation actions.

Under the Proposed Action, the susceptibility of returning adult fall Chinook salmon to diseases that led to the 2002 fish die-off would be expected to decrease in the lower Klamath River during late summer of 2016. It is well documented that the Trinity River and lower Klamath River would see a reduction in water temperatures (Magneson and Chamberlain 2015). However, although the anticipated release of flow from Lewiston Dam to meet the need in 2016 would be less than in the year that Magneson and Chamberlain reviewed (2015), it would still be influential to the lower river. After supplemental flow actions were implemented in 2003, 2004, and 2012-2015, general observations were that the sustained higher releases from mid-August to mid-September in each year coincided with no significant disease or adult mortalities, with the exception of 2014 when an additional releases of a lower magnitude (less than 2,500 cfs) was required to combat a September *Ich* outbreak.

Rearing juvenile Coho may be present in the mainstem Trinity River downstream of Lewiston Dam throughout the entire Proposed Action period, with adults entering the Klamath River Basin around mid-September. Estimated releases from Lewiston Dam, as part of the Preventive Base Flow augmentation portion of the Proposed Action, would be about 900 cfs to meet a target flow of up to 2,800 cfs in the lower Klamath River. This flow rate typically does not alter downstream flows enough that they overtop berms, allowing juvenile fish to distribute themselves into temporarily inundated areas and creating a standing hazard for when flows subside. However, because the Proposed Action will result in cooler temperatures in the upper Trinity River, habitat for rearing juvenile Coho salmon will increase longitudinally downstream from the dam because a greater length of river will be at suitable and optimal water temperatures for juvenile Coho salmon rearing.

High flows associated with the Preventive Pulse Flow and Emergency Flow components of the Proposed Action have the potential to minimally impact Coho salmon by creating a stranding potential. However, if the Preventive Pulse Flow was used, the overall impact would be

anticipated to be positive in nature for the fish species in that it would flush and dilute *Ich* parasites and provide improved water quality and flow to facilitate movement of adult salmon to further help alleviate the potential for disease outbreak.

If the Emergency and/or Preventive Pulse Flow components are implemented, riparian berms throughout the action area would likely be overtopped. Juvenile fish may distribute themselves into temporarily inundated areas. As flows from Lewiston Dam recede to a baseline level of 450 cfs, these areas could become disconnected from the mainstem and any juveniles in them have the potential to become stranded. The TRRP has completed a significant amount of channel restoration work that has helped to reduce the number of potential stranding locations along the river. Additionally, the potential for stranding will be minimized by implementing conservative flow release changes (ramping rates) that will allow fish to move into the mainstem before connectivity to temporarily inundated areas is lost. Based on the number and location of potential stranding locations and implementation of conservative ramping rates, the proportion of juveniles that may be affected by the Proposed Action is anticipated to be small and will minimally effect the overall freshwater survival of juvenile Coho salmon.

Given the inherent uncertainties regarding events of this nature, combined with the predicted low fish run size to the Klamath River basin, it is not possible to predict with absolute certainty that the Proposed Action will preclude a fish die-off in 2016. In addition it is not possible to accurately quantify the reduced disease risk attributed to the increased flows. However, given the past experiences with flow augmentation, and the knowledge of cold water requirements for salmon and contributing factors to disease outbreak (warm water temperatures, low water velocities and volumes, high fish density, and long fish residence times), implementation of the Proposed Action is anticipated to reduce the risk of *Ich* infection and associated fish die-off fall of 2016. Furthermore, the Preventive Base Flow component of the Proposed Action is to be considered a primary treatment to the potential problem that lowers the need to implement the Preventive Pulse Flow, which in turn is also used to lower the potential need to implement the emergency component. In this way, the treatments are progressive in nature to ensure a disease outbreak does not occur.

4.3.2.2 Sacramento River Basin

Implementation of the Proposed Action would not affect the quantity and quality (i.e. water temperature) of flow suitable for trans-basin diversions to Whiskeytown Reservoir in 2016. As a consequence, there are no impacts anticipated from either the No Action or Proposed Action alternatives.

Trinity and Shasta Reservoirs are operated in a coordinated fashion. Depending on the details of future operations and the fill pattern at both reservoirs, the Proposed Action may reduce the available cold water resources used to meet temperature objectives in the Sacramento River in 2017. If the drought persists and the full 84 TAF is used, changes to the ability to achieve temperature objectives would be expected, which could impact ESA-listed salmon and steelhead. As previously stated, the determination of whether or not there would be a distant future impact is speculative at this time since the forecasting hydrology is difficult to accurately predict.

4.4 Indian Trust Assets

4.4.1 No Action Alternative

Because the projected flow of the lower Klamath River is relatively low, there is an increased risk for a fish die-off in the lower Klamath River in 2016 if the No Action Alternative is selected. A fish die-off in 2016, regardless of apparent causes, would be devastating for the tribal trust fisheries in the Klamath and Trinity Rivers.

