RECLAMATION
Managing Water in the West

Draft Environmental Assessment

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

15-09-MP

U.S. Department of the Interior
Bureau of Reclamation

July 2015

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 U.S. Bureau of Reclamation (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, 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 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 with 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 which 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 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.

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. Due to the extended drought, there is little to no snow pack, and accretions are predicted to be minimal. Thus 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.

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 the 27th of August. 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, potentially large fish-run size, 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 2013 a joint memorandum from the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) was sent to Reclamation, recommending a 2013 fall flow release. The memorandum outlined a fish metric to be used as an indicator of the first substantial increase of fall-run Chinook salmon into the lower Klamath River. This metric is then intended to indicate

when augmentation should begin. The onset of fish migration would be used as a trigger rather than following calendar dates, to make better use of limited water resources while temperature would be used to determine duration of flow augmentation and disease occurrence to trigger an emergency response. More specifically, USFWS and NMFS recommend initiating fall flows once the cumulative harvest of adult Chinook salmon within the Estuary Area has exceeded 7,000 fish (USFWS & NMFS 2013). This fishery data comes from the Yurok tribe beginning in July. Also suggested in the memorandum are discharge recommendations based on projected fall-run Chinook sizes. For a projected fall run of less than 170,000 adult Chinook, a minimum target flow of 2,500 cfs is recommended (Strange 2010). Reclamation has used these recommendations to inform the development of the Proposed 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 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 M-Opinion confirming that the inclusion of the proviso in the 1955 Trinity River Division Act requiring that not less than 50,000 acre-feet 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, and thus the diversion of water to, the Central Valley Project. Thus, 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.

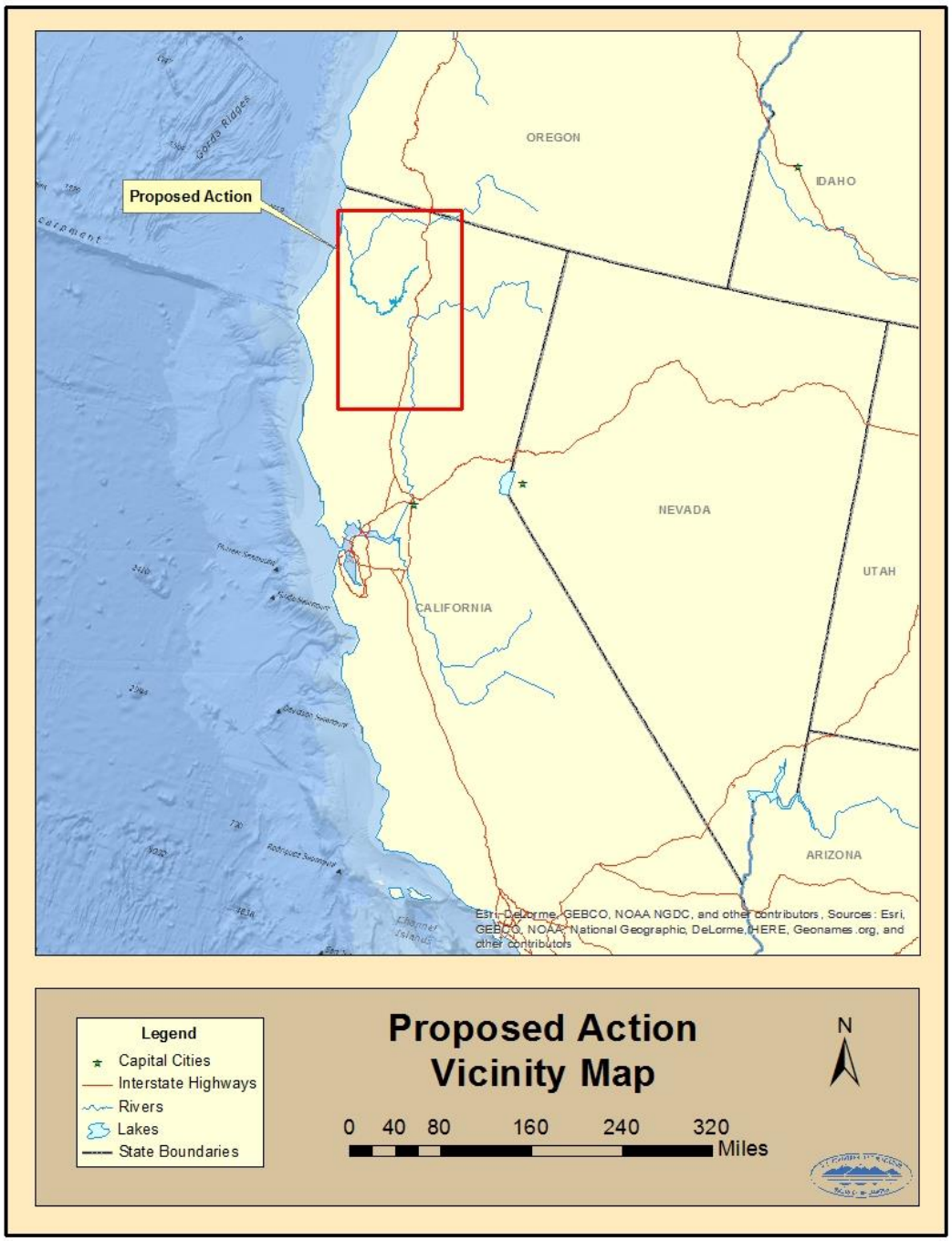

Figure 1. Vicinity of Proposed Action

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 Trinity River Division with the rest of the Central Valley Project 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

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:

[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.

