RECLAMATION
Managing Water in the West

Environmental Assessment

2015 Lower Klamath River Late-Summer Flow Augmentation From Lewiston Dam

EA-15-04-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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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 proposal to release supplemental flows from Lewiston Dam to improve water quality and reduce the prevalence of fish disease in the lower Klamath River. The Proposed Action will be implemented in late summer of 2015 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 transbasin 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).

Reclamation is currently in preparation of an Environmental Impact Statement (EIS) that examines impacts associated with a Long-Term Plan to Protect Adult Salmon in the Lower Klamath River. The Notice of Intent to prepare a draft EIS was published in the Federal Register. The web address to access this notice is:

> https://www.federalregister.gov/articles/2015/07/14/2015-17208/notice-of-intent-to-prepare-a-draft-environmental-impact-statement-for-the-long-term-plan-to-protect

The draft EIS is anticipated to be released to the public early 2016.

1.1 Need for the Proposal

The State of California is currently experiencing a record-breaking drought. Since the drought began in 2012, and the changing water conditions since then (i.e. decreased flows and increased temperatures), fish pathogens have proliferated compromising fish health. In August and September 2002, a large fall run of Chinook salmon (estimated 170,000) returned to the Klamath River when flows in the lower Klamath River averaged only 2,000 cubic feet per second (cfs). There was a subsequent outbreak of two deadly fish pathogens, *Ichthyophthirius multifiliis* (*Ich*) and *Flavobacterium columnare* (*Columnaris*). This outbreak resulted in a substantial number of premature (prior to successful spawning) adult salmonid deaths. 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 listed as threatened under the Endangered Species Act (ESA). These deaths are attributed to: (1) pathogens Ich and Columnaris; and (2) warm water temperatures, low water velocities and volumes, high fish density, and long fish residence times that likely contributed to the disease outbreaks and subsequent mortalities (Guillen 2003; Belchik et al. 2004; Turek et al. 2004). In 2003, 2004, 2012 and 2013, predictions of large runs of fall-run Chinook salmon to the Klamath River Basin and drier than normal hydrologic conditions prompted Reclamation to arrange for late-summer flow augmentation to improve environmental

conditions in the lower Klamath River to reduce the probability of a disease outbreak. In these years 38 thousand acre-feet (TAF) of supplemental water was released from Trinity Reservoir in 2003, 36 TAF in 2004, 39 TAF in 2012, and 17.5 TAF in 2013. There were no large pathogen-related fish die-offs in these years.

Due to the prolonged and worsening drought, early to mid-August Klamath River flows in 2014 were even lower than the 2002 flows, averaging 2,088 cfs as opposed to the 2,528 cfs of 2002. Low flows, large fall run sizes, and outbreaks of *Ich* drove the need for two emergency releases from Lewiston Dam in August and September 2014. The first release began August 23, 2014, had a target flow rate of 2,500 cfs (at the Klamath near Klamath [KNK] gage), and was maintained until September 14, 2014. A second, larger release was necessary due to the observed presence of *Ich*. In 2014, the total volume released was 64 TAF. Despite the unprecedented high incidence of infection, the second, emergency release appeared to be successful and no significant mortalities of fish occurred.

Conditions in 2015 reflect the continuation of drought in the area. Klamath River flows in 2015 are anticipated to be 2,000 cfs in late August. This is consistent with flows observed in 2002, the year of the large fish die-off. Because of the extended drought, there is little to no snow pack, and accretions are predicted to be minimal. Therefore, lower Klamath River flows are anticipated to remain low, only getting lower as we approach fall of 2015. The predicted fall run of Chinook is fairly large with 119,000 expected to return to the lower Klamath River. While a predicted run of 119,000 is not as high as the fall run of 2002 (170,000), run-size predictions are difficult to make. It is not uncommon for run predictions to be off by 50,000 fish or more in either direction. Furthermore and perhaps more importantly, the U.S. Fish and Wildlife Service (2015) identified "the pattern of upstream migration to be a more important factor in determining disease risk than run size alone" to suggest that run size should be de-emphasized as an indicator for disease risk.

Ich is already present in the river system. The Yurok Tribe captured six Chinook salmon from Blue Creek, a tributary of the lower Klamath River, on July 22nd and all tested positive for *Ich* infection. One of these fish had a severe infection, with more than 30 *Ich* spots per gill arch. This disease occurrence is a month earlier than that discovered in 2014 when it was first observed on the 27th of August. More recently, the Yurok Tribe reported severe *Ich* presence in adult salmon on August 20. Such high levels of *Ich* present this early in the year indicate a significant risk for a large fish die-off in 2015. The warmer than normal water temperatures, low flows, and presence of *Ich* already in the system all point toward a risk of infection and fish die-off event in 2015. The Proposed Action is needed to reduce the likelihood, and/or severity of any *Ich* and *columnaris* outbreaks that could lead to associated fish die-offs in 2015.

In 2015, Reclamation requested that the USFWS provide technical assistance to aid Reclamation's deliberations on determining the extent of an action in 2015 to reduce the risk of an adult fish kill in the lower Klamath River (USFWS 2015: Appendix A). This memorandum was produced to be relevant to 2015, providing clarity and modifications to considerations for fall flow augmentation as previously described in joint memorandum by the USFWS and the National Oceanic and Atmospheric Administration (NOAA) (USFWS and NOAA 2013). Three factors that were discussed in this memorandum included de-emphasis of the significance of run

size, clarifications to the *Ich* trigger used to define severity of infection, and alteration of the emergency trigger of "doubling the flow". Otherwise the information as presented in the 2013 memorandum was considered as relevant for consideration in 2015.

In 2015, the Hoopa Valley Tribe commissioned Mr. Josh Strange of Stillwater Sciences to provide a review of the need for a pulse flow in the lower Klamath River in addition to a preventative and emergency flow augmentation actions identified in the draft EA (Strange 2015). This review included evaluating the scientific rationale and evidence for elevated background levels of *Ich* in 2015. This information was taken into consideration for the need for an action.

Additionally, Humboldt County sent a letter dated May 19, 2015, to the Secretary of the Interior requesting that its contract amount of not less than 50,000 acre-feet (AF) be provided to address fisheries needs and to protect human health and safety in the Klamath/Trinity river system. This request is also supported by the recently released Solicitor's Opinion (M-37030) confirming that the inclusion of the proviso in the 1955 Trinity River Division 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), and thus the diversion of water to, the Central Valley Project. 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 Hoopa Valley Tribe and the Yurok Tribe have also requested in writing that the Humboldt County contract amount be made available for augmenting flows in the lower Klamath River.

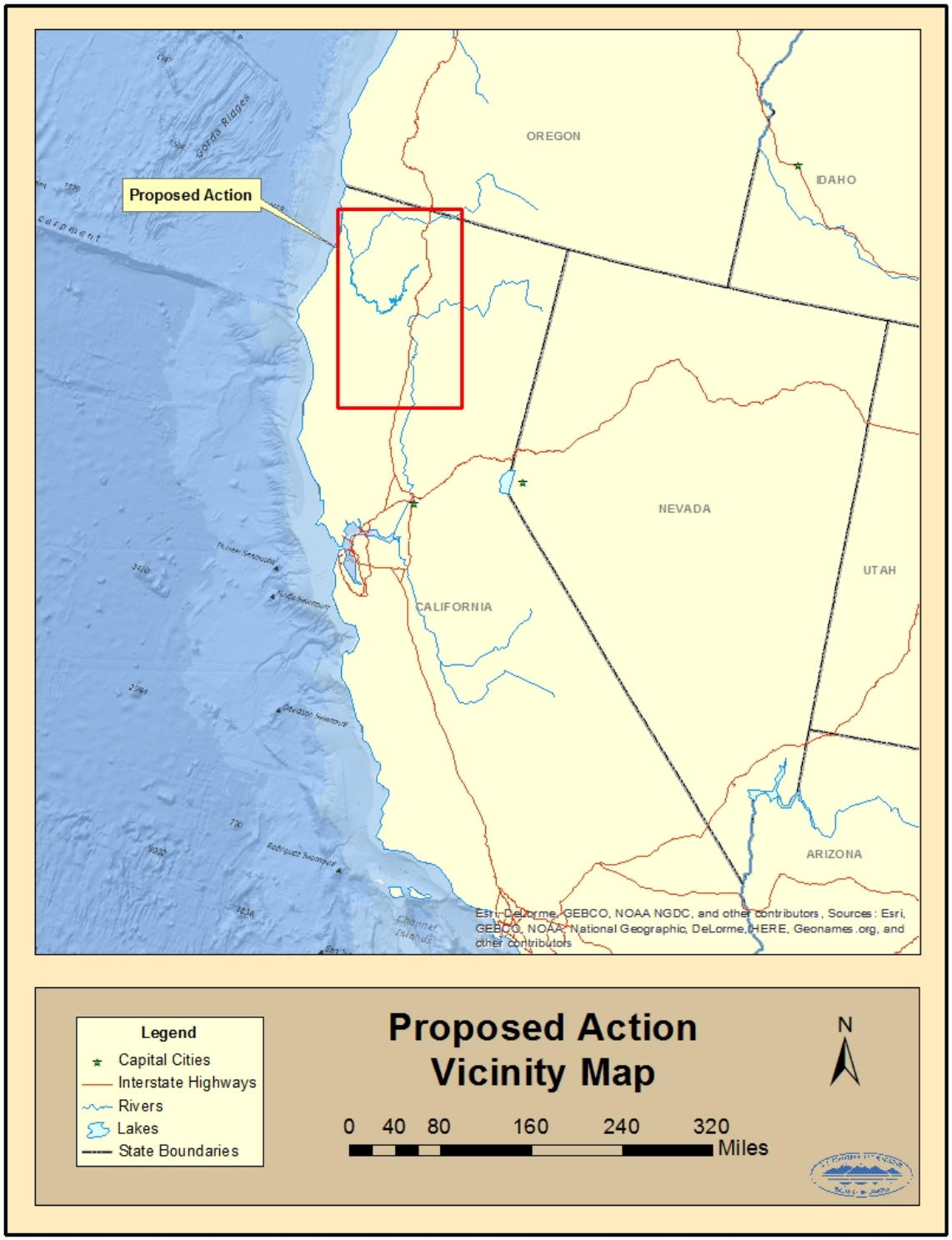


Figure 1. Geographic scope of the Proposed Action

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 Act limits the integration of the TRD with the rest of the Central Valley Project (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 CVPIA. In addition, the Proposed Action is also consistent with Reclamation's obligation to preserve tribal trust resources.