The Hoopa Valley Tribe and the Yurok Tribe both depend on the salmon harvest for subsistence, ceremonial, and commercial needs to maintain a moderate standard of living. These Tribes have fished these rivers for thousands of years and tribal culture is deeply connected to the river and the salmon. Without the harvest, tribal communities would be greatly impacted.

4.4.2 Proposed Action

Under the Proposed Action, it is expected that vulnerability to disease would be decreased for fall run Chinook salmon returning to the lower Klamath River, relative to the No Action Alternative. In turn, the risk to the tribal trust fishery would be expected to decrease. In 2003, 2004 and 2012-2015, supplemental flows were implemented, and general observations were that the sustained higher releases from mid-August to mid-September in each year coincided with no significant adult mortalities.

4.5 Environmental Justice

4.5.1 No Action Alternative

Because the projected minimum flow of the lower Klamath River is relatively low, there is an increased risk for a fish die-off in the lower Klamath River in 2016 if the No Action Alternative is selected. A fish die-off in 2016 would negatively impact tribal trust fisheries, commercial, and recreational fisheries in the Klamath and Trinity Rivers. Impacts could also arise in ocean salmon fishing commerce, as a large die-off of salmon in 2016 could result in a diminished brood year and fewer fish returning to the ocean. These impacts could translate into environmental justice impacts, as many of the communities depending on these fisheries are considered low-income and/or are made up of minority populations.

4.5.2 Proposed Action

Under the Proposed Action, it is anticipated that the run of fall Chinook salmon returning to the lower Klamath River in the late summer would be less susceptible to a disease outbreak similar to that which caused the 2002 fish die-off. In turn, the risk to the tribal, commercial and recreational fisheries, and the associated environmental justice would be reduced.

Implementation of the Proposed Action would reduce the water storage of Trinity Reservoir by as much as 84 TAF. This could reduce trans-basin diversions to the Sacramento River Basin in 2017, depending on whether or not the drought persists. While water exports from the Trinity River Basin are used for a variety of purposes in the Sacramento River Valley, these diversions typically make up only a small fraction of the total water used. If 2017 is another drought year, the effects to environmental justice would be minor. If 84 TAF is released and a more median winter/spring ensues, implementation of the Proposed Action is anticipated to have even less of

an effect on low-income and/or minority populations who depend on CVP water allocations than would be the case if the drought persists.

4.6 Socioeconomic Resources

4.6.1 No Action Alternative

Because the projected minimum flow of the lower Klamath River is relatively low, there is an increased risk for a fish die-off in the lower Klamath River in 2016 if the No Action Alternative is selected. A fish die-off in 2016 would negatively impact any fishery-related socioeconomic resources. This includes lost revenue from loss of fishing guide and fishing charter revenue (both on the river and ocean) and decreased recreational fishing tourism.

In future years, losses could include revenue from commercial salmon sales, fishing guide and fishing charter services (both on the river and ocean) and recreational fishing tourism. There could also be an added cost to the people who rely on the salmon for their subsistence and must then purchase other food sources.

Under the No Action Alternative there would be no significant changes to the lake levels that would impact access to Trinity Lake and could otherwise impact the socioeconomics of the region. The 90 percent exceedance forecast for Trinity Reservoir storage volume for EOS 2016 is 977 TAF, which equates to a water elevation of 2,252 ft that is almost 50 ft higher than in 2015.

4.6.2 Proposed Action

Under the Proposed Action, Reclamation anticipates a reduced risk of disease susceptibility to the fall-run Chinook salmon returning to the Klamath River in the late summer. In turn, there may be less potential for adverse effects to fisheries-related socioeconomic resources, including those to fishing guide and fishing charter revenue and recreational fishing tourism.

In comparison to the No Action Alternative, future years' lost revenue from commercial salmon sales, fishing guide and fishing charter services and recreational fishing tourism would likely be lower, as would potential lost subsistence fishing.

Implementation of the Proposed Action would lower the water level in Trinity Reservoir by 10 ft in comparison to the No Action Alternative. This change does not change the public access points to the reservoir. There could be minor socioeconomic impacts to business owners surrounding Trinity Reservoir from reduction in tourism and associated revenue streams, as well as costs associated with moving private docks and ramps. These impacts would come toward the end of the typical lake tourist season, which continues through October but generally slows after Labor Day.

Depending in part on whether or not Trinity Reservoir completely fills in water year 2017, there is a possibility that some of the water volume from Trinity Reservoir used to implement the Proposed Action may not be available for other uses in the future. It would be speculative to estimate the amount and use of water that may be unavailable in the future. Since the CVP facilities are operated in a coordinated fashion, and annual water allocations to contractors are

determined by supply conditions throughout the system, it is unlikely that any allocations to individual contractors would be reduced in the future to accommodate a lower overall water availability associated with implementation of the Proposed Action.