- 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).

- Indian Sacred Sites: There would be no impacts 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 impacts 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. Further, the Proposed Action only includes providing controlled reservoir releases that are within the normal operational envelope.
- Land Use: There would be no impacts 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 [USFWS] 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 will occur 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 will follow 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 Site #11530500; Klamath near Klamath gage [KNK]), and scheduled releases from Lewiston Dam are shown in Figure 4. Forecasted flows at the KNK gage, based upon the 90% exceedance from the California-Nevada River Forecast Center, would be approximately 2,000 cfs in the second half of August and through September (not including the Ceremony pulse flow from Lewiston Dam).

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 via auxiliary bypass. 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 occur regardless of the Proposed Action, from September 11, 2015 until October 12, 2015. These dates are subject to change based on changing river conditions.

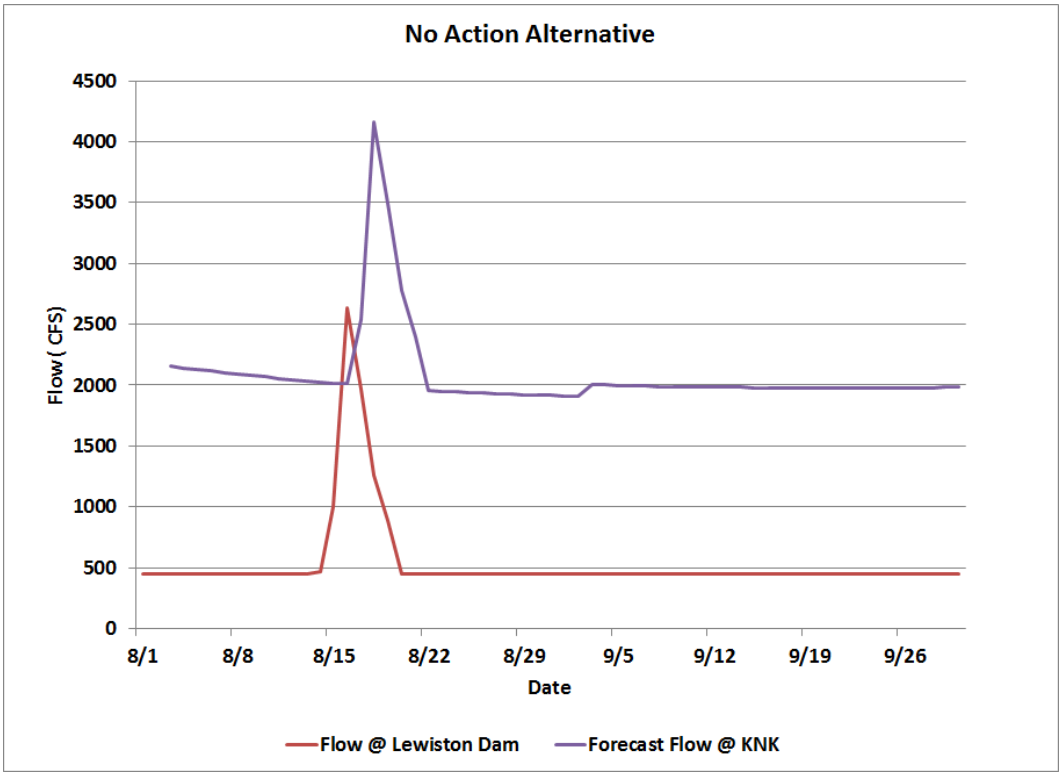

Figure 4. Hydrograph showing flows in the Klamath River near Klamath (KNK), California for the No Action Alternative.

2.2 Proposed Action

Continued dry hydrologic conditions and the 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. The Proposed Action includes supplemental flows to prevent a disease outbreak and a contingency volume to be used on an emergency basis to avoid a significant die-off of adult salmon. 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 supplemental flows. The technical team would be monitoring flow in the lower Klamath River, water temperature, fish residence time and the overall condition of the fish in the river.

If the technical team determines that key fish metric triggers are met, Reclamation would operate Trinity and Lewiston reservoirs to release sufficient flow from Lewiston Dam to target a minimum flow of 2,500 cfs in the lower Klamath River (USGS Station KNK) from August 19 through September 20, 2015, hereafter referred to as the Action Period. The quantity of water projected to meet this target is up to 32,000 acre-feet. In addition the Proposed Action would include an emergency release provision, or a portion thereof, that could include use of up to

an additional 51,000 AF. The augmentation of flow, either the preventative or emergency components of the proposed action, would be subject to the following environmental and biological conditions, which are to be informed by active monitoring programs that can alter the timing and duration of the flow augmentation. Details of the conditions follow:

- The initiation of flow augmentation to meet the 2,500 cfs target at KNK would depend on the following triggers: a) when the cumulative harvest of Chinook salmon in the Yurok Tribal fishery in the Estuary area meets or exceeds a cumulative total of 7,000 fish, and/or b) mean daily water temperature at river kilometer (rkm) 13 is greater than 23 degrees C for 3 consecutive days, and/or c) fish health and related river conditions. It is anticipated that flow augmentation would commence no earlier than August 19th following the scheduled Hoopa Valley Tribe's Ceremony flows and later if monitored conditions indicate that a preventative flow was not yet warranted. Any flow augmentation would continue through September 20, or later if conditions warranted (See Figures 5 & 6).