1.3 Resources Analyzed in Detail

The range of potential impacts assesses whether the release of additional flows from Lewiston Dam in late summer 2015 might cause significant effects on the human environment. 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).

[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.

- 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 and water levels along the Trinity River and would not exceed the historic range of flows.

- Floodplains, Wetlands and Waterways: There would be no impact to floodplains under the No Action Alternative as conditions would remain the same as existing conditions. The Proposed Action does not involve construction, dredging, or other modification of regulated water features. No permits under the Clean Water Act would be needed. Furthermore, the Proposed Action only includes providing controlled reservoir releases that are within the normal operational envelope.

- Land Use: There would be no impact to land use under the No Action Alternative as conditions would remain the same as existing conditions. There are also no changes in land use anticipated from implementation of the Proposed Action. The proposed water releases from Lewiston Dam are within the historic range of flows addressed in the Trinity River Mainstem Fishery Restoration Environmental Impact Statement/ Environmental Impact Report (TRMFR EIS/EIR; U.S. Fish and Wildlife Service *et al.* 2000). In addition, the magnitude and timing of the target flows in the lower Klamath River are well within the range of historic flows resulting from rainstorms, etc. Therefore, no changes in land use near the rivers will be required as a consequence of the Proposed Action.

- 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. To the extent there may be such impacts, those would be speculative and need not be analyzed. As there would be no impact to the resources listed above resulting from the Proposed Action or the No Action Alternative, they will not be considered further.

Section 2 Proposed Action and Alternatives

2.1 No Action Alternative

Under the No Action Alternative, Reclamation would not release additional flows to avoid a fish disease outbreak and subsequent fish die-off, from the Lewiston Dam in late summer 2015. Current late-summer releases from Lewiston Dam would remain at 450 cubic feet per second (cfs), as prescribed in the Record of Decision for the TRMFR EIS/EIR (U.S. Fish and Wildlife Service *et al*. 2000). Flow releases at Iron Gate Dam 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 Lewiston Dam releases to provide for the Hoopa Valley Tribe's Boat Dance Ceremony (Ceremony) as is customary in odd numbered years. In 2015, the Ceremony occurred on August 18th, necessitating the peak flow of 2,650 cfs from Lewiston to occur one day prior to the event to account for travel time from the dam to the ceremonial site. Flow adjustments (also called ramping rates) from the base flow of 450 cfs to the peak and down from the peak to 450 cfs followed contemporary approved rates of change to minimize public and environmental concerns. In total, the implementation of the ceremonial flow above the base flow of 450 cfs will result in a 5-day span of increased flow accounting for approximately 10,900 AF (Figure 4).

Under the No Action Alternative the estimated flows in the lower Klamath River (U.S. Geological Survey [USGS] Site #11530500; KNK gage), and scheduled releases from Lewiston Dam are shown in Figure 4. Forecasted flows at the KNK gage would be approximately 2,000 cfs in the second half of August and through September (not including the Ceremony pulse flow from Lewiston Dam). This flow is based on forecast tributary contributions from the California Nevada River Forecast Center (90 percent exceedance) and planned dam releases from Iron Gate (900 cfs in August and 1,000 in September) and Lewiston (450 cfs in August and September).

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 2015. With the current schedule, 97 TAF will be transferred in August, 62 TAF in September, and 20 TAF in October.

Due to regulatory-driven temperature targets in both the Sacramento and Trinity Rivers, flows are anticipated to be released from the auxiliary bypass outlet on Trinity Dam. In other words, colder water from lower reservoir depths will be released directly into the river, bypassing hydroelectric power plant facilities. These bypasses are anticipated to be needed, although the schedule for their need is subject to real-time management and review of thermal regimes and changing river conditions. Preliminary dates to use the auxiliary bypass outlet are from September 11, 2015 until October 12, 2015.

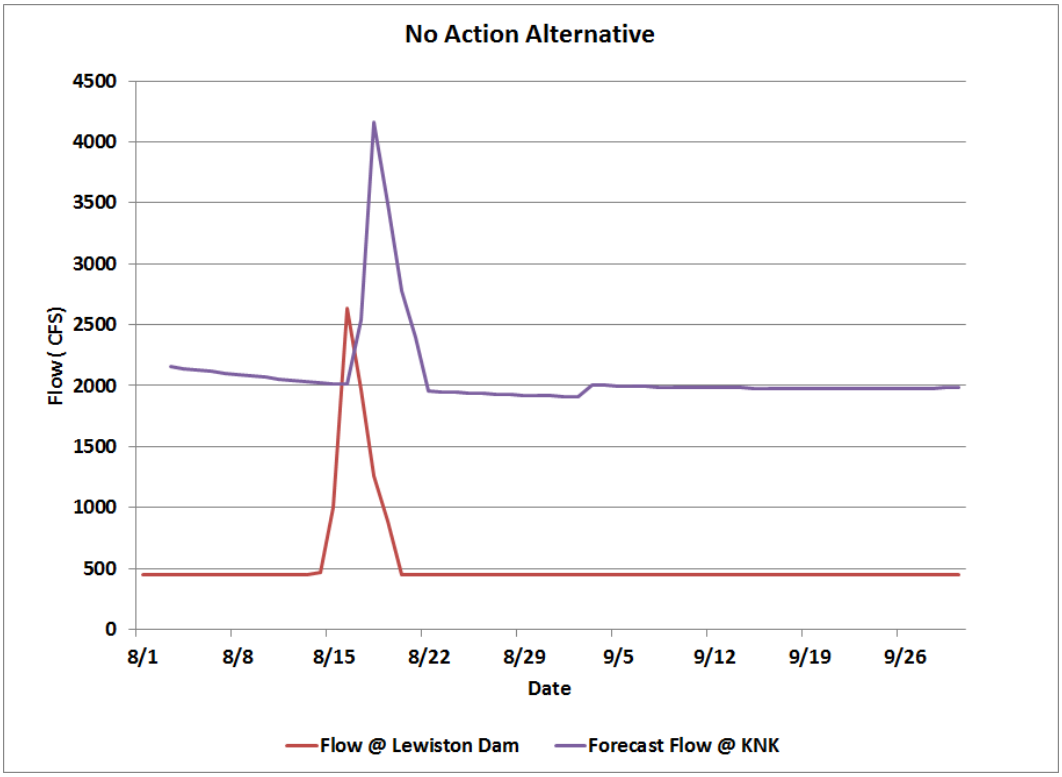


Figure 2. Hydrograph showing projected flows from Lewiston Dam on the Trinity River and the Klamath River near Klamath (KNK), California for the No Action Alternative

2.2 Proposed Action

Continued dry hydrologic conditions and recent discovery of the presence of *Ich*, the fish disease thought primarily responsible for the fish die-off in 2002, has prompted Reclamation to consider supplementing flows to the lower Klamath River in 2015 (Figure 3). The Proposed Action includes supplemental flows (up to 51 TAF) to prevent a disease outbreak (preventative flow), a preventative pulse flow, and a contingency volume (up to 37 TAF) to be used on an emergency basis to avoid a significant die-off of adult salmon. The total volume of the preventative flows with the emergency response would equal 88 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 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 of the fish in the river. Details of implementing these components of the Proposed Action follow:

Preventative Flow Augmentation:

- Initiate preventative flow augmentation in the lower Klamath River to a target flow of 2,800 cfs at the USGS gage (http://waterdata.usgs.gov/ca/nwis/uv?site_no=11530500) located in the lower Klamath River near Klamath (KNK Gage), when the cumulative

harvest of Chinook salmon in the Yurok Tribal fishery in the estuary area meets or exceeds a total of 7,000 fish.

- Initiate preventative flow augmentation releases by August 22 to meet the target flow (2,800 cfs) in the lower Klamath River, if the fish harvest metric above is not met. This date is selected based on historical harvest information in the estuary and the middle Klamath River area (as summarized in USWFWS and NOAA 2013).
- Continue flow augmentation to target a flow of 2,800 cfs in the lower Klamath River, as measured at the KNK Gage through September 20, 2015. Flow from Lewiston Dam to meet a target of 2,800 cfs in the lower Klamath River is anticipated to reduce average daily water temperatures to below 23ºC that may otherwise inhibit adult upstream migration (USFWS 2015).
- Implement fish pathology monitoring to determine the need for a fish pathology/mortality emergency release, and
- Monitor conditions to inform need and timing of emergency flow releases based on real-time environmental conditions.

Preventative Pulse Flow:

- Due to the heightened alert for this year with the recent and continued low level infections of *Ich* observed, a 3- day pulse (including ramping up and down) peaking at 5,000 cfs in the lower Klamath River may be implemented when:
    - the peak of fall run migration (first or second week of September) is identified in the lower Klamath River as indicated by tribal harvest, and
    - low level infections of *Ich* (less than 30 *Ich* per gill) is found on three fall-run adult salmon (of a maximum sample size of 60) captured in the lower Klamath River in one day during the first or second week of September. Sampling and confirmation would follow the methods as described in NOAA and USFWS (2013). The benefit of the pulse is to enhance flushing/dilution of the river of parasites when the bulk of fall run adults are likely to be the lower river. This flow would also further improve water quality and help facilitate movements of adult salmon.
- If rainfall increases the flow in the lower Klamath River to above 5,000 cfs this component would not be implemented.
- If needed, this action may avert the need to apply the emergency criteria.
- Implementation of a pulse flow will be within the Proposed Action volume of 51 TAF.

Emergency Flow Augmentation:

- Initiate emergency flow release to target a flow of 5,000 cfs in the lower Klamath River for up to five days if emergency conditions exist as identified below:
    - 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 couples with the confirmed presence of *Ich* by the USFWS Fish Health Center.