4.7 Power Generation

4.7.1 No Action Alternative

In order to meet temperature targets on both the Trinity River and Sacramento side, the auxiliary bypass at Trinity Reservoir may be used opportunistically. Doing so bypasses power generation at Trinity Dam but allows colder water of the deeper strata of Trinity Reservoir to be acquired in order to ensure the cold water released to these rivers remain suitable. This is a routine operation in years of lower storage. The storage volume is substantially larger than the past two years. As a consequence, the use of the auxiliary outlet in 2016 is anticipated to be substantially less than in 2014 and 2015.

Under the No Action Alternative, the flow released from Lewiston Dam into the Trinity River in August and September 2016 would be maintained at 450 cfs, consistent with the flows described in the TRMFR EIS/EIR (see Figure 4). These flows are consistent with the existing condition; therefore, there would be no new effects to hydropower generation.

4.7.2 Proposed Action

Implementation of the Proposed Action will not adversely affect power generation in 2016. The expected schedule for water delivery to the Clear Creek Tunnel has already been developed; the Proposed Action would not affect these exports. It is anticipated that the auxiliary bypass may be used opportunistically for either the No Action Alternative or the Proposed Action.

If Trinity Reservoir does not fill in water year 2017, there is the potential that some portion of the water released through Lewiston Dam to implement the Proposed Action in 2016 may have been later released through the Clear Creek Tunnel, J. F. Carr Powerplant, the Spring Creek Tunnel and Powerplant and Keswick Power Plant in 2017. In turn, the foregone release may result in decreased power generation in comparison to the No Action Alternative. The effects are complex and difficult to accurately determine and quantify, because they are dependent on future conditions, including the particular refill patterns at Trinity Reservoir, whether or not safety-of-dams releases occur at Trinity Dam in 2016, and Shasta Reservoir operations. However, if 84 TAF were released to the Trinity River to implement the Proposed Action in full, future foregone generation could be a maximum of about 92,400 megawatt hours (MWH). At \$50 per MWH, based on 2014's average market rate of \$45 with consideration for inflation, this equates to a revenue loss of about \$4,620,000. The extent to which all or a portion of this hypothetical lost revenue may become relevant and actual is dependent on the aforementioned future conditions which carry great uncertainty at this time.

The decision to use the auxiliary bypass outlet opportunistically for temperature control would be made independent of the Proposed Action. Power generation opportunities are subject to many restrictions and uncertainties unrelated to the Proposed Action. Also, power production patterns are generally driven by water operations decisions. It is difficult to accurately predict whether or not power in excess of Reclamation's water pumping needs would be available at a

given time, and power available for CVP power customers would be sufficient to meet demand. In the event that water operations are changed due to implementation of the Proposed Action, CVP power customers may have to buy power from alternative sources when CVP power would have otherwise been generated using the water that was used to implement the Proposed Action.

4.8 Global Climate

Climate change refers to significant change in measures of climate (e.g. temperature, precipitation, or wind) lasting for decades or longer and is considered a cumulative impact. Many environmental changes can contribute to climate change (changes in sun's intensity, changes in ocean circulation, deforestation, urbanization, burning fossil fuels, etc.; EPA 2010). Gases that trap heat in the atmosphere are often called greenhouse gases (GHG). Some GHG, such as carbon dioxide (CO₂), occur naturally and are emitted to the atmosphere through natural processes and human activities. Between 1990 and 2009, CO₂ was the primary GHG (approximately 85 percent) produced in the U.S. due to the combustion of fossil fuels such as coal, natural gas, oil, and gasoline to power cars, factories, utilities and appliances. The added gases, primarily CO₂ and methane gas (CH₄), are enhancing the natural greenhouse effect and likely contributing to an increase in global average temperature and related climate change.

In 2006, the state of California issued the California Global Warming Solutions Act of 2006, widely known as Assembly Bill 32, which requires California Air Resources Board (CARB) to develop and enforce regulations for the reporting and verification of statewide GHG emissions. CARB is further directed to set a GHG emission limit, based on 1990 levels, to be achieved by 2020. In addition, the EPA has issued regulatory actions under the Federal CAA, as well as other statutory authorities to address climate change issues.

4.8.1 No Action Alternative

Under the No Action Alternative, hydropower generation would occur to some extent depending on the extent of auxiliary bypass use. The amount and timing would vary according to available opportunities and other water release and delivery commitments. CVP power customers would not have to change their power purchase patterns and sources more so than the status quo conditions. Additional hydrocarbon-generated electricity would not have to be purchased in lieu of sustainably-sourced power, such as hydropower, more so than the status quo conditions. Therefore, there would be no additional affects to GHG emissions.