- Real-time environmental and biological monitoring would also be used to gain knowledge regarding the ecological consequences of the actions while also informing management whether an emergency response may be required to thwart a fish die-off in 2015. For example, the Yurok Tribe will sample adult Chinook salmon and thoroughly examine them for signs of Ich infection on a weekly basis. The need for an emergency response is also based on the criteria outlined in the 2013 NMFS/FWS memorandum. The two primary criteria for implementation of an emergency response are sustained increased water temperatures and the prevalence of a severe ich infection and observed mortality. For purposes of this review, the emergency response would constitute re-operating Trinity and Lewiston reservoirs to double the current flow on the lower Klamath River at the KNK gage for up to a 7-day period (up to a maximum flow of 5,000 cfs). This is designed to increase the water turnover rate in areas where adult fish are holding, more effectively flush the infectious life form of Ich downstream into the estuary where they cannot survive, and make it more difficult for additional fish to be infected. It will likely reduce parasite replication rates and promote movement of adult salmon. Cold water is a biological cue for salmon to migrate upstream.

- Ramping rates from Lewiston Dam would follow contemporary approved rates of change to minimize public and other environmental concerns, such as rapid rises in water levels and stranding of fish.

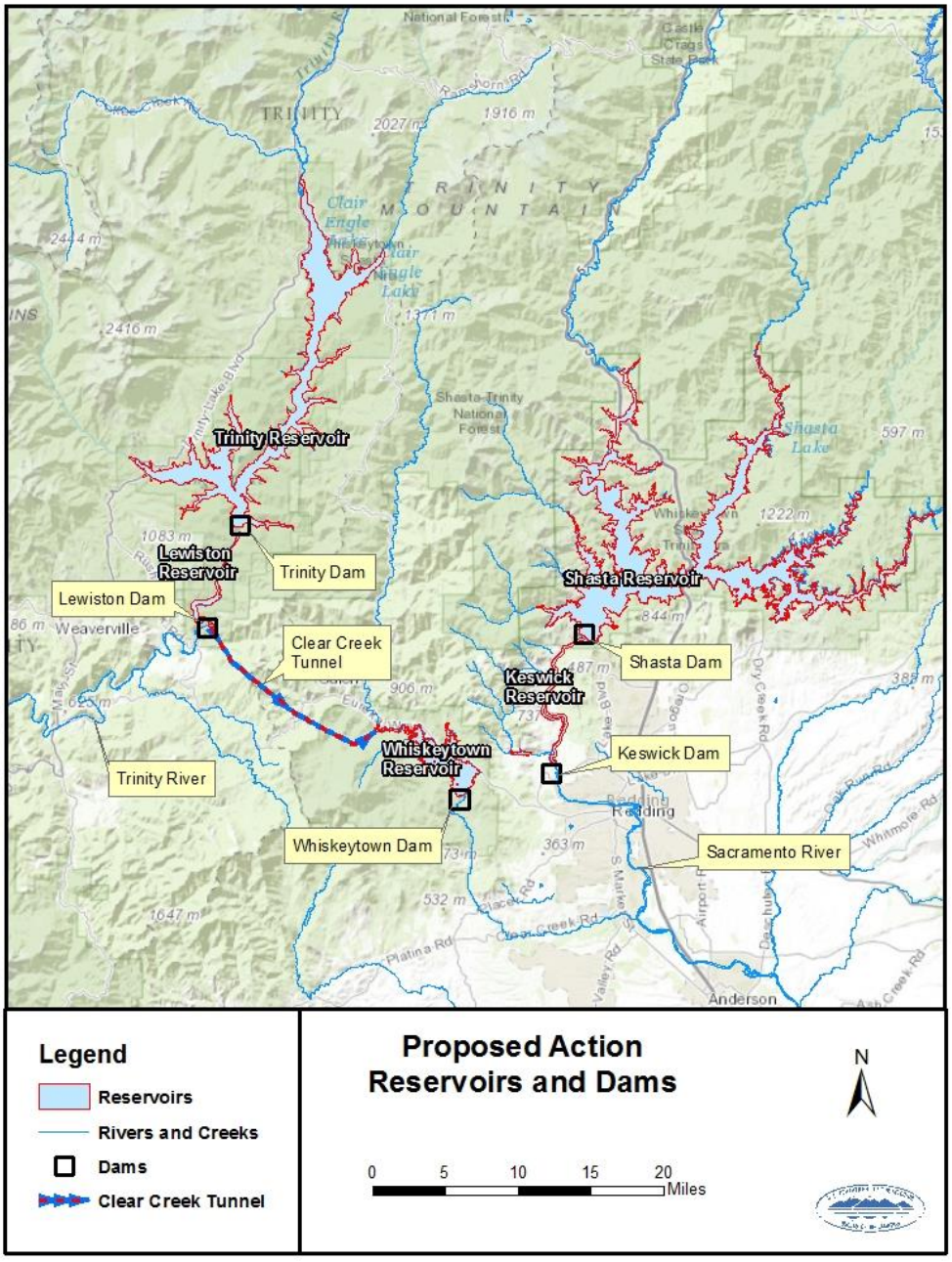

Figure 2. Proposed Action – Reservoirs and Dams

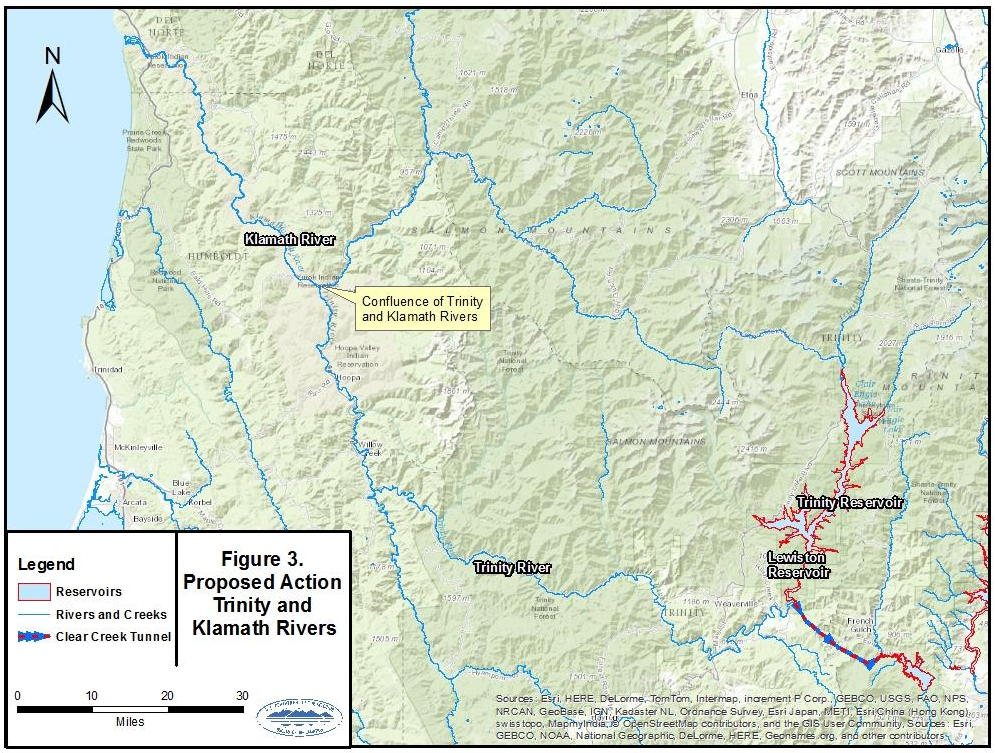

Figure 3. Proposed Action – Trinity and Klamath Rivers

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 to meet regulatory-driven temperature targets. As with the No Action Alternative, use of the bypass is anticipated from September 11, 2015 until October 12, 2015. These dates are subject to change based on changing river conditions. Transbasin diversions for 2015 have already been determined and would not be altered by the Proposed Action.

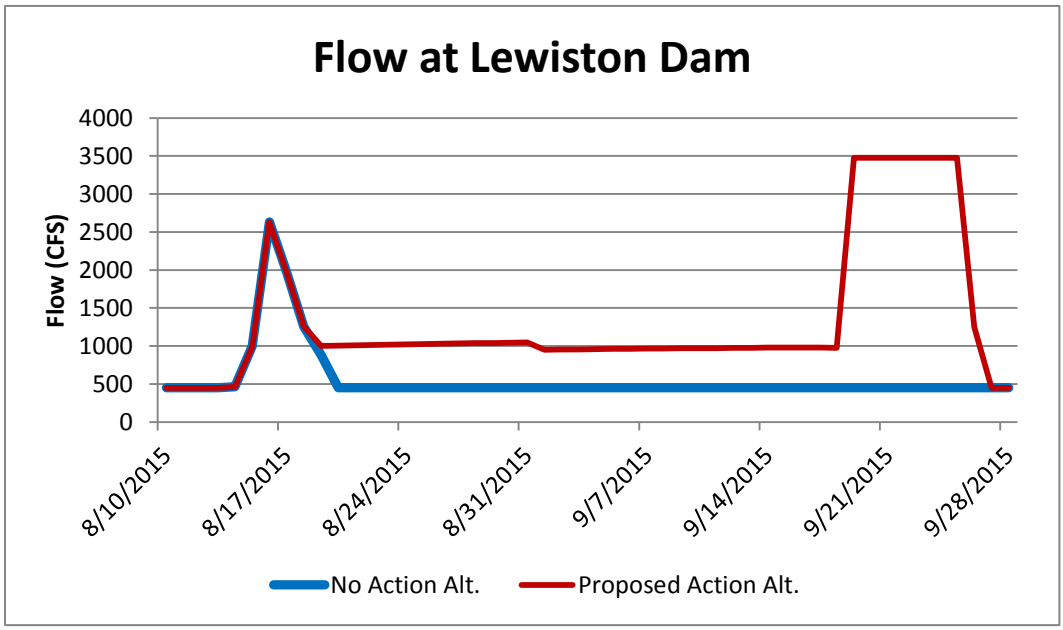

Figure 5. Hydrograph showing flows at Lewiston Dam for the Proposed Action and No Action Alternative.