- Use the protocol for sharing and confirming information on a real-time basis to determine if and when the emergency flows would be implemented.
    - Key staff members will be on high alert during the flow augmentation action and will be getting 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 the Klamath Fish Health and Assessment group. An emergency release will be considered by Reclamation on receipt of a positive pathology report.

Flows prior to the augmentation release beginning August 19 would remain consistent with the No Action Alternative, including the release associated with the Hoopa Valley Tribe's Boat Dance Ceremony, diversions to the Sacramento River Basin, and use of the auxiliary bypass outlet at Trinity Dam to meet regulatory-driven temperature targets. As with 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. Preliminary dates when the bypass outlet would be used are September 11, 2015, until October 12, 2015. Transbasin diversions for 2015 have already been determined and would not be altered by the Proposed Action.

In 2015 Reclamation proposes to target a flow rate of 2,800 cfs at the lower Klamath River gage (See Figure 4). This is an increase from the target flow rate of 2,500 cfs used in 2014. The experience in 2014 indicated a flow rate of 2,500 cfs may not have been sufficient to thwart widespread *Ich* infection and a large emergency pulse flow was required. By increasing the target flow to 2,800 cfs the need for a preventative pulse flow and or the emergency flow should be diminished and the overall release should be limited to the 51 TAF used in the preventative portion of the action.

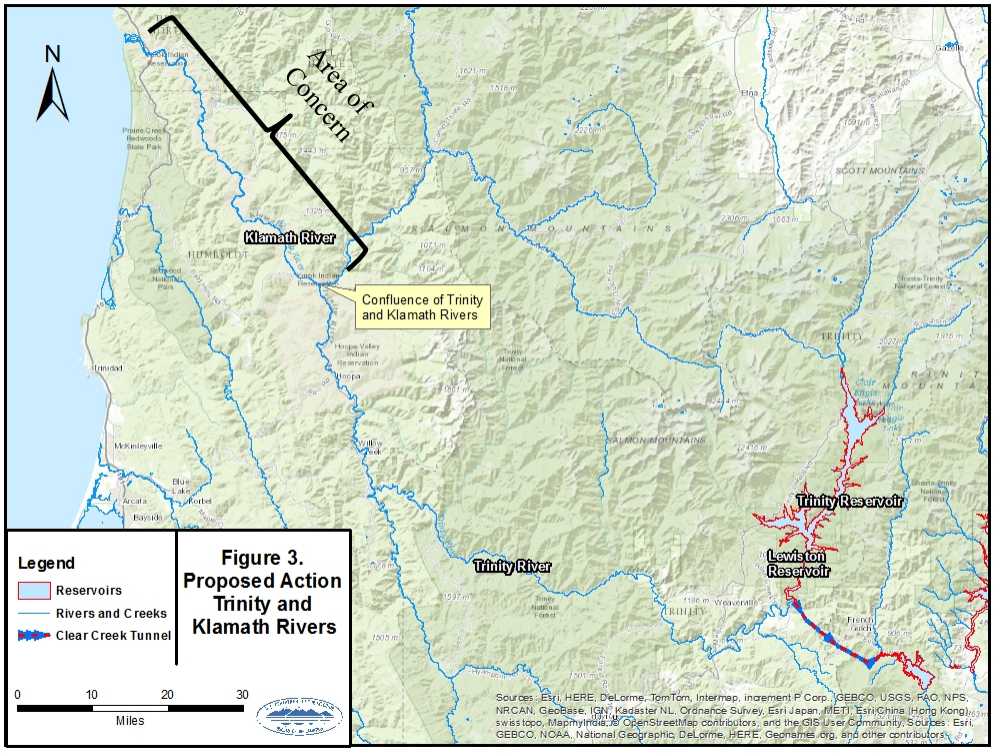
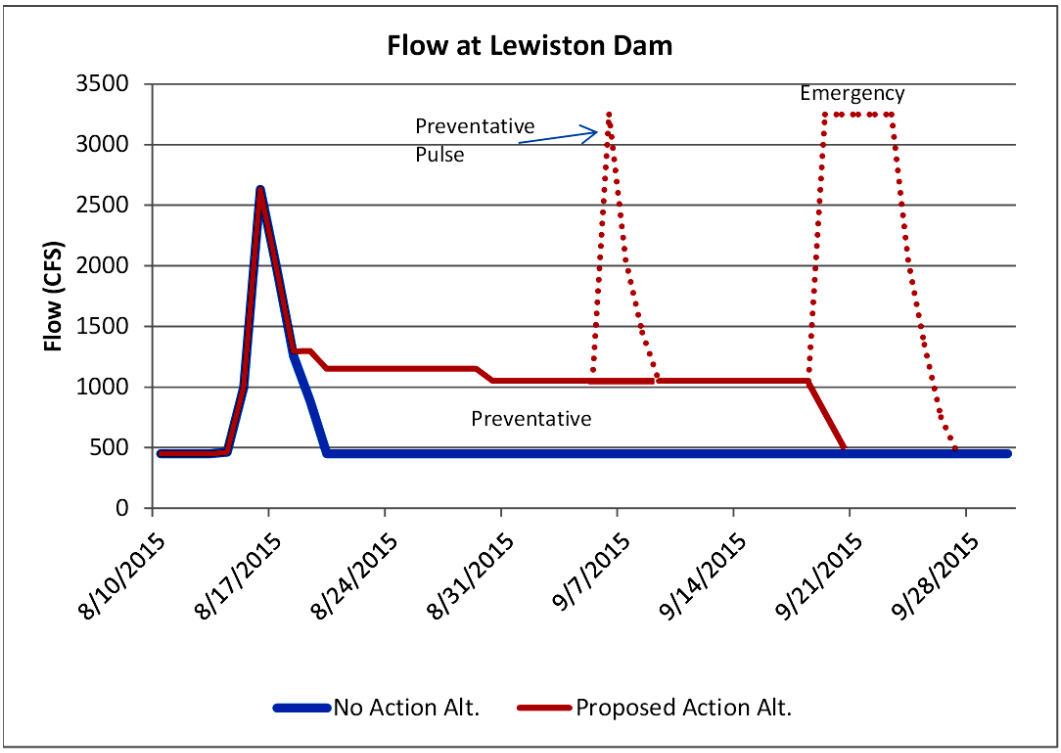


Figure 3. Proposed Action Area of Concern - Trinity and Klamath Rivers



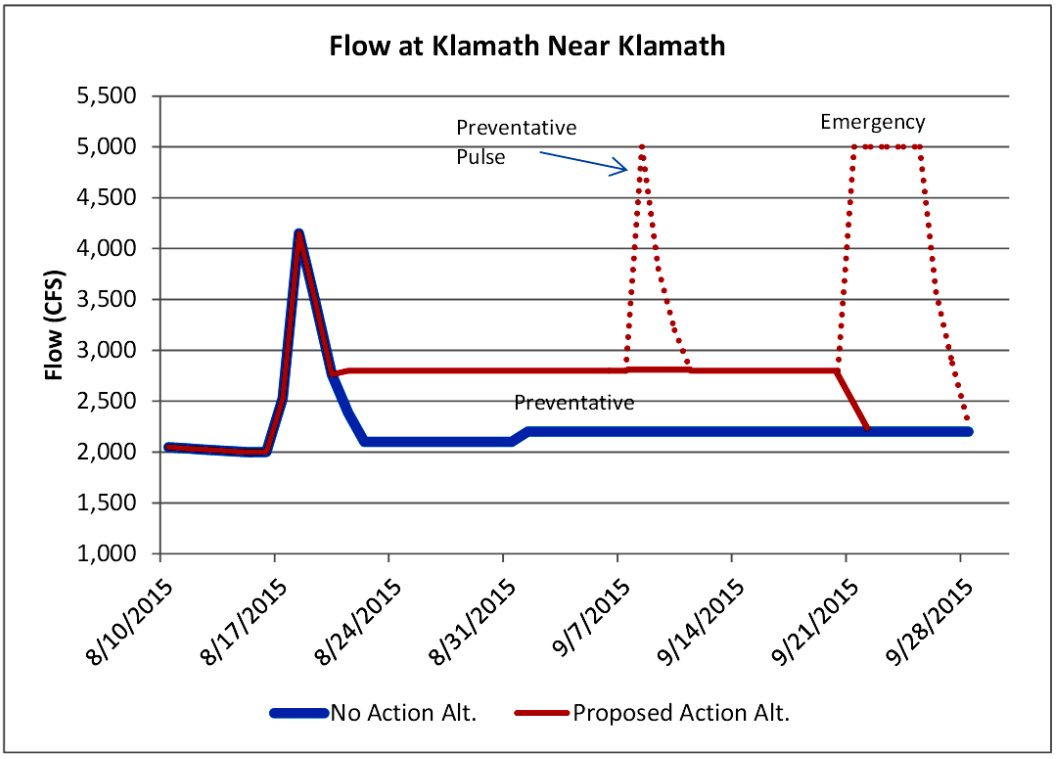


Figure 4. Hydrograph showing flows at Lewiston Dam (USGS Station #11525500)(top figure) and Klamath River near Klamath (USGS gage #11530500)(bottom figure) for the Proposed Action and No Action alternatives. Note: the dashed line represents possible flow augmentation actions and are provided for illustration purposes

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 the Iron Gate Dam.

The 2015 water supply conditions in the upper Klamath Basin and in the Trinity River Basin have deteriorated throughout the year. In the upper Klamath River basin, a press release from Reclamation on April 7, 2015 stated "Since the start of the water year (October 2014) through April 1, 2015, the Klamath Basin has received 96 percent of average precipitation, but those conditions have come alongside snowpack that is significantly lower than normal at only 7 percent of average. This is the largest disparity on record between precipitation and snowpack, meaning that runoff from snowpack will be extremely limited. The Klamath Project relies on snowpack to sustain inflows to Project reservoirs during the summer months in order to meet the Project's irrigation demands."