4.8.2 Proposed Action

While no GHG emissions would be generated as a direct result of implementation of the Proposed Action, there may be some broader scale or theoretical effects to GHG emission levels associated with the Proposed Action.

If 50 or 84 TAF of water is released from Trinity and Lewiston Reservoirs to augment flows in the lower Klamath River, some of that volume of water may have been exported from the Trinity River Basin at some unknown time in the future, depending on fill patterns for Trinity Reservoir and other operational decisions. In that circumstance, hydroelectric power would have been generated at the J. F. Carr Powerplant, the Spring Creek Powerplant, and likely the Keswick Powerplant using all or some of the water contemplated in the Proposed Action. The power

generated by this volume of water may have been available for purchase by the CVP preference power customers, whom share the CVP energy production that is in excess of Reclamation's water pumping needs. At any given time, CVP power customers may have to purchase power from an alternate source when available CVP power is not sufficient to meet their demands. This alternate source, non-CVP power may be hydrocarbon-generated. Assuming 50 or 84 TAF of water is used for flow augmentation, tens of thousands of megawatt hours of power generation may be foregone at some time in the future. However, the magnitude and timing of the potential additional CO₂ equivalent is dependent on the alternate power source selected and therefore unknown, as are the associated effects on Global Climate. The effects to Global Climate from the Proposed Action are therefore too speculative to warrant further analysis.

4.9 Cumulative Impacts

According to CEQ regulations for implementing the procedural provisions of NEPA, a cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." Cumulative effects can result from individually-minor but collectively-significant actions taking place over a period of time.

4.9.1 No Action Alternative

Selection of the No Action Alternative would increase the risk of fish disease outbreak in the lower Klamath River, and could result in a large fish die-off similar to that which was experienced in 2002. If another fish die-off was to occur, the effects would be immediate but potentially lasting. The immediate effect would be a reduction of fish to harvest by tribal members as well as recreational fisherman. The longer-term effect could include partial loss of a brood and subsequent cohort from that brood that would return to the river in future years.

4.9.2 Proposed Action

4.9.2.1 Water Resources

There are no anticipated substantial cumulative impacts on Trinity River Basin water resources related to the Proposed Action. Although there are a number of relatively small-scale water diversions downstream of Lewiston Dam, no additional impacts are expected to occur compared to recent past years.

The TRD of the CVP is operated in coordination with all the other CVP and State Water Project facilities. Due to the inherent difficulty and uncertainty with forecasting future water supply conditions within this large geographic area, it is not possible to meaningfully evaluate how a potential slightly lower Trinity Reservoir storage in 2016 may exacerbate system-wide supply conditions in the future.

Although there are no adverse impacts associated with implementing the Proposed Action in 2016, there is potential for cumulative effects. As previously stated, water was released from Trinity Reservoir to decrease potential for fish disease outbreaks in 2003, 2004 and 2012 through 2015. With continuing drought conditions, reservoirs have not replenished, and cold water storage within the reservoirs is particularly low. Looking forward, Reclamation may implement

similar flow augmentation actions in future years. Notably, Reclamation is in the process of completing a EIS on the Long-Term Plan to Protect Adult Salmon in the Lower Klamath River for which Reclamation anticipates a late fall 2016 release. One of the alternatives being analyzed in the EIS involves an annual augmentation of flows when certain triggers indicate risk of a large disease-induced fish die-off. In other words, Reclamation has implemented augmentation actions for ecological protection purposes in recent years and may do so again in future years.

Repeated releases from Trinity Reservoir could deplete cold water storage, making it difficult to meet regulatory-driven temperature benchmarks in the Trinity and Klamath Rivers. When cold water storage levels are low, water directed through hydropower plants can become too warm for downstream aquatic organisms, including sensitive fish species. In this case, use of the auxiliary bypass must be relied on in order to meet temperature goals. There is a subsequent loss of both power and the revenue it generates.

Historically, water from Trinity Reservoir has been used in conjunction with water from Shasta Lake to regulate temperatures in the Sacramento River in support of winter-run and spring-run Chinook salmon. If drought conditions persist, releasing supplemental flows from Trinity Reservoir could reduce the total volume of water available for diversion to the Sacramento River via the Clear Creek Tunnel, as well as the cold water storage that, in years past, has been used to help control the temperature of the Sacramento River. If cold water storage in the Trinity Reservoir is insufficient to support temperature control of the Sacramento River, Reclamation would then need to rely heavily on Shasta Lake to meet temperature needs for the Sacramento River. The cold water pool in Shasta Lake is higher in 2016, as compared to the same timeframe in 2015, which suggests available cold water will be adequate to meet Sacramento River needs in 2016. Repeated releases from Trinity Reservoir with continued drought conditions could result in negative impacts to Federally-listed fish species such as winter-run and spring-run Chinook salmon, and Central Valley steelhead. Again, however, it is too early to accurately predict the future water supply. Therefore, any prediction of anticipated cumulative impacts would be speculative.