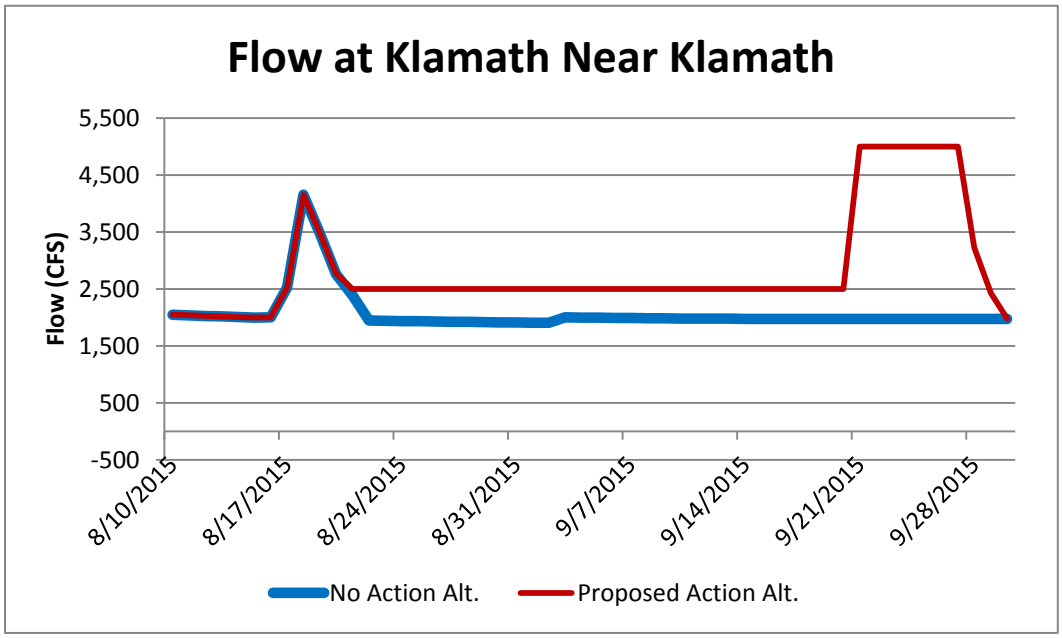

Figure 6. Hydrograph showing flows in the Klamath River near Klamath (USGS Station KNK), California for the Proposed Action and No Action Alternative.

In 2015 Reclamation proposes to begin releasing flows earlier, beginning August 19th, and to continue the releases further into the fall-run until September 20.

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 Klamath 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 upon 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 not available from the upper Klamath River.

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 Trinity River Division (TRD) of the CVP (Figure 2). 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, 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 and into 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 2).

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 trans-basin 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.

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, as part of the mandates of the Trinity River Restoration Program. 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.

In years of relatively low storage, water released from Trinity Reservoir may be released through the use of the auxiliary bypass (Elev 1999') in lieu of the penstock (Elev 2160'), 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 upon 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 million acre-feet (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. Using the same probability of exceedance values, the long term forecast for the end of July in 2016 ranges between 802 and 357 TAF (without the Proposed Action). To put this in perspective the end of July storage in Trinity Reservoir for 2015 was 834 TAF.

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[7, 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 utilized 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 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 other tribes within the region including the Karuk and Klamath.

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.

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. Also, water from Trinity Reservoir is exported to the Central Valley for consumptive use, and generation of hydroelectric power.

3.6 Power Generation

The Trinity River Division (TRD) has the capacity to generate substantial hydroelectric power per acre-foot of water diverted because the elevational difference between Trinity and Keswich Reservoirs provides the gravitational flow to generate hydropower at 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 upon storage as well as downstream needs for cold water. When the storage gets low enough to entrain water of an unsuitable temperature into the powerplant, Reclamation must switch to use of the auxiliary outlet.

Section 4 Environmental Consequences

4.1 Water Resources

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 16 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 would 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 occur 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.

4.1.2 Proposed Action

Under the Proposed Action, flow from Lewiston Dam would be the same as the No Action Alternative before August 19th, but thereafter could be maintained to achieve a flow in the lower Klamath River of 2,500 cfs through September 20. The timing of when flow from Lewiston Dam would be increased to meet the downstream target would be subject to real-time biological monitoring that is intended to identify key factors that may lead to a large disease outbreak

(epizootic) and potentially an associated fish die-off. Therefore in the absence of a formal identified need, the flows at Lewiston would remain at 450 cfs. Based upon 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 be approximately 1,000 cfs, representing an approximate 550 cfs increase in flow 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. Assuming flow to meet the target of 2,500 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 32 TAF.

In the 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. Again, real-time monitoring would be used to inform Reclamation as to whether an impending fish die-off was to occur that would invoke use of the water, or a portion thereof. 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. This flow would continue for at least a few days but would be subject to federal biological review of the information at hand including forecast meteorology and fish disease monitoring. 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.