After planning for the Klamath River flows below Iron Gate Dam, and Upper Klamath Lake elevation management, consistent with the NMFS and USFWS biological opinion addressing operation of Reclamation's Klamath Project, and providing for limited irrigation water delivery, Reclamation determined that in practical terms, supplemental water for late summer lower Klamath River flows is unlikely to be available from the upper Klamath River. In addition, the Klamath water out of Iron Gate Dam is warmer and generally of lower 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 and algae to proliferate. While water from Iron Gate Dam 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 Iron Gate Dam. This additional benefit from Lewiston Dam water is presently deemed important to increase the effectiveness at ameliorating environmental conditions in the lower Klamath River believed to be responsible for the die-off in 2002.

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 Central Valley Project (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 Trinity River origin water to remain in the Trinity basin.

Trinity Reservoir is the primary water storage facility in the TRD of the CVP (Figure 5). At capacity, it stores 2,448 million acre-feet (MAF), 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 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; to generate hydropower by Redding Electric Utility; and provide water for downstream irrigation, 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, and those areas within the Sacramento River Basin including Clear Creek that is fed from Whiskeytown Reservoir and the Sacramento River. These needs include meeting certain temperature requirements in both systems for several fish species. Meeting these temperature requirements relies in part on transbasin diversions from Lewiston Reservoir to the Sacramento River basin that reduces 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.

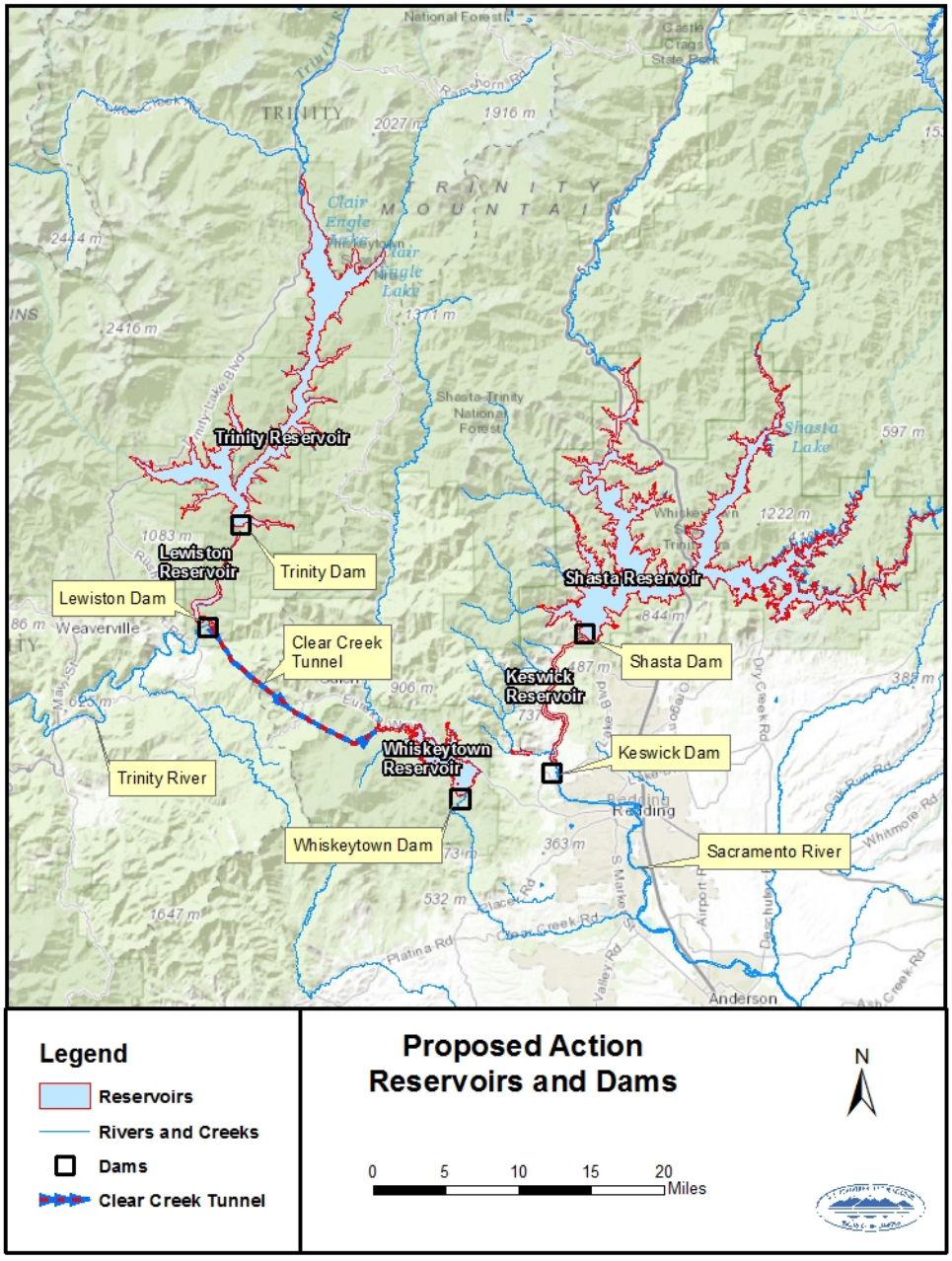


Figure 5. Water resource areas of Trinity River Division.

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 Record of Decision. 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 federally-listed species in the Sacramento River Valley.

Every odd year there is a prescribed release to support the ceremonial needs of the Hoopa Valley Tribe in late summer. This prescribed flow requires up to 11,000 AF of water above base flows

to achieve requisite flows on the Hoopa Reservation for the event. This event occurs in August or September.

In years of relatively low storage, water released from Trinity Reservoir may be released through the use of the auxiliary bypass outlet (Elev 1999') in lieu of the penstock (Elev 2100'), 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 2014, the use of the auxiliary bypass would be used in 2015 to access this cold water source. The degree to which it is used is dependent on the volumetric need as 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 2012-2014. The average quantity of water used from the Trinity in these past five years was 39 TAF. The largest flow augmentation action from Trinity occurred in 2014 when 64,000 AF was released for both a preventative and a first time use of an emergency action. Additionally, in 2014 another 16,000 AF was released from Iron Gate Dam on the mainstem Klamath River. 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 Iron Gate Dam were available. 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 2015 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 and release from Trinity Dam are used to meet a variety of needs in both the Trinity and Sacramento River basins. Minimum storage in Trinity typically occurs in October or November of each year. The historic average (1963 to 2010) storage for the end of September is approximately 1.67 MAF. In 2015, the 50 and 90 percent exceedance level, the water storage projection for the end of September is approximately 595 TAF and 599 TAF, respectively.

3.2 Biological Resources

3.2.1 Trinity and Klamath River Basins

Several anadromous 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 both federally-listed coho salmon (*Oncorhynchus kisutch)* as well as non-listed fish, including the North American green sturgeon (*Acipenser medirostris*), 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 federally-threatened, part of the 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 Iron Gate Dam. 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)

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 Iron Gate Dam. 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[2, 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 Iron Gate Dam. 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
Type I												
Incubation[1]												
Emergence[1, 2]												
Rearing												
Juvenile outmigration[1]												
Adult migration in mainstem1[1,3,11]												
Adult entrance into tributaries[1,11]												
Spawning[1, 8]												
Type II												
Rearing												
Juvenile outmigration[1, 9, 10, 11]												
Type III												
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 Iron Gate Dam. 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
Type I												
Incubation												
Emergence[1]												
Rearing												
Juvenile outmigration[2,3,4,5]												
Adult migration[6, 7,8]												
Spawning[9,10,11,12]												
Type II												
Rearing												
Juvenile outmigration[2, 13]												
Type III												
Rearing												
Juvenile outmigration[2, 13]												

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

The riparian corridor of the Trinity River, as well as the lower Klamath River system is 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 in which Trinity River water is used. Species of potential concern include the following federally-listed 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 were described and considered in the TRMFR EIS/EIR and the associated Record of Decision. 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 and the Yurok Indian Reservations was to reserve tribal rights to harvest fish from the Klamath and Trinity Rivers. The Hoopa Valley Indian Reservation is located on the Trinity River and the Yurok Reservation is on the Klamath to 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 Indian Trust Assets with 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 the Karuk, Klamath tribes, Resigini 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

Affected socioeconomic resources include commercial, recreational, and tribal salmon and steelhead fisheries on Klamath Basin stocks and the associated economic activities. 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 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 Basin, hydropower is also generated at Judge Francis 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 storage as well as downstream needs for cold water. Acquiring water through the penstock occurs 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 Water Resources

For purposes of the effects analyses that follow, hydrological forecast information for both short-term and long-term are included. However, it is paramount that the reader understands that 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 and considerable uncertainty is likely associated with these values.

4.1.1 No Action Alternative

Selection of the No Action Alternative would result in lower late-summer flows on the Trinity and Klamath rivers. Use of the auxiliary bypass would still be necessary to meet temperature targets.

Under the No Action, flow from Lewiston Dam during August and September would include a one-day pulse (plus ramping up and down) of approximately 2,650 cfs on August 17 to meet a flow requirements for ceremonial purposes at the Hoopa Valley Tribes reservation on August 18. In addition, and outside of this ceremonial need, flow from Lewiston Dam would remain at 450 cfs consistent with the prescription of the Trinity River ROD. During the time of the peak flow arrival, flow of the lower Klamath River at KNK would increase to approximately 4,000 cfs. 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. This anticipated flow level is similar to what was experienced in 2002, as well as 2014 minus the augmentation action.

4.1.1.1 Coldwater Storage Availability and Water Temperatures

Storage in Trinity Reservoir would remain at approximately 595 TAF at the end of September, which is just slightly lower than the 605 TAF that occurred at the end of September in 2014. The estimate of end of November storage in Trinity Reservoir with a temperature of less than 52 °F would be 176 TAF. 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 transbasin diversions to Whiskeytown Reservoir in 2015, representing the source of water for the Clear Creek and Spring Creek diversions to Keswick Reservoir.

Under a 50 and 90 percent probability of exceedance forecasts, the projected storages at the end of September (EOS) for the No Action alternative are 599 and 595 TAF, respectively (Table 5). These values would be similar to that of 2014 (605 TAF), which included the supplemental flows of 64 TAF. Placing these values in context, however, the EOS storages would rank the second lowest storage in the drought years reviewed (Table 6).