4.9.2.2 Biological Resources

No additional cumulative impacts to biological resources, beyond those described in the TRMFR EIS/EIR, are anticipated.

4.9.2.3 Indian Trust Assets (ITA)

Cumulative effects to ITA from future activities are somewhat speculative. Activities of Executive Branch Federal agencies who may affect ITA are carefully scrutinized regarding their affects to these assets. State and local activities that are undertaken on non-Federal land are subject to associated limitations, and the resulting affects to ITA would be speculative.

4.9.2.4 Environmental Justice

Cumulative effects of future activities on minority and low income populations are speculative. Federal agency actions are subject to scrutiny regarding their affects to these populations; however, state and local activities on non-Federal lands are not necessarily subject to the same analyses. Therefore, it is speculative to determine the effects of future, non-Federal activities on minority and low income populations.

4.9.2.5 Socioeconomic Resources

Cumulative impacts of future activities on socioeconomic resources are speculative. Federal agency actions are subject to scrutiny regarding their affects to these resources. State and local activities on non-Federal lands are not necessarily subject to the same analyses, so it is not possible to meaningfully determine the effects of future, non-Federal activities on socioeconomic resources.

Section 5 Consultation and Coordination

5.1 Agencies and Groups Consulted

Reclamation coordinated with the USFWS, NMFS, California Department of Fish and Wildlife (CDFW), Hoopa Valley Tribe, and Yurok Tribe in the preparation of the EA. Comments received from the public review of the draft will be used to develop the final EA and Finding of No Significant Impact (FONSI). Input from substantive comments received on the draft EA has been incorporated into the appropriate section of this final document.

5.2 Endangered Species Act (16 USC § 1531 et seq.)

Section 7 of the Endangered Species Act (ESA) of 1973 (as amended) requires Federal agencies, in consultation with the Secretary of the Interior (through USFWS) and/or Commerce (through NMFS), to ensure that their actions do not jeopardize the continued existence of Federally Endangered or Threatened species, or result in the destruction or adverse modification of the Critical Habitat of these species.

State Water Board Order WR90-5 (Order) requires Reclamation to prepare a management plan that “ensures the (CVP) operations do not result in redd dewatering, stranding, or temperature impacts to winter-run Chinook salmon or indirect impacts to other salmonids in the Sacramento or Trinity River basins.” On July 8, 2016, Reclamation, in cooperation with NMFS, CDFW and the State Water Board, released a final Sacramento River Temperature Management Plan (2016 Temp Plan) to fulfill the requirements of the Order. On June 28, 2016, NMFS concurred with Reclamation’s determination that the final 2016 Temp Plan is consistent with the requirements of NMFS’ 2009 Biological Opinion for the Coordinated Long-Term Operation of the Central Valley Project and State Water Project (2009 BiOp).

On August 22, 2016, Reclamation issued a letter to NMFS indicating that the results of model runs used to forecast water temperatures associated with the Proposed Action indicate that the temperatures of water released through Clear Creek Tunnel and Keswick and Whiskeytown Dams during the timeframe of implementation is no greater than those identified in the approved 2016 Temp Plan. The letter therefore requested concurrence from NMFS that the effects of the Proposed Action are within the effects evaluated for the RPA Action I.2.4.C in 2009 NMFS’ BiOp and the 2016 Temp Plan and will neither result in exceedance of incidental take in the 2009 NMFS BiOp, nor jeopardize the continued existence of listed species or destroy or adversely modify their designated critical habitats. Reclamation received NMFS’s concurrence on its determination in a letter dated August 24, 2016.

Reclamation has not identified any adverse effects to essential fish habitat. Therefore consultation regarding the Magnuson-Stevens Act (MSA) for the Sacramento River species is not needed. As to the Coho salmon for the Trinity Basin, the MSA will be conducted as part of the ongoing consultation on the Coho salmon.

5.3 National Historic Preservation Act (54 USC § 300101 et seq.)

54 U.S.C. § 304108, commonly known as Section 106 of the National Historic Preservation Act (NHPA), requires that Federal agencies take into account the effects of their undertakings on historic properties. Historic properties are cultural resources that are included in, or eligible for inclusion in, the National Register of Historic Places. 36 CFR Part 800 implements Section 106 of the NHPA. Reclamation reviewed the Proposed Action and determined that it has no potential to cause effects on historic properties, pursuant to 36 CFR § 800.3(a)(1). As such, Reclamation has no further obligations under Section 106 of the NHPA. The memorandum bearing Reclamation's determination is included as Appendix B.