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 7 days of flow from Lewiston Dam that is double the flow in the lower Klamath River (up to a target of 5,000 cfs). 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 volume of water that may be used in this portion of the action may include up to 51,000 AF. In combination with the preventative flows, the proposed action could require up to 83 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 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. 2160') or the auxiliary outlet (elev. 1999') in 2015; and 2) refine our knowledge of how an augmentation action (up to 83 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 afterwards through November, which is beyond the time of water temperature concern for 2015. Additionally it was determined that implementing the proposed action would reduce the storage (and in particular the cold water storage) in Trinity Reservoir by up to 83 TAF, resulting in an end of September 2015 storage of approximately 515 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 approximately 107 TAF of water less than 52 °F remaining.

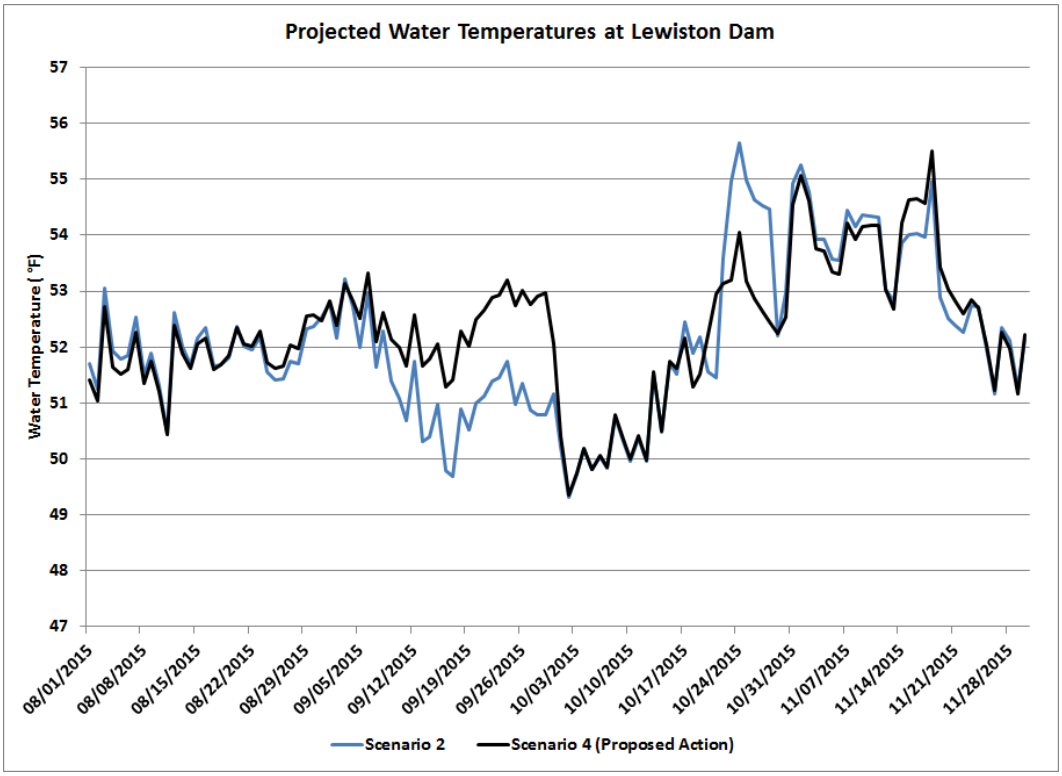

Figure 7. Sacramento River Temperature model results showing the influence of the augmentation action and the thermal regime from Lewiston Dam through the power house (i.e, No bypass) and with use of the auxiliary outlet works, which bypasses the power house. This is one of many model simulations performed on the proposed action is presented.

The reduction in storage of up to 83 TAF due to implementation of the Proposed Action may influence the cold water resource in the following year, but is dependent upon whether the reservoir would fill. In the event the reservoir spills, or substantial safety-of-dams releases occur, there could be no effect. Otherwise, there could be a corresponding reduction in available cold water resources in the following year that may be accountable to implementing the action in 2015.

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. 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. The complexities and uncertainties of accurately predicting water surface elevations that far in the future are tied to variable and unpredictable precipitation patterns and therefore preclude 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 2,500 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.

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 release of up to 83 TAF affects the 2016 water supply and water allocations will depend on the water year 2016 hydrology and operational objectives. Water allocations are not likely to be affected by implementation of the proposed action.

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.

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 were 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 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 utilize 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 release 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 83 TAF. Thus implementing the proposed action would not jeopardize the coldwater 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 baseflow releases from Lewiston Dam, as part of the preventative augmentation portion of the Proposed Action, are anticipated to be less than 1,000 cfs. This flow rate typically does not create stranding hazards, because downstream flows are not high enough to overtop berms.

If the emergency release component is implemented (i.e. up to 3,500 cfs at Lewiston, reaching up to 5,000 on the lower Klamath River for up to a seven-day duration), 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 Trinity River Restoration Program 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 2015. 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 is anticipated to reduce the risk of Ich infection and associated fish die-off fall of 2015.

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. Specifics on model assumptions and more detailed results can be found in a biological review (See Appendix A). 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 5 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.

Table 5. 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)

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, changes to the ability to achieve temperature objectives would be expected, which could impact ESA-listed salmon and steelhead.

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. Without the harvest the tribes would be greatly impacted.