In contrast and looking further into the future, under the 50 and 90 percent probability of exceedance forecasts, the end of July (EOJ) storages would be 802 and 357 TAF (Table 5). Placing these projected storage values into the context of what occurred in the past, the 50 and 90 percent forecast values would rank 2nd and 1st in terms of lowest storage, respectively (Table 6).

Table 5. Storage Projections (TAF) of Trinity Reservoir

Time Period	50 Percent (Probability of Exceedance)[b]		90 Percent (Probability of Exceedance)[c]	
	No Action	Proposed Action[d]	No Action	Proposed Action[d]
End of Sept 2015	599	548 (511)	595[c]	544 (507)
End of July[e] 2016	802	751 (714)	357[c]	306 (269)[c]

a – all projected storage values assume a Trinity River Record of Decision flow volume for a Dry water year type or 453TAF and the Hoopa Valley Tribal dance flow volume is used in 2015
b – Monthly diversions (TAF) to the Sacramento Basin: Aug- 90, Sept- 61, Oct-40, Nov-19, Dec-1, Jan-1, Feb-0, Mar-3, Apr -26, May - 24, Jun - 93, Jul – 88
c – Monthly diversions (TAF) to the Sacramento Basin: Aug- 89, Sept- 62, Oct-15, Nov-28, Dec-19, Jan-6, Feb-1, Mar-1, Apr -38, May - 37, Jun - 117, Jul – 89
d – Storage volume remaining following the preventative flow (preventative flow plus emergency flow)
e – Hydrologic forecasts this far out are subject to large errors.

Table 6. End Month Storages in Drought Years

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	595 or 599 (or 544 or 548 with Proposed Action)

4.1.2 Proposed Action

Under the Proposed Action, flow from Lewiston Dam would be the same as the No Action Alternative until August 19, After August 19, there are two possible changes to flow releases that depend on whether the fish metric of harvest of 7,000 adult salmon in the lower Klamath has been met or not. If this target is met during the Ceremony, the flow from Lewiston Dam would seamlessly transition from the down-ramping of the Ceremonial flow to a target flow of 2,800 cfs in the lower Klamath River. In the event that this metric is not met, flow from

Lewiston Dam would be reduced at prescribed down ramping rates towards a base flow of 450 cfs but then would again be increased from Lewiston on August 22 to meet a target flow of 2,800 cfs in the lower Klamath River. Flow would be regulated to maintain this target through September 20. Based on the July 8 forecast of river flow accretion and expected releases from Iron Gate Dam, the estimate of flow from Lewiston Dam to meet this target flow would likely be between 1,100 and 1,300 cfs. This represents an increase of flow from Lewiston of between 650 to 850 cfs over the No Action alternative. Flows of this magnitude or higher 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, including this year. Assuming flow to meet the target of 2,800 cfs was needed immediately following the Ceremonial flow and extended through September 20, the volume of water that could be used as a preventative measure would be approximately 51 TAF.

If conditions are met to implement a preventative pulse flow, the pulse flow would commence 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 3- day pulse (including ramping up and down) peaking at 5,000 cfs in the lower Klamath River would occur during the preventative flow augmentation period. During the one-day peak, the flow from Lewiston could be up to 3,500 cfs. Implementing this action would result in flows from Lewiston being approximately 3,500 cfs. The benefit of the pulse is to enhance flushing of the river of parasites while also facilitating movement of adult salmon in this year of potentially higher *Ich* levels. The pulse flow would constitute a volume of approximately 7 TAF when considering the base flow target of 2,800 cfs is in effect. (Note: The volume needed to potentially meet this need would come from the differences between the old accretion forecast values as included in the Draft Environmental Assessment, which were underestimates, and new estimates of higher accretion that result in a likely reduction of augmentation flow to meet the downstream target: this update on accretion means the evaluations that follow are still under the scope of the total volume considered in the Proposed Action).

In the unlikely event that the emergency portion of the action is implemented, flow from Lewiston Dam could increase up to 3,500 cfs any time after August 19th to meet a target flow in the lower Klamath River of 5,000 cfs. However, based on the preventative flow target of 2,800 cfs in the lower Klamath River it is unlikely that this need would arise (USFWS 2015). In addition, the possible implementation of a preventative pulse flow, would likely further reduce the chance that the emergency flows would be need. Again, real-time monitoring would be used to inform Reclamation as to whether an *Ich* epizootic was occurring and would invoke use of the emergency water.

If implemented, the emergency flows would represent an approximate increase of 3,000 cfs from Lewiston Dam over the No Action Alternative or 3,500 cfs. The duration of this flow would occur over five days and would be subject to Federal biological review of the information at hand including forecast meteorology and fish disease monitoring results (See Section 2.2. Proposed Action). Implementing the emergency component of this action could occur later in September if needed, although based on the period of past augmentation actions, the need for an augmentation beyond early October diminishes as day length decreases, ambient air temperature

cool and chances of precipitation increase. Up to 37 TAF could be used if the emergency flows were implemented.

Implementing an emergency action would require rapid planning by Reclamation and other agencies and tribes to identify the response measure that may be needed to avert a die-off, including release of up to 5 days of flow from Lewiston Dam to target a flow of 5,000 cfs in the lower Klamath River. The need for a rapid response is based on the potential for rapid spread of a disease outbreak and the approximate 2-day travel time of water from Lewiston Dam to the lower Klamath River. The implementation of a protocol to ensure timely exchange of information to inform managers of the need to implement the emergency action would occur. The volume of water that may be used in this portion of the action may include up to 37 TAF. In combination with the preventative flows, the Proposed Action could require up to 88 TAF of cold water from Trinity Reservoir.

4.1.2.1 Coldwater Storage Availability and Water Temperatures

Implementation of the Proposed Action is not expected to adversely influence the water temperatures of water released to the Trinity River or that which may be diverted to the Sacramento River in 2015. This conclusion was determined through use of the Sacramento River Temperature Model (SRTM). Through this modeling effort, Reclamation was able to: (1) gain an understanding regarding the sensitivity of water temperature responses to releasing water from Trinity Reservoir through either the power outlet (elev. 2100') or the auxiliary outlet (elev. 1999') in 2015; and (2) refine our knowledge of how an augmentation action (up to 88 TAF) could influence the quantity of remaining cold water resource in Trinity Reservoir through 2015. In essence, this modeling effort provided a way to estimate the remaining quantity of suitable cold water to help determine the feasibility of implementing the proposed augmentation action. From this review, Reclamation determined (1) the auxiliary outlet was important for reducing water temperatures at Lewiston Dam and outlets of Whiskeytown including Whiskeytown Dam and Spring Creek Tunnel; and (2) that adequate cold water supply would be available in support of the flow augmentation action as well afterward through November, which is beyond the time of water temperature concern for 2015. Implementing the preventative portion of the Proposed Action would reduce the storage (and in particular the cold water storage) in Trinity Reservoir by up to 51 TAF resulting in an EOS 2015 storage of approximately 544 TAF. In comparison to the No Action Alternative with an estimated 176 TAF of water less than 52 °F at the end of November, the Proposed Action would result in a reduction of approximately 51 TAF, with an estimate of 125 TAF remaining. Placing the EOS storage volumes into a historical context, these projected storage volumes would represent the 2nd lowest EOS storage recorded since the TRD was developed, only rivaled by the 1977 drought when the EOS storage at Trinity was 242 TAF (Table 6). As previously mentioned, however, the long term hydrologic forecast is subject to considerable uncertainty.

Looking further into the future (end of July [EOJ], 2016), the forecasts show more divergence (Table 5). Implementing the Proposed Action would use up to 51 TAF resulting in EOJ storages of 751 and 306 TAF, respectively. Placing the EOJ 2016 storage values in perspective, the 90 percent exceedance projection would, as in the No Action alternative, likely represent the worst storage condition for Trinity Reservoir for this month since the project was developed (See Table 6). As an example, the EOJ storage in 1977, representing the lowest storage years on

record, the storage was 535 TAF, which is larger than what is projected under 90 percent condition with or without the Proposed Action.

Again in contrast to the dry year forecast, the situation improves with a median year forecast (50 percent forecast) where storage is projected at 716 TAF at the end of July 2016 after a total release of 88 TAF. In comparison to 2015, this volume would be approximately 115 TAF less than what occurred in 2015 or 834 TAF. Taking this into account as well as the temperature modeling analysis that indicated there would be approximately 100 TAF available at the end of November 2015, it would suggest that under this forecast (and assuming similar cold water storage as in 2015) there could be enough suitably cold volume to meet the basic water temperature needs in the Trinity through November. As with the dry year forecast (above), if as the year progressed and forecasting becomes more accurate that there may also be a need to re-operate the TRD up to and including altered diversion patterns and schedules to ensure an adequate supply of suitably cold water is available to meet in-basin needs. Compared to the dry year forecast, the potential need to change operations of the TRD would be reduced.

Predicted water temperatures for water released from Lewiston Dam for a No Action alternative and Proposed Action are shown in Figure 7. These results are based on a schedule of release of 83 TAF over the period of August 15 to September 30 to provide an approximation of the water temperatures that could occur this year. Reclamation initially conducted the water temperature assessments on a volume of 83 TAF; however, based on public, agency and tribal review of the 83 TAF proposal, the proposed action has been modified to a maximum of 88 TAF. The change in the proposed action from 83 TAF to 88 TAF is not significant to the sensitivity of the model or the results. Thus, the results of the analysis are believed to be suitable to the new action. These results are based on a suite of assumptions that included foreseeable events and the use of the auxiliary bypass outlet and release of 83 TAF versus what is believed to be more realistic volume to be used in 2015 or up to 51 TAF (USFWS 2015). These results suggest that suitable water temperatures would be available for release in 2015 under either alternative.

If Trinity Reservoir fills during 2016, there would be no effects to water resources available for all potential purposes. In contrast, if Trinity Reservoir does not fill in 2016, some water volume, up to the amount released for supplemental Klamath River flows, may 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 2015, or water operations within the Central Valley. Water allocations for irrigation and M&I deliveries have already been determined for 2015, and the supplemental water would not affect the projected volume of water to be exported to the Sacramento River Basin in 2015. The extent that the flow augmentation releases would affect the 2016 water supply and water allocations is dependent on the water year 2016 hydrology and operational objectives. However, long range predictions of the 2016 hydrology are not expected to be accurate at the time writing this document to be meaningful. This is especially true when the forecast spans a time when rainfall typically occurs.

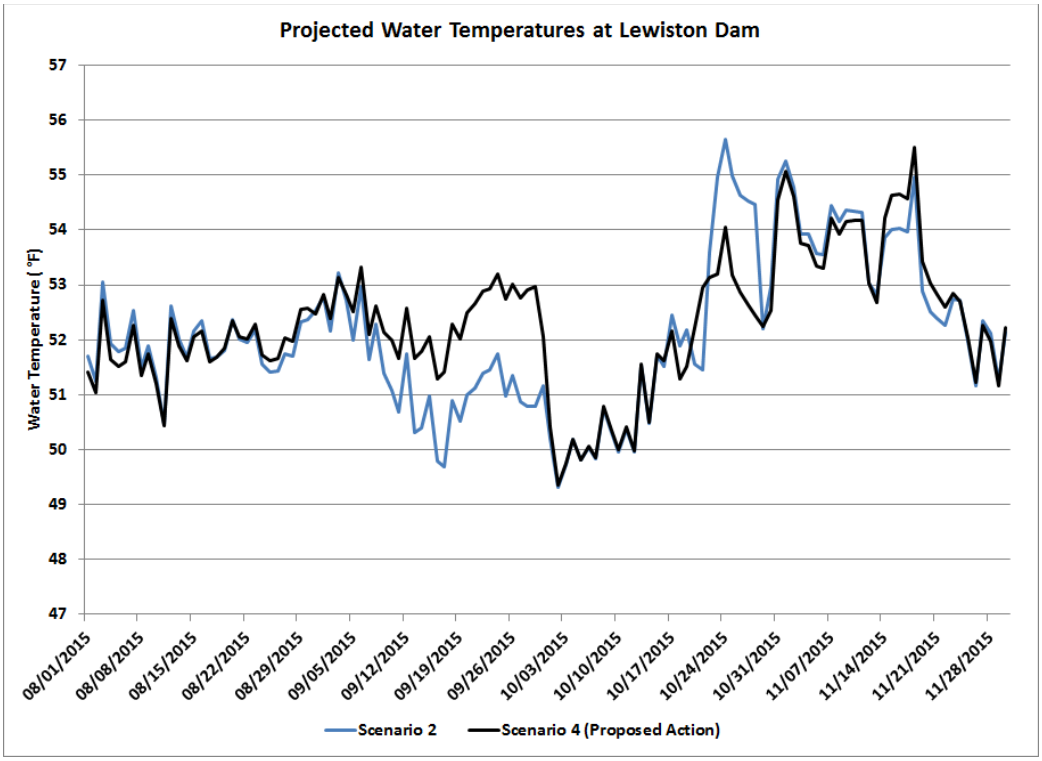


Figure 7. Sacramento River Temperature model results showing the influence of the augmentation action and the thermal regime from Lewiston Dam with Scenario 2 (No Action Alternative) and the Scenario 4 (Proposed Action).

With a target flow rate of 2,800 cfs the preventative flows could account for up to 51 TAF of cold water out of Trinity Reservoir. All indications are that a preventative flow rate of 2,800 cfs makes it very unlikely there would be a need for the preventative pulse flow or the emergency flows, so the volume of the Proposed Action is anticipated to be limited to 51 TAF or less. The potential impact looking forward into 2016 could mean 51 TAF less cold water available for transbasin diversion to the Sacramento River Basin but this remains uncertain. If the extreme drought conditions were to continue, the potential impacts of the drought on storage in Trinity Reservoir could result in approximately 306 TAF being left in Trinity Reservoir (total storage volume) by July 2016 after implementation of the 51-TAF preventative flows (See Table 5). However, and as stated at the start of Water Resources section, using forecasts this far into the future become speculative in nature. Therefore, projecting possible storage in 2016 cannot be determined with any precision whether this volume would occur let alone be enough to meet in-basin needs, or to support transbasin diversions. If this situation was to occur, diversion patterns and schedules would need to be altered to ensure an adequate supply of suitably cold water is available to meet in-basin needs.

In the unlikely event that additional releases are needed above the 51 TAF based on the emergency criteria identified in the project description (see Section 2.2) up to 37 TAF of additional cold water may be released. This would be a total reduction in the Trinity cold water pool of up to 88 TAF. This is potentially 88 TAF 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 (90 percent exceedance), the end of July storage in 2016 could be as low as 270 TAF. In this case, and based on the diversion patterns and

quantities that were included in this forecast volume, there would not be an adequate supply of cold water to meet the needs within the Trinity River Basin nor those outside of the basin (i.e. Sacramento River Basin) in 2016. In this case there would be a need to alter operations in the Trinity River Division up to and including altered diversion patterns and schedules to ensure an adequate supply of suitably cold water is available to meet in-basin needs. Trinity water must first be used to support Trinity River Basin needs before transbasin diversions can be considered. However, the degree to which these altered management strategies would be needed would largely depend on future hydrology that is at this time very difficult to accurately predict.

In 2015, recreational activities in Trinity Reservoir are not likely to change to any great extent due to the Proposed Action. In the current year, boat ramp access to the lake is expected to remain the same as the No Action Alternative (see Section 4.5.2 for additional discussion). In contrast, there is a small chance that some boat ramps might not be useable due to a reduced water elevation in the lake during the latter part of summer 2016, should the drought continue. As alluded to earlier, the complexities and uncertainties of accurately predicting water storage, and thus surface elevations, into the long term future precludes Reclamation from providing meaningful estimates.

The significant recreational activities in the Trinity River that may be influenced by the Proposed Action include pleasure rafting and fishing (boating), and recreational fishing. Flows from Lewiston Dam needed to augment the lower Klamath River flow to 2,800 cfs would be expected to continue to provide bank- and boat-based fishing as well as boating opportunities along the entire river. In addition, the greater quantity of water in the lower river would afford greater power boat access to a larger section of the Klamath River thereby expanding fishing opportunities for many.

4.2 Biological Resources

4.2.1 No Action Alternative

Because the projected minimum flow of the lower Klamath River is relatively low, the medium to large run-size projection for fall Chinook salmon, and the presence of *Ich* already in the river system there is an increased risk for a fish die-off in the lower Klamath River in 2015 under the No Action Alternative. While the temporary increase in flow for the tribal Ceremony could provide temporary relief for stressful environmental conditions in the lower Klamath River, the duration of influence of the pulse would likely only last between 5 and 7 days, which would not be long enough to cover the entire period of concern (or mid-August to mid-September). The tribal pulse flow would also occur very early in the fall-run; typically the fall-run does not begin until the last week of August, with federally-listed coho typically entering the Klamath River Basin in September. This pulse flow could help to flush any *Ich* currently in the river, but it would not help during peak run time when fish would likely be in highest concentrations, typically the second week of September. In 2014 levels of Ich infection didn't spike until mid-September, necessitating an emergency release.

If a fish die-off similar to that which was experienced in 2002 was to occur, it would be not only devastating this year, but would have lasting impacts to the species. Such a large fish die-off can affect the age class structure of salmon populations for a number of years. The consequences

could also prevent the Trinity River Restoration Program (TRRP) from meeting natural fall-run Chinook salmon escapement goals.

4.2.2 Proposed Action

4.2.2.1 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 2015. It is well documented that the Trinity River and lower Klamath River would see a reduction in water temperatures (Magneson and Chamberlain 2015) (see Figure 7). In turn, salmon may experience less physiological stress and vulnerability to disease. In 2003, 2004, and 2012-2014, 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 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.

The estimates of cold water storage available after November if the Proposed Action is implemented (See Section 4.1.2) suggest there is cold water to support an augmentation action of up to 88 TAF. Thus implementing the Proposed Action would not jeopardize the cold water resources for immediate use in 2015. Thermal protection required for coho salmon during late September would still be achievable.

High flows associated with the Proposed Action have the potential to minimally impact coho salmon, by creating a stranding potential. 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 base flow releases from Lewiston Dam, as part of the preventative augmentation portion of the Proposed Action, are anticipated to be between 1,100 and 1,300cfs to meet a 2,800 cfs target in the lower Klamath River. This flow rate typically does not create stranding hazards, because downstream flows are not high enough to overtop berms. 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.

If the preventative pulse flow was used, the overall impact would be anticipated to be positive in nature for the fish species. The pulse flow would be intended to flush and dilute Ich parasites and also provide improved water quality and flow to facilitate movement of adult salmon to further help alleviate the potential for disease outbreak. Early signs of Ich infections on adult salmon in the Klamath River system have been detected early this year (July 22) as compared to the past to suggest there could be higher levels of Ich infectivity this year (Strange 2015).

Although not anticipated being needed, if the preventative pulse flow or the emergency release component is 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 brood year 2014. Based on past augmentation experiences, including 2014 when an emergency flow was released, the benefit to coho as a species from implementation of the Proposed Action outweighs the smaller impact to juveniles.

Given the inherent uncertainties regarding events of this nature, combined with the predicted moderately large 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 2015, nor is it possible to accurately quantify the reduced disease risk attributed to the increased flows. Given past experiences in 2003, 2004 and 2012-2014, the knowledge of cold water requirements for salmon, and the contributing factors to disease outbreak (warm water temperatures, low water velocities and volumes, high fish density, and long fish residence times (Guillen 2003; Belchik et al. 2004; Turek et al. 2004)), implementation of the Proposed Action or its various components including the preventative, preventative pulse flow or the emergency flows are anticipated to reduce the risk of Ich infection and associated fish die-off fall of 2015. Furthermore, and most importantly, the preventative component of the Proposed Action is believed to be adequate to ensure that a preventative pulse or emergency releases are not needed.