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Appendix A Discussion of Legal Authority for 2016 Lower Klamath River Late-Summer Flow Augmentation

A. Trinity River Division Act

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

The recently released Solicitor’s Opinion, M-37030, concludes that each of the two provisos in section 2 of the TRD Act are “separate and independent limitations on the TRD’s integration with, and thus diversion of water to, the CVP” and that the two provisos may “require separate releases of water as requested by Humboldt County and potentially other downstream users pursuant to Proviso 2 and a 1959 Contract between Reclamation and Humboldt County.”³ M-Opinion 37030 at 2. Formal opinions of the Solicitor are binding on the Department of the Interior and its bureaus.

Section 2 of the TRD Act and, in particular, proviso 1 of section 2 was the subject of the recent decision by the District Court for the Eastern District of California in *San Luis Delta Mendota Water Authority v. Jewell*, 52 F. Supp 3d 1020 (E.D. Cal. 2014) regarding the fall flow augmentation in 2013. In that decision, the court concluded that proviso 1 was limited in scope to the Trinity River basin and did not provide authorization for the Secretary of the Interior to implement the 2013 flow releases to benefit fish in the lower Klamath River. *Id.* at 1063. The court also noted that remand was not appropriate because the focus of Plaintiffs’ complaint was the completed 2013 flow releases.⁴ The District court did not enter an order enjoining any further releases after 2013, and in 2014 the court did not enjoin flow releases.

As discussed in more detail in the Solicitor’s Opinion, the 1955 Act and its legislative history support the view that the Act authorizes the Proposed Action to augment flows in the lower Klamath River to protect fish migrating through this area to the Trinity River. *See* M-Opinion 37030 at 9-13. The two provisos in section 2 of the 1955 Act were included specifically to

² Reclamation’s water permits from the State of California includes the following condition:

“Permittee shall release sufficient water from Trinity and/or Lewiston Reservoirs into the Trinity River so that not less than an annual quantity of 50,000 acre-feet will be available for the beneficial use of Humboldt County and other downstream users.”

Condition 9.

³ The 1959 water delivery contract between Reclamation and Humboldt County includes the following:

“The United States agrees to release sufficient water from Trinity and/or Lewiston Reservoirs into the Trinity River so that not less than an annual quantity of 50,000 acre-feet will be available for the beneficial use of Humboldt County and other downstream users.”

Contract, Article 8.

⁴ The decision of the district court is currently on appeal to the Ninth Circuit Court of Appeals.

protect the interests of downstream entities, ensuring that the interests of those downstream from the Project all the way to the ocean would be protected from the impacts of the Project.⁵ The legislative history specifically shows that, prior to the passage of the 1955 Act, in-basin users became concerned that the construction of the TRD would deprive them of their needs, and they thus sought to ensure that only water that was “surplus” to the needs of the downstream interests in the Trinity and lower Klamath River basins would be exported to the Central Valley.⁶

In a similar vein, the district court in its decision in *Tehama Colusa Canal Authority v. Interior*, 819 F. Supp 2nd 956 (2011), *aff'd* 721 F.3d 1086 (9th Cir. 2013), held that Congress can expressly provide for in-basin priority of water over the export of that water for general use by the CVP. The court noted that one purpose of the Trinity River division is "to transport Trinity River water to the Sacramento River," but then specifically cited proviso 2 of the 1955 Act as a limitation on this authority. *Id.* at 982.

The court concluded that the 1955 Act:

Demonstrate[s] that Congress knew how to create a preference in the allocation of CVP water for an area when it wanted to do so. The [1955] Act prioritizes 50,000 acre feet of CVP water to Humboldt County. Congress created an express legislative priority for use of CVP water with particularized statutory language applicable to the Trinity River Division Unit.⁷

Id. This analysis is consistent with the analysis and conclusions in the Solicitor’s Opinion, which supports the use of proviso 2 of section 2 of the TRD Act for the release of water from Trinity Reservoir for beneficial use to Humboldt County and other downstream users below Trinity Reservoir. The use of Trinity Reservoir water for fishery purposes is a beneficial use of water that is consistent with Proviso 2 of Section 2 of the TRD Act, the contract between Reclamation and Humboldt County and the Trinity Division water rights. The Solicitor’s Opinion also recommended that Reclamation conduct “an appropriate level of analysis” in response to a request to release Trinity Reservoir water pursuant to Proviso 2 to consider the proposed use of the water and any other requirements or limitations that may apply to such release. There is thus, no absolute requirement that a specific quantity of water must be released in any given year, rather the quantity and timing is based on the “appropriate level of analysis.” Further, the Solicitor’s Opinion states “a release made under Proviso 2 may also be part of the long-term management strategy regarding instream flows in the lower Klamath River.” M-Opinion 37030 at 15.