4.3.2 Proposed Action

Under the Proposed Action, it is expected that the risk of disease vulnerability to the large 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 disease or adult mortalities (except in 2014 when disease was prevalent, but mortality rates low).

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. 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 large 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.

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.

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.

Depending in part on whether Trinity Reservoir completely fills in water year 2016 after implementation of the Proposed Action, 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 1-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 83 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 91,000 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 $4,565,000. 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 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 natural 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 76 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 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 62 TAF of water is used for flow augmentation, a maximum of 75,330 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 53,149 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 were to occur, it could…

4.8.2 Proposed Action

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 coldwater 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 upon 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 currently very low (estimate) and is warmer than usual (example). If cold water from Trinity is not available this could reduce the period of time Reclamation can meet temperature goals in the Sacramento River. Repeated releases from Trinity Reservoir with continued drought conditions could result in negative impacts to federally listed winter-run and spring-run Chinook salmon.

Table 6. Storage Projections of Trinity Reservoir

Storage Projections of Trinity Reservoir [a]				
Time Period	50 Percent (Probability of Exceedance)[b]		90 Percent (Probability of Exceedance)[c]	
	No Action	Proposed Action	No Action	Proposed Action
End of Sept 2015	599	516	595[c]	512[c]
End of July 2016	802	721	357[c]	275[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): 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): Aug- 89, Sept- 62, Oct-15, Nov-28, Dec-19, Jan-6, Feb-1, Mar-1, Apr -38, May - 37, Jun - 117, Jul - 89

Implementing the proposed action augmentation flows would result in a loss of approximately 83 TAF from Trinity Reservoir for either probability of exceedance forecast (See Table 6). Under the condition of a forecast of 50 percent probability of exceedance, the projected storage at the end of September for the no action and proposed action would range between 599 and 516 TAF. Under the same exceedance condition, the forecast for storage under the No Action and Proposed Action for the end of July in 2016 would be 802 and 721.

Under the conditions of 90 percent probability of exceedance, representing a near worst case condition, the storage for the end of September remains similar to the 50 percent forecast for either alternative. In contrast, under the 90 percent probability of exceedance the projected end of July 2016 storages are reduced by over 200 percent compared to the 50 percent condition, or 357 TAF in the No Action and 275 TAF in the proposed action. Placing the end of July 2016 storage values in perspective, the 90% exceedance projection would likely represent the worst storage condition for Trinity Reservoir for this month since the project was developed. As an example, the end of July storage in 1977, representing one of the worst storage years on record, the storage was 542 TAF, which is larger than what is projected under 90 percent condition with or without the proposed action. It should be noted that there are several months remaining in the warm and dry season following this projection for July of 2016. Estimates of a cold water resource that would be needed to maintain cold water for the Trinity River alone are approximately 79TAF.

Section 5 Consultation and Coordination

5.1 Agencies and Groups Consulted

Reclamation coordinated with the USFWS, NMFS, CFW, Hoopa Valley Tribe, and Yurok Tribe in the preparation of the EA.

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, 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.

By letters dated May 18, 2015, and June 25, 2015, the Bureau of Reclamation (Reclamation), in cooperation with the California Department of Water Resources (DWR), submitted and subsequently updated a Contingency Plan for operation of the CVP and SWP from July through November, 2015, in accordance with RPA Action I.2.3.C. An updated Sacramento River Temperature Management Plan for Water Year 2015 prepared pursuant to RPA Action I.2.4 of the National Marine Fisheries Service (NMFS) 2009 BiOp was included as part of the June 25, 2015 Contingency Plan request. By letter dated July 1, 2015, NMFS concurred that Reclamation and DWR's Contingency Plan for July – November 2015, as amended by the Revised Sacramento River Temperature Management Plan, is consistent with RPA Action I.2.3.C in NMFS' 2009 BiOp. Reclamation is seeking concurrence from NMFS that the operations described in the previously submitted Updated Project Description dated May 14, 2015, as amended by the Lower Klamath River 2015 Fall Augmentation Flows described in this EA, are within the limits of the Incidental Take Statement of the BiOp and serves as the revised Contingency Plan through November 2015.

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

54 U.S.C. § 304108, commonly known as Section 106 of the 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.

Section 6 References

Bartholow, J. M. and J. Heasley. 2006. Evaluation of Shasta Dam scenarios using a salmon production model. U.S. Geological Survey, Reston, Virginia.

Belchik, M., Hillemeier, D., and Pierce, R.M. 2004. The Klamath River Fish Kill of 2002; Analysis of Contributing Factors. Yurok Tribal Fisheries Program. 42pp.

Cramer Fish Sciences. 2010. A Revised Sacramento River Winter Chinook Salmon Juvenile Production Model. Prepared for NOAA. 30 p.

Environmental Protection Agency (EPA). 2010. Climate Change – Basic Information. Website: http://www.epa.gov/climatechange/basicinfo.html.

Guillen, G. 2003. Klamath River Fish Die-off, September 2002: Causative Factors of Mortality. US Fish and Wildlife Service. Report Number AFWOF-02-03. 128pp. Foott, J.S. 2002. Pathology report. FHC Case No. 2002-139. USFWS. Anderson, California.