4.2.2.2 Sacramento River Basin

Implementation of the Proposed Action would not affect the quantity and quality (i.e. water temperature) of flow suitable for transbasin diversions to Whiskeytown Reservoir in 2015 (See Section 4.1.2.1).

To assess potential impacts to winter-run Chinook rearing in the Sacramento River Basin, egg and egg-to-fry mortality were estimated for the Clear Creek and Bend Bridge temperature nodes on the Sacramento River using a dynamic simulation framework model developed by Cramer Fish Science (CFS 2010).

This model was developed to estimate winter-run Chinook salmon juvenile production, but provides discretized mortality rate estimates for specific life stages. The model was run for the No Action Alternative without use of the auxiliary bypass, the No Action Alternative with use of the auxiliary bypass, the Proposed Action without use of the auxiliary bypass, and the Proposed action with use of the auxiliary bypass. The model assessed potential impacts through November 2015. Table 1 shows the estimated temperature-induced egg mortality and egg-to-fry survival results for each of the above-mentioned operational scenarios. Differences in effects on early lifestage survival of winter-run Chinook between the scenarios are very small at both modeled locations (Clear Creek and Bend Bridge). For temperature-induced egg mortality, the difference between scenarios was so small it was within the uncertainty in the model, in other words there is

no measurable impact to winter-run Chinook in 2015 from implementation of the Proposed Action.

Water temperature predictions used in the modeling reflected a flow augmentation action of 83 TAF. It is important to note that since the time of these model runs that slight modifications to the Proposed Action occurred bringing the total volume up to 88 TAF; however the change in the proposed action from 83 TAF to 88 TAF is not significant to the sensitivity of the model or the results. Furthermore, the proposed action is not likely to require the emergency component so that the amount of water used is likely to be up to 51 TAF. Thus, the results of the analysis are believed to be equally applicable to the new action.

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 2016. If the drought persists and the full 88 TAF was used, changes to the ability to achieve temperature objectives would be expected, which could impact ESA-listed salmon and steelhead. It is unlikely the full 88 TAF would be released, and thus the impacts are equally unlikely.

Table 7. Sacramento River winter-run Chinook salmon temperature-induced egg mortality and egg-to-fry survival estimated from the Cramer Fish Science model (CFS 2010b). These model runs used actual temperatures from April 1 through July 21 and modeled temperatures from July 22 through October 30 (Scenario 2) or November 30 (Scenarios 1, 3-4). CCR = Clear Creek node on the Sacramento River and BND = Bend Bridge.

	Scenarios*							
	1		2		3		4	
	CCR	BND	CCR	BND	CCR	BND	CCR	BND
Temperature-induced egg mortality (%)	5.1	86.6	5.0	86.8	5.1	87.1	6.0	87.7
Approximate egg-to-fry survival (%)	20.1	2.8	20.2	2.8	20.1	2.7	19.9	2.6

*Modeling scenarios include Lewiston Dam releases to meet:

1. Base Trinity River Record of Decision flows (ROD flows) and Hoopa Valley Tribal Dance flows (August 15-August 18)
2. Base ROD flows, Hoopa Valley Tribal Dance (August 15-August 18), and Bypass flows (through October 30)
3. Hoopa Valley Tribal Dance flows from August 15-August 18, and a 2,500 cfs target at KNK from August 19-September 20 followed by seven days of releases to meet a 5,000 cfs target at KNK
4. Hoopa Valley Tribal Dance Flows from August 15-August 18; a 2,500 cfs target at KNK from August 19-September 20, followed by seven days to meet a 5,000 cfs target at KNK; and Bypass flows (through November 30)

4.3 Indian Trust Assets

4.3.1 No Action Alternative

Because the projected minimum flow of the lower Klamath River is relatively low, the medium to large run-size projection for fall Chinook salmon, and the potential of Ich presence in the river there is an increased risk for a fish die-off in the lower Klamath River in 2015 if the No Action Alternative is selected. A fish die-off in 2015, 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.

4.3.2 Proposed Action

Under the Proposed Action, it is expected that the risk of disease vulnerability to the returning run of fall Chinook salmon to the lower Klamath River would be decreased, relative to the No Action Alternative. In turn, the risk to the tribal trust fishery would be expected to decrease. In 2003, 2004 and 2012-2014, 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.

4.4 Environmental Justice

4.4.1 No Action Alternative

Because the projected minimum flow of the lower Klamath River is relatively low, the medium to large run-size projection for fall Chinook salmon, and the potential of Ich presence in the river there is an increased risk for a fish die-off in the lower Klamath River in 2015 if the No Action Alternative is selected. A fish die-off in 2015 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 2015 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.

4.4.2 Proposed Action

Under the Proposed Action, it is likely 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 ultimately 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 88 TAF, however Reclamation anticipates only the preventative flows will be required meaning up to 51 TAF would be released. This could reduce transbasin diversions to the Sacramento River Basin in 2016 depending on whether or not the drought persists. In 2014 approximately 602 TAF were diverted from the Trinity River Basin (via Lewiston Reservoir) to

the Sacramento River Basin, and in 2015 a total of 425 TAF are anticipated to be diverted, with the decrease in part due to the continued drought. While exports from the Trinity Basin are used for a variety of purposes in the Sacramento River Valley, these diversions likely make up only a small fraction of the total water used. If 2016 is another drought year, the effects to environmental justice would be minor. If 51 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.

4.5 Socioeconomic Resources

4.5.1 No Action Alternative

Because the projected minimum flow of the lower Klamath River is relatively low, the medium to large run-size projection for fall Chinook salmon, and the potential of Ich presence in the river there is an increased risk for a fish die-off in the lower Klamath River in 2015 if the No Action Alternative is selected. A fish die-off in 2015 would negatively impact any fishery-related socioeconomic resources. This includes lost revenue from commercial salmon sales, loss of fishing guide and fishing charter revenue (both on the river and ocean), decreased recreational fishing tourism, and the added cost to the people who rely on the salmon for food and must now purchase other food sources.

Under the No Action Alternative the one public boat ramp currently usable (down to a water elevation of 2,170 ft) at Trinity Reservoir, the Minersville Public Boat Ramp, would remain usable. The 90 percent exceedance forecast for Trinity Reservoir storage volume for end of September is 595 TAF, which equates to a water elevation of 2,201 ft. There is no anticipated socioeconomic impact to communities surrounding Trinity Reservoir under the No Action Alternative.

4.5.2 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.

Implementation of the Proposed Action would lower the water level in Trinity Reservoir. There is one public boat ramp currently usable at Trinity Reservoir, the Minersville Public Boat Ramp operated by the U.S. Forest Service. The Minersville Ramp is operable down to a lake elevation of 2,170 ft, which translates to a storage volume of 423.5 TAF. Under the Proposed Action using the 90 percent exceedance forecast, the lake elevation will drop to 2,193 ft with just the preventative flows (totaling 51 TAF) and 2,185 ft if the emergency response is implemented and the full 88 TAF is released (Figure 6). Minersville Ramp would remain operable under the Proposed Action. 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 tourist season. Lake tourism generally slows after Labor Day.

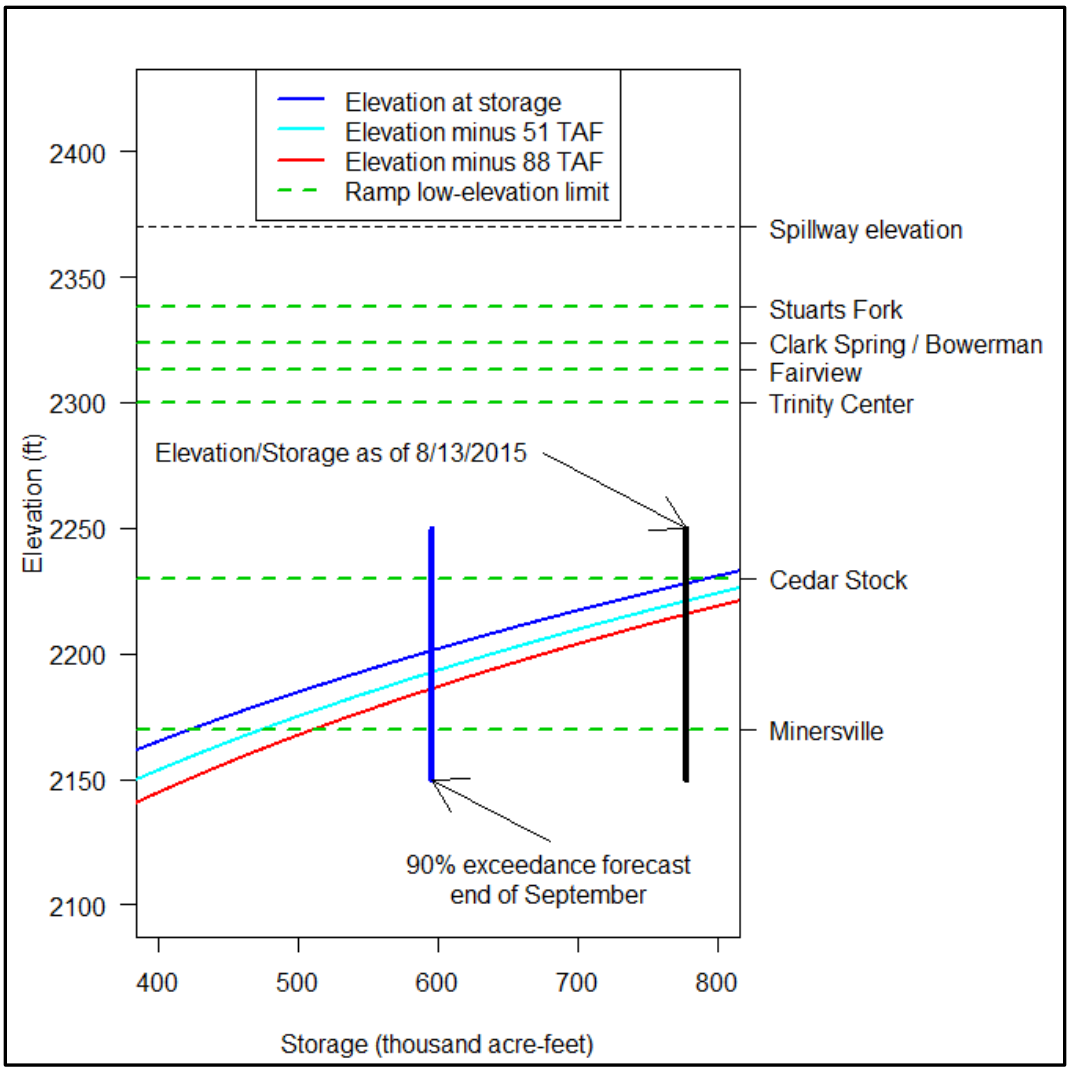


Figure 6. Trinity Reservoir water elevation plotted over water storage in TAF for the Proposed Action (both preventative flow and combined with the emergency flow) showing boat ramp limitations.

Depending in part on whether Trinity Reservoir completely fills in water year 2016, 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 of water that may be unavailable in the future. However, the amount of water needed for the preventative flows in the lower Klamath River is a small proportion of the total CVP water deliveries. 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 due to implementation of the Proposed Action.

4.6 Power Generation

4.6.1 No Action Alternative

In order to meet temperature targets on both the Sacramento side and the Trinity side, the auxiliary bypass will be used. Selection of the No Action Alternative will not change this. Use of the auxiliary bypass will release water avoiding the power plants, and thus there is an associated loss in hydropower generation.

Under the No Action Alternative, the flow released from Lewiston Dam into the Trinity River in August and September 2015 would be maintained at 450 cfs, consistent with the flows described in the TRMFR EIS/EIR, in addition to a short term pulse flow from Lewiston Dam to support a one-day ceremonial need of the Hoopa Valley Tribe (see Figure 4). These flows are consistent with the existing condition; therefore, there would be no new effects to hydropower generation.

4.6.2 Proposed Action

Implementation of the Proposed Action will not adversely affect power generation in 2015. The expected schedule for water delivery to the Clear Creek Tunnel has already been developed, and the Proposed Action would not affect these exports. It is anticipated the auxiliary bypass will be used for both the No Action Alternative and the Proposed Action.

If Trinity Reservoir does not fill in water year 2016, some portion of the water that is released through Lewiston Dam to implement the Proposed Action in 2015 may not be available for later release through the Clear Creek Tunnel, Carr Powerplant, the Spring Creek Tunnel and Powerplant and the powerplant at Keswick Dam in 2016. In turn, this may result in decreased power generation. While complex to determine and quantify, depending on the particular refill patterns at Trinity Reservoir, whether safety-of-dams releases occur at Trinity Dam in 2015, and Shasta Reservoir operations, etc.; in very general terms, if 51 TAF were released to the Trinity River to implement the preventative flows under the Proposed Action, future foregone generation could be a maximum of about 56,100 megawatt hours (MWH). At $50 (market estimate based on last year's average rate of $45) per MWH, this equates to a loss in revenue of $2,805,000. However, water levels being as low as they are, it is very unlikely the magnitude of impact would be this large. Use of auxiliary bypass outlet is anticipated regardless of implementation 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. Whether power in excess of Reclamation's water pumping needs is available at a given time, and whether power available for CVP power customers is sufficient for their demands is difficult to predict. In the unlikely 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.

4.7 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 CO_2, occur naturally and are emitted to the atmosphere through natural processes and human activities. Between 1990 and 2009, CO_2 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 CO_2 and CH_4, 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 Clean Air Act as well as other statutory authorities to address climate change issues.

4.7.1 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 sustainable sourced power more so than the status quo conditions. Therefore, there would be no additional affects to GHG emissions.

4.7.2 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 51 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 case, hydroelectric power would have been generated at the J.F. Carr Powerplant, the Spring Creek Powerplant, and likely the Keswick Powerplant. The power generated by this volume of water would have been available for purchase by the CVP preference power customers as available. CVP preference power customers 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 when available CVP power is not sufficient for their demands. This non-CVP power may be hydrocarbon generated. Assuming 51 TAF of water is used for flow augmentation, a maximum of 56,100 megawatt hours of power generation may be foregone at some time in the future. Assuming that power customers would have to replace all of that power with hydrocarbon generated power, an estimated additional 39,581 metric tons of CO_2 equivalent would be emitted. The magnitude and timing of the potential additional CO_2 equivalent is unknown, as are the associated effects on Global Climate. For example, it is unlikely that more than 25,000 metric tons of CO_2 equivalent would be emitted on an annual basis so it is unlikely to have a significant effect on global climate.

4.8 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.

4.8.1 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 may also have a lasting effect. 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 cohort of fish that would impact the next generation of salmon returning to the river system.

4.8.2 Proposed Action

4.8.2.1 Water Resources

There are no anticipated substantial cumulative impacts on Trinity 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 with 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 2015 may exacerbate system-wide supply conditions in the future.

Although there are no adverse impacts associated with implementing the Proposed Action in 2015, there is potential for cumulative effects to consider. As previously stated, water was released from Trinity Reservoir to decrease potential for fish disease outbreaks in 2003, 2004, 2012, 2013, and 2014. With continuing drought conditions, reservoirs have not replenished, and in particular cold water stores are very low (See Section 3.1). Looking forward, Reclamation may be implementing flow augmentation actions in future years. Reclamation is in the early phases of NEPA analysis on the Long-Term Plan to Protect Adult Salmon in the Lower Klamath River (anticipate releasing Public Draft EIS early 2016). One of the alternatives being analyzed involves augmenting flows on an annual basis when certain triggers indicate risk of a large disease-induced fish die-off. In other words, Reclamation has implemented augmentation actions in recent years and may do so again in future years.

Repeated releases from Trinity could deplete cold water stores making it difficult to meet regulatory-driven temperature benchmarks in the Trinity and Klamath Rivers. When cold water

storage levels are low, water run through hydropower plants can become too warm for downstream aquatic organisms, including sensitive fish species. In this case, use of 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. If drought conditions persist, releasing additional 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 store 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. The cold water pool in Shasta Lake is higher in 2015 as compared to 2014 for the same time of year also suggesting adequate storage will be available to meet Sacramento River needs this year. Repeated releases from Trinity Reservoir with continued drought conditions could result in negative impacts to federally-listed fish species such as winter-run, spring-run Chinook salmon, and Central Valley steelhead. Again, however, it is too early to accurately predict the future water supply so there are no anticipated cumulative impacts.

4.8.2.2 Biological Resources

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

4.8.2.3 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.

4.8.2.4 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.

4.8.2.5 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. The draft Environmental Assessment was released for public review from July 31 to August 7, 2015. Comments received on the draft were used in developing this final EA and FONSI. Response to comments received on the draft EA are provided in the Finding of No Significant Impact document.

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

Section 7 of the Endangered Species Act requires Federal agencies, in consultation with the Secretary of the Interior (through the Fish and Wildlife Service) and/or Commerce, to ensure that their actions do not jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of these species.

The Proposed Action would not affect any federally-listed threatened or endangered species under the jurisdiction of the Fish and Wildlife Service. Therefore, there is no need to consult with the Fish and Wildlife Service pursuant to the ESA.

The affected area includes three river basins, the Klamath, Trinity and Sacramento. Water from the Trinity River Division of the Central Valley Project has a transbasin diversion that supplies water to both the Trinity and Sacramento River Basins that in part are used to meet the needs of several fish species protected under the Endangered Species Act (ESA).

For federally-listed threatened and endangered species under the jurisdiction of the Secretary of Commerce (through the National Marine Fisheries Service or NMFS), Reclamation included the proposed action as an amendment to the modifications to the CVP and SWP operations as an update to the Contingency Plan for operation of the CVP and SWP from July through November 15, 2015, in accordance with the RPA and conference opinion on the long-term operation of the NMFS 2009 Coordinated Long-term Operation of the Central Valley Project (CVP) and State Water Project (SWP) Biological Opinion (NMFS 2009 BiOp). This is detailed in the August 14, 2015, letter to NMFS and the accompanying Biological Review. This analysis concluded that because the proposed action is contemplated within the drought exception procedures as described in the 2009 NMFS BiOp it will not result in violation of the incidental take limit in the NMFS 2009 BiOp, nor jeopardize the continued existence of the listed species or destroy or adversely modify their designated critical habitats. NMFS concurred in this determination by letter, dated August 20, 2015.

Reclamation is currently in consultation pursuant to section 7 of the ESA with NMFS for coho salmon in the Trinity River Basin as documented in a letter and accompanying Biological Review submitted to NMFS on August, 12, 2015. Based on the analysis provided in the

Biological Review and the information contained in this EA, Reclamation has determined that the Proposed Action will not violate section 7(d) of the ESA in that the proposed action would not constitute an irreversible or irretrievable commitment of resources which would have the effect of foreclosing the formulation or implementation of any RPA measures which would violate section 7(a)(2) of the ESA.

Reclamation consulted under the Magnuson-Stevens Act (MSA) for the Sacramento River species in the 2009 Biological Opinion (BiOp) and since there was a determination, concurred with by NMFS, that because the proposed action is contemplated within the drought exception procedures as described in the 2009 NMFS BiOp it will not result in violation of the incidental take limit in the NMFS 2009 BiOp, nor jeopardize the continued existence of the listed species or destroy or adversely modify their designated critical habitats no further consultation under the MSA is needed. As to the coho, the MSA will be conducted as part of the ongoing consultation on the coho. Additionally, as determined in the EA, Reclamation did not identify any adverse effects from the proposed action on essential fish habitat.

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 consideration 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. The 36 CFR Part 800 regulations implement Section 106 of the NHPA and outline the procedures necessary for compliance with the NHPA. Compliance with the Section 106 process follows a series of steps that are designed to identify if significant cultural resources are present in the Proposed Action project area and to what level they would be affected by the proposed Federal undertaking.

Reclamation determined that the Proposed Action is the type of activity that has no potential to cause effects on historic properties; therefore the California State Historic Preservation Officer was not consulted (See Appendix B).

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