⁵ See, e.g. S. Rept. No. 1154, 84th Cong., 1st Sess. (1955), p. 5 (“An asset to the Trinity River Basin, as well as the whole north coastal area, are the fishery resources of the Trinity River. The development of the Trinity River was planned with a view to maintaining and improving fishery conditions.”)

⁶ The bill reported by the House committee, H.R. 4663, emphasized:

That there is available for importation from the Trinity River, water that is surplus to the present and future water requirements of the Trinity and Klamath River basins, and that surplus water, in the amount proposed in the Trinity River division plan, can be diverted without detrimental effect on fishery resources.

House Rept. No. 602, 84th Cong., 1st Sess. At 4 (May 19, 1955).

⁷ The court also discussed a similar limitation on the integration of the New Melones Division of the CVP in its authorizing legislation.

B. The Trinity River Basin Fish and Wildlife Management Reauthorization Act of 1995

The Trinity River Basin Fish and Wildlife Management Reauthorization Act of 1995 (“1995 Reauthorization Act”), Pub. L No. 104-143, 110 Stat. 1338 (which was enacted after the CVPIA and does not cite that statute) is among the statutes that may also provide authority for the augmentation flow releases.

The district Court in *SLDMWA v. Interior*, suggested that Reclamation could have relied on the 1995 Reauthorization Act as authority to make the augmentation releases. *SLDWMA* at 1061-62. The court also implied that this statute is not limited in the same manner as the court had interpreted the 1955 Act, and instead serves as “an acknowledgement that rehabilitation of fish and wildlife in the Trinity River Basin may require rehabilitation of fish habitat in the lower Klamath River.” *Id.*

The 1995 Reauthorization Act modified the Trinity River Basin Fish and Wildlife Management Act of 1984, adding an additional subparagraph to Section 1 of that Act that states:

(5) Trinity Basin fisheries restoration is to be measured not only by returning adult anadromous fish spawners, but by the ability of dependent tribal, commercial, and sport fisheries to participate fully, through enhanced in-river and ocean harvest opportunities, in the benefits of restoration.

The 1995 Act also modified the last subparagraph in Section 1, altering it to include a reference to the aiding ocean populations and the resumption of commercial and recreational fishing activities. The revised subparagraph (7) states:

(7) the Secretary requires additional authority to implement a management program, in conjunction with other appropriate agencies, to achieve the long-term goals of restoring fish and wildlife populations in the Trinity River Basin, and, to the extent these restored populations will contribute to ocean populations of adult salmon, steelhead, and other anadromous fish, such management program will aid in the resumption of commercial, including ocean harvest, and recreational fishing activities.

The 1995 Act also expanded the reach of the authorized fishery restoration activities, amending Section 2(a)(1)(A) so that it states:

(a) Subject to subsection (b), the Secretary, in consultation with the Secretary of Commerce where appropriate, shall formulate and implement a fish and wildlife management program for the Trinity River Basin designed to restore the fish and wildlife populations in such basin to the levels approximating those which existed immediately before the start of the construction referred to in section 1(1) and to maintain such levels. . . . Such program shall include the following activities:

(1) The design, construction, operation, and maintenance of facilities to –

(A) Rehabilitate fish habitats in the Trinity River between Lewiston Dam and Weitchpec and in the Klamath River downstream of the confluence with the Trinity River.

Both the House and Senate noted that this change was intended to authorize restoration activity in the Klamath River below the confluence with the Trinity River. S. Rpt. 104-253, 104th Cong. (1996) (“This section authorizes restoration activity in the Klamath River below its confluence with the Trinity River . . .”); H.R. Rpt. 104-395, 104th Cong. (1995) (“Section 3 also authorizes restoration activity in portions of the Klamath River . . .”).

The Act also amended section 3 of the 1984 Act to add a new subsection (d), stating:

(d) Task Force actions or management on the Klamath River from Weitchpec downstream to the Pacific Ocean shall be coordinated with, and conducted with the full knowledge of, the Klamath River Basin Fisheries Task Force and the Klamath Fishery Management Council, as established under Public Law 99-552. The Secretary shall appoint a designated representative to ensure such coordination and the exchange of information between the Trinity River Task Force and these two entities.

In addition, the 1995 Act added a section that states:

Sec. 5. – Nothing in this Act shall be construed as establishing or affecting any past, present, or future rights of any Indian or Indian tribe or any other individual or entity.

In the October 1, 2014 Decision and Order, Judge O’Neill suggested that Reclamation could rely on the 1995 Act as authority to make releases to benefit the lower Klamath River, particularly because the addition of language to section 2(a)(1)(A) implied that the Act’s focus was broader than just the Trinity River basin.

Section 4 of the 1984 Act, which was amended by the 1995 Act, included an authorization of appropriations for design and construction under the management program to be formulated under section 2 “to remain available until October 1, 1995,” and an authorization of appropriations for operations, maintenance, and monitoring under the management program for each of the fiscal years in the 10-year period beginning on October 1, 1985. The 1995 Act extended the authorization in section 4(a) to October 1, 1998, and extended the authorization for operations, maintenance and monitoring for an additional 3 years, or a total of 13 years after the period beginning in 1985.

The 1995 Act also added an additional subsection (i) to section 4 to the 1995 Act, stating:

- (i) Beginning in the fiscal year immediately following the year the restoration effort is completed and annually thereafter, the Secretary is authorized to seek appropriations as necessary to monitor, evaluate, and maintain program investments and fish and wildlife populations in the Trinity River Basin for the purpose of achieving long-term fish and wildlife restoration goals.

The program authorization set forth in section 2 is long-term, or permanent, general grant of authority despite the established expiration term for the authorization for appropriations and provides in general authority “[s]uch other activities as the Secretary determines to be necessary to achieve the long-term goal of the program” which include actions to restore habitat in the lower Klamath River such as the proposed fall flow releases.

C. The Fish and Wildlife Coordination Act

The FWCA provides the Secretary with broad authority “to provide assistance to, and cooperate with, Federal, State, and public or private agencies and organizations” to take actions for the “protection, rearing, and stocking of all species of wildlife, resources thereof and their habitat, in controlling losses of the same from disease or other causes.” 16 U.S.C. § 661. The Bureau of Reclamation has been delegated authority under the FWCA to take “actions, directly or by providing financial assistance... regarding the construction and/or continued operation and maintenance of any Federal reclamation project” to among other things “improve instream habitat.” Departmental Manual, 255 DM 1.

The FWCA provides authority for Reclamation to take actions that result in habitat improvements such as releases of water to improve habitat for the fish in the lower Klamath River below its confluence with the Trinity River. This authority is discretionary. The delegation of authority to Reclamation under the FWCA specifies that any actions taken under this delegation must be related to habitat that is affected by a Reclamation Project. (Reclamation is authorized to conduct activities for the improvement of fish and wildlife habitat associated with water systems or water supplies affected by Reclamation projects, including but not limited to fish passage and screening facilities at any non-Federal water diversion or storage project within the region; Reclamation Manual 6.f.(2) [from 255 DM 1.1.B.]

The Proposed Action provided in the EA is authorized by the FWCA because the construction and operation of the Trinity River Division affected the average annual flow in the Trinity River and the Klamath River below its confluence. The flow augmentation improves that habitat.

D. CVPIA

CVPIA §3406(b)(1) provides that the Secretary shall make all reasonable efforts to address “other identified adverse environmental impacts of the Central Valley Project not otherwise specifically enumerated in [3406(b)].” Reclamation could conclude that the CVP has adversely impacted the lower Klamath River. Since the TRD is part of the CVP, this section applies to the Trinity River.

E. Tribal Trust Obligation

The trust responsibility to protect the tribal fishing rights provides a supplementary authority for the action.

CULTURAL RESOURCES COMPLIANCE
Mid-Pacific Region
Division of Environmental Affairs
Cultural Resources Branch

MP-153 Tracking Number: 16-NCAO-203

Project Name: 2016 Lower Klamath River Late-Summer Flow Augmentation from Lewiston Dam

NEPA Contact: Megan Simon, Natural Resources Specialist

NEPA Document: EA-16-06-NCAO

MP-153 Cultural Resources Reviewer: Joanne Goodsell, Archaeologist

Date: August 2, 2016

JOANNE GOODSELL Digitally signed by JOANNE GOODSELL
Date: 2016.08.02 14:41:30 -07'00'

Reclamation proposes to release supplemental water from Lewiston Dam on the Trinity River to improve water quality conditions and reduce the prevalence and severity of infections from the fish disease known as *Ichthyophthirius multifiliis* (*Ich*) in the lower Klamath River. These releases would be made to help avert a large-scale die of adult fall run Chinook salmon. Under the proposed action, increased flows would take place from late August through late September 2016. The augmented releases will be discharged through existing facilities, then flow through the Trinity River to its confluence with the Klamath River and through the Klamath River to the Klamath River estuary near Klamath California.

Reclamation has determined that the proposed action is the type of undertaking that does not have the potential to cause effects on historic properties, should such properties be present, pursuant to 36 CFR § 800.3(a)(1). As such, Reclamation has no further obligations under 54 U.S.C. § 306108, commonly known as Section 106 of the National Historic Preservation Act (NHPA). The proposed action will result in no impacts to cultural resources.

This document conveys the completion of the cultural resources review and NHPA Section 106 process for this undertaking. Please retain a copy with the administrative record for the proposed action. Should the proposed action change, additional review under Section 106, possibly including consultation with the State Historic Preservation Officer, may be required.