Magneson, M.D. and C.D. Chamberlain. 2015. The Influence of Lewiston Dam Releases on Water Temperatures of the Trinity River and Lower Klamath River, CA, April to October 2014. U.S. Fish and Wildlife Service, Arcata Fish and Wildlife Office, Arcata Fisheries Data Series Report Number DS 2015-41, Arcata, California.

National Marine Fisheries Service (NMFS). 2006. Endangered and threatened species; revision of species of concern list, candidate species definition, and candidate species list. Federal Register 71: 61022-61025.

Pacific Fishery Management Council (PMFC). 2012. Preseason Report I: Stock Abundance Analysis and Environmental Assessment Part 1 for 2012 Ocean Salmon Fishery Regulations. Portland, OR. 137 pp. Available at: http://www.pcouncil.org/wp-content/uploads/Preseason_Report_I_2012.pdf

Pacific Fishery Management Council (PMFC). 2013. Preseason Report III: Council Adopted Management Measures and Environmental Assessment Part 3 for 2013 Ocean Salmon Fishery Regulations. Portland, OR. 45 pp.

Pacific Fishery Management Council (PMFC). 2015. Preseason Report II: Proposed Alternatives and Environmental Assessment – Part 2 for 2015 Ocean Salmon Fishery Regulations. (Document prepared for the Council and its advisory entities.) Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 101, Portland, Oregon 97220-1384.

Public Law 84-386. Trinity River Division, Central Valley Project, August 12, 1955.

Public Law 102-575 Central Valley Project Improvement Act. 1992.

Scheiff, T. and P. Zedonis, 2010. The Influence of Lewiston Dam Releases on Water Temperatures of the Trinity and Klamath Rivers, CA. April to October, 2009. U. S. Fish and Wildlife Service, Arcata Fish and Wildlife Office, Arcata Fisheries Data Series Report Number DS 2010-17, Arcata, California.

Stillwater Sciences. 2009. Effects of sediment release following dam removal on the aquatic biota of the Klamath River. Technical report. Prepared by Stillwater Sciences, Arcata, California for State Coastal Conservancy, Oakland, California. January. 185 pp.

Strange, J. 2010. Upper Thermal Limits to Migration in Adult Chinook Salmon: Evidence in the Klamath River Basin. Transactions of the American Fisheries Society 139:1091-1108.

Turek, S., Rode, M., Cox, B., Heise, G., Sinnen, W., Reese, C., Borok, S., Hampton, M., and Chun, C. 2004. September 2002 Klamath River Fish-Kill: Final Analysis of Contributing Factors and Impacts. California Department of Fish and Game. 183pp.

U.S. Fish and Wildlife Service, Bureau of Reclamation, Hoopa Valley Tribe, and Trinity County. 2000. Trinity River Mainstem Fishery Restoration Environmental Impact Statement/Environmental Impact Report.

United States Fish and Wildlife Service (USFWS). 1999. Effect of temperature on early-life survival of Sacramento River fall- and winter-run Chinook salmon. Red Bluff, CA: Northern Central Valley Fish and Wildlife Office, January 1999.

United States Bureau of Reclamation (USBR). 2015. Drought monitoring and assessment report. Brood Year 2013 winter-run Chinook Salmon drought operation and monitoring assessment. Report. Mid-Pacific Region, Sacramento CA. March 2015.

Appendix A: NHPA, Section 106 Compliance

CULTURAL RESOURCES COMPLIANCE
Division of Environmental Affairs
Cultural Resources Branch (MP-153)

MP-153 Tracking Number: 15-NCAO-179

Project Name: 2015 Lower Klamath River Late-Summer Flow Augmentation from Lewiston Dam

NEPA Document: 15-09-MP

NEPA Contact: Kylene Lang, Natural Resource Specialist

MP 153 Cultural Resources Reviewer: Mark Carper, Archaeologist

Date: June 25, 2015

Reclamation proposes to release additional flows from Lewiston Dam in late summer 2015 to augment the Trinity and lower Klamath Rivers. This is the type of undertaking that does not have the potential to cause effects to historic properties, should such properties be present, pursuant to the NHPA Section 106 regulations codified at 36 CFR § 800.3(a)(1). Reclamation has no further obligations under NHPA Section 106, pursuant to 36 CFR § 800.3(a)(1).

Under the proposed action, Reclamation would operate Trinity and Lewiston Reservoirs to target a minimum flow of 2,800 cfs with potential for a peak flow of 3,600 from Lewiston Dam between August 15 and October 1, 2015. The Proposed Action will not produce any ground disturbances, it will not result in the construction of new facilities or the modification of existing facilities, and it will not result in any changes in land use.

I concur with the statement in the cultural resources section of the EA for this undertaking that 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).

With this determination, Reclamation has no further NHPA Section 106 obligations. This memorandum is intended to convey the completion of the NHPA Section 106 process for this undertaking. Please retain a copy in the administrative record for this action. Should changes be made to this action, additional NHPA Section 106 review, possibly including consultation with the State Historic Preservation Officer, may be necessary. Thank you for providing the opportunity to comment.

CC: Cultural Resources Branch (MP-153), Anastasia Leigh – Regional Environmental Officer

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Appendix B: Response to Comments

The draft EA and FONSI were made available for a seven-day public review on Reclamation's Mid-Pacific Region web site following a July 31, 2015, press release. Comments received were considered in developing the final EA and FONSI.

Reclamation received: