Draft Environmental Assessment

Trinity River Winter Flow Variability Project

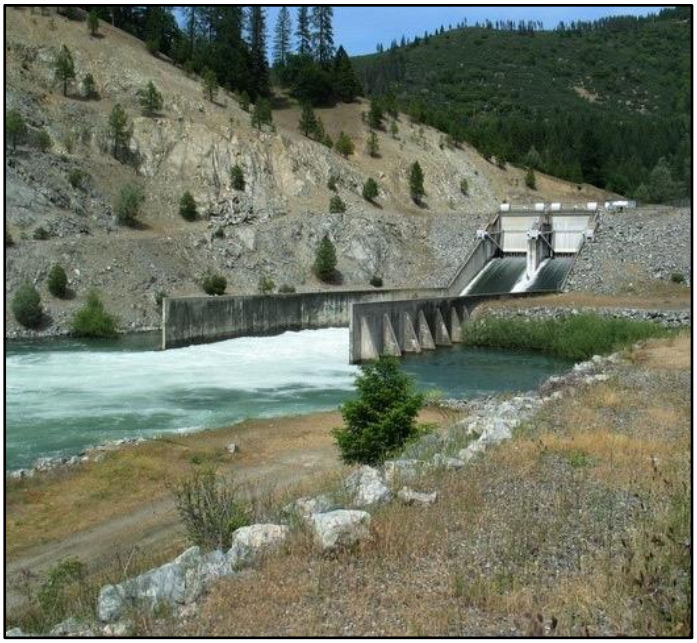
CGB-EA-2021-51

September 2021

Project Proponent and Lead Agency

Trinity River Restoration Program Office

U. S. Department of the Interior, Bureau of Reclamation



Trinity River releases from Lewiston Dam (photo: TRRP)



Young salmon on the Trinity River (photo: Yurok Fisheries Dept.)

Trinity River Restoration Program
Restore • Adapt • Improve

BUREAU OF RECLAMATION

Trinity River Winter Flow Variability Project
Draft Environmental Assessment
CGB-EA-2021-51

Project Proponent and Lead Agency

U.S. Department of the Interior
Bureau of Reclamation – Trinity River Restoration Program Office
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Mission Statements

The Department of the Interior (DOI) conserves and manages the Nation's natural resources and cultural heritage for the benefit and enjoyment of the American people, provides scientific and other information about natural resources and natural hazards to address societal challenges and create opportunities for the American people, and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities to help them prosper.

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.

Trinity River Winter Flow Variability Project

Draft Environmental Assessment

CGB-EA-2021-51

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
°C	degrees Celsius
AEAM	Adaptive Environmental Assessment and Management
Basin Plan	Water Quality Control Plan for the North Coast Region
BLM	U.S. Bureau of Land Management
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CNRFC	California Nevada River Forecast Center
CVP	Central Valley Project
DOI	U.S. Department of the Interior
DWR	California Department of Water Resources
EA	Environmental Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESU	evolutionarily significant unit
FEIS	Final Environmental Impact Statement
Forest Service	U.S. Forest Service
HEFS	Hydrologic Ensemble Forecast Service
HVT	Hoopa Valley Tribe
ITAs	Indian Trust Assets
NEPA	National Environmental Policy Act
Program	Trinity River Restoration Program
Reclamation	Bureau of Reclamation
Regional Water Board	North Coast Regional Water Quality Control Board
ROD	Record of Decision
TAF	Thousand Acre-Feet (TAF)
TMC	Trinity Management Council
TRD	Trinity River Division
TRFES	Trinity River Flow Evaluation Study
TRRP	Trinity River Restoration Program
USC	United States Code
USFWS	U.S. Fish and Wildlife Service

1. Introduction and Background

This Environmental Assessment (EA) for the proposed Trinity River Winter Flow Variability Project (Winter Flow project, project, or Proposed Action) was prepared by the U.S. Department of the Interior (DOI), Bureau of Reclamation (Reclamation), Trinity River Restoration Program (TRRP, Program) office to meet the requirements of the National Environmental Policy Act (NEPA). The primary objective of the Winter Flow project is to increase spawning and rearing habitat and to enhance river conditions for salmon and steelhead.

Reclamation's TRRP office is the lead agency under NEPA. TRRP has collaborated on the proposed Winter Flow project with Program partner entities, which include the Hoopa Valley Tribe (HVT), the Yurok Tribe, and federal and state permitting agencies. Federal and state Responsible and Trustee agencies that have supported and contributed to this effort include: the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service, California Department of Fish and Wildlife (CDFW), and the North Coast Regional Water Quality Control Board (Regional Water Board). The Bureau of Land Management (BLM), which manages public lands along Trinity River, has also endorsed the Proposed Action.

1.1 Purpose of This Document

This EA has been prepared in accordance with NEPA (42 United States Code (USC) 4321 et seq.), the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations (CFR) Parts 1500-1508), and the DOI Regulations for the Implementation of NEPA (43 CFR Part 46). NEPA requires that governmental agencies publicly disclose information about their proposed activities that may affect the environment and evaluate the potential environmental impacts of their proposed actions before making formal commitments to implement them. This document evaluates the environmental impacts of the No Action alternative (Alternative 1) and the Proposed Action (Alternative 2) and is designed to facilitate implementation of the Proposed Action under all applicable laws. If there are no significant environmental impacts identified as a result of the analyses, and Reclamation decides to select the Proposed Action (Alternative 2), a Finding of No Significant Impact (FONSI) may be signed to complete the NEPA compliance process. Reclamation has prepared this EA pursuant to 43 CFR. Section 1505.1(b), which provides that "[a]n agency may prepare an environmental assessment on any action in order to assist agency planning and decision making."

This EA incorporates by reference and is tiered from the 2000 *Trinity River Mainstem Fishery Restoration Environmental Impact Statement* and Record of Decision (ROD), referred to hereafter as the Trinity River FEIS and ROD (USFWS, Reclamation, and HVT 2000)[1]. The Trinity River FEIS and ROD function as project-level NEPA documents that support policy decisions associated with managing Trinity River flows and as programmatic NEPA documents providing "first-tier" review of other potential actions, including the Proposed Action[2]. The ROD, dated December 19, 2000, directed DOI agencies to implement the Flow Evaluation Alternative, which was identified as the Preferred Alternative in the Trinity River FEIS. For more information about the ROD, see the Trinity River Restoration Program website.

[1] The Trinity River EIS/ Environmental Impact Report (EIR) and ROD are available at https://www.trrp.net/program-structure/foundational-documents/.

[2] The Proposed Action is Alternative 2, as described in Chapter 2: Description of Alternatives of this EA.

1.2 Location of Project

The TRRP's target restoration reach is the approximately 40-mile length of the Trinity River downstream of Lewiston Dam to the confluence of the North Fork Trinity River (also referred to as the North Fork) in Trinity County, California (Figure 1-1). Potential impacts resulting from the Proposed Action or No Action would occur at Lewiston Dam, near Lewiston, California, and would extend through and beyond the restoration reach.

1.3 Trinity River Restoration Program Background

Congress authorized construction of the Trinity River Division (TRD) of the Central Valley Project (CVP) in 1955 (Public Law 386, 84th Congress, 1st Session). Authorized water use from the TRD included irrigation and beneficial uses in the Central Valley, power production, and the preservation of fish and wildlife. The TRD began operations in 1963, blocking 109 miles of important salmonid habitat above Lewiston Dam and exporting as much as 90 percent of the Trinity River's inflows into Trinity Lake to the Sacramento River Basin. Fisheries resource managers observed an almost-instantaneous decline in the numbers of naturally produced adult salmonids returning to spawn in the Trinity River basin (declines of 53 to 96 percent, depending on the salmonid species; USFWS and HVT 1999).

To address these precipitous declines, numerous pieces of legislation and a decades-long study led to the completion of the Trinity River Flow Evaluation Study (TRFES) by USFWS and HVT (1999)[3] and the subsequent Trinity River FEIS and ROD. The ROD recognized that salmon recovery required "rehabilitating the river itself" by "restoring the attributes that produce a healthy, functioning alluvial river system" and selected a course of action that included variable annual instream flows, physical channel rehabilitation, sediment management, watershed restoration, and infrastructure improvements guided by an Adaptive Environmental Assessment and Management (AEAM) program[4].

Following the signing of the ROD, the DOI established the TRRP and opened Reclamation's TRRP office in 2002 to restore fish and wildlife populations of the Trinity River affected by dam construction and related diversions. Administered by Reclamation, TRRP is a partnership of federal and state resource agencies, Hoopa Valley and Yurok Tribes, and Trinity County. The purpose of the TRRP is to mitigate impacts of the TRD on anadromous fish populations in the Trinity River by successfully implementing the ROD and achieving Congressionally mandated restoration goals[5]. The long-term goals of the TRRP are to (1) restore the form and function of the Trinity River; (2) restore and sustain natural production of anadromous fish populations in the Trinity River to pre-dam levels; and (3) facilitate full participation by dependent tribal, commercial, and sport fisheries through enhanced harvest opportunities[6].

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[3] The TRFES is available at https://www.fws.gov/arcata/fisheries/reports/technical/trinity_river_flow_evaluation_-_final_report_full_version.pdf.

[4] A description of the TRRP AEAM program is available at https://www.trrp.net/program-structure/adaptive-management/.

[5] A full description of the Trinity River Restoration Program is available at www.trrp.net

[6] TRRP foundational documents are available at https://www.trrp.net/program-structure/foundational-documents/.

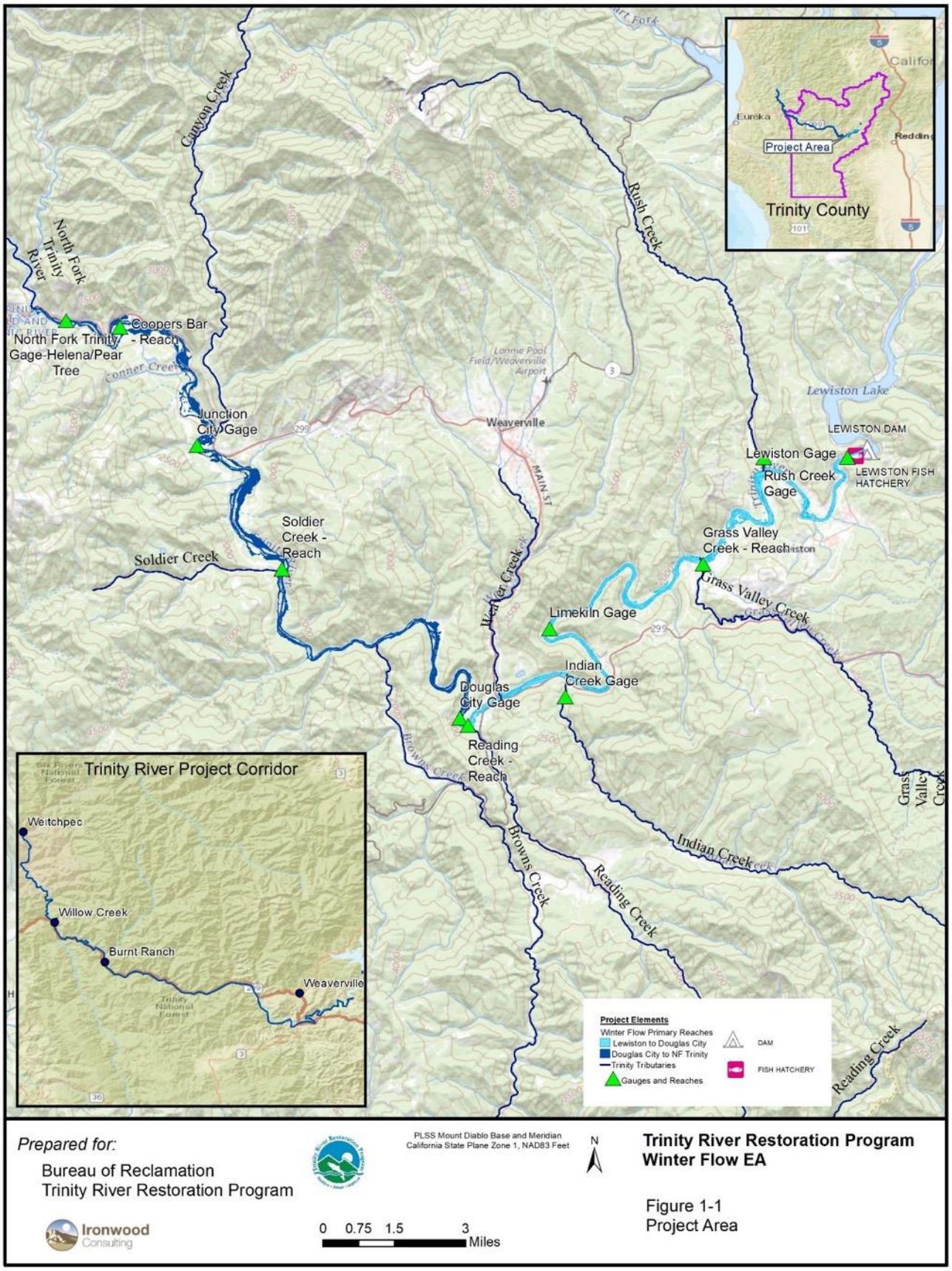


Figure 1-1. TRRP mainstem project restoration reach, where channel rehabilitation projects are implemented, its major tributaries and flow monitoring gauges at which local flows are measured.

The TRRP is tasked with increasing habitat and river function for all life stages of naturally produced native Trinity River anadromous fish through river rehabilitation projects and dam release management so that naturally spawning anadromous fish populations may increase to congressionally mandated levels that existed prior to the construction of Lewiston and Trinity Dams. That said, there are many factors that influence returning adult salmon populations such as ocean and in-river harvest, and Klamath River and ocean conditions. The TRRP's efforts are focused on recovery of juvenile salmon and steelhead which are most directly impacted by TRRP's actions. The most immediate metric of TRRP success is therefore the number and size of juvenile salmon and steelhead that out-migrate from the Trinity River each year[7].

The TRRP's strategy is to restore the Trinity River's ecological processes to increase habitat quality and quantity for native anadromous fish. The five primary components of TRRP's river restoration work include:

1. Variable annual instream flows – releasing water from Lewiston Dam, based on the water year type, to mimic natural Trinity River flows and interact with downstream areas to enhance conditions for all life stages of fish and wildlife. These variable annual instream flows are also sometimes called restoration releases or restoration flows.

2. Channel rehabilitation – restoring the functional floodplain of the river, which has been channelized and simplified by managed river flows and mining. To date, the TRRP has constructed 34 of the rehabilitation projects identified in the 1999 TRFES and Trinity River FEIS (USFWS, Reclamation, and HVT 2000)[8].

3. Sediment management – reintroducing gravel (aka coarse sediment) to the river and working to control unnaturally high inputs of fine sediment (see Watershed restoration listed below). Gravel provides spawning areas and other habitat benefits for salmon. Gravel entering the river system upstream of the Trinity dam is blocked from being transported to the Trinity River below Lewiston Dam and creates a gravel deficit. TRRP resupplies the river with gravel to make up for the dam's blocked gravel supply that would otherwise be provided naturally.

4. Watershed restoration – addressing negative impacts that have resulted from poor land management in the Trinity River basin. Watershed restoration activities include decreasing the input of fine sediment from Trinity River tributaries, ensuring passage to tributary habitat, and creating better aquatic conditions in watershed areas to support stream life.

5. Adaptive management – monitoring, evaluating, and improving the effectiveness of river restoration actions.

1.4 Project Background

Flow regulation by dams on many California rivers has caused a distortion of the natural winter-flood, summer-drought hydrograph (Parker, M. S, & Power, M. E. 1997). As a consequence, peak winter storm flows capable of mobilizing riverbed substrates are greatly reduced and summer base flows are artificially enhanced (Mount, Jeffrey F 1995). Post-TRD flow regulation on the Trinity River eliminated nearly all high flows adequate to form and maintain the alluvial river and, reduced scour by winter floods downstream of Lewiston Dam

[7] Summaries of the TRRP fish outmigration statistics are available here: https://www.trrp.net/restoration/adaptive-management/fish-biology/fisheries-monitoring-and-escapement/.

[8] The 2009 Master EIR authorizes the TRRP to complete rehabilitation projects and gravel augmentation, after NEPA and California Environmental Quality Act (CEQA) review for individual projects at the project site level. It is available here: https://www.trrp.net/library/document/?id=365.

(USFWS and HVT 1999). Operation of the TRD also changed the thermal regime of the Trinity River, providing warmer water temperatures during the winter and colder water temperatures during the late spring and summer than were present prior to the TRD because of deep water releases from Trinity Dam (USFWS and HVT 1999). Figure 1-2 illustrates the changes in water allocation on the Trinity River beginning before the construction of Lewiston Dam and before and after the implementation of the ROD.

The TRRP is mandated by Congress to restore anadromous fisheries to pre-dam levels, including those held in trust by the federal government for the Hoopa Valley and Yurok Tribes. The ROD specifies that this would be accomplished through the restoration of natural physical and ecological processes and provided a suite of tools to accomplish that goal. Among these tools, and arguably the most powerful, are variable annual instream flows. These variable instream flows, or restoration releases, were first implemented by TRRP in 2004.

ROD-recommended flow releases use an allocated volume of water based on water year type (determined in mid-April; see https://www.trrp.net/restoration/flows/) to mimic snowmelt hydrology and create a more natural cycle of flow variability, promote alluvial processes, and provide water temperature and habitat benefits for fisheries resources (TRRP (Trinity River Restoration Program). 2013). In most water-year types, variable releases have extended to early summer before returning to baseflow conditions and then remain at baseflow until the following April, when a new water year type is determined.

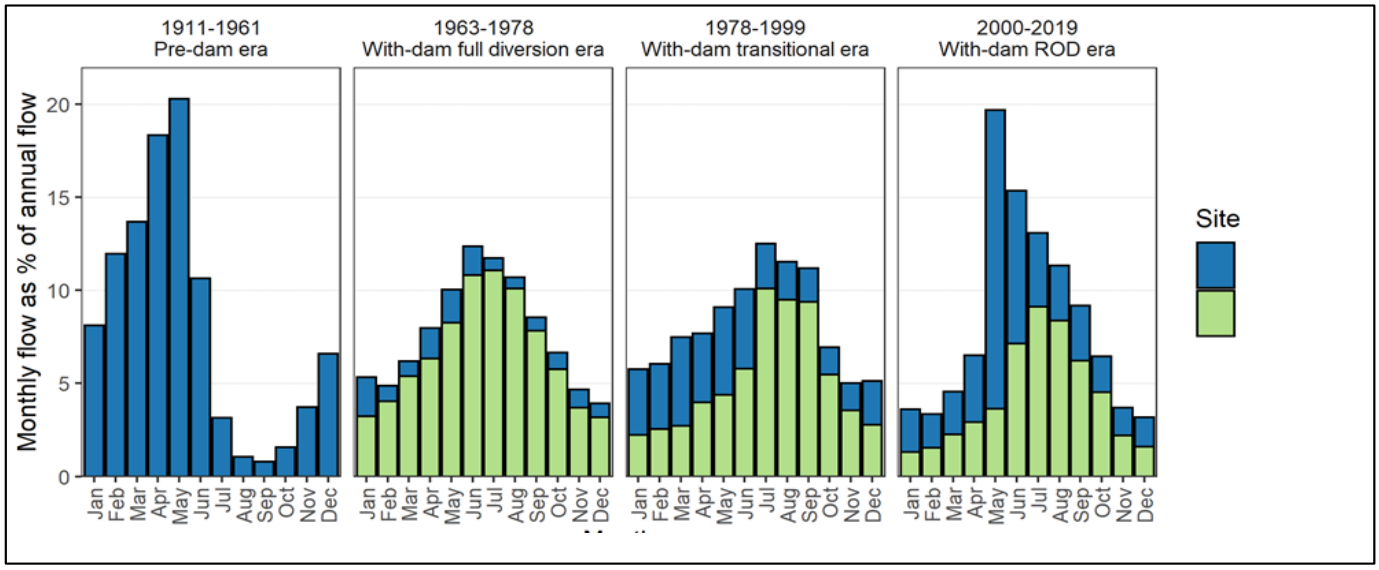


Figure 1-2. Changes to the proportion of water upstream of Lewiston available to the Trinity River over time (from Asarian et al. 2021, in review).

Annual flow regimes, including the ROD releases, are determined by the TRRP through the recommendations of the Trinity Management Council (TMC). The annual flow regimes, or hydrographs, are reviewed and approved by Reclamation and USFWS before they are implemented. The TMC is supported by a Science Advisory Board[9] and by work groups[10] comprised of technical experts that make recommendations regarding Trinity River resource management based on model results and criteria used to evaluate various flow actions. The methodological approach for determining the schedule for annual instream flow releases is based on management objectives and

[9] See the Science Advisory Board website at: https://www.trrp.net/program-structure/program-structure/scientific-advisory-board-sab/

[10] Work groups include Fish Work Group, Flow Work Group, Watershed Work Group, Riparian & Aquatic Ecology Work Group, Physical Work Group, Design Work Group, and the Inter-Disciplinary Team.

water volumes determined for each water-year type (see TRFES Section 8.1[11]). The annual instream flow release recommended by the TMC follows the recommendations in the TRFES, as outlined in the ROD. Current TRRP flow management releases the majority of annual water volume after April 15 (Figure 1-2), with a baseflow of 300 cubic feet per second (cfs) for seven months of the year (October 15 to April) when streams in the region experience their largest and most variable flow events. During the winter months (prior to April 15), the current flow regime releases approximately 20 percent of the entire water year's total flow. However, without the operation of Trinity and Lewiston dams, approximately 50 percent of the total flow released during a water year would occur in the winter months, a much larger proportion than occurs under current management. Undammed tributaries to the Trinity River naturally flow higher during winter storm events and as high-elevation snowpack melts in early spring. Thus, natural contributions to the Trinity River from its tributaries often recede by the time the existing ROD flow releases from Lewiston Dam occur after mid-April.

The asynchrony between the current implementation of ROD flow releases and the natural variability of free flowing (pre-dam) conditions has cascading impacts on the river's form and ecology, and perhaps the most detrimental of the impacts is to young salmon. Pacific salmon life histories have adapted to the natural seasonal variability of flows for millions of years (Groot, C. and Margolis, L. 1991). The inundation of Trinity River mainstem rearing habitat, including floodplains, side channels, and alcoves constructed by TRRP does not occur until the majority of juvenile salmonids are downstream of the restoration reach (Petros, P., W.D. Pinnix, and N.J. Harris. 2017). Later in the spring, the unnaturally cold dam releases to the river slows growth of juveniles and delays environmental cues that trigger smolts to outmigrate to the ocean before conditions in the Lower Klamath become too warm to support salmon migration.

The current flow management keeps river conditions unnaturally cold in the spring, which suppresses metabolic rates during the key period of growth for young salmon and other aquatic and amphibious wildlife, including native frogs and turtles. Overall, flows released from Lewiston Dam after April 15, result in cold water that is not synchronized with Trinity River watershed conditions and is unlike the conditions under which native fishes evolved. The Proposed Action is intended as an initial strategy to initiate a remedy to this unnatural situation[12].

The thermal regime issue identified by USFWS and HVT in 1999 due to the cold deep-water (hypolimnetic) releases from Trinity Dam has not been resolved through the implementation of restoration releases. In fact, thermal impacts in late spring and early summer now extend farther downstream due to high-magnitude flow releases under current flow management. The Trinity Reservoir currently does not have a temperature control device, which could aid in managing river temperatures. Therefore, cold water releases are an operational reality when implementing variable flows in the Trinity River during the spring and early summer months. While colder water temperatures during the winter and fall, when adult fish return to the river, support healthy fisheries, temperature suppression during the spring and early summer months can be detrimental to juvenile salmon.

1.5 Purpose and Need

Appendix C of the Trinity River FEIS, Implementation Plan, and AEAM Plan (USFWS, Reclamation, and HVT 2000), states that the TRRP "will provide recommendations for the flow modifications for the OCAP [Operations Criteria and Plan] of the TRD of the CVP, if necessary." The ROD further states that "based on subsequent monitoring and studies guided by the TMC, the schedule for releasing water on a daily

[11] https://www.fws.gov/arcata/fisheries/reports/technical/Trinity_River_Flow_Evaluation_-_TOC.pdf

[12] The Proposed Action is based on review and modelling of specific actions that have the potential to provide immediate benefits to fishery resources, as described in Chapter 2 of this EA. Additional flow management actions for the further benefit of fisheries and other resources including recreation would require a more in-depth NEPA review.

basis, according to that year's hydrology, may be adjusted but the annual flow volumes outlined in the ROD may not be changed."

As stated in the TRFES (USFWS and HVT 1999), "No high-flow release(s) are planned, but synchronization of peak releases with stormflows should be evaluated through the adaptive management program to assess opportunities to maximize benefits of high-flow releases while conserving water." The Proposed Action is intended to use flow regime modification in accordance with this guidance, as outlined in TRRP's foundational documents. However, the Trinity River FEIS and the ROD do not provide a framework that outlines the logistical details necessary to implement changes to the ROD flow regime. This lack of operational framework has stifled previous efforts to shift flow from the spring period to the winter months.

The purpose and need of the Proposed Action are to refine the timing of restoration flows using the principle of AEAM to better meet geomorphic, fish habitat, and temperature objectives of the ROD. Appendix C of the Trinity River FEIS states that AEAM will consist of a "designated team of scientists that recommend changes to fishery restoration efforts and annual operating schedules in response to monitored effects of implemented actions and in order to ensure that restoration goals of the Trinity River are effectively met…Alterations in magnitude and/or duration of releases into the Trinity River (while maintaining annual instream release volumes for each water year type) are dependent on the information/management needs of the Trinity River program. Any substantial deviation from the currently recommended fishery flow regime would be done in accordance with all applicable laws" (USFWS, Reclamation, and HVT 2000).

The proposed winter flow variability activities are needed to support the TRRP's goals of restoring fish populations to pre-dam levels and restoring dependent fisheries, including those held in trust by the federal government for the Hoopa Valley and Yurok Tribes, as mandated by Congress and outlined in the 2000 ROD (USFWS, Reclamation, and HVT 2000).

The purpose of the proposed winter flow project is to shift a portion of the ROD water volume used for restoration releases to the winter period to improve anadromous fish habitat conditions. Moving a portion of the ROD volume released from Lewiston Dam to the winter period as an initial flow management action would benefit the Trinity River ecological processes and Trinity Reservoir management in these ways:

- Enhance natural cleaning and transport of river gravels by overlapping tributary flows and Lewiston dam releases. Time restoration releases from Lewiston Dam to better match natural flow variability during winter and spring runoff events. Reduce buildup of sediment at tributary mouths, enhancing tributary and river confluence functions.
- Enhance growth of juvenile salmonids by shifting a portion of ROD water volume released from Lewiston Dam currently released in spring to the winter period. Reduced cold water releases in spring/summer also benefit growth of all native aquatic species (fish, their prey, and wildlife). The negative impacts from cold water releases exclusively in the spring would be reduced, including the suppression of salmonid metabolism and the indirect impacts of reduced growth rate of prey (macroinvertebrates) in the river.
- Promote synchronization of ecological processes between tributaries and the mainstem Trinity River. Allow the river to naturally warm earlier in the season to provide the proper environmental cues that smolts rely on in timing their outmigration to the ocean.

- Increase food availability by providing seasonally appropriate disturbance of macroinvertebrate prey species to promote primary production and by inundating floodplains before salmon fry emergence by supporting plant (algal and rooted) and insect growth.

- Inundate naturally occurring and Program-created floodplains and other productive off-channel rearing habitats prior to fry emergence, including increased access to channel rehabilitation projects that provide access to relatively warm and productive floodplain fishery nursery habitats after fry emergence and prior to downstream migration.

1.6 State Historic Properties Office Consultation

Federal agencies are required to consider the effects of their actions on historic properties (i.e., cultural resources that rise to a certain level of significance) in compliance with Title 54 USC Section 306108, commonly referred to as Section 106 of the National Historic Preservation Act[13]. The Section 106 process is often used to satisfy the requirements for assessment of significant impacts to cultural resources under NEPA. The Section 106 process includes identification, consultations, and, if needed, mitigation measures for effects determined adverse and unavoidable. Reclamation has concluded that, although the Proposed Action is considered an undertaking pursuant to 36 CFR Section 800.3(a)(1), neither the No Action (Alternative 1) nor Proposed Action (Alternative 2) meet the criteria for significant impacts on properties listed, or eligible for listing, on the National Register of Historic Places. Consultation with the California State Historic Properties Office is therefore not required for the implementation of either alternative.

1.7 Scoping and Public Involvement to Date

Since the signing of the 2000 ROD and efforts to begin its implementation, TRRP and other agencies have held numerous public meetings and open houses to obtain public input and provide the public with information on TRRP activities (the TRRP website for more information). As part of ongoing TRRP outreach activities, TRRP staff members have met with local groups (e.g., fishing guides, whitewater rafters, and local residents) and individual landowners to obtain stakeholder input and advice and to address general concerns, many of which are not specific to the Winter Flow project. Notice of all public meetings and other pertinent project information are announced in local newspapers and posted on the TRRP's website. Included below is a summary of the scoping and public involvement for the Winter Flow project to date.

1.7.1 Public Scoping

Public scoping for the Winter Flow project began on May 18, 2021, and it ended on June 18, 2021. At the onset of the public scoping period, notices informing the public of the intent to begin the environmental review process were posted on TRRP and Reclamation websites and at the TRRP Weaverville office. Scoping notices were also emailed to Trinity River individuals and Listservs interested in the Trinity River; and hardcopy notices were mailed to local landowners along the river corridor and interest groups.

During public scoping for this project, 72 individuals or organizations provided comments in response to the public scoping notice. The scoping notice, scoping meeting agenda, and summarized scoping input are included in Appendix A.

[13] For more info on the Section 106 of the National Historic Preservation Act, see https://www.gsa.gov/real-estate/historic-preservation/historic-preservation-policy-tools/legislation-policy-and-reports/section-106-national-historic-preservation-act-of-1966.

1.7.2 Public Review Period

This EA will be available for public review and comment from September 17, 2021, to October 18, 2021. A public comment meeting, held virtually, will take place on Tuesday, October 5, 2021, at 6 PM Pacific Standard Time. A link to the meeting will be available on the TRRP's website, Winter Flow Variability page (see https://www.trrp.net/restoration/flows/winter-flow-variability/).

Please send comments to Chad Abel via email at ceabel@usbr.gov or mail to:

Winter Flow Variability Project EA
C/O TRRP
P.O. Box 1300
Weaverville, CA 96093

2. Description of Alternatives

This chapter describes Alternative 1 (No Action) and Alternative 2 (Proposed Action) for the Winter Flow project. The concept for the Proposed Action was first discussed by the TRRP Flow Workgroup in 2017 (located at: https://www.trrp.net/calendar/fish-workgroup/), which prepared a Draft Supplementary Information Report (Draft SIR) to explore the potential of modifying the winter flow regime with respect to the parameters outlined in the ROD (Appendix B). Upon review of the Draft SIR, Reclamation's legal counsel indicated that an EA would be required for modification to the timing of restoration releases proposed under the Winter Flow project. In September 2020, TRRP prepared a memorandum outlining the Flow Work Group's conceptual plan for exploring the potential benefits of modifying the winter flow regime within the parameters of the ROD (Appendix C). A team of collaborating scientists from TRRP partner entities began evaluating various approaches to flow regime modification in January 2021 and their evaluation resulted in the completion of a white paper entitled *Shifting a Portion of Trinity River Spring Releases from Lewiston Dam to the Winter Period: A Flow Management Action to Benefit Juvenile Salmonid Habitat Availability, Growth, and Outmigrant Timing* that outlines the basis for the Proposed Action (Appendix D; referred to herein as the Project White Paper).

2.1 Alternative 1 (No Action)

Under Alternative 1, herein referred to as the No Action alternative, the flow management regime currently implemented under the ROD would remain in place without modification.

Section 1 of the Trinity River FEIS Implementation Plan (Stalnaker, C and Wittler, R J (2000) outlines the methods by which Reclamation implements the ROD volumes and restoration flows. Reclamation would provide the TMC with a preliminary estimate of the water year classification in early February. The TMC would then formulate a preliminary schedule, or hydrograph, for the instream fishery release to the Trinity River and submit it to Reclamation for operational planning. Final decisions on the designation of the water year type would be based on the April 1 runoff forecast, determined by the Bulletin 120 (B120) forecast issued by the California Department of Water Resources (DWR)[14]. By April 15 of each year, the TMC would provide a schedule for the instream fishery release from Lewiston Dam for consideration by the DOI co-lead agencies (Reclamation and USFWS). Once approved, Reclamation would operate the TRD as closely to the proposed schedule as operationally possible. Under the No Action alternative, Reclamation would continue to provide annual instream flows below Lewiston Dam in accordance with the recommendations of the TMC and Flow Work Group, as outlined in the Trinity River FEIS Implementation Plan (Stalnaker and Wittler 2000).

Per the ROD, the total volume of water released from the TRD to the Trinity River will range from 369,000 acre-feet (af) to 815,000 af, depending on the annual hydrology (water year type) determined as of April 1 of each year (see Table 2-1 and ROD [Appendix B]). Based on subsequent monitoring and studies guided by the TMC, the schedule for releasing water daily, according to that year's hydrology, would be adjusted but the annual flow volumes established in Table 2-1 would not change.

Under the No Action alternative, annual water volumes released to the Trinity River from Lewiston Dam would continue to be determined by the projected inflow to Trinity Reservoir for the water year (October 1 through September 30) by the B120 forecast. Each of the five water year types defined in the ROD, from Critically Dry to Extremely Wet, would continue to be determined by the April 1 B120 forecasted inflow and would be allocated a specific water volume (Table 2-1), which is commonly referred to as "the ROD water volume."

As noted in Chapter 1, the majority of annual water volume would continue to be released after April 15 (Figure 1-2), and a baseflow of 300 cfs would be maintained for seven months of the year (October 15 to April). Under

[14] The B120 Forecast is available at https://cdec.water.ca.gov/snow/bulletin120/

the No Action alternative, the annual flow regime would continue to follow this pattern, which is outlined in detail in the Trinity River FEIS.

Table 2-1. Trinity Reservoir Inflow, ROD Water Volumes, Peak Flow in Cubic Feet per Second, and Peak Flow Duration for Trinity River Releases from Lewiston Dam

Water Year Class	Trinity Reservoir Inflow (af)	ROD Water Volumes (af)
Critically dry	< 650,000	369,000
Dry	650,000 -1,024,999	453,000
Normal	1,025,000 - 1,349,999	647,000
Wet	1,350,000 - 1,999,999	701,000
Extremely wet	≥ 2,000,000	815,000

2.2 Alternative 2 (Proposed Action)

Under Alternative 2, herein referred to as the Proposed Action, the flow releases from Lewiston Dam would remain within the ROD Water Volumes outlined in Table 2-1. A hydrograph determined by the TMC and approved by Reclamation and USFWS would continue to be implemented based on the water year determination in April, but the schedule of restoration releases would be expanded so that as many as three additional winter releases would occur beginning December 15 each year.

A portion of ROD water volumes would be shifted to the winter period to better mimic natural flow variability, inundate rearing habitats prior to and during fry emergence, reduce cold water suppression in spring and early summer, create seasonally appropriate scour to promote primary production of prey species and drift foraging[15] opportunities for juvenile fish, and encourage earlier juvenile fish outmigration. A portion of the ROD water would be released during the winter and early spring season in two distinct periods, termed the Flow Synchronization Period and the Elevated Baseflow Period. These are discussed in detail below. Under the Proposed Action, flows in the Trinity River during summer and winter baseflow periods would not fall below the minimum ROD flows of 450 cfs in summer and 300 cfs in winter.

Figure 2-1 shows an example of what a hypothetical water year hydrograph would look like, using the 2016 wet water year as a comparison to the existing conditions (No Action alternative). Figure 2-1 also demonstrates that ROD objectives (i.e., the magnitude or peaks of the restoration releases) can still be met under the Proposed Action by shortening the duration of the peak or truncating the receding limb of the historic hydrograph. In the 2016 example water year (Figure 2-1), shifting water to the winter period while maintaining peak flows after April was accomplished by truncating the receding limb so the river returned to 450 cfs summer baseflow by mid-June instead of the beginning of August. Figure 2-1 also graphs the full natural flow[16] from the 2016 water year to illustrate when peaks in flow would have naturally occurred prior to dam construction.

Figure 2-2 outlines the decision tree for determining the timing and volume of restoration flow releases under the Proposed Action.

2.2.1 Flow Synchronization Period

The purpose of the flow action during this period would be to synchronize a high magnitude dam release with a winter high flow event in the tributaries and to mimic elevated flows that would have occurred in the mainstem prior to dam construction. Between December 15 and February 15 of each year, ROD water equivalent to 60,000 af would be released from Lewiston Dam when forecasting tools at the U.S. Geological (USGS) mainstem gage

[15] Drift foraging is where fish hold at a location in the water column and make short trips into faster flowing water to intercept invertebrate prey that is being moved down the river.

[16] The full natural flow is the unimpeded contributions from the blocked watershed area above Lewiston Dam. It shows the timing of when water would have naturally been contributed to Trinity River if not impounded by Trinity Lake.

above the North Fork anticipates river levels of 4,500 to 12,000 cfs[17]. Reclamation set 6,500 cfs as the maximum flow from Lewiston Dam during this period when TRRP began investigating the winter flow action, and 60,000 af was determined to be the volume required for a peak of that allowed magnitude when Trinity River FEIS ramping rates[18] for the ascending limb[19] and naturally observed ramping rates on the receding limb[20] were applied. The peak flow during this period would be synchronized with storm events or "flow triggers," and would not occur in the event that there are no substantial storm events during this period. Analysis of post-ROD water years 2004 to 2019 shows that a flow trigger would have occurred between December 15 and February 15 in six of the 16 water years that were analyzed.

Following Reclamation's guidelines to TRRP, the maximum flow released from Lewiston Dam during this period would not exceed 6,500 cfs. Under current floodway infrastructure constraints, if the flow forecast exceeds 12,000 cfs at the USGS mainstem gage above the North Fork, the not to exceed 6,500 cfs synchronized flow release would not occur until the receding limb of the flow event is predicted to be 12,000 cfs or less at that gage.

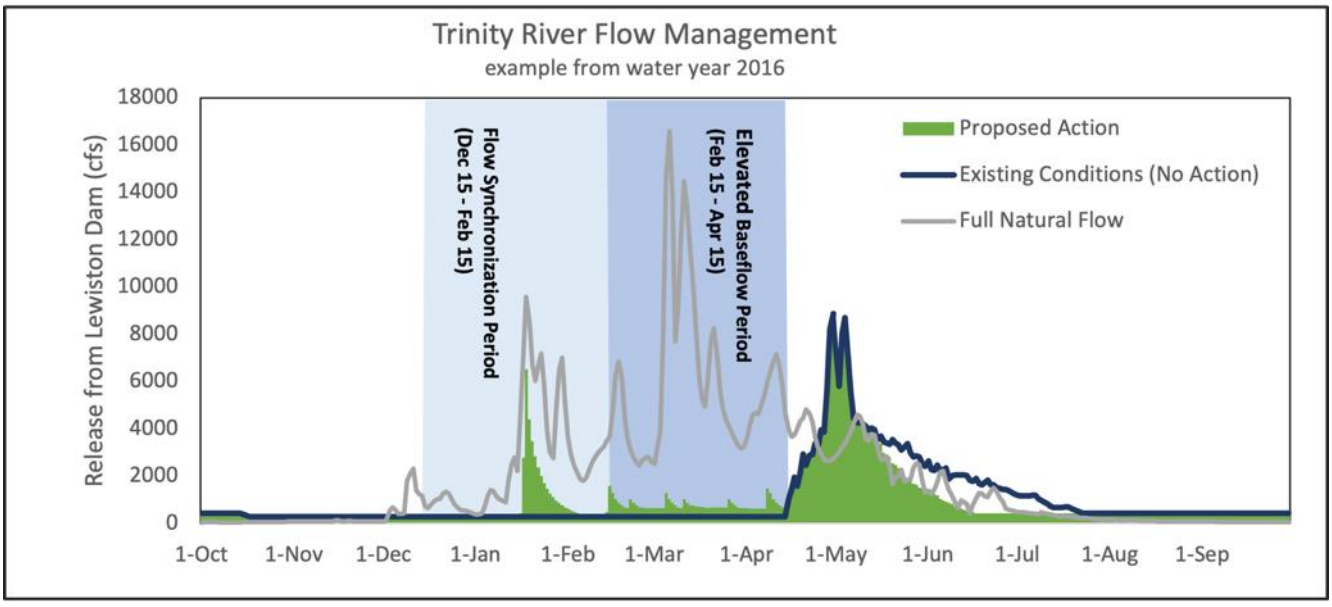
Synchronizing Lewiston Dam releases to the receding limb of natural tributary runoff events would be a conservative approach that avoids impacts to downstream properties and structures because there would no longer be uncertainty in the peak magnitude of the flow event. Flow magnitude thresholds for flow triggers and releases would be reevaluated as new information becomes available, or floodway infrastructure constraints change.

[17] Information for the current conditions at the North Fork gage, which is located above the junction of the mainstem and North Fork Trinity River, can be accessed at https://waterdata.usgs.gov/ca/nwis/uv?site_no=11526400.

[18] The ramping rates refers to the rate of change of water flow (in cubic feet per second per hour).

[19] The ascending limb of a hydrograph represents the rapid increase in resulting from rainfall causing surface runoff and then later throughflow. Peak discharge occurs when the river reaches its highest level.

[20] The receding limb of a flow event is the point at which discharge into the river begins to decrease after peaking, and the river's levels fall.



Note: The blue line represents the hydrograph that was implemented in 2016. Green represents the timing of hypothetical water releases that could occur under the Proposed Action. Grey line represents the full natural flow.

Figure 2-1. The Proposed Action compared to Existing Conditions (No Action alternative), using the 2016 Wet Water Year as an example.

2.2.2 Elevated Baseflow Period

Between February 15 and April 15, ROD water would be released from Lewiston Dam based on, and in proportion to, DWR's 90 percent exceedance B120 water supply forecast[21], which would prevent the overuse of ROD water should the water year end up being drier than expected. The predictive ability and methodological approach to using the 90 percent exceedance B120 water supply forecast is further described in section 2.2.3.2.

Prior to the Elevated Baseflow period, a hydrograph would be developed by TRRP to schedule the elevated baseflow releases for the range of forecasts that could be expected. The elevated baseflow release schedule would be shared with interested parties on the TRRP website and through other customary avenues of public notification for flow actions including, but not limited or confined to, email listservs, fliers on public bulletin boards, mailers, and social media, shortly after its approval for release by Reclamation. A similar process of TMC recommendation and Reclamation and Service review, as currently occurs after the April water year forecast, would occur in both February and March after the water year forecast for those months were finalized.

The TRRP would rely on the Decision Tree shown in Figure 2-2 to determine the volume of water to release during the elevated baseflow period. The Decision Tree process would occur when the DWR's February B120 forecast is posted, and again when the March B120 forecast is posted. DWR typically posts B120 forecasts about 8 to 10 days after the beginning of each calendar month.

The Decision Tree process would follow this outline:

1. Determine if a Flow Synchronization Period is implemented or not: Did a storm event (flow trigger) occur between December 15 and February 15, that resulted in a minimum discharge of 4,500 cfs at the USGS mainstem gage above the North Fork?

[21] The 90 percent exceedance B120 water supply forecast indicates that there is a 90 percent chance that the water supply will exceed the forecast, and a 10 percent chance that it will fall short of the forecast.

- If yes, 60,000 af would be released regardless of water year type, so that there would be a 6,500 cfs synchronization flow from Lewiston Dam timed to occur with tributary runoff. This would initiate the Flow Synchronization Period.

- If no, there would be no flow trigger release, and no Flow Synchronization Period would be implemented that year.

2. Determine Elevated Baseflow Period releases in February

    - If the Flow Synchronization Period was implemented:

        - B120 forecast of Dry or Critically Dry would mean no February release.
        - B120 forecast of Normal would mean a 60,000 af release.
        - B120 forecast of Wet or Extremely Wet would mean a 120,000 af release.

    - If no Flow Synchronization Period was implemented:

        - B120 forecast of Critically Dry or Dry would mean a 60,000 af release.
        - B120 forecast of Normal would mean a 120,000 af release
        - B120 forecast of Wet or Extremely Wet would mean a 180,000 af release.

3. Determine Elevated Baseflow Period releases in March

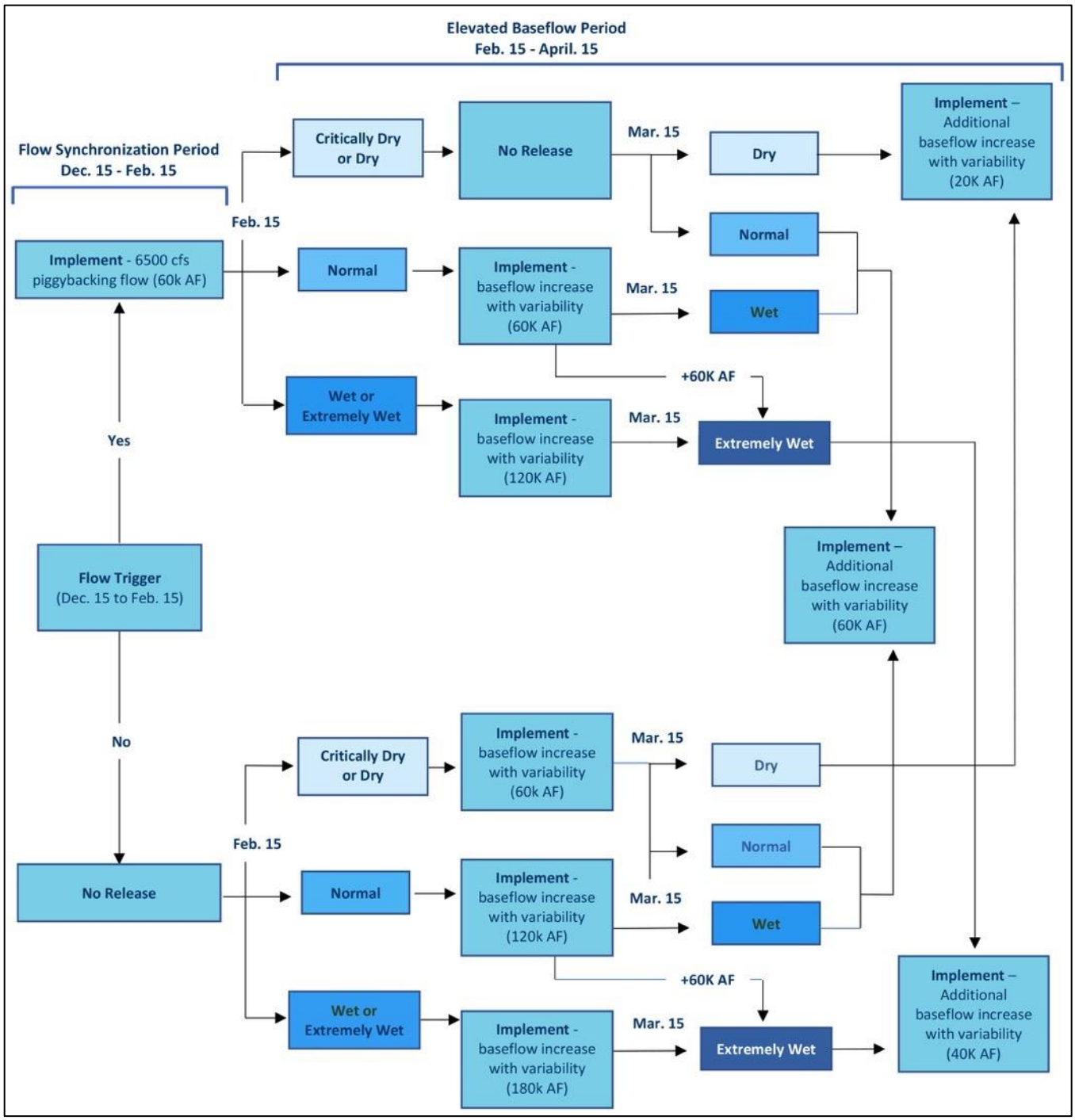
    - If the Flow Synchronization Period was implemented:

        - B120 forecast of Critically Dry would mean no additional release would occur.
        - B120 forecast of Dry would mean a 20,000 af release.
        - B120 forecast of Normal could mean a 60,000 af release but would be based on whether the Normal winter period allocation of 120,000 af had yet to be met.
        - B120 forecast of Wet could mean a release if the Wet winter period allocation of 180,000 af had yet to be met.
        - B120 forecast of Extremely Wet water year forecast would mean an additional release of at least 40,000 af but could result in a higher release to reach the Extremely Wet winter period allocation of 220,000 af.

    - If no Flow Synchronization Period was implemented:

        - B120 forecast of Critically Dry would mean no additional release.
        - B120 forecast of Dry would mean a 20,000 af release.
        - B120 forecast of Normal could result in a 60,000 af release if the Normal winter period allocation of 120,000 af had yet to be met.
        - B120 forecast of Wet could mean a release if the Wet winter period allocation of 180,000 af had yet to be met.
        - B120 forecast of Extremely Wet would mean a release of at least 40,000 af but could result in a higher release to reach the Extremely Wet winter period allocation of 220,000 af.

The Decision Tree guides the TRRP on the volume of ROD water to be released, but it can also be considered a balance sheet that ensures the volume shifted during the winter period will represent the March B120 90 percent exceedance forecast of water year type, and the volume prescribed in the winter period for that water year type each year (Table 2-2, third column). In other words, regardless of whether a flow trigger occurs and the Flow Synchronization Period release of 60,000 af is implemented, the overall volume of 60,000 af in Critically Dry, 80,000 af in Dry, 120,000 af in Normal, 180,000 af in Wet, and 220,000 af in Extremely Wet would be shifted to the winter period each year, according to the B120 90 percent exceedance forecast in March.



Note: The Decision Tree for the Proposed action shows Flow Triggers releasing 60 thousand acre-feet (TAF) in Critically Dry Years, 80 TAF in Dry Years, 120 TAF in Normal Years, 180 TAF in Wet Years, and 220 TAF in Extremely Wet Years prior to April 15.

Figure 2-2. Decision Tree for the Proposed Action.

This flow management action has been designed to safeguard against the possibility that the actual water year determination (made in April each year) ends up being drier than predicted, as the overall volume of water to be shifted to the winter period (Table 2-2, fourth column) is considerably less than the ROD volume for that water year type.

Table 2-2. Water Volumes Shifted under the Proposed Action for Each Water Year Type Using Example Water Year Types

Water Year Type	ROD Water Volume (af)	ROD Volume Shifted to Winter Period under Proposed Action (af)	Percent ROD Volume Shifted from Summer to Winter under Proposed Action
Critically Dry	369,000	60,000	16%
Dry	453,000	80,000	18%
Normal	647,000	120,000	19%
Wet	701,000	180,000	26%
Extremely Wet	815,000	220,000	27%

2.2.3 Methodological Approach for Forecasting Releases Under the Proposed Action

2.2.3.1 Precipitation Event Synchronization Forecasting

Prior to implementing the Flow Synchronization Period, TRRP would evaluate the uncertainty in the streamflow forecasts to prevent downstream flooding of structures from synchronized releases. The TRRP would use the National Oceanic and Atmospheric Administration's (NOAA) California Nevada River Forecast Center (CNRFC) Hydrologic Ensemble Forecast Service (HEFS), which is rigorously predictive up to 4 days prior to precipitation events[22]. The CNRFC has agreed to generate the HEFS for the Trinity River gage above the confluence of the North Fork Trinity River, at the location where all major tributaries that contribute to flood events in the TRRP restoration reach have entered the river.

Information from the CNRFC-HEFS would allow the TRRP to provide Reclamation a 72-hour notice to in order to implement a winter flow synchronization event. The public would be notified at the same time through notices posted on the TRRP's winter flow variability page (located at: https://www.trrp.net/restoration/flows/winter-flow-variability/) and by emails to interested parties.

2.2.3.2 Using the B-120 to Predict Water Year Type

Under the Proposed Action and as described in Section 2.2.2, winter baseflow increases based on predicted water year type would occur during the Elevated Baseflow period, between February 15 and April 15. Since the implementation of ROD flows in 2004, the February and March 90 percent exceedance water supply forecast has never overpredicted the observed water year determination.O

The available record of February and March B120 90 percent exceedance forecasts in post-ROD years (2004 through 2020) has produced conservative predictions that tend to skew drier than the implemented water year type for each year (see Table D-1 in Appendix D – Project White Paper). Using the B120 90 percent exceedance water supply forecast to predict water volumes available for elevated base flows after February 15 is a conservative approach that would avoid "overspending" ROD volumes during the Flow Synchronization or Elevated Baseflow periods because the forecast is a conservative water year prediction tool[23].

[22] Information about the CNRFC-HEFS products can be accessed at https://www.cnrfc.noaa.gov/WRverification_help.php.

[23] For example, Table D-2 of the Project White Paper (Appendix D) shows that the B-120 often underestimates the April water year determination. This is denoted by the negative values of -1 and -2 in numerous years; a -1 in the February 90 percent for 2004, for example, means that a Normal water year was predicted when a Wet water year was implemented. Likewise, in 2006 the February 90 percent predicted a Normal water year but an Extremely Wet water year was implemented.

Under the Proposed Action, after April 15, the remaining ROD water would be released to the Trinity River using the same methodology that currently exists for the scheduling of restoration flows under the ROD, as outlined in the TRFES. Table 2-2 shows the ROD water volume (af) and proportion that would be shifted to the winter period for each water year type.

2.3 Alternatives Considered but Dismissed from Further Analysis

2.3.1 Two-Category Winter Release

The two-category winter release alternative is an approach developed to release 60,000 af of ROD water volume in Dry and Critically Dry water year types and a maximum 120,000 af of ROD water volume in Normal and wetter water years between December 15 and April 15. This alternative allows for a 60,000 af winter storm synchronization release from December 15 through February 15 by incorporating the flow forecasting and synchronization triggers described above. After February 15, a flow action to release an additional 60,000 to 120,000 af would be implemented if the B-120 90 percent exceedance prediction in February or March is Normal or wetter or when a winter storm synchronization release had not occurred.

This alternative was dismissed from further analysis after initial modelling indicated that moving a maximum of 120,000 af under the two-category winter release approach would likely not achieve the desired benefits in wetter than Normal years. Specifically, temperature suppression would still occur after April 15 through the release of the remaining ROD volumes. The Proposed Action incorporates elements of the two-category alternative during Dry and Normal years.

3. Affected Environment and Environmental Consequences

3.1 Introduction to the Analysis

This chapter describes the affected environment along the 40-mile stretch of the Trinity River between Lewiston Dam and the confluence of the North Fork Trinity River, and analyzes the potential environmental impacts associated with implementing the No Action (Alternative 1) and the Proposed Action (Alternative 2). The analysis for each resource area includes discussions of the existing environmental setting.

The effects analysis for the No Action Alternative (or existing conditions) and the Proposed Action for many resources is based on the application of the best available science and employs the use of models and analysis of existing data to determine potential effects of both alternatives. Appendix E provides an expanded explanation and results of these models and scientific review and application that are relevant to geomorphology and soils, water quality, vegetation, fishery resources, and energy and utilities.

Reclamation analyzed the affected environment and determined that the Proposed Action and No Action alternative do not have the potential to cause adverse effects to the resources listed in

Table 3-1.

Table 3-1. Resource Topics Eliminated from Further Consideration in This EA

Resource Topic	Comments
Agricultural and Forestry Resources	Neither the Proposed Action nor the No Action alternative would involve activities that would impact forestry and agricultural resources, including any ground disturbance, removal of trees, or changes to land use. Therefore, there would be no forestry or agricultural-related impacts.
Air Quality	Neither the Proposed Action nor the No Action alternative would involve activities that would result in a discernable increase in emissions that could result in an increase in production and accumulations of greenhouse gases or other air pollutants.
Cultural Resources	Reclamation concluded that, although the Proposed Action is considered an undertaking pursuant to 36 CFR Section 800.3(a)(1), the Proposed Action would have no significant impacts on properties listed, or eligible for listing, on the National Register of Historic Places.
Environmental Justice	Neither the Proposed Action nor the No Action alternative would involve activities that would cause dislocation; changes in employment or increase flood, draught, or disease; or disproportionately impact economically disadvantaged or minority populations. There would be no impacts to tribal ceremonial releases resulting from the Proposed Action. Therefore, there would be no environmental justice-related impacts.
Hazardous Materials	Neither the Proposed Action nor the No Action alternative would result in any activities that would include hazardous materials. Therefore, there would be no hazardous materials-related impacts.
Indian Trust Assets	Impacts on Indian Trust Assets (ITAs) associated with uses of the river and its resources (e.g., fisheries) are incorporated by reference from Section 5.1.1 of the FEIS (U.S. Fish and Wildlife Service (USFWS, Reclamation, and HVT 2000). Neither the Proposed Action nor the No Action alternative would impact ITAs.
Indian Sacred Sites	Neither the Proposed Action nor the No Action alternative would limit access to ceremonial use of Indian sacred sites on federal lands by Indian religious practitioners or adversely affect the physical integrity of such sacred sites. Therefore, there would be no impact to Indian Sacred Sites.
Land Use	The Proposed Action and the No Action alternative are consistent with federal agency resource management plans and with the Trinity County General Plan (Trinity County. 1988). Neither alternative would result in changes to land use or alter access. Therefore, there would be no land-use related impacts.
Mineral Resources, Geology and Geologic Hazards	Unique mineral or geological resources are not present in the Trinity River corridor. Neither alternative would involve activities that would result in or increase the likelihood of geologic hazards. Therefore, there would be no mineral or geologic resource-related impacts.

Resource Topic	Comments
Noise	Neither the Proposed Action nor the No Action alternative would result in activities that would increase or alter noise levels and therefore will have no noise-related impacts.
Public Health and Safety	Hazards to the public were addressed in the Trinity River FEIS, and no issues were identified. No further analysis is required, as the Proposed Action or the No Action alternative would be consistent with the Trinity River FEIS and ROD.
Socioeconomics, Population, and Housing	Neither the Proposed Action nor the No Action alternative would result in changes to populations or population growth and will not displace existing people or housing. Effects to the recreational economy are addressed in 3.7.1. Affected Environment.
Visual Resources/ Aesthetics	Neither the Proposed Action nor the No Action alternative would involve activities that would result in a temporary and long-term changes to visual resources or aesthetics. Scenic resources associated with scenic highways are not present. Therefore, there would be no visual resource-related impacts.
Wild and Scenic Rivers	Neither the Proposed Action nor No Action alternative would have a negative effect to the wild and scenic attributes of the Trinity River including its water quality and free flowing condition. The Proposed Action would ultimately enhance the overall form and function of the Trinity River, thereby increasing natural conditions and supporting the anadromous fishery outstandingly remarkable value, for which it was designated a federal Wild and Scenic River. Temporary effects to recreational boating from reduced flows and water velocity in summer are addressed under Recreation.
Wildlife, Wetlands, and Terrestrial Sensitive Species	Neither the Proposed Action or No Action alternative would involve activities that would result in a temporary and long-term changes to wildlife habitat, wetland resources, or terrestrial plant and animal sensitive species. Therefore, there would be no wildlife or wetland-related impacts. Vegetation resources, with respect to native species riparian recruitment, is addressed in Section 3.5 .

3.2 Geomorphology and Soils

3.2.1 Affected Environment

Millions of cubic yards of mining debris were washed into the Trinity River from upslope hydraulic mines over a 60-year period ending in the 1930s. The era of hydraulic mining was followed by large-scale cable and then bucket line dredge mining of the alluvial valley floor into the 1950s. The channel and Trinity River floodplain were dredged extensively, and enormous piles of mining waste called dredge tailings are evident on both sides of the river throughout the river corridor. Beginning in the early 1960s, the Trinity River was regulated by Trinity and Lewiston dams. Water and power diversions of up to 90 percent of the Trinity River to the Sacramento River basin in the 1960s and 1970s led to substantial floodplain changes along the Trinity River as the channel narrowed from vegetation that established on the riverbanks and caused sediment to deposit in berms along the river's edge (USFWS and HVT 1999). Reservoirs associated with the dams also captured sediment from the upper watershed and so the regulated river no longer had a sediment supply at Lewiston. These impacts simplified the river channel and reduced its floodplain area to the detriment of the river's biology, including salmonids and foothill yellow-legged frogs.

3.2.1.1 Bedload Transport

Bedload transport is a form of sediment movement that involves sand, gravel, and cobbles rolling or bounding downstream along the streambed. Bedload transport has been used to describe the geomorphic character of various Trinity River reaches and to monitor changes along the river since the TRFES (USFWS and HVT 1999). Increases in bedload transport create juvenile salmonid-rearing habitat by causing morphological changes to the river. In general, upper reaches of the Trinity River within the study area, near Lewiston Dam, have less bedload transport than the lower reaches due to reduction of flood magnitudes by the dams and a lower supply of sediment than downstream reaches that receive sediment and water from tributaries.

3.2.1.2 Coarse and Fine Sediment Accumulation

Accumulation of fine sediment due to loss of high winter and spring flows after construction of the TRD and watershed erosion from mining, logging, and other land use practices were identified in the Trinity River EIS (USFWS, Reclamation), and HVT 2000) as detrimental to the Trinity River's natural form and function. The reduction in flood events after dam construction resulted in fine sediment accumulation reducing the quality of fish spawning gravels, food-producing riffles, and over-winter habitat that caused anadromous fish populations to markedly decline. The return of high spring flows authorized by the TRFES (USFWS and HVT 1999) improved these habitats for fish but are mistimed to when tributaries deliver sediment to the river during winter floods. This causes fine and coarse sediment to accumulate at tributary junctions to potentially reduce fish access to affected creeks and can strongly limit the fish production capacity of the watershed downstream from the dams. Restoring winter floods to route tributary sediments downstream when they are delivered to the river will improve fish migration into the creeks and river habitats by shaping these sediments into bars that provide habitat for juvenile salmonids, birds, turtles, and frogs.

3.2.2 Environmental Consequences

3.2.2.1 Alternative 1 – No Action

Under the No Action alternative, impacts to geomorphic processes and soils resources would remain similar to existing conditions. Therefore, there would be no impacts to these processes or resources.

3.2.2.2 Alternative 2 – Proposed Action

The Proposed Action would benefit the Trinity River fishery, as sediment that is supplied to the river from tributaries would be more rapidly dispersed downstream to maintain fish migration pathways into and out of the creeks. The increased mainstem flow events that would result from synchronization of restoration releases with natural tributary runoff would also increase scour of the active channel to clear pathways for flow through gravels to benefit salmon egg incubation (see Section 3.2 for a discussion and analysis of the role of scour in providing salmonid habitat), promote a diverse assemblage of riparian vegetation and river meandering, and increase bedload transport.

Bedload Transport

To understand changes to bedload transport that may occur under the Proposed Action alternative, bedload transport potential was estimated at various locations along the Trinity River from Lewiston Dam to the North Fork Trinity River under the existing conditions (No Action alternative) and the Proposed Action[24]. Between 2004 and 2019, the Proposed Action would slightly decrease coarse bedload transport in reaches upstream of Grass Valley Creek, cause no change between Grass Valley and Indian creeks, and increase transport downstream of Reading Creek (Figure 3-1). Appendix E provides a full explanation of methods and results for analyzing the Proposed Action's and No Action's effects on bedload transport.

Under the Proposed Action, synchronization of elevated ROD flow releases with flow events on tributary channels would increase flows for transporting bedload and mobilizing delta deposits of sediment. These effects

[24] The estimates were made using projected flows for a series of years during the same period from December 15 to February 15 for the No Action alternative and the Proposed Action. The mobilized coarse bedload was estimated using daily average flows predicted by RBM-10 (Jones, E. C., R). Bedload was calculated using 2015 sediment rating curves (Gaeuman, D., Stewart, R. L., & Pittman, S. (2018) for the reaches where rating curves existed. Where information was not available, the nearest sediment rating curve was applied. This resulted in the most downstream rating curve, located near Douglas City, being applied to the two reaches downstream.

are expected to increase juvenile fish habitat along the lower reaches of the Trinity River by shaping sediment into bars and floodplain deposits. Potential bedload transport at lower reaches would help to create a more natural meandering river form where shallow floodplain features could be inundated during the synchronized flow and elevated baseflow periods, to provide rearing habitat.

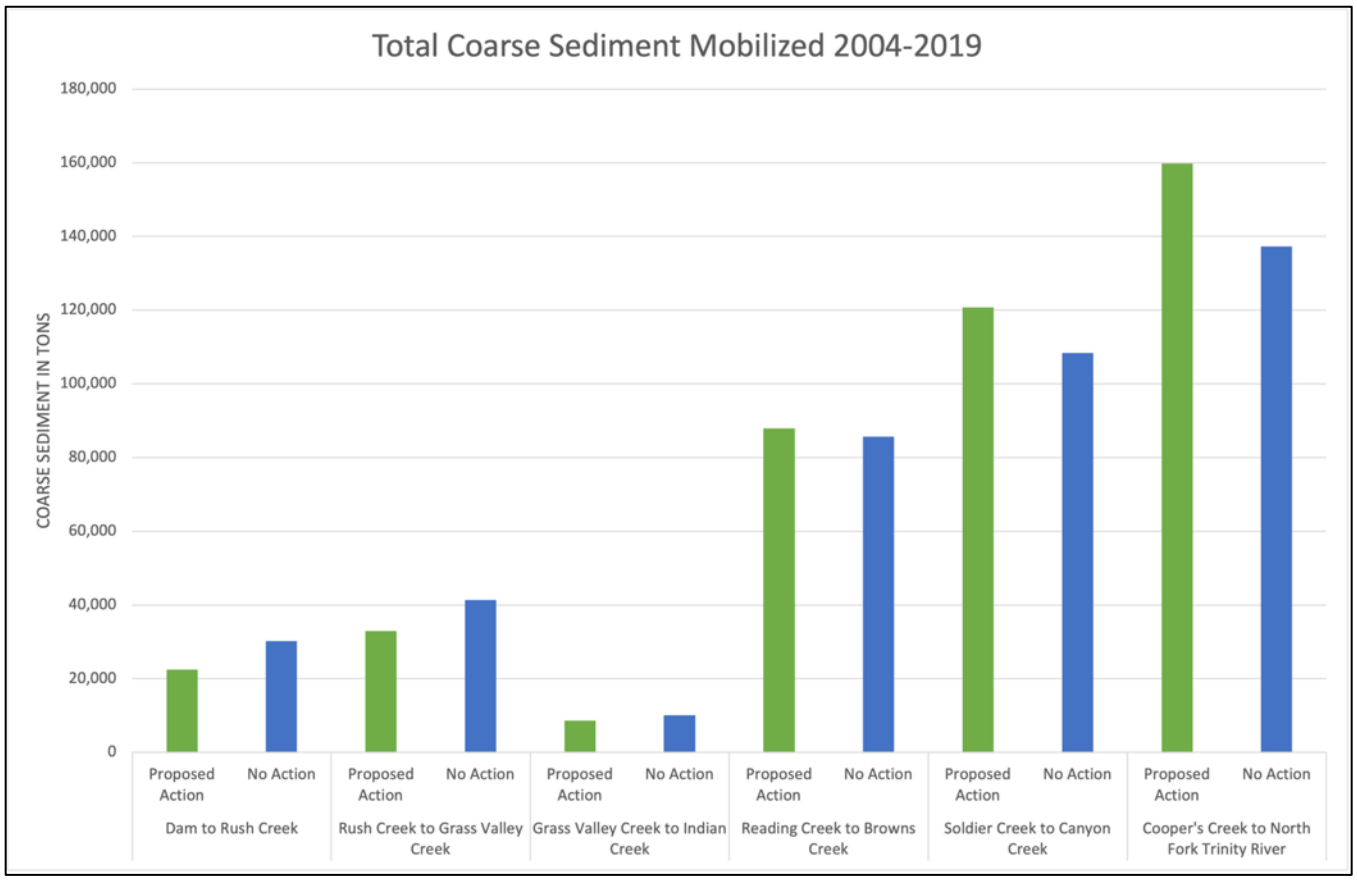


Figure 3-1. Total course sediment mobilized 2004 – 2009. Actual (No Action – blue) and hypothetical (Proposed Action – green) bedload transport at different locations for 2004-2019 for the Proposed Action (green).

Coarse and Fine Sediment Accumulation

The Proposed Action would result in changes to the frequency of higher flows that could result in increased erosion along the river's banks compared to existing conditions (No Action). Erosion, as discussed above, is a natural process and component of a functional riverine system. Disturbance from erosion promotes river meandering, development of habitat for aquatic and terrestrial species, and recruitment of diverse riparian and wetland communities (see Section 3.6 for a detailed discussion of riparian recruitment and vegetation; Florsheim, Joan & Mount, Jeffrey & Chin, Anne. (2008). These effects will help maintain floodplain habitat and function created by the TRRP's rehabilitation projects [25].

While the Proposed Action may support erosion in some areas, in other areas riparian vegetation would benefit from frequent inundation that could result in more stable bank conditions as vegetation establishes and matures in these areas. The mosaic of stable and active bank areas will provide diverse structure and habitat functions, including maturation of riparian trees that contribute large woody debris to the channel to provide structure in

[25] The TRRP's rehabilitation projects are described in detail in the Trinity River FEIS and in the Trinity River Channel Rehabilitation and Sediment Management for Remaining Phase 1 and Phase 2 Sites EIR, completed in 2009. Each rehabilitation project since 2009 has undergone environmental review under NEPA and CEQA.

aquatic habitats for fish and wildlife. In other areas, a more natural bank erosion regime will promote changes in channel morphology and pattern and help reverse channelization of the river that developed from flow regulation in the past.

3.3 Hydrology and Flooding

3.3.1 Affected Environment

The study area for the hydrology and flooding analysis is the 100-year floodplain, which is defined as the area that has a one percent annual chance of flooding and is measured along the Trinity River as 11,000 cfs at Lewiston Dam and 94,830 cfs just downstream of the North Fork tributary (FEMA) 2014). Under the ROD, dam releases from Lewiston Dam are not to exceed 11,000 cfs. To support restoration flows, in the early 2000s, the TRRP cleared the floodplain of structures (e.g., bridges, pump houses, and buildings) to accommodate the Maximum Fishery Flow (MFF) [26]. Permitted existing structures within the MFF would be protected under the Proposed Action. The MFF zone is smaller than the 100-year floodplain at any given location along the Trinity River, except at Lewiston dam where they coincide (Table 4.4-1 from the Master Environmental Impact Report (EIR), and shows the MFF at intervals along the Trinity). Protection of the MFF also ensures that structures within the larger 100-year floodplain are protected from flooding. The Trinity River baseflow is 300 cfs during the winter baseflow period (October 15 – April 15). After spring restoration releases, the dam release flow returns to the summer baseflow of 450 cfs through October 15.

3.3.2 Environmental Consequences

3.3.2.1 Alternative 1 – No Action

Under the No Action, impacts to hydrology and flooding would remain similar to existing conditions, with the timing of ROD and restoration releases remaining the same. Therefore, there would be no impacts on hydrology or flood occurrence.

3.3.2.2 Alternative 2 – Proposed Action

Restoration Release Volume and Timing

Variable instream flows under the Proposed Action would occur in phases beginning as early as December 15 and extend through late spring/early summer, based on water year type, to release the full ROD volume (see Figure 2-2). The TRRP would determine the Lewiston Dam release schedule for winter and spring restoration releases based on the predicted water year type and on predicted winter runoff events, as described in Section 2.2 . The volume of restoration releases would not be changed from existing conditions and would remain the same as stipulated in the ROD and outlined in Table 2-1.

Because releases would occur in several phases in the early spring, rather than one longer and larger release in May and June, the result would be multiple pulses that are shorter in duration between December 15 and July 1, rather than the larger volume release in early summer under existing conditions. The river would return to the summer baseflow of 450 cfs by late May or early June in dry years and by July in all year types. Under existing conditions, the summer baseflow period of 450 cfs is typically reached in mid-July. The Proposed Action would therefore result in a change to the timing of winter, spring, and summer flow volumes. More water would be released in the winter. The overall volume of water released during the water year from Lewiston Dam, however,

[26] The Maximum Fishery Flow is defined as the 11,000 cfs release from Lewiston dam plus Spring Tributary 100-year flows at any point on the Trinity River. The area corresponding to flow was cleared during the early years of the TRRP so 11,000 cfs flows could be safely released without flooding infrastructure along the river.

would remain the same as the existing conditions (see Table 2-1). The river flows would not fall below the summer baseflows of 450 cfs and winter baseflows of 300 cfs.

Flood Potential

Restoration releases would be timed with natural winter runoff and precipitation events using NOAA's CNRFC-HEFS prediction for the Trinity River at the USGS mainstem gage above the North Fork (see Section 2.2.3.1) to avoid surpassing MFF boundaries at all locations along the Trinity River and to ensure peak flow from Lewiston Dam would not contribute to flooding of property, roads, or facilities.

Between December 15 and February 15, ROD water equivalent to 60,000 af would be released from Lewiston Dam when forecasting tools at the USGS mainstem gage above the North Fork anticipates river levels of 4,500 to 12,000 cfs. The maximum flow from Lewiston Dam during this period would not exceed 6,500 cfs, so inundation downstream of the dam would remain within the MFF limits. If the flow forecast exceeds 12,000 cfs, the synchronized flow would not be released until the receding limb of the flow event is predicted to be 12,000 cfs or less at the USGS mainstem gage above the North Fork. This conservative approach would avoid impacts to downstream properties and structures because there would no longer be uncertainty in the peak magnitude of the flow event. Flow release magnitude and "trigger" thresholds would be reevaluated as new information becomes available and floodway infrastructure constraints change.

Under the Proposed Action, releases from the Lewiston Dam and therefore the potential for flood hazards would remain within the MFF limits. There would be no impacts or increases to 100-year flood zone, as the MFF volumes are below the Federal Emergency Management Agency floodplain boundaries. Therefore, the Proposed Action would have no effect on flooding in the study area.

3.4 Water Quality

3.4.1 Affected Environment

The release of water from Lewiston Dam influences water quality in the Trinity River, primarily in the 40-mile reach downstream of the dam. These influences are particularly important with respect to turbidity, suspended sediments, and temperature.

The activities described in Chapter 2 of this EA are subject to compliance with the Water Quality Control Plan for the North Coast Region (Basin Plan; Regional Water Board 2011). The beneficial uses for the Trinity River are outlined in Table 2-1 of the Basin Plan. In addition to municipal and domestic water supply, the beneficial uses affected by the water quality of the Trinity River are primarily those associated with supporting high-quality habitat for fish. Recreation (contact and non-contact) is another important beneficial use potentially affected by various water quality parameters (e.g., sediment and temperature). The Basin Plan identifies both numeric and narrative water quality objectives for the Trinity River.

Section 3.4 in the Trinity River FEIS (USFWS, Reclamation, and HVT 2000) summarizes the water quality objectives for each of the categories that have been established by the Regional Water Board to protect designated beneficial uses. Trinity River water quality as well as its beneficial uses, sediment, turbidity and temperature are discussed in-depth in Section 4.5 of the 2009 Master EIR in relation to the TRRP's rehabilitation projects, and is relevant to this analysis. Section 3.4 of the Trinity River FEIS (USFWS, Reclamation, and HVT 2000) also provides a comprehensive discussion of water quality parameters that influence water quality in the 40-mile reach of the Trinity River below Lewiston Dam with respect to the Lower Klamath watershed and the Central Valley.

3.4.1.1 Suspended Sediment and Turbidity

In 1992, the Environmental Protection Agency (EPA; U.S. Environmental Protection Agency (EPA). 2001) added the Trinity River to its list of impaired rivers, under the provisions of Section 303(d) of the Clean Water Act, in response to a determination by the State of California that the water quality standards for the river were not being met due to excessive sediment. In 2001, the EPA established a Total Maximum Daily Load (U.S. Environmental Protection Agency (EPA). 2001) for sediment in the river. The Regional Water Board has continued to identify the Trinity River as impaired in subsequent listing cycles. However, the TRRP reports that ROD flows have mobilized fine sediment from the Lewiston reach and that this stretch of river may now experience a deficit of fine sediment (see Appendix E). The primary adverse impacts associated with excessive sediment in the Trinity River pertain to degradation of habitat for anadromous salmonids. The restriction of streamflow downstream of the TRD that greatly contributed to the impairment of the Trinity River below Lewiston Dam (U.S. Environmental Protection Agency (EPA). 2001) is now, at least in upstream reaches, in a deficit condition. The Trinity River is typically very clear, with background turbidity levels in the range of 0 to 1 nephelometric turbidity units during low-flow conditions (300 to 450 cfs).

During winter and spring runoff events and restoration releases under the ROD, the Trinity River experiences temporary increases in turbidity and suspended sediment due to scour of the riverbed. Scour of this nature is considered part of the natural dynamic processes of a healthy river and increases in turbidity are generally short in duration and extent. During winter storms, turbidity levels can substantially increase where sediment input from recently burned areas (e.g., 2018 Carr Fire scar at Deadwood Creek) are included. A discussion of the dynamics of scour on the Trinity River's health and on the objectives of the ROD for rehabilitating the river's fisheries is included in Section 3.2

3.4.1.2 Temperature

Water temperature is one of the most important variables affecting salmonids and other aquatic organisms (Carter 2005). Temperature influences feeding rates and growth, metabolism, development, timing of migration, spawning and rearing, and the availability of food. Water temperatures in the Trinity River are primarily influenced by dam releases and flows, and distance downstream from the Lewiston dam. A key objective of the TRRP's flow management is to improve the thermal regimes for all anadromous salmonid life stages that use the Trinity River. The TRRP has been using flow management practices to meet specific temperature management targets, and temperature monitoring data have been collected as part of the AEAM process since 2002.

Since the construction of the TRD, discharge from Lewiston Dam have had a significant effect on water temperatures in the Trinity River downstream. Reservoir releases from Lewiston Dam have altered the natural temperature regime, making the river warmer in the winter and colder in the summer than under pre-dam conditions. Depending on the water year type and time of year, this effect diminishes to varying degrees with distance from Lewiston Dam.

The importance of Trinity River water temperature on salmonid lifecycles is discussed in detail in Section 3.6 . Reclamation has worked to meet water temperature objectives and targets for protecting adult spring Chinook Salmon upstream of the North Fork Trinity River (adult holding targets) and out-migrating juvenile salmonids throughout the mainstem river, as measured at Weitchpec (outmigration targets), since its inception in 2000. The adult holding temperature targets (Table 3-2) are implemented as part of the Basin Plan and compliance is monitored by the Regional Water Board. Outmigration temperature targets were developed as part of the TRFES, are currently under review, and will likely be recommended to the TMC for reevaluation and revision. Therefore, the juvenile outmigration targets are not included in this discussion, but are described in detail in Appendix E.

Seasonally warm thermal habitats are largely unavailable on the Trinity River until floodplains are inundated by restoration releases in mid-April. The TRRP's Fish Work Group (located at: https://www.trrp.net/calendar/fish-workgroup/) recently recommended utilizing a 7-Day Average of the Daily Average (7DADA) of 55.4 degrees

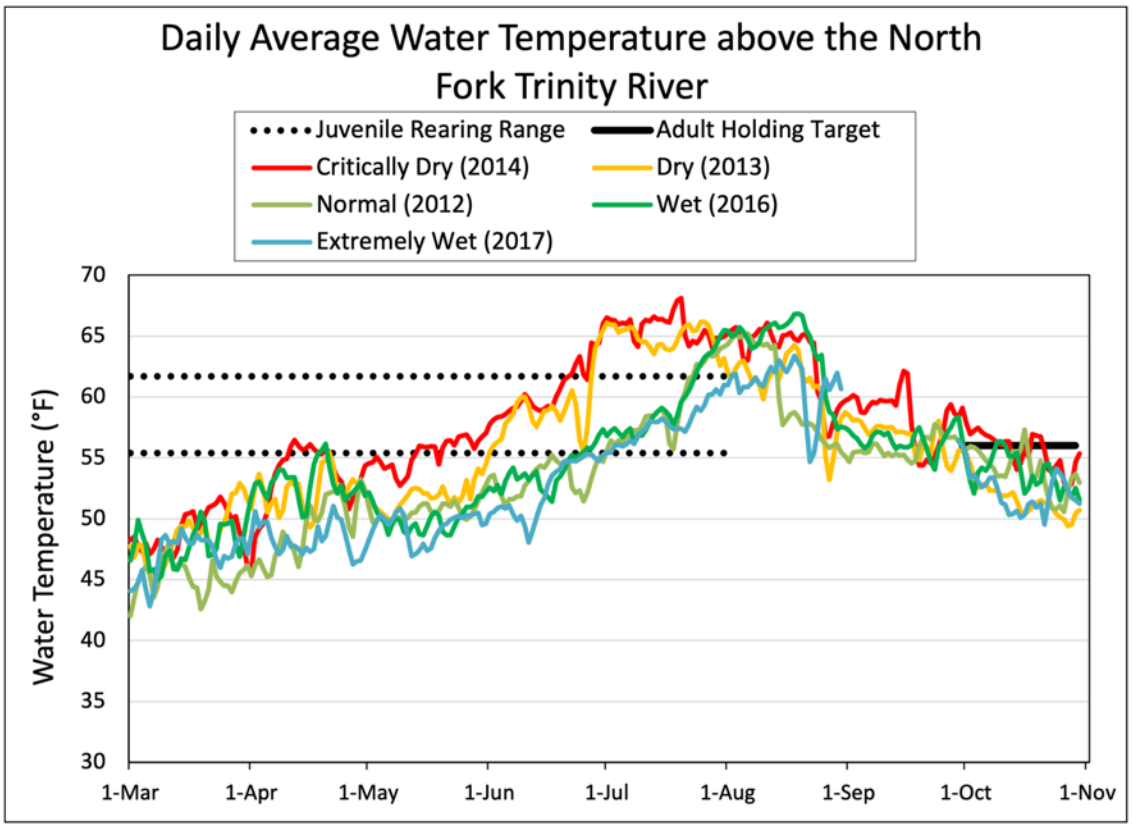
Fahrenheit (°F; 13 degrees Celsius [°C]) to 61.7°F (16.5 °C) as rearing temperature targets in the Trinity River upstream of the North Fork Trinity River from April 1 to July 31, based on research that suggests this is the optimal temperature range for growth (See Appendix E and Lusardi, R. A). The TMC has not yet formally adopted this recommendation; however, it is included in this analysis because temperature during the critical rearing period is a central focus of the Proposed Action to move ROD water volumes prior to April 1 (see Table 3-2).

Consistently low water temperatures are assumed by most fishery managers to be either positive or at least not harmful; however, cold water during juvenile rearing periods can limit fish growth (Lusardi, R. A)). A recent publication illustrates the potential synergy between seasonally warm and perennially cool habitats, with fish that traverse these two types of thermal habitat growing more than fish that were restricted to either habitat (Armstrong). Similarly, diverse juvenile rearing temperature conditions influence and may increase outmigrant growth in the Trinity River. Consequently, the newly proposed juvenile rearing temperature target is presented as a range such that temperatures below the lower target are considered detrimental in a similar way as temperatures above the upper target.

Table 3-2. Temperature Targets for Adult Holding and Juvenile Rearing

Source	Location	Dates	Target or Range
Basin Plan and WR 90-5 Adult Holding Targets	Douglas City	July 1 – September 14	≤60°F (15.5 °C)
	Douglas City	September 15 – 30	≤56°F (13.3 °C)
	North Fork	October 1 – December 31	≤56 °F (13.3 °C)
Fish Work Group Recommendations Juvenile Rearing Range	North Fork	April 1 – July 31	55.4 - 61.7 F (13°C to 16.5°C)

Recent Trinity River water temperatures at the North Fork Trinity River are shown in Figure 3-2, along with the threshold for juvenile rearing recommended by the Fish Work Group. Note that at the end of April for most water year types, just as the Trinity River begins to achieve the recommended targets in the optimal rearing range for juvenile salmonids, a large reduction in temperatures occurs. This is due to the large volume of water that is released annually from Lewiston Dam in accordance with TRRP restoration flow releases.



Note: Decreases in water temperatures in late April are due to ROD spring releases. The juvenile rearing temperature target range is shown with dotted lines and the adult holding temperature target is shown with a solid line.

Figure 3-2. Water temperatures for representative water year types in the Trinity River above the North Fork Trinity River.

In general, tributaries are colder than the body of water they feed (Segura, C., P.). However, due to the cold deep-water releases from Trinity Reservoir, after April the mainstem Trinity River is now colder than most if not all the tributaries upstream of the North Fork Trinity River. For example, in 2017 (Extremely Wet) and 2018 (Critically Dry) Rush Creek was often 18°F (-7.8°C) warmer than the mainstem Trinity River (Figure 3-3.). Low water temperatures can mean slow metabolism and slower fish growth, which can impact survival (Iwama, G. K. and A. F. Tautz. 1981). Larger Chinook smolts are thought to have a better chance at survival during ocean entry (Pearcy, W. G. 1992) as well as through the first ocean winter (Beamish, R.J. and C. Mahnken. 2001).

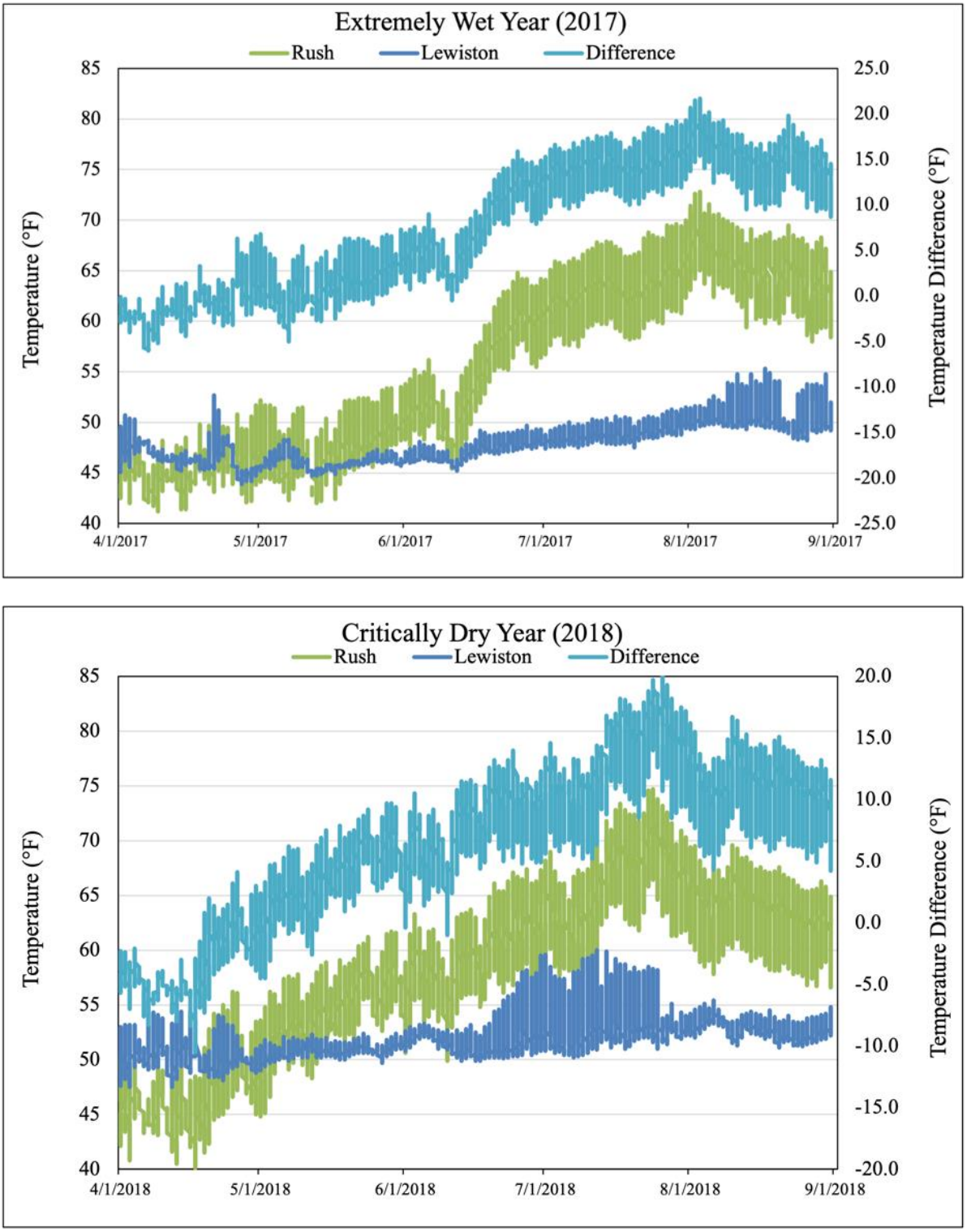


Figure 3-3. Critically dry years for 2017 and 2018. Water Temperature (left vertical axis) and Temperature Difference (right vertical axis) of the Trinity River at Lewiston and Rush Creek from April to September of 2017 (an Extremely Wet Year) and 2018 (a Critically Dry Year).

3.4.2 Environmental Consequences

3.4.2.1 Alternative 1 – No Action

Under the No Action Alternative, impacts to water quality and associated beneficial uses would remain similar to existing conditions. Turbidity and suspended sediment along the 40-mile reach of the river would remain unchanged, and temperature compliance would remain the same. Therefore, there would be no impacts on water quality.

3.4.2.2 Alternative 2 – Proposed Action

Sediment and Turbidity

Under the Proposed Action, suspended sediment and turbidity would not be substantially higher when compared to the existing conditions. Multiple flow peaks during the winter and spring runoff events from tributaries, combined with restoration releases, would briefly result in increases to suspended sediment and turbidity levels, and may exceed the levels that occur during these same periods of runoff and precipitation under the existing conditions. These increases would be temporary, would mimic natural conditions in a pre-dam environment, and would not pose a long-term impact to water quality in the Trinity River.

Temperature

Under the Proposed Action, restoration releases would result in warmer Trinity River temperatures earlier in the summer season. Generally, the adult holding and juvenile rearing temperature targets are exceeded slightly more under the Proposed Action when compared to the existing conditions (No Action). Appendix E provides a full explanation of methods and results for analyzing the Proposed Action's and No Action's effects to temperature.

Under existing conditions, the temperatures in the Trinity River are suppressed during late spring and summer months by restoration releases, impacting the quality of water for fisheries and salmonid growth, which is discussed in greater detail in Section 3.6 . By synchronizing restoration releases with winter runoff from tributaries and implementing an elevated baseflow in winter, the Proposed Action would result in water receding earlier in summer, allowing temperatures to elevate into the target range. This would improve conditions for fish growth. By reaching summer baseflow earlier in the summer, the precipitous drop in temperature that occurs with restoration releases at the end of April would be reduced. The lower sections of the restoration reach would be warmer earlier in the summer, which would promote juvenile fish growth (as discussed in Section 3.6).

3.5 Vegetation

3.5.1 Affected Environment

The 40-mile reach of the Trinity River below Lewiston Dam supports a diversity of plant communities and wildlife habitats. The study area for vegetation includes the 100-year floodplain, where restoration flows under the ROD and the Proposed Action would occur.

The dominant habitat types in the project area include riverine, montane riparian, non-native and invasive annual grassland, and barren. Dominant overstory plant species in these 17 habitats are listed in Table 3-3.

Table 3-3. Plant Communities and Other Habitats in the Project Area.

California Wildlife Habitat Relationships	Acres	Percent of Project Reach	Dominant Species
Riverine	468	25	Open water (Trinity River and tributaries)
Montane Riparian	461	24	Fragrant sumac (*Rhus trilobata*), bigleaf maple (*Acer macrophyllum*), black cottonwood (*Populus trichocarpa*), black walnut (*Juglans hindsii*), blue elderberry (*Sambucus nigra*), California grape (*Vitis californica*), virginsbower (*Clematis sp.*), Indian rhubarb (*Darmera peltata*), mugwort (*Artemisia douglasiana*), narrowleaf willow (*S. exigua*), dusky willow (*S. melanopsis*), Oregon ash (*Fraxinus latifolia*), red willow (*S. laevigata*), rose (*Rosa sp.*), shining willow (*S. lucida*), straggly gooseberry (*Ribes divaricatum*), western goldenrod (*Euthamia occidentalis*), white alder (*Alnus rhombifolia*), western chokecherry (*Prunus virginiana*).
Annual grassland / non-native	224	12	Yellow starthistle (*Centaurea solstitialis*), creeping bentgrass (*Agrostis stolinifera*), redstem filaree (*Erodium cicutarium*), Himalayan blackberry (*Rubus armeniacus*), Maltese starthistle (*C. melitensis*), other non-native species.
Barren	181	9	California brickellbush (*Brickellia californica*), dog fennel (*Anthemis arvensis*), sweet clover (*Melelotus sp.*), Oregon goldenaster (*Heterotheca oregona*), Parry's rabbit brush (*Chrysothamnus parryii*), tailings piles and open/no vegetation.
Urban	139	7	Human disturbances and roads.
Ponderosa Pine	127	7	Ponderosa pine (*Pinus ponderosa*).
Valley Foothill Riparian	101	5	Arroyo willow (*Salix lasiolepis*) and Fremont cottonwood (*Populus fremontii*).
Montane Hardwood	55	3	Madrone (*Arbutus menziesii*), Oregon white oak (*Quercus garryana*), California black oak (*Q. kelloggii*), canyon live oak (*Q. chrysolepis*).
Douglas-fir	53	3	Douglas-fir (*Pseudotsuga menziesii*).
Blue Oak-Foothill Pine	40	2	Foothill pine (*Pinus sabiniana*), canyon live oak.
Montane Hardwood-Conifer	27	1	Bigleaf maple (*Acer macrophyllum*), mountain maple (*A. spicatum*), white oak (*Q. alba*), ponderosa pine.
Mixed Chaparral	12	1	Wedgeleaf ceanothus (*Ceanothus cuneatus*), whiteleaf Manzanita (*Arctostaphylos sp.*), coyote brush (*Baccharis pilularis*).
Lacustrine	9	<1	Open water (lakes and ponds).
Freshwater Emergent Wetland	7	<1	Cattail (*Typha angustifolia, T. domingensis, T. latifolia*), rushes (*Juncus effusus, Juncus sp.*), nut sedge (*Cyperus sp.*), reed canary grass (*Phalaris arundinacea*), sedge (*Carex sp.*).
Perennial Grassland	4	<1	Blue wild rye (*Elymus glaucus*), other native grasses.
Klamath Mixed Conifer	<1	<1	Incense cedar (*Calocedrus decurrens*).
Mixed Hardwood-Conifer	<1	<1	Foothill pine, white oak (*Quercaus alba*).
Grand Total	**1,908**	**100**	

3.5.1.1 Riparian Recruitment and Encroachment

Historic mining has resulted in the loss of riparian vegetation, along with topsoil that supported pre-mining riparian communities. While the pre-mining vegetation characteristics of the Trinity River valley are unknown, the extent and diversity of riparian communities has almost certainly been reduced due to human activities. In addition to loss of riparian habitat, the dynamics of riparian communities in relation to the river have shifted.

Riparian encroachment along the river has contributed to the simplified channel form that resulted from the consistent low flows between the 1960s and 1990s. As discussed in Section 3.2 reduced high flows and scour allow for encroachment of vegetation and contribute to simplified river morphology. One of the TRRP's management objectives under the ROD is to expand and increase the complexity of the Trinity River riparian corridor and to reverse riparian encroachment, which it has made significant progress toward achieving. These management objectives are now met through TRRP channel rehabilitation and revegetation efforts in combination with scouring of the active channel via ROD flows.

3.5.2 Environmental Consequences

3.5.2.1 Alternative 1 – No Action

Under the No Action alternative, disturbance to the vegetation communities and habitats would occur at similar levels as described above in the future. Habitat conditions and the riparian corridor in the project area would remain similar to current conditions.

3.5.2.2 Alternative 2 – Proposed Action

Riparian Recruitment and Encroachment

Under the Proposed Action, winter flow releases are expected to help maintain scour of the channel using restoration flows while also reducing formation of sediment berms along the channel that result in encroachment and simplified channel morphology. More deposition and frequent inundation of the floodplain may allow native riparian species to better compete with less desirable, invasive, and non-native species such as yellow starthistle and Himalaya berry, for establishment in freshly disturbed areas like channel rehabilitation sites. Figure 3-4 shows modeled results for black cottonwood recruitment under the No Action alternative and the Proposed Action between 2004 and 2019 at nine locations along the reach between Lewiston Dam to the confluence with the North Fork Trinity River (see Figure 1-1).

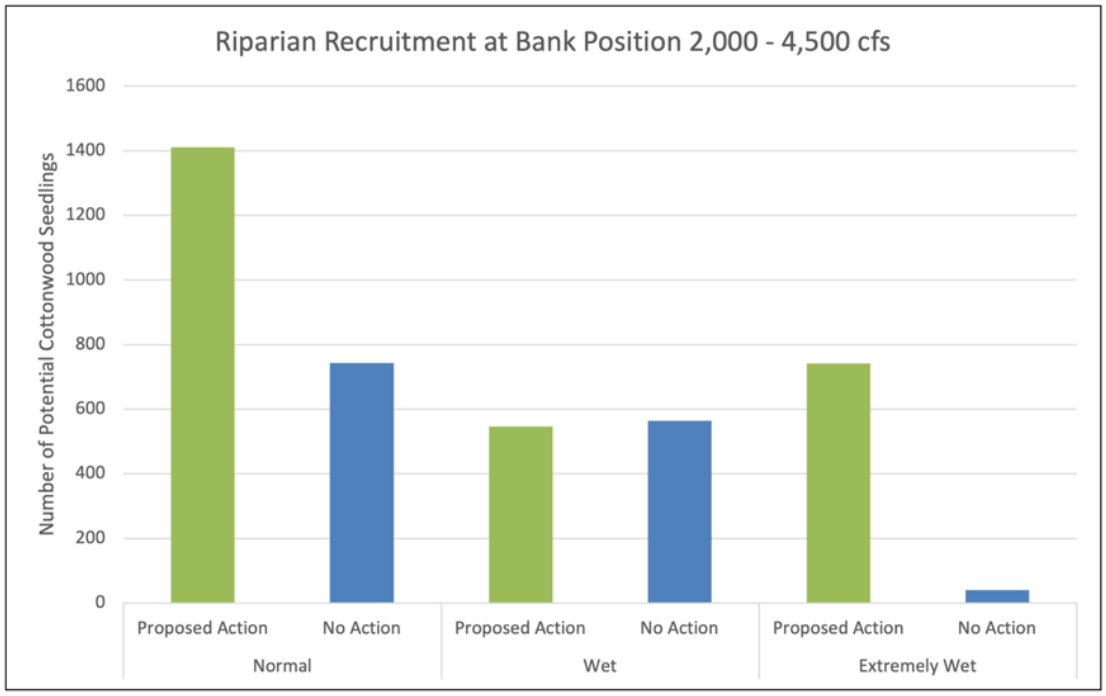


Figure 3-4. Black Cottonwood Recruitment Model results from 2004 – 2019 by Water Year Type at bank position 2,000-4,500 cfs in Normal, Wet, and Extremely Wet years for the Proposed Action and the No Action alternative (Existing Conditions).

The analysis for riparian recruitment utilizes black cottonwood as an indicator species because it is a desirable native riparian species that has been observed over time to recruit along the Trinity River. Note that the TRRP does not have objectives for riparian recruitment during Critically Dry and Dry years, and the analysis is therefore limited to Normal, Wet, and Extremely Wet years. Appendix E provides a full explanation of methods and results for analyzing the Proposed Action's and No Action's effects on riparian recruitment across all water year types.

While the No Action alternative and the Proposed Action would result in recruitment of black cottonwoods, the Proposed Action would increase the opportunity for riparian recruitment in Normal, Wet, and Extremely Wet water years by increasing the frequency of inundation at the bank positions that are under water at 4,500 cfs flows. The 2,000 to 4,500 cfs bank position offers the greatest general potential for successful recruitment due to open and sparsely vegetated areas and relatively low-bank elevation; therefore, more frequent inundation and successful riparian seedling recruitment has been previously observed under existing conditions at this bank position. The Proposed Action would result in a notable increase in recruitment at this bank position in Extremely Wet and Normal water years (Figure 3-4).

Figure 3-4 shows black cottonwood recruitment model results at the 2,000 to 4,500 bank position from 2004 to 2019 by water year type in Normal, Wet, and Extremely Wet years for both the Proposed Action and existing conditions (No Action alternative). The increased establishment of black cottonwood would result from increased frequency and duration of inundation at this bank position under the Proposed Action during Normal and Extremely Wet years. During Wet years, recruitment would be similar at this bank position under the Proposed Action when compared to existing conditions.

In summary, the Proposed Action generally would increase recruitment in the 2,000 to 4,500 cfs bank position for targeted years of Normal and Extremely Wet water year types when compared to existing conditions. This is important because this bank position has the greatest opportunity for successful recruitment to occur due to the availability of space and the relative frequency of inundation. The Proposed Action may also result in increased recruitment opportunity in all water year types for desired species within the 450 to 2,000 cfs bank position, which would allow native riparian species to establish in freshly disturbed areas such as the TRRP's channel rehabilitation sites prior to being out competed by non-native species.

3.6 Fishery Resources

This section describes the fishery resources and aquatic habitats that are known to occur in the project area and evaluates the impacts of the No Action alternative and the Proposed Action on these resources. Information from a focused literature review, project-specific modelling, and informal consultation with resource and TRRP partner agencies is incorporated into the analysis. The methods and analysis results are included in Appendix E.

3.6.1 Affected Environment

The native anadromous species of interest in the mainstem Trinity River and its tributaries are Chinook Salmon (*Oncorhynchus tshawytscha*), Coho Salmon (*Oncorhynchus kisutch*), steelhead (*Oncorhynchus mykiss irideus*) and Pacific Lamprey (*Entosphenus tridentatus*). There are two spawning races of Chinook Salmon, spring- and fall-run, and two spawning races of steelhead, winter- and summer-run.

Resident native fish species found in the Trinity River Basin include game fish such as Rainbow Trout (*Oncorhynchus mykiss*) and non-game fish such as Speckled Dace (*Rhinichthys osculus*), Klamath Smallscale Sucker (*Catostomus rimiculus*), Klamath River Lamprey (*Lampetra similis*), Three-spined Stickleback (*Gasterosteus aculeatus*), Coast Range Sculpin (*Cottus aleuticus*), and Marbled Sculpin (*Cottus klamathensis*). The abundance of resident native species and the factors affecting their abundance within the basin are not well understood; however, all these species evolved and existed in the Trinity River prior to the TRD and are presumably adapted to the conditions.

Non-native fish species found in the Trinity River include American Shad (*Alosa sapidissima*), Brown Bullhead (*Ameiurus nebulosus*), Green Sunfish (*Lepomis cyanellus*), Brown Trout (*Salmo trutta*), and Brook Trout (*Salvelinus fontinalis*).

Federal and state special status fish species with the potential to occur in the project area include:

- Southern Oregon/Northern California Coast Evolutionarily Significant Unit (ESU) of Coho Salmon (federally and California state threatened)
- Upper Klamath-Trinity Rivers ESU Chinook Salmon – Spring Run (federal Endangered Species Act candidate; California state endangered).

As discussed in Chapters 1 and 2, ROD restoration releases attempt to mimic snowmelt hydrology, create a more natural cycle of flow variability, promote alluvial processes, and provide water temperature and habitat benefits for fisheries resources (TRRP (Trinity River Restoration Program). 2013). The timing and volumes of these restoration releases are based on an approved hydrograph developed by TRRP and occur after mid-April. Restoration releases typically extend to early summer before returning to summer baseflow conditions (450 cfs). Winter baseflow conditions (300 cfs) begin October 15 and last until the following April, when a new water year type is determined and the Trinity River hydrograph is approved. The restoration releases affect the baseline environmental conditions of fishery resources that include habitat availability; food availability; temperature regime that influences growth, health, and timing of juvenile outmigration; and the extent of redd scour.

3.6.1.1 Habitat Availability

The timing of restoration releases has resulted in underutilization of naturally occurring and TRRP-created rearing habitat by juvenile fish. This is because the lateral gains in rearing habitat occur when discharge increases and overspills from the river channel to the surrounding margins and floodplains. Under the existing conditions, this occurs after most of the fish have left the restoration reach. Table 3-4. shows a comparison of percent juvenile Chinook Salmon outmigration at Pear Tree rotary screw traps by February 1 and the percent juvenile Chinook that have outmigrated by the time that spring flow releases occur and the winter baseflow conditions transition to spring runoff conditions (Petros, P., W.D. Pinnix, and N.J. Harris. 2017).

From 2003 to 2016, an average of 60 percent of salmonids had reared and outmigrated from the restoration reach prior to the restoration releases at the end of April (Petros, P., W.D. Pinnix, and N.J. Harris. 2017) (Table 3-4.). Under the existing conditions, most juvenile Chinook Salmon are not able to access productive floodplains that provide habitat with low velocity, ample forage, cover, and warmer temperatures known to bolster growth of juvenile salmon (Sommer, T.R., W.C. Harrell and M. Nobriga. 2005; Jeffres, C.A., J.J. Opperman and P.B Moyle. 2008). In addition, native fish are unable to take advantage of increases in drift forage opportunities that can occur with changes in discharge during fry emergence and while juvenile fish are present.

Table 3-4. Percent Juvenile Chinook Salmon Outmigration at Pear Tree Completed by February 1 and by Onset Date for Spring Restoration Flow Releases

Year	Percent Outmigration (February 1)	Spring Flow Restoration Release Date	Percent Outmigration by Release Date
2003	14%	April 30	74%
2005	14%	April 22	72%
2006	0%	April 12	50%
2007	0%	April 27	53%
2008	1%	April 23	46%
2009	2%	April 27	50%
2010	8%	April 23	62%
2011	14%	April 22	58%
2012	1%	April 21	49%
2013	5%	April 21	53%
2014	0%	April 23	47%
2015	16%	April 22	83%
2016	46%	April 21	87%
Averages	9%	April 22	60%

3.6.1.2 Food Availability

River food webs benefit from riverbed scour caused by flood disturbance (Wootton, J. T., Parker, M. S., & Power, M. E. (1996); Parker, M. S, & Power, M. E. 1997). Shortly after flood scour, stream insects are dominated by fast-growing taxa that are vulnerable to predation by juvenile fish, such as midges (*Chironomidae*) and mayflies (*Baetidae*) (Parker, M. S, & Power, M. E. 1997). These early successional species decrease as larger, slow-growing taxa, which are less vulnerable to predation, increase. With this shift comes a reduction in available forage for juvenile fish (Parker, M. S, & Power, M. E. 1997)

It is unclear the extent to which the asynchrony between natural hydrology and restoration releases aimed at generating flooding and scour impacts the overall macroinvertebrate assemblage and biomass on the Trinity River. However, it is expected that juvenile fish would not be able to take advantage of the short-term responses in primary production and increased drift forage that often occur prior to and during emergence in unregulated systems. Periodic channel bed scour is an objective of restoration releases outlined in the Trinity River FEIS (USFWS, Reclamation, and HVT 2000), but the timing of these scour events, which usually is in May, does not support prey availability when juvenile fish are present in the upper river (see Table 3-4.).

While high-flow disturbance events have similar benefits in providing land-borne nutrients to the system and resetting primary production, increases in invertebrate prey species productivity and therefore the drift foraging success by salmonids are mostly beneficial in the near term. Peak densities of juvenile salmonid prey species (e.g., chironomids) have been shown to be higher in ephemeral habitats continuously inundated for 5 to 10 weeks Merz et al. 2012). A study of food web response following a controlled flood on the Colorado River found that concentrations of invertebrate drift increased 148 percent in the months following disturbance (Cross, W.F., C.V. Baxter, K.C. Donner, E.J. Rosi-Marshall, T.A. Kennedy, R.O. Hall, Jr., H.A. Wellard Kelly, and R.S. Rogers. 2011), but drift, like primary succession following disturbance, is most impactful to food availability in the short-term and would only benefit juvenile salmon when they are in the river.

The unmatched timing between scour, prey species availability, and juvenile salmon presence likely effects the size of outmigrating juvenile fish due to increased competition for limited prey. Recent findings from Thomas Gast & Associates (Thomas Gast & Associates. 2021) found that more redds recorded in the previous fall leads to lower consumption of food by juvenile fish, and therefore smaller outmigrating juvenile fish. In summary, increased competition for food and habitat may result in smaller fish (Thomas Gast & Associates. 2021). Consequently, adding more food to the system during high flows should benefit fish growth.

Under existing conditions, temperature also impacts food availability. Deep-water releases from Trinity Dam artificially lower water temperature, which increases the time that important prey species are available for drift foragers. When water temperatures are increased from 44.6°F (7°C) to 59°F (15°C), generation time for midges drops from 36 days to 25 days, and generation time for mayflies drops from 250 days to fewer than 100 days (Asarian et al. 2021, in review). The effects of cold-water releases are discussed in the next section.

3.6.1.3 Temperature

Temperature is one of the most important environmental influences on salmonid biology. The general temperature conditions in the Trinity River are discussed in-depth in Section 3.3 . Most aquatic organisms including salmon and steelhead are cold-blooded, meaning their body temperature and metabolism are largely determined by the ambient temperature of water (Carter, K. 2006.). Temperature targets are widely used by fishery managers to accommodate the various life stages of Pacific salmonids (Carter, K. 2006.). For example, Chinook Salmon can consume approximately three times more food at 59°F (15°C) than at 41°F (5°C). Consumption, however, does not translate directly into growth since additional energy is required for metabolism, egestion, and excretion; however, the maximum potential for growth does occur at higher temperatures (Thomas Gast & Associates. 2021; also see Appendix E).

A defining characteristic of cold-blooded organisms, which includes stream invertebrates, amphibians, reptiles, and fish, is their core temperature conforms to ambient temperature. For this reason, ability to choose the temperature of their surroundings is of particular importance, referred to as behavioral thermoregulation, and affects an organism's ability to capture and metabolize food (Cairns, Andrew, D. Blake, K. Dowd. 2008; Armstrong, Jonathan and D. Schindler. 2013. ; Watz, J. and J. Piccolo. 2010), reproduce and develop (Railsback et al. 2016), and evade predation (U.S. Environmental Protection Agency (EPA). 2001). For example, well-fed salmonids tend to behaviorally thermoregulate in slightly warmer water where the combination of feeding opportunities and warmer water leads to greater growth. When food is scarce, salmonids will select cooler water to lower their metabolic rate and conserve energy (U.S. Environmental Protection Agency (EPA). 2001). Cold temperatures can reduce foraging salmonids' ability to capture prey (Watz, J. and J. Piccolo. 2010). In summary, warm water with abundant prey allows salmon to both forage successfully and metabolize food more readily. Colder water results in lower metabolic rates and therefore slower growth (Elsner, RA, Shrimpton 2019, Lusardi, R. A; also see Appendix E).

Temperature also plays a role in the timing of juvenile fish outmigration. Several studies of the timing of juvenile outmigration from the Trinity River indicated that suppressed temperatures resulting from the current restoration releases under the ROD result in a delay in fish growth, and thus a delay in the timing of their migration from the river to the ocean (see Appendix E)[27].

[27] The Willow Creek outmigrant trap on the Trinity River has been operated annually since 1989. It was installed and continues to be operated primarily to assess Chinook Salmon outmigration timing and duration, and models have been developed to evaluate when 80 percent of the Chinook juveniles have passed the trap based on accumulated daily averaged water temperatures in Hoopa (Hayden, T. and A. Heacock. 2014). Thomas Gast & Associates (Thomas Gast & Associates. 2021) found the best single variable for the timing of juvenile outmigration was water temperature in the Trinity River above the confluence with the North Fork. The Pear Tree site is further upstream where the water

3.6.2 Environmental Consequences

3.6.2.1 Alternative 1 – No Action

Under the No Action alternative, impacts to fishery resources would remain similar to existing conditions. Habitat availability, food availability, and temperature along the 40-mile reach of the river would remain unchanged. Therefore, there would be no impacts on fishery resources.

3.6.2.2 Alternative 2 – Proposed Action

The primary objective of the Proposed Action is to increase rearing habitat for anadromous salmonids in a manner that benefits Coho Salmon and other special-status fish species. Appendix E provides a full explanation of methods and results for analyzing the Proposed Action's and No Action alternative's effects on fishery resources that include habitat availability, food availability, and temperature.

Habitat Availability

The Proposed Action would shift restoration releases earlier in the year, resulting in inundation of the floodplains when most juvenile fish are rearing in the restoration reach. The anticipated effects of this would be more available rearing habitat, as slow water habitat and access to abundant food resources would be more plentiful and available in the inundated floodplain earlier in the year. Table 3-5. shows the predicted percent change in habitat capacity[28] for the 40-mile restoration reach, and the percentage of individual habitat units within the restoration reach predicted to have increased habitat capacity (USFWS and NOAA. 2018).

Table 3-5. Predicted Change in Habitat Capacity for the 40-Mile Restoration Reach, and the Percentage of Individual Habitat Units within the Restoration Reach Predicted to Have Increased Habitat Capacity

Discharge (cfs)	Percent Change in Predicted 40-Mile Habitat Capacity	Percent Habitat Units with Predicted Capacity Increases
300	0%	0%
500	3%	58%
700	7%	61%
900	10%	66%
1,100	14%	72%
1,300	19%	78%
1,500	25%	81%

Food Availability

The Proposed Action would result in increased food availability for salmonids by providing flows that are expected to scour (release some attached algae and macrophytes and associated invertebrates from their habitats) earlier in the year to increase food availability prey. The Proposed Action would result in increased temperatures earlier in the year by reducing the impacts on temperature of restoration releases that currently take place under existing conditions and by inundating shallow areas along the floodplain that hold warmer water earlier in the

temperature is colder than at Hoopa and may be more indicative of the temperatures experience during outmigration. These analyses suggest that warmer water temperatures during the initial time of the restoration releases would encourage earlier outmigration (Thomas Gast & Associates. 2021).

[28] Habitat capacity is an index of the number of juvenile Chinook salmon that could be supported in a given area based on water depths, velocities, and distances to cover (Som, N. A., R. W. Perry, E. C. Jones, K. De Juilio, P. Petros, W. D. Pinnix, and D. L. Rupert. 2017).

season (see Section 3.3), which would result in more abundant prey species when juvenile salmon are present in the upper reaches of the Trinity River. The volume of flow that results from the proposed action during both the synchronization and increased base-flow periods would result in floodplain inundation earlier, thus providing habitat for prey species to colonize and food availability for drift foraging earlier in the season. This would potentially impact the size of juvenile fish by reducing competition for more abundant food. The compounded impacts of increased food availability and warmer temperatures (discussed in the next section) would potentially result in larger fish and earlier outmigration of juvenile fish, when compared to existing conditions. These effects would contribute toward the ROD's objective of rehabilitating the Trinity River's anadromous fisheries.

Temperature

Under the Proposed Action, the Trinity River would experience warmer temperatures earlier in the summer, as a portion of restoration releases would be shifted earlier in the year, better matching natural runoff from tributary streams, and thus reducing the duration of temperature suppression that occurs during restoration releases under existing conditions (see Section 3.3). The effect of warmer temperatures earlier in the year include increased juvenile rearing habitat availability (discussed above) and more rapid juvenile growth resulting from increased availability of food (discussed above). Warmer temperatures would not only increase prey species abundance, but also the ability of juvenile fish to consume and benefit from increased prey availability, as discussed above.

Based on models for the Proposed Action and No Action alternative (existing conditions), it is expected that the overall result of the Proposed Action's effect on temperature would be larger fish earlier in the season, and potential earlier outmigration of juvenile fish.

The modeled water temperatures and their effect on Chinook salmon mass showed that in all years between 2004 and 2019, the Proposed Action would result in greater mass by the end of June when compared to existing conditions (see Appendix E)[29]. The effect is most pronounced in wetter water year types, as the action moves a larger volume of water from the spring juvenile Chinook salmon rearing period to the winter and/or early spring months. The differences in daily growth rate of juvenile Chinook salmon between the Proposed Action and No Action alternative are smaller in dryer water years than wetter water years, as the water temperatures provided by the two alternatives are more similar to each other.

These effects would help the TRRP meet the objectives of the ROD to rehabilitate the Trinity River's anadromous fisheries, when compared to existing conditions.

3.7 Recreation

3.7.1 Affected Environment

The Trinity River provides year-round commercial and private recreational opportunities, including boating, kayaking, canoeing, rafting, inner tubing, fishing, swimming, camping, gold panning, wildlife viewing, picnicking, hiking, and sightseeing. Outdoor recreation is an important part of the social and economic character of Trinity County as a whole. The study area for the recreation analysis is Trinity County, and topics of analysis include the economic characteristics of the recreation sector and access to recreation opportunities directly associated with the Trinity River. Section 3.8 of the Trinity River FEIS and Section 4.8 of the 2009 Master EIR give detailed description of the recreation environment along the Trinity River. (The Master EIR is available on the TRRP website at http://www.trrp.net/program-structure/foundational-documents)

[29] Differences in the end-of-June mass for the Proposed Action and No Action alternative ranged from 1.1 grams (g) to 2.2 g. The resulting differences in mass as a percentage of end-of-June Chinook salmon size ranged from 5.7 percent to 19.2 percent over the study period. The relationship between total water year volume and the percentage difference in end-of-June mass between the alternatives was significant ($R^2 = 0.594$; $P < 0.001$), resulting from the warmer water temperatures that the alternative provides in the spring months relative to that of the no action alternative.

Campgrounds or other formal recreational sites, and public access to public lands occur throughout the project area (see Table 3-6). Although public use is restricted at most private river access points, access to the Trinity River is available from both public and private lands, with federal (U.S. Forest Service [Forest Service] and BLM) and state (CDFW) agencies offering public river access points. Visitor use in the project area is heavy in places, with both rafting and fishing companies and individuals using the river corridor.

The Trinity River was designated by the Secretary of the Interior as a federal Wild and Scenic River in 1981 under the 1968 Wild and Scenic Rivers Act (see https://www.rivers.gov/wsr-act.php). In addition to the mainstem Trinity River from the confluence with the Klamath River to 100 yards below Lewiston Dam, three Trinity River tributaries were also designated: the North Fork Trinity River, the South Fork Trinity River, and the New River. The mainstem Trinity River from 100 yards below Lewiston Dam downstream to Cedar Flat is classified as a "Recreational" wild and scenic river. In 1998, BLM delineated the wild and scenic river corridor to include areas within 0.25 miles on either side of the river.

3.7.1.1 Trinity County Recreation Economy

The economic impacts of river recreation on the Trinity River recreation economy, also referred to as "travel and tourism" sector[30], employs 329 individuals, which comprises about 22 percent of the total employment in Trinity County (Headwaters Economics 2020). Compared to the U.S. (16 percent) as a whole, and to California (17 percent), the proportion of tourism-related jobs is slightly higher in Trinity County.

Thirty individuals residing in Trinity County hold jobs directly related to recreation, including but not limited to fishing and rafting guides, which comprises about two percent of the total employment in the County. While this number represents individuals who are Trinity County residents, the recreation industry also employs seasonal staff who may have permanent residence outside of the area and are not accounted for in the official U.S. Census Bureau counts.

The proportion of individuals directly employed in recreation is comparable to the U.S. and California. Restaurant and lodging related jobs account for 240 jobs, which is about 16 percent Trinity County's employment. Retail-related businesses employ 59 people, which comprises 4 percent of the total employment. Both retail trade and restaurants and lodging employ a slightly higher proportion of individuals when compared to the United States and California.

Section 3.8 of the Trinity River EIS analyzed the impacts of the restoration releases on the recreation, fishing, and boating economy, and found that implementation of the restoration releases under the ROD would result in benefits to the region's economic growth (USFWS, Reclamation, and HVT 2000). Data indicates that employment in recreation-related industry has increased slightly since the implementation of the ROD in 2004, while total jobs across all sectors has decreased in the same period (U.S. Census Bureau 2020 data accessed from Headwaters Economics. 2020.

3.7.1.2 Recreational and Guided Fishing

Fishing for Chinook salmon and steelhead and resident trout is a major recreational activity on the Trinity River throughout the year. The continued listing of both Coho Salmon and Spring Chinook Salmon and the prohibition of take of unmarked steelhead are all a result of low run size that has affected the fishing harvest quota, season length, and fish eligible for harvest. Fishing in the fly-water only section, downstream of the dam, is open April 1

[30] Travel and Tourism includes businesses that provide goods and services to visitors and the local population. These industries are Retail Trade, Passenger Transportation, Arts & Entertainment & Recreation, and Accommodation & Food Services. In 2018, the Department of Commerce first developed statistics illustrating the economic impact of outdoor recreation in the United States. See the Bureau of Economic Analysis's Outdoor Recreation Satellite Account at https://www.bea.gov/data/special-topics/outdoor-recreation.

through September 15 each year. The preferred flow ranges for fishing identified in the Trinity River EIS (Table 3-32) are 300 to 800 cfs for shore fishing, 300 to 800 cfs for wading, and 200 to 1,500 cfs for drift-boat and drift-raft fishing (USFWS, Reclamation, and HVT 2000).

The BLM and the Forest Service issue up to 100 permits for commercial fishing guides along the reach of Trinity River from Lewiston Dam downstream to Burnt Ranch (at Cedar Flat). By agreement, the BLM manages commercial fishing guide permits and the USFS manages commercial boating and rafting permits on this section of the Trinity River.

3.7.1.3 Recreational and Guided Boating

The Trinity River EIS defines the river's primary recreation season as Memorial Day to Labor Day, or approximately the last week of May to the end of the first week in September. River guiding and recreational boating take place year-round and are not confined to the primary season. Rafting, kayaking, canoeing, and other water recreation activities are most popular during the primary season, which follows the current restoration flow releases in late April or early May, when flows in the upper reaches of the Trinity River near Lewiston Dam are at their highest annual levels. The primary recreation season overlaps with the summer baseflow period when Trinity River flows are declining from spring peaks to the 450 cfs summer baseflow.

The Trinity River FEIS (Table 3-32) identified flows ranging between 200 cfs and 8,000 cfs to be the preferred range for boaters, and the current flow regime under the ROD falls primarily within this range with peak flows that may exceed 8,000 cfs in late April through early June[31]. Comments from recreational boaters during this project's scoping period identified preferred boating flows of generally between 1,000 and 2,000 cfs for the Pigeon Point run. The boatable flow range outlined in several guidebooks for this reach of the Trinity River is minimum at 500 cfs, optimal at 1,500 cfs and high at 4,000 cfs (Holbeck, L. 1998, Menten, D. P. 2016). River guiding usually takes place between summer baseflow (450 cfs) and 1,500 cfs.

The Forest Service issues 13 rafting permits for the river, from Lewiston Dam to Burnt Ranch. The reach most popular among rafting outfitters is the Pigeon Point reach, which is immediately downstream of the restoration reach and runs from the Pigeon Point campground to the Big Flat take out.

[31] The preferred ranges for boating include flatwater canoeing (200 to 1,500 cfs) and white-water kayaking, canoeing, and rafting (450 to 8,000 cfs).

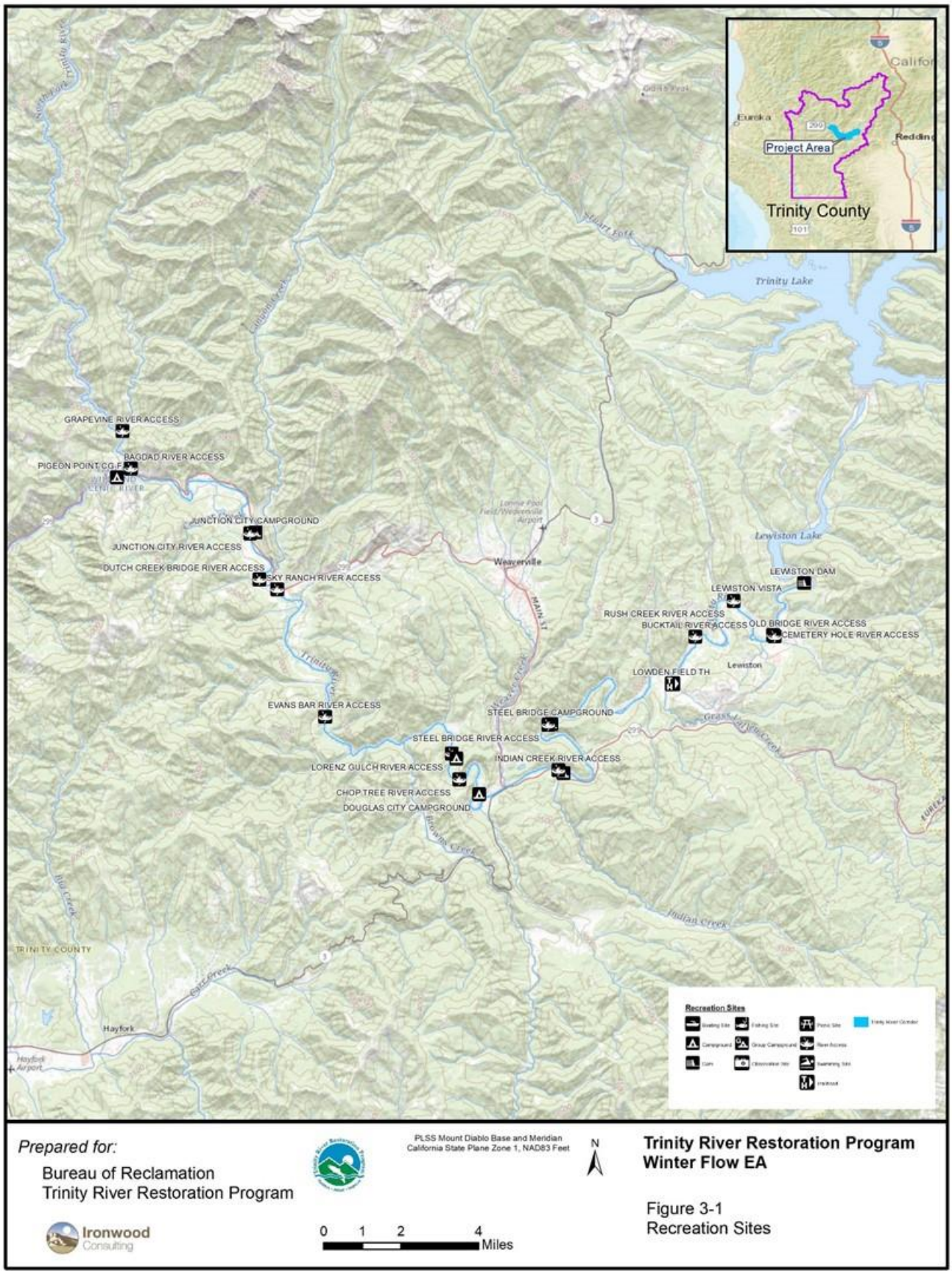


Figure 3-5. Recreation sites along the Trinity River, including boat ramps, campgrounds, and access points.

3.7.2 Environmental Consequences

3.7.2.1 Alternative 1 – No Action

Under the No Action alternative, access to recreational resources and their economic importance in the project area are expected to remain the same as those under existing conditions described above.

3.7.2.2 Alternative 2 – Proposed Action

The Proposed Action would not result in effects to recreational river access or campground access.

The Proposed Action involves no ground disturbance. There would be no alterations to the wild and scenic nature of the river outside of those that would naturally occur. Expected project benefits to juvenile fish health could translate to higher numbers of returning adults in support of the recreational fishery. Therefore, there would be no negative impacts to the Trinity River's wild and scenic recreational designation or environment when compared to existing conditions.

During the public scoping, several parties submitted concerns about the effects that the Proposed Action would have to recreation in and along the Trinity River. These concerns included economic impacts to those working in the recreational economy and effects to fishing and rafting.

Trinity County Recreation Economy

The Proposed Action is not likely to have a discernable effect on the recreational economy or employment in Trinity County. There may be a beneficial effect to the tourist economy as the river's fisheries improve and offer a more robust fishery for recreationists. There would not likely be a change to employment in the tourism and recreation sector, including to the two percent of workers employed directly in the recreational economy.

Recreational and Guided Fishing

The Proposed Action would result in a recreational fishing environment that more closely mimics the pre-dam Trinity River than under existing conditions, with increased river levels during storm runoff events and elevated winter baseflows (see Figure 2-1 and Section 2.2). While the experience of fishing in the Trinity River would be more similar to a natural free-flowing river, the Proposed Action would result in reduction of shore and wade (300 to 800 cfs), and boat (200 to 1,500 cfs) fishing days during the winter and spring months (January through April), when compared with existing conditions. The loss of fishing days would be greater in wetter years and would result in the most days lost during March and April, with generally few to no days lost in January and February. During the driest years, there would likely be no changes to fishing days in winter and spring and an increase to fishing days in May, June, and July.

On average, the Proposed Action could result in a net annual loss of five shore and wade fishing days with lost days between January and April and gained days between May and July. The return to the summer baseflow earlier in the season will increase the number of wade fishing days during the late spring and summer months, particularly for the fly fishing only reach. The Proposed action could result in an annual increase of eight boat fishing days, with losses in between January and April and gains between May and July. Increased flows during the synchronization period would be short in duration, would generally coincide with storm events, and would be preceded by a 72-hour notification as described in Section 2.2 , so that fishing during the synchronization periods could be avoided. This would result in inconvenience to fishers and long-term client scheduling by guides, and might result in intermittent loss of wade and boat fishing days during the winter and spring months in some years.

The near- and long-term benefits to fisheries from this more natural flow regime would result in increased quality of recreational fishing opportunities when compared to the existing conditions. Recreational fishing opportunities

would potentially increase over time under the Proposed Action because the project is designed to create productive seasonal habitat for salmon through flooding, food availability through scour and drift, and providing optimal temperature ranges for different life stages. If runs were restored, fishing opportunity could increase through expanded seasons, increased quota, and removal of take prohibitions.

Section 3.6 provides a detailed discussion of the potential improvements to the fisheries health as a result of the Proposed Action, which would beneficially affect the recreational fishing experience in the Trinity River. While the direct and near-term impacts from the Proposed Action would be to juvenile fish, the long-term impacts of the Proposed Action would improve fishing opportunities by increasing the size and number of smolts that leave the Trinity River, therefore increasing the health of the fishery and the rates of return by adult salmon.

Recreational and Guided Boating

Under the Proposed Action, the overall volume of restoration releases would remain the same as existing conditions, as mandated under the ROD. However, a portion of the restoration releases that have occurred during June and July since 2004, when the ROD was implemented, would be moved earlier in the year to be synchronized with winter runoff events in Trinity River tributaries. This could impact the recreational experience of recreational boaters and boat guides who have grown accustomed to consistent low winter releases from Lewiston dam and higher releases in May and June.

Summer 450 cfs baseflows would be reached earlier in the summer under the Proposed Action, around late June or early July, versus late July under the existing conditions. The earlier summer baseflow period may impact recreational boating by shortening the duration of the receding limb of the restoration flow releases, thereby impacting the experiences of the proportion of recreational boaters and raft outfitter clients who prefer higher levels during those time periods, but not those who enjoy lower flows during those time periods. Under the Proposed Action, flows would not be reduced below the summer baseflow period of 450 cfs mandated under the ROD. Based on comments and analysis submitted during public scoping by the American Whitewater Association (AWA), there would be no substantial impact to the number of boatable days among the minimum (500 cfs), optimum (1,500 cfs), and high (4,000 cfs) river flow ranges that are preferred by the recreational boating community during the summer months (see AWA's comment letter in Appendix A – Public Scoping Materials and Comments).

Spring flows during the elevated baseflow period would be increased so that a beneficial effect to recreational boating may occur. The elevated baseflow would result in consistent flows in March and April that would fall within the preferred flow range for boaters. While the elevated baseflow falls outside of the primary rafting season, it may provide an expanded boating season for local recreationists and spring season tourists.

3.8 Energy and Utilities

3.8.1 Affected Environment

The TRD produces electricity that is utilized in surrounding communities through power produced at the Trinity Power Plant and the Lewiston Power Plant. Between 2010 and 2019 the market value of TRD-generated power was approximately $121.3 million. Annual market value during that period ranged from $8.8 million in 2016 to $16.9 in 2013 (see Table 3-6.). The market value of power generated at the Trinity Power Plant is dependent on both the amount of power that is generated and the larger market value of power at the time of generation. A detailed description of the power resources affected environment can be found in Section 3.10 of the Trinity River EIS.

3.8.2 Environmental Consequences

Power impacts were evaluated for the No action and Proposed Action based on the market value of power produced by the Trinity Power Plant for years 2010 through 2019. Trinity Dam release rates for power production are calculated using the minimum dam release rate (300 cfs winter base flows) and the upper limit of Trinity Power Plant capacity 3,600 cfs. Releases over 3,600 cfs exceed capacity of the turbines and are released directly to the river without additional energy production.

For the No Action alternative, the total Trinity release rate was calculated as the maximum of actual historical Trinity and Lewiston release rates, which includes restoration releases, baseflow releases, and other intermittent releases such as for tribal ceremonies. For the Proposed Action, total Trinity release rates were calculated as the maximum potential releases (as described in Section 2.2) up to the 3,600 cfs energy generation capacity. The amount of energy produced in megawatt hours (MWh) was calculated under both scenarios. Using the MWh for the No Action alternative and the Preferred Action, the market value under both alternatives was calculated[32].

3.8.2.1 Alternative 1 – No Action

Under the No Action alternative, the magnitude and market value of power from the TRD would be the same as described in the affected environment (see Section 3.10 of the Trinity River EIS; USFWS, Reclamation, and HVT 2000).

3.8.2.2 Alternative 2 – Proposed Action

Appendix E explains the methods and results used to analyze the effects on energy and utilities by the Proposed Action and No Action alternative.

Under the Proposed Action, there would be no substantial change to the market value of power generated by the Trinity Power Plant when compared to existing conditions (No Action alternative). Table 3-6. shows that the variation between the Proposed Action and the No Action alternative is minimal except for calendar year 2019, when the Proposed Action would have resulted in a substantial increase (15.3 percent), and therefore a significant benefit, to the market value of Trinity Power Plant energy. Given the unpredictable dynamics of market rates of power, there is no reliable way to predict future impacts of the Proposed Action on the value of generated power. However, based upon comparisons of recent annual power production values, it is likely that the Proposed Action would result in no significant impact to the market value of the energy produced by the Trinity Power Plant.

[32] The equation was developed by applying a linear regression to the historically recorded Trinity Power Plant and MWh for this same period. Equation for the Trinity Power Plant MWh Generation as a function of Trinity Power Plant Generation Flow Rate: MWh=MAX(0,0.7463*Trinity Gen-33.1452). For both scenarios the value was calculated by multiplying the MWh by the NP15 market rate of power. Yearly results are shown in Table 3-6.

Table 3-6. Trinity Power Plant Generation Market Value ($ Millions) and Percent Difference under the No Action (Existing Conditions) and the Proposed Action (Modelled)

Year	Water Year Type	Trinity Power Plant Generation Market Value ($ million)			
		No Action (Existing Conditions)	Proposed Action	Market Value Difference	Percent Difference
2010	Normal	10.64	10.94	0.30	2.8%
2011	Wet	12.46	12.98	0.52	4.0%
2012	Normal	11.52	11.33	(0.19)	-1.7%
2013	Dry	16.86	17.37	0.51	3.0%
2014	Critically Dry	16.86	16.78	(0.08)	-0.1%
2015	Dry	10.72	10.60	(0.12)	-1.3%
2016	Wet	8.79	8.52	(0.27)	-3.1%
2017	Extremely Wet	13.31	13.48	0.17	1.3%
2018	Critically Dry	10.11	10.15	0.04	0.4%
2019	Wet	10.05	11.72	1.67	15.3%
Total	**All Water Year Types**	**121.4**	**123.9**	**2.5**	**2.1%**

4. Cumulative Impacts and Other NEPA Considerations

On July 16, 2020, CEQ published a final rule to update its regulations for federal agencies to implement NEPA. The definition of effects or impacts was revised to mean "changes to the human environment from the proposed action or alternatives that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action or alternatives, including those effects that occur at the same time and place as the proposed action or alternatives and may include effects that are later in time or farther removed in distance from the proposed action or alternatives" (40 CFR § 1508.1(g)). Cumulative impact, defined in 40 CFR 1508.7 (1978), was repealed (40 CFR § 1508.1(g)(3)). On April 16, 2021, DOI released Secretarial Order (SO) 3399 which directed departments to "not apply the 2020 Rule in a manner that would change the application or level of NEPA that would have been applied to a proposed action before the 2020 Rule went into effect on September 14, 2020."

In consideration of recent updates to federal regulations, orders, and guidance, cumulative effects of implementation of reasonably foreseeable projects are analyzed. Cumulative impacts have been defined by the CEQ regulations in 40 CFR 1508.7 as "the impact on the environment which results from the incremental impact of the [proposed] action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time." Cumulative impacts include the direct and indirect impacts of a project together with the past, present, and reasonably foreseeable future actions of other projects. According to CEQ's cumulative impacts guidance, the cumulative impact analysis should be narrowed to focus on important issues at a national, regional, or local level. The analysis should look at other actions that have affected or could affect the same resources as the action alternatives. Actions considered in this cumulative analysis include activities authorized under the Trinity River EIS and ROD and the 2009 Master EIR (see https://www.trrp.net/program-structure/foundational-documents/ for more information).

4.1 Channel Rehabilitation Projects

The 2009 Master EIR includes a chronology of the management actions relevant to the Trinity River Basin between 1938 and 2008 (Section 1.4.4, pages 1 through 8). Additional details concerning the legislative and management history can be found in the Trinity River EIS and the EA/Final EIRs for TRRP projects constructed between 2005 and 2008[33]. The Master EIR (Section 1.4.5, pages 1-10 through 1-15) also contains a summary of the restoration activities undertaken since the signing of the ROD and brief discussions of other watershed restoration programs and activities occurring within the basin. These documents are on file at the TRRP office in Weaverville, California and the Weaverville public library and are also available on the TRRP website located at: http://www.trrp.net.

[33] Hocker Flat, the Canyon Creek Suite, Indian Creek, and Lewiston-Dark Gulch. Environmental documentation and project descriptions for each are available https://www.trrp.net/dataport/rad/?what=table-trrpmainstem.

The cumulative impacts section provided in Chapter 5 of the 2009 Master EIR listed foreseeable channel rehabilitation projects, based on input from the lead and cooperating agencies. The geographic scope of the area examined for cumulative effects in that assessment was the Trinity River corridor between Lewiston Dam and the confluence of the North Fork Trinity River at Helena, California. The following projects were considered in that section of river and are still considered timely and relevant:

- Fish Habitat Management
- Trinity River Mainstem Fishery Restoration Project
- California Coastal Salmonid Restoration Program/Five-Counties Salmonid Conservation Program
- Clean Water Act Section 303(d) Total Maximum Daily Load Requirements Program

Since 2009, the TRRP has implemented projects at all the Phase 1 channel rehabilitation sites and at nine of the Phase 2 sites. The Deep Gulch and Sheridan sites were constructed in 2017. The Bucktail site constructed in 2008 was expanded in 2016 to include additional areas. The Dutch Creek project was constructed in 2020. The Chapman Ranch Phase A site was constructed in 2019, and the Phase B site is under construction in 2021. The Oregon Gulch project is scheduled to begin between 2021 and 2023, and Sky Ranch is proposed for 2022 or thereafter. These projects would cumulatively improve anadromous fish spawning and rearing habitat throughout the extent of the Trinity River and, taken together with the Proposed Action's potential beneficial impacts to the watershed identified in the analysis, would result in increased efficacy of TRRP's restoration efforts toward the ROD's objectives.

4.2 Watershed Restoration Projects

Since 2009, there have been a number of watershed restoration and road sediment reduction projects implemented by various agencies and organizations throughout the Trinity River basin. While some of these were considered in the 2009 Master EIR, the USFS, the Five Counties Salmonid Conservation Program, the Watershed Research and Training Center, and the Trinity County Resource Conservation District have been funded for and/or completed additional projects intended to improve watershed conditions, restore aquatic habitat, improve aquatic connectivity, and reduce road-related sediment delivery to streams and rivers. These watershed restoration projects are intended to improve water quantity and quality, as well as rearing habitat in the Trinity River Watershed and, taken together with the Proposed Action's potential beneficial impacts to the watershed identified in the analysis, would result in increased efficacy of TRRP's restoration efforts toward the ROD's objectives.

4.3 Gravel Augmentation Projects

The TRRP continues to add coarse sediment (gravel) at five permitted locations downstream of Lewiston Dam, and fine sediment impairment in the Grass Valley Creek area has been remediated (e.g., from the Hamilton ponds). In addition, TRRP-managed flows have been implemented yearly since 2004. Ongoing monitoring efforts by TRRP partners continues to document improvements in habitat use and restoration of alluvial processes and riparian vegetation. Gravel augmentation projects are intended to improve anadromous fish spawning and rearing habitat in the Trinity River and, taken together with the Proposed Action's potential beneficial impacts to the watershed identified in the analysis, would result in increased efficacy of TRRP's restoration efforts toward the ROD's objectives.

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Appendix A – Public Scoping Materials and Comments

Public Scoping Materials

Public scoping for the Winter Flow project began on May 18, 2021, and it ended on June 18, 2021. At the onset of the public scoping period, notices informing the public of the intent to begin the environmental review process were posted on the TRRP and Reclamation websites and at the TRRP Weaverville office (see Figure A-1. Winter Flow Project Scoping Notice). Electronic scoping notices were emailed to stakeholders and hardcopy notices were mailed to local landowners along the river corridor and interest groups.

The TRRP received comments from 72 individuals or organizations, totaling 79 unique comments categorized into eight topics. Scoping comments were reviewed and categorized by principal issue of concern. Table A-1 summarizes the types and topics of comments received.

Table A-1. Summary of Scoping Comment Types or Topics

Scoping Comment Type or Topic	Total
Public Notices from TRRP or Other Entity	5
Individual Commentors – Individuals or Organizations	72
Comments by Topic	79
All impacts	1
Fishery Resources	9
Hydrology and Flooding	2
Methodological and Scientific Approach and Rationale	8
Recreation - Boating	53
Recreation - Boating and Fisheries	2
Recreation - Fishing	1
Water Quality	2

Table A- 2 gives the name of each commenter (individual or organization) and the text of the comment as well as the scoping comment topic and where the comment topic is address in the Winter Flow Project EA.

Winter Flow Variability Action – Proposed for Implementation in 2022

Project Background

The Trinity River Restoration Program (TRRP or Program) is beginning a 30-day public scoping period to announce and explain a new flow management proposal on the Trinity River and is requesting input from stakeholders and interested parties.



Photo 1. Trinity River release from Lewiston Dam (photo by TRRP)

Following the 2000 Record of Decision (ROD), the U.S. Department of Interior (DOI) established TRRP to restore the fisheries of the Trinity River affected by dam construction and related diversions of the Trinity River Division of the Central Valley Project[1]. The Trinity River has also been impacted by past mining and timber harvest activities in the watershed, and these conditions are collectively addressed as well through TRRP's restoration efforts.

Administered by the U.S. Bureau of Reclamation (Reclamation), the TRRP is a partnership of federal and state resource agencies, Tribes, and Trinity County. The Program works to restore the processes and attributes of an ecologically functioning river system, which should, in turn, recover diminished salmon and steelhead populations while retaining Trinity and Lewiston Dams' deliveries of water and power to California's Central Valley.

There are five primary components of TRRP's river restoration work:

1. ***Variable annual instream flows***: releasing water from Lewiston Dam, based on the water year type[2], to mimic natural Trinity River flows and interact with downstream areas to enhance conditions for all life stages of fish and wildlife. These variable annual instream flows are also sometimes called "restoration releases".
2. ***Channel rehabilitation***: restoring the functional floodplain of the river, which has been channelized and simplified by managed river flows and mining.
3. ***Sediment management***: reintroducing gravel (aka coarse sediment) to the river. Gravel provides spawning areas for salmon and provides other habitat benefits. Gravel entering the river system upstream of the dam is blocked from being transported to the Trinity River below Lewiston Dam, creating a gravel deficit in the river over time. TRRP resupplies the river with gravel to make up for the dam's impact in blocking new gravel supplies that would otherwise be provided naturally.

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[1] https://www.usbr.gov/mp/cvp/

[2] TRRP uses five water year types to determine how much water will be available to the Trinity River each year. The five water year types are: Critically Dry, Dry, Normal, Wet, and Extremely Wet. A wetter water year means more water is available for restoration flow releases.

4. ***Watershed restoration***: addressing negative impacts that have resulted from poor land management in the basin. Watershed restoration activities include decreasing the input of fine sediment from Trinity River tributaries that can clog spawning gravels and fill deep areas of the river.
5. ***Adaptive management***: monitoring, evaluating, and improving the effectiveness of river restoration actions.

The TRRP is proposing to change how variable annual instream flows are managed (Primary TRRP Component #1) with existing ROD water from Lewiston Dam. Since the implementation of the ROD, variable flow releases (aka restoration releases) have occurred after the water year type is determined in mid-April[3]. An approved hydrograph (i.e. water release schedule) developed by TRRP determines how much water is released daily during this period of elevated flows. Variable releases typically extend to early summer before returning to baseflow conditions and then remain at baseflow until the following April when a new water year is determined.



Photo 2. Young salmon on the Trinity River (photo credit Yurok Tribe Fisheries Department)

The current approach to implementing variable flows in the Trinity River results in cold water releases from Lewiston Dam that are out of sync from when the pre-dam Trinity River would have naturally received seasonal peak flows. Undammed tributaries to the Trinity River naturally flow higher during winter storm events, and as high elevation snowpack melts in early spring. Thus, natural contributions to the Trinity River from its tributaries are often receding by the time ROD flow releases from Lewiston Dam occur after mid-April.

The asynchrony between flow management and the natural variability of pre-dam flows has cascading impacts on the river's form and ecology, and perhaps the most detrimental of the impacts is to young salmon. Pacific salmon's life history has adapted to the natural seasonal variability of flows for millions of years. Current flow management keeps river conditions unnaturally cold, which suppresses metabolic rates during the key period of growth for young salmon. Later in the spring, the unnaturally cold river delays environmental cues that trigger smolts to outmigrate to the ocean before conditions in the lower Klamath become too warm to support salmon migration.

The TRRP proposes for Reclamation to shift a portion of the ROD water used for restoration releases to the winter period. In order to consider a change to the timing of Lewiston Dam releases that have been in place for nearly two decades, the TRRP will complete an Environmental Assessment (EA) to meet National Environmental Policy Act (NEPA) requirements and Reclamation will serve as the lead agency. The EA will evaluate and disclose

[3] The water year type is determined by the Department of Water Resources' B120 (ca.gov) water supply forecast.

the potential environmental effects of releasing ROD water earlier (e.g., during the winter period). Reasonable alternatives that could satisfy the proposal's intent will be analyzed if they are determined to be feasible. At a minimum, the EA will analyze the effects of the Proposed Action and a No Action Alternative.

The purpose of this notice is to invite you to contribute to the NEPA process for the winter flow project by providing comments, suggestions, or concerns you may have about the project during a public scoping period, pursuant to 40 CFR § 1501.9[4]. This scoping notice includes a general description of the Proposed Action and the purpose of and need for the project to encourage your informed participation.

Winter Flow Variability (Proposed Action) Goals and Objectives

Moving a portion of the ROD volume released from Lewiston Dam to the winter period is intended to have the following benefits to the natural character of the Trinity River:

- Time restoration releases from Lewiston Dam to better match natural flow variability during winter and spring runoff events. Coinciding natural flows and Lewiston dam releases would enhance natural cleaning and transport of river gravels.
- Limit the impact that cold water from the dam has on the growth of juvenile salmon by shifting a portion of ROD water from Lewiston Dam to the winter period.
- Allow the river to naturally warm earlier in the season than currently occurs to provide the environmental cues smolts rely upon in timing their outmigration to the ocean.
- Provide elevated flows before salmon fry emergence to increase food availability and higher river levels after emergence to increase access to floodplain nursery habitats
- Move ROD water allocations earlier to maintain more consistent lake levels in Trinity Reservoir through the summer months.

Description of Proposed Action

Under the Proposed Action, Reclamation would shift a portion of the ROD water for release during the winter to two distinct periods termed the Flow Synchronization Period and the Elevated Baseflow Period (Figure 1).

Flow Synchronization Period: Between December 15 and February 15, ROD water equivalent to 60,000-acre-feet would be released from Lewiston Dam when forecasting tools at downstream gages anticipate a rise in river levels of 4,500 to 12,000 cubic feet per second (cfs). The maximum flow from Lewiston Dam during this period would not exceed 6,000 cfs. The optimal combination of natural and dam-regulated flows to the Trinity River resulting from this flow synchronization would be adjusted downward, as necessary, to prevent flooding or damage to downstream properties.

Elevated Baseflow Period: Between February 15 and April 15, ROD water would be released from Lewiston Dam based on the Department of Water Resource's B120 water supply forecast. Using the B120 would prevent the overuse of ROD water should the water year end up being drier than expected. During this period, a hydrograph would be developed by TRRP to schedule the elevated baseflow releases.

Under the proposed action, after April 15, the remaining ROD water would be released to the Trinity River using the same methodology that currently exists for the scheduling of restoration flows. The maximum winter

[4] Council on Environmental Quality (CEQ) National Environmental Policy Act Implementation Regulations. 40 CFR Parts 1500–1508 (2020).

release of ROD water under the Proposed Action would differ from year to year based on the water year type, as follows:

- 60,000 acre-feet in a Critically Dry water year,
- 80,000 acre-feet in a Dry water year,
- 120,000 acre-feet in a Normal water year,
- 180,000 acre-feet in a Wet water year, and
- 220,000 acre-feet in an Extremely Wet water year

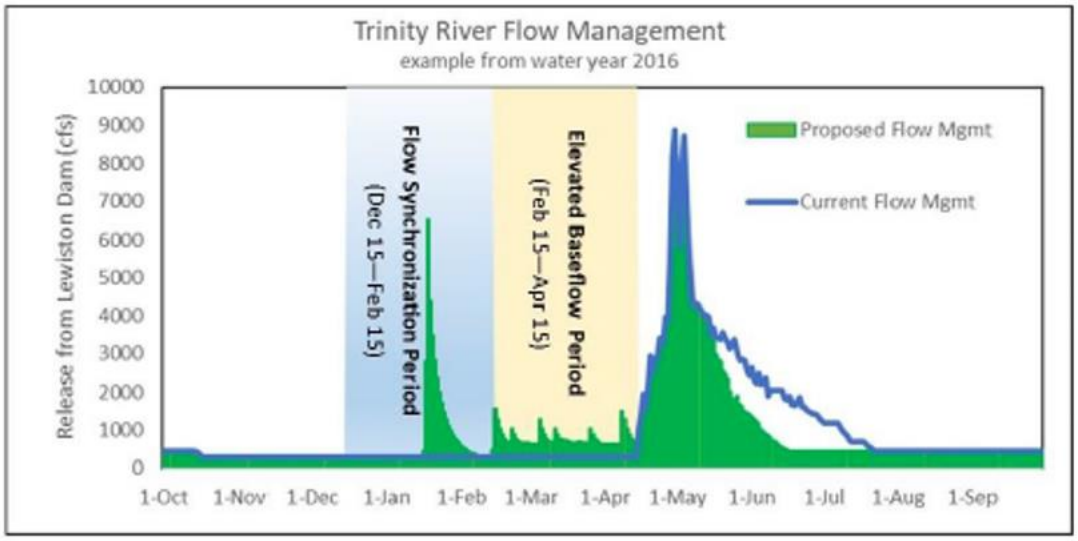


Figure 1. The Proposed Action to current flow management, using the wet water year in 2016 as an example. The blue line represents the hydrograph (i.e. water release schedule) that was implemented in 2016. Green represents the timing of water releases that would occur under the Proposed Action.

Possible Impacts

Possible impacts related to this management action that will need to be assessed through the EA include:

- Impacts on hydropower generation
- Impacts on water delivery to the Central Valley
- Recreational impacts, including fishing, rafting, and boating
- Risk of flooding through the management action
- Impacts on cultural resources and historic properties
- Biological impacts to the fishery, wildlife, vegetation, and wetlands

Proposed Project Schedule

- **Public Scoping:**
  May 18 – June 18, 2021
- **Draft EA for public comment:**
  September 2021
- **Final EA and Flow Decision:**
  November 2021
- **Proposed implementation:**
  New flow management under the proposed action would begin December 15, 2021.

To Comment on this Winter Flow Project Scoping Proposal:

- Send your comments via **mail** by June 18, 2021, to:
  Winter Flow Scoping
  C/O TRRP
  P.O. Box 1300
  Weaverville, CA 96093
- OR send your comments via email by June 18, 2021, to fgutermuth@usbr.gov.
- Only comments postmarked or emailed by June 18, 2021, will be fully considered by TRRP to meet the Project's NEPA timeline per DOI Secretarial Order 3355.

How to Participate in the Winter Flow Scoping Process

The TRRP is seeking information or analysis related to winter flow management. All comments submitted via mail and email will be considered. Full citation of referenced literature is requested to ensure and expedite its retrieval. After the scoping comment period, TRRP will review the scoping comments and determine key issues.

- Project information and updates are available at: https://www.trrp.net/restoration/flows/winter-flow-variability/.
- Send your comments via mail or email to the addresses above
- For all submittals, please include Winter Flow Scoping Comment in the subject line and the following information:
  - Your name and address (telephone and email address are also suggested)
  - Project-specific comments about the Proposed Action. Please include supporting information that would help identify issues, develop alternatives to respond to those issues, or predict the environmental effects of the proposal.
- Comments received will be considered part of the public project record for this proposal and will be available for public inspection.

Trinity River Restoration Program

BUREAU OF RECLAMATION

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Figure A-1. Winter Flow Project Scoping Notice.

Table A- 2. Scoping Meeting Comments and Summarized Responses

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Hydrology and Flooding	John Braz	My Questions are: How is this going to affect the flood plain in the Junction City area? What effect will it have on bank erosion to our respective properties? Will it affect the current FEMA Flood zones as they stand now? Has the inflow from the tributaries below the dams been taken into consideration? Can you breakdown the flow cart from acre feet being released during various acreage feet released to cubic for the various releases? ex.: 60,000 acre ft. how many cubic feet a minute, 80,000, 120,000, 180,000, 220,000.	Section 3.3 Hydrology and Flooding
Recreation - Boating	Lin Okelley	I boat the Trinity in the summer	Section 3.7 Recreation
Recreation - Boating	Megan Futscher	I have heard that there are plans to stop or greatly reduce water release to the Trinity river during the summer months. I wanted to write to say that I have rafted and whitewater kayaked on the Trinity river many times from the time I was a child up until now as an adult. The river has been such a valuable outdoor recreating experience for me and it would be devasting to loose the possibility of boating on it. I would like to strongly advocate for the continuing of the summer releases, at least on weekends, to maintain the river for recreational boaters.	Section 3.7 Recreation
Fishery Resources	Hahn Archiblad	I support this proposal. If it is good for the fish, I agree!	Section 3.6 Fishery Resources

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Recreation - Boating	Evan Drath	The Trinity River has been the rafting and camping destination of choice for my family for almost 20years. My wife and I took our first rafting trip as a young couple to Hayden Flat in the Summer of 2004. Since then we have celebrated birthdays, friendships, and family vacations to the Trinity – enjoying both private and commercial rafting experiences. Recently, we took our 10 year old son and his best friend and family for a multi-day camping/rafting trip – introducing them to this beautiful and rare area. It is hard to overstate what a loss it would be if The Trinity River and the area surrounding it were reduced to fish flow during the Spring and Summer months. Please maintain the Spring and Summer releases. Feel free to contact me for more input. Thank you for your time.	Section 3.7 Recreation
Recreation - Fishing	Randy Hamann - Steel Bridge Guides	To Whom it may concern, I am a licensed/permitted fishing guide on the Trinity River, and have been since 2010. I have read your proposal and am in favor of implementing what's been proposed. My only additional comment would be to consider using the allocated water for the Winter Flushing events to instead maintain a higher minimum Winter flow, the current Winter minimums allow the river water to get too cold and don't represent what pre-dam Winter flows would have been.	Section 3.4 Water Quality Section 3.6 Fishery Resources
All impacts	Rick Barton	I do not support this project. I disagree with all the possible impacts.	Non-substantive
Recreation - Boating	Sean	I boat the trinity in the summer!	Section 3.7 Recreation

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Recreation - Boating	Alex Bowlds	I am not in favor of the proposed Trinity River water release schedule. The proposed schedule will eliminate whitewater recreating on the river during the summer months. This will have an adverse impact on the already struggling businesses that depend on tourism and recreation dollars that come with people that use the river during the summer months. Please continue with the current release schedule. It that is not possible, at least provide increased weekend and holiday releases that support whitewater recreation. Weekend and holiday releases don't need to be 24 hours per day. They can be scheduled to reach the peak flow at Pigeon Point at 10:00am and drop off by 5 or 6pm each day. All stakeholders should have a voice in the decision to change the release schedule. Many of us have been using the Trinity River for a variety of uses for decades. The whitewater boating community is just one of the stakeholders. I strongly believe that reasonable compromises can be made to the benefit of all.	Section 3.7 Recreation

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Recreation - Boating	Ben Gravitz	The proposed flow changes for the Trinity river would essentially eliminate most of the spring and summer white water boating season and therefore should not be allowed to go forward. Thousands of commercial and recreational paddlers use the river for their livelihoods and recreation, not to mention the lodging and food service businesses that would be adversely impacted by this proposal. The river is currently managed to balance the interests of power generators, agriculture and recreational river users while protecting fish. This new proposal radically disrupts that balance and needs to be stopped now. Please let me know what you will do to preserve this balanced approach and the spring/summer flows on the Trinity.	Section 3.7 Recreation
Recreation - Boating	Bree Schaider	Dear federal government organization who fairly represents all people, and protected waterways. Please continue higher summer flows to allow for not only summer boating but also encourage healthier waters for flora/fauna.	Section 3.7 Recreation
Recreation - Boating	Ida Crawford	I am a kayaker from Chico who enjoys boating the Trinity all summer. Usually do the Pidgeon Point run. Please do not drop the flows during the summer to the proposed levels. That would ruin the experience.	Section 3.7 Recreation
Recreation - Boating	Marilyn Freedberg	I boat the Trinity River in the summer. It is one of my favorite rivers and our kayaking club has its biggest annual trip there over the 4th of July weekend, for more that 20 years.	Section 3.7 Recreation

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Recreation - Boating	Paul Futscher	Thousands of people have boated the Trinity River on late spring and summer flows particularly after the ROD 2000 that put water back into the river more often. Besides rafting companies and individuals paddling groups from all over come up and run it: Gold Country Paddlers, Loma Prieda Paddlers, Shasta Padders, AW, Sierra Paddling clubs, and many more. Hell-hole is know throughout the paddling community. Please refer to Dreamflows for guides to the river: 450cfs is not really a boatable level. The boating mostly stops once the river drops much below 1,000cfs with a preferred level of 1,500cfs-3,000cfs. I read the proposal and under the new plan and a normally wet year the boating would end the very beginning o June instead of July 15th – six weeks earlier. Effectively this will end white-water on the Trinity. This should be considering in your planning.	Section 3.7 Recreation

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Methodological and Scientific Approach and Rationale	Russell Giuntini	I read with great interest your proposed flow management plan hoping TRRP would lay out the science to justify the proposed flow changes. On any number of occasions in the past I've been told Kyle was completing a study that would lay out the science behind any new flow regimen Most recently that subject came up at one of the stops during Congressman Huffman's float of the river wherein we were told the study was near completion but needed peer review. Is Kyle's study complete? Has it been peer reviewed? With that in mind I am requesting a copy of any and all scientific papers that TRRP believes support the proposed the flows set forth in the scoping notice. Thank you.	Appendix B – White Paper Appendix E – Resource Analysis Methodology and Results
Recreation - Boating	Joe Burns	I kayak the Trinity in the summer.	Section 3.7 Recreation
Recreation - Boating	Johnny Newsome	I am writing to voice my desire to have recreational white water flows be factored into any future Trinity River release schedules. I retired to this area in large part because I am an avid kayaker and I often enjoy Boating on the Trinity.	Section 3.7 Recreation

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Water Quality, Methodological and Scientific Approach and Rationale	Jvorp	Years 2020 and 2021 have been classified as Critically Dry. The TRRP would commence December 15, 2020 with the withdrawal of a significant volume of water from Trinity Lake (Flow Synchronization). Unless historic rainfall occurs before Flow Synchronization commences, lake levels will be low perhaps historically low. Water quality of Trinity Lake will certainly be unknown and may be compromised. Synchronizing the Trinity River will also impact Lewiston Lake. The impact of replacing water in Lewiston Lake and the Trinity River with the water remaining in Trinity Lake in December of 2020 must be analyzed. In fact the benefit of starting ay study after 2 years of Critically Dry rainfall must be fully explored.	Chapter 2 Description of Alternatives Section 3.4 Water Quality Appendix B – White Paper Appendix E – Resource Analysis Methodology and Results
Recreation - Boating and Fisheries	Walter Melville	I have boated the Trinity River in the late spring or summer. You must also consider the effect of exporting the Trinity River flows on the endangered salmon on both the Trinity and Klamath Rivers.	Section 3.7 Recreation
Recreation - Boating and Fishing	Morgan Milligan	I am a whitewater rafter and fishing enthusiast. This new proposed river flow management plan effectively eliminates boating and diminishes fishing on the Trinity during summer months. This does not help support the boating, fishing, or economy of the nearby towns and communities. Bad choice I paddle and fish the Trinity River every year. I help keep the local business alive by spending time in the area. Keep the boating flows as they are…Please!!!	Section 3.7 Recreation

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Recreation - Boating	Paul Raffaeli	Please support white-water boating on the Trinity with continued summer flows. I do paddle the Trinity River and would really like summer releases to continue.	Section 3.7 Recreation
Recreation - Boating	Paul Eilers	Please continue to release summer flows to allow rafting and kayaking on the Trinity.	Section 3.7 Recreation
Recreation - Boating	Suzanne Remien	I boat the Trinity River in the summer!	Section 3.7 Recreation
Recreation - Boating	Bruce and Sharon Schumacher	We have kayaked and canoed the Trinity River in California for years. We want the boatable releases to continue for us and the boating community.	Section 3.7 Recreation
Recreation - Boating	Joe Simpkin	Mr Getermuth, I'm associated with 3 or 4 Nor Cal whitewater boating groups. The proposed summer Trinity release schedule (450 cfs, +/-50% of the "**Trinity River's flow**) has a lot of folks riled up. I don't have an opinion quite yet, but am trying to understand the nuts and bolts of TRRP's decision. I've got two basic questions and was hoping you could answer them. **Is the "flow of the Trinity River" defined as the release of the Trinity Lake?** **If not, how is the "flow of the Trinity River" defined or calculated?** I counted at least a dozen tributaries to Trinity Lake upstream of Lewiston.	Chapter 2 Description of Alternatives

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Methodological and Scientific Approach and Rationale	Ted Couch	Writing to say I OPPOSE proposed changes, and believe the TRRP should continue with current program. While there has been some scientific research on this, the conclusions are not firm enough to justify such a change. This would have serious impacts to the viability of the region, economics, and beyond. I urge you to please continue with current release operations, thank you.	Chapter 2 Description of Alternatives Appendix B – White Paper Appendix E – Resource Analysis Methodology and Results

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Recreation - Boating	Joe Simpkin	Thanks for the email Mr Gutermuth. I know that the TRRP is most concerned with trying to maintain a healthy fish spawning environment, and I applaud that. You said: **"Trinity River releases are those that come from Lewiston Lake and flow downstream in the Trinity River versus those that flow via tunnel to the central valley."** The part I'm interested in right now is the direct source of Lewiston Lake water, +/-50% of which is released into the Trinity River. It would seem obvious that the water came from Trinity Lake, but I wanted to be certain of that before I opened my mouth and took a position. I was looking online to try to find the numbers on the water diverted from Trinity Lake to the CVP (and other interests) to compare that to the flows that actually reached the Trinity below Lewiston. I would love to know how much West lands (and others) get from Trinity Lake, but I haven't yet found a source for those numbers. Might you be able to direct me?	Chapter 2 Description of Alternatives

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Recreation - Boating	Whitney Cary	Please do not change the flow plan on the Trinity River. This will make late spring and summer boating recreation on the Trinity nearly impossible. I would like to ask that you continue with the current release schedule and give weekend releases during the summer. If the flow plan is changed now, it will be nearly impossible to reverse it with Ag and power resisting the change back. Please consider releasing the water from the top of the water column, not the bottom, with current release schedule.	Section 3.7 Recreation
Recreation - Boating	Zak Leiby	I'm an avid whitewater boater and grew up on the Klamath river. I've been paddling all over California for 30 years and the Trinity river is one of the most amazing whitewater rivers in the State. These proposed changes could drastically alter the boating season and harm the local economy. I urge you to reconsider these changes.	Section 3.7 Recreation
Hydrology and Flooding	George Zengal	Hand written. Feels the comment period is too short for such a major project. Questions include: Will proposed flow changes be into perpetuity Will changes result in levels above 2016 FEMA flood plane Will flows be at or above existing 2016 100 yr boundary If 2 and or 3 above are yes, then for what periods each year Resident has pump house that could be inundated Will this affect septic/leach fields May have significant property value effects See full comment on following pages	Chapter 2 Description of Alternatives Section 3.3 Hydrology and Flooding

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Recreation - Boating	Mark Mills	I have been boating and fishing on the Trinity River for many years thanks to summer recreational flows. I would like the summer flows to continue. Please take the steps required to make this happen and kindly notify me of any proposed changes. Summer river users help the local economy by purchasing goods and services in the river towns. It would be a big economic hit to the area if summer flows were discontinued.	Section 3.7 Recreation
Recreation - Boating	Matt Porter	I have been kayaking on the Trinity River since 1999. I run The Burnt Ranch Gorge Section of the Trinity River all year. I run the Burnt Ranch Gorge and Pidgeon Point sections between 450 cfs and 3000 cfs on the Burnt Ranch gauge. The best flows for recreational Kayaking on the burnt ranch are 800cfs – 2500 cfs @ Burnt Ranch (1000cfs is the very best)	Section 3.7 Recreation
Recreation - Boating	Val Vigil	I kayak the Trinity, Pigeon Pt. run almost every weekend until the flows get below 600 CFS. I prefer it between 900 and 2000 CFS. It is usually too low by August, but if it could flow longer I would love it.	Section 3.7 Recreation
Recreation - Boating	Loren Powers	As a boater I request that you please allow summer release to continue. This is critical for our environment and for recreational purposes. We find such joy from this section of river.	Section 3.7 Recreation
Recreation - Boating	Russ Barrett	I boat the trinity during the summer	nonsubstantive

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Recreation - Boating	Urs	Since 1991 I have been boating on the Trinity river, about 20 to 30 days per year. I hope to be able to continue to do so for many years to come.	Section 3.7 Recreation
Recreation - Boating	Ryan Enright	My name is Ryan and I am a whitewater kayaker who enjoys boating the main Trinity (also NF East Branch when flowing). American Whitewater has asked us to weigh in on our flow preferences and time of year that we boat. Basically, I boat here whenever I can! Typical periods of activity are very end of December, early January and summer (August, it would seem). From my kayak log: However, as you can see, this year I kayaked in May when the river was pumping at its highest, 2000 cfs and down to 1500 cfs by the end of the week. If I could have it my way, I'd boat it at 1500 cfs and up everytime. These flows have the best haystack waves and HellHole is most successfully run! Also, Good Morning America, Pinball and FishTail had excellent wave trains as well!	Section 3.7 Recreation
Recreation - Boating	Jeff Wasielewski	I paddle the Trinity River in my inflatable kayak in the months of August and September. My preferred flow level as measured at the Burnt Ranch Gorge Gauge is 1,500 cfs. I am concerned that the TRRP will reduce the flows in August and September.	Section 3.7 Recreation
Recreation - Boating	Madeline Dannewitz	My name is Madeline and I've been a guide on the trinity river for three seasons. I boat the river year round, whenever the flows are high enough to boat. My favorite commercial level for rafting this beautiful river is anywhere from 850-2,000 CFS. Of course us private boaters all love those big flows of above 2,000 CFS though! It breaks my heart for this season, as the flows have already dropped in June to what they usually are in August, around 450 CFS. Please help our recreational boaters and fish by keeping the flows up!	Section 3.7 Recreation

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Recreation - Boating	David Cheung	I'd like to weigh in on the new proposed changes to the flow schedule on the Trinity River. We are not local to the area, but we do visit regularly during various times of the year, including late May, June, and sometimes in July. We are recreational boaters and always appreciate flows that benefit us as well as the wildlife on this pristine river. I personally prefer flows between 1,000 to 2,500 cfs depending on water management needs, but I've been known to boat as low as 500 cfs, although some sections become somewhat hazardous at those flows.	Section 3.7 Recreation
Recreation - Boating	Beth Gaydos	White water kayak Pigeon Point. Prefer 2,000 cfs	Section 3.7 Recreation

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Fishery Resources	Life in Balance	While your efforts to improve fish habitat are applaudable we should admit they are based on the fallacy that humans can control natural systems better than nature can, as evidenced by the predicament we are now in. The only true course of action we should pursue is the removal of all dams and to disallow properties to be developed in regions prone to flooding lest they choose to accept the responsibility. The collapse of the salmon population and the oceans in general will continue until we swallow our pride and attempt to live in harmony with nature instead of trying to control her. We treat the oceans like dumping grounds and allow over-fishing. We choose immediate convenience over long-term responsibility. This way of life is not sustainable and our children and their children will reap the sorrowful harvest. Let us remove the dams and let nature resume her work. We can adapt around the conveniences in favor of a healthier ecosystem.	Section 3.6 Fishery Resources

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Recreation - Boating	William Thorpe	I have run the Trinity from Pigeon Point to the confluence with the Klamath including Burnt Ranch At flows from 450 to 12,500 cfs. I worked commercially through the 1990's when Big Flat was a thriving whitewater town like Coloma, CA. Pigeon Point prime level is 1200-1400cfs. Safest and most forgiving level is 1600cfs. Burnt Ranch prime is 1400cfs. Hayden to Cedar is prime 1200-2400cfs. Picket Fence rapid becomes dangerous at 600cfs and basically unrunnable below 525cfs. There is metal in river left at low flows. Big Flat to Hayden is scenic and fun with many options for access. I have held a permit (not covid time) and in the future wlll hold a permit with USFS under Disabled Adventure Outfitters. We serve people with bleeding disorders. Teenagers spend a week from as far as Fresno. In good years we held trips for groups from Michigan and Texas. People will travel long distance to experience the Trinity. It is difficult to book trips when we are not sure of water. I try to book camps earlier and earlier each year. But kids are in school until mid-June. We need to write a grant to Boating and Waterways to improve access at Cedar Flat. The Tunnel Flat run with put-in at Hawkins Bar is a beautiful run. I live in Humboldt County because the close proximity to the Trinity River I have boated the Trinity all 12 months of the year. Wetsuits, dry suits, swim suit. Smith River winter. Then Salmon River until it drops under 3.5 feet. Then it's Trinity every weekend until Picket Fence is too low. Hell Hole is not very safe to run under 625cfs. One year I portaged my canoe at 550 and recommended the raft do the same. They ran it and a hemophiliac broke his femur. Drove him to Weaverville and got airlifted to Sac	Section 3.7 Recreation

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Recreation - Boating	Laura Heron	I am a whitewater kayaker and I boat regularly on the Trinity River in the spring, summer and fall. My preferred release flows are between 1000-3000cfs.	Section 3.7 Recreation
Water Quality Fishery Resources	Anna Sierra-Nowell	We want clean water. For the fish so they can sustain humanity. You won't know the price of water until the well runs dry.	Section 3.4 Water Quality Section 3.6 Fishery Resources
Recreation - Boating	Wes Schrecongost	I am writing in regards to new flow management in the trinity river. I spend a large amount of time on the trinity river. It's a special place to me where I learned to kayak at the age of 30. I then spent as much time on this river due to the beauty and adventure that are available. I tend to spend a large amount of time with my friends on the burnt ranch gorge section where I've been able to form relationships with many dear friends because of these opportunities provided by these flow releases. I'd say I kayak burnt ranch gorge 3-5 times a week and we have our weekly run every wed night after work during the long summer hours. I hope that I'll be able to continue These summer adventures with my friends	Section 3.7 Recreation
Recreation - Boating	Bruno Pitton	Please consider recreational boaters when determining flow schedule proposal.	Section 3.7 Recreation
Recreation - Boating	Carolyn Atwood	I support American Whitewater in their comments on the winter flow variability on the Trinity River. Specifically, I boat the Trinity during the spring and summer months. I support an increase in the minimum flow to a level above 600 cfs during the summer months.	Section 3.7 Recreation

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Recreation - Boating	Masa Oto	Time of Year: June ~ October (after snow melt season is over and before rainy season begins). Flow level at Burnt Ranch Gorge: 900-1400 cfs. Dam Release for Trinity river can give CA paddlers' community super high quality white water while many rivers are un-runnable in summer to autumn. There have been 450-500 cfs release in dry-time of other rivers, but higher flows in several days every month would be much desirable.	Section 3.7 Recreation
Methodological and Scientific Approach and Rationale Fishery Resources	Benson Kanemoto	This new flow proposal is being investigated because after 20 years someone noticed it's not working? If it's working why change it? The only thing I've seen is gravel filling up the holding pools for salmon and steelhead. Meanwhile, the high flows through Lewiston lake destroy all weed beds and the insects that feed the trout.	Chapter 2 Description of Alternatives Section 3.6 Fishery Resources Appendix B – White Paper Appendix E – Resource Analysis Methodology and Results
Recreation - Boating	Bill Tuthill	I have paddled all sections of the Trinity river, and would like summer releases to continue.	Section 3.7 Recreation
Recreation - Boating	David Rodriguez	I boat the Trinity river in the summer.	Section 3.7 Recreation
Recreation – Boating	Mike Michalak, The Fly Shop	See full comment on following pages.	Section 3.6 Fisheries Resources Section 3.7 Recreation
Recreation - Boating	Mariah Hagstrom	Hi my name is Mariah Hagstrom 17600 Highway 238 grants Pass 97527 541-291-6633 Our preferred Trinity river flow is 1,800-2000Ccfs	Section 3.7 Recreation

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Recreation - Boating	Davide Sartoni	I paddle the Trinity River from March to July and prefer flows between 1,000-1,500 cfs at Burnt Ranch Gorge	Section 3.7 Recreation
Recreation - Boating	Ginger Shaffer	My name's Ginger and I love kayaking the pigeon point section of the Trinity River. I heard about the proposal to lower the flows during the summer months. I usually boat there year round but it's always nice to have a dependable run within my area so I can get on the water. Of course I enjoy high water out there, but I also enjoy around 800 cfs. I hope it works out and the boating community has a dependable run year round!	Section 3.7 Recreation
Methodological and Scientific Approach and Rationale Fishery Resources	Jed Fish	See full comment on following pages.	Chapter 2 Description of Alternatives Section 3.2 Geomorphology and Soils Section 3.3 Hydrology and Flooding Section 3.7 Recreation Appendix B – White Paper Appendix E – Resource Analysis Methodology and Results

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Methodological and Scientific Approach and Rationale Fishery Resources	Andrew Harris, Trout Unlimited	See full comment on following pages.	Chapter 2 Description of Alternatives Section 3.6 Fishery Resources Appendix B – White Paper Appendix E – Resource Analysis Methodology and Results
Fishery Resources	Allen Houston	See additional attachments on following pages.	Section 3.6 Fisheries Resources Appendix B – White Paper Appendix E – Resource Analysis Methodology and Results
Recreation – Boating	David Steinhauser, Trinity River Rafting	See full comment on following pages.	Section 3.6 Fishery Resources Section 3.7 Recreation
Recreation - Boating	Theresa Lorejo-Simsimon, American Whitewater Association	See full comment on following pages.	Section 3.6 Fishery Resources Section 3.7 Recreation

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Recreation - Boating	American Whitewater Association	On Wednesday June 2, Seth Naman (NOAA) and Kyle De Juilio (YTFP) Theresa L. Lorefo-Simsiman and Dave Steindorf of the American White water associate (AWA). Goals of the meeting were to inform AWA staff about the planned flow releases patters in the proposed action, and TRRP affiliates to hear any concerns or feedback from AWA staff. Seth presented background information on the ROD and current flow patterns, including the proportions of the water year flow volume that currently occur before and after mid April, as well as the historical proportions. Kyle presented the post ROD hydrographs, both with and without the proposed action. Seth and Kyle fielded questions from the AWA staff including particulars on the proposed action, changes to flows during the spring months, and AWA staff agreed to look into particular flows, locations, and time of year that may be of concern to their constituents, and circle back with Kyle and Seth. Overall the AWA supported the flow actions in the proposed action but wanted to evaluate the proposed action further.	Section 3.6 Fishery Resources Section 3.7 Recreation
Methodological and Scientific Approach and Rationale Fishery Resources	Chairman Byron Nelson, Jr., Hoopa Valley Tribe	See full comment on following pages.	Chapter 2 Description of Alternatives Appendix B – White Paper Appendix E – Resource Analysis Methodology and Results

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Recreation - Boating	Matthew Hollifield	I am reaching out regarding the Trinity River Restoration Program/Winter Flow Variability Action. My name is Matthew Hollifield, and I am among the many that enjoy rafting the Trinity River in the summer. I typically boat with a larger group on or around the 4th of July. Ideal flow level is 1,800 - 2,000 CFS as measured at Burnt Ranch Gorge. Please continue to make recreational rafting a viable summer activity on the Trinity River.	Section 3.7 Recreation
Recreation - Boating	Dave Bish	My name is David Bish and I moved to Northern California 30 years ago specifically for the wilderness opportunities including, first and foremost, the white water opportunities. I consider the Trinity River to be my home river. I have boated it at many different levels and find it is both a challenging river as well as a great destination for introducing new boaters to the sport. I generally boat the Pigeon Point to Big Flat and Hayden Flat to Cedar Flat sections. I find that my favorite river flows are in the range of about 800-1800 cfs - a little higher and a little lower are acceptable. Please feel free to contact me if you wish additional input	Section 3.7 Recreation
Recreation - Boating	Mary Nishioka and Jim Tornillo, Shasta Trinity Fly Fishers	See full comment on following pages.	Section 3.7 Recreation
Recreation - Boating	Andy Hertz	I'm writing to express my interest in recreational releases on the Trinity River. My family rafts and kayaks the Pigeon Point section of the river during the Spring, Summer, and Fall. Our preferred flow at the Burnt Ranch Gorge gauge is 1800-4000 cfs.	Section 3.7 Recreation

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Methodological and Scientific Approach and Rationale Fishery Resources	Friends of the Trinity River (Signed by Andy Hertz, Armand Castagna, Clark Tuthill, Darrin Victorine, Jim Smith, Kyle Catanese, Paul Catanese, Scott Stratton, Tom Mahan, Trent Tuthill, Russ Giuntini)	See full comment on following pages (section.	Chapter 2 Description of Alternatives Appendix B – White Paper Appendix E – Resource Analysis Methodology and Results
Recreation - Boating	Joseph Krochka	I was asked by American Whitewater to submit my input in consideration of possible changes to the scheduled water releases from Lewiston Dam. My name is Joseph Krochka. I am a whitewater rafting and kayaking enthusiast. And I LOVE boating the Trinity River! While my friends and I boat California rivers year-round, my ideal time to boat the "Pidgeon Point" section of the Trinity is May, June and July. I will eagerly make the four-hour drive from my home in Auburn, CA to get on the Trinity at least once a year during those months. The ideal flow is between 1200 - 1800 cfs. The Trinity is such a wonderful river! There are sections for ALL skill levels of boaters. Added to that are the clear, clean water and outstanding fishing opportunities. I hope an agreement can be made to support all interests in this outstanding natural resource!	Section 3.7 Recreation
Recreation - Boating and Fishing	Jessa Rego	I am so happy to hear that the Trinity River Restoration Program is looking at the Winter Flow Variability Action to help fish. I learned to kayak and raft on Pigeon Point and Hayden to Cedar, and have been boating there for 12 years. I will be happy for anything that really helps the fish. Increased winter flows would make for more fun winter boating. I like and flow from passable to 10k cfs any time of year	Section 3.7 Recreation

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
Recreation - Boating	Davide Sartoni	I paddle the Trinity River from March to July and prefer flows between 1,000-1,500 cfs at Burnt Ranch Gorge	Section 3.7 Recreation

Recreation - Boating	Jim Froland	I am writing to comment on the newly proposed summer flow releases from Lewiston Dam on the Trinity River. Specifically, I'd like you to consider incorporating some limited, short-term releases for recreational boating during the summer period through the section from Lewiston to Burnt Ranch. My experience suggests a periodic flow release of 1500 to 2000 cfs during the summer months (measured at the Burnt Ranch gauge) that was timed to coincide with weekend boating activities, would provide continued recreational boating and substantial economic benefits to the local communities. Background - I understand the new Flow Variability Action is being considered to improve fish habitat and survival, specifically for Chinook Salmon. For the record, I am in full support of your attempts to improve these conditions for fish, and welcome ongoing improvements based on current studies and future research. My comments here are in regards to your new proposed summer flow releases. I have been rafting and kayaking that section of the Trinity River for the past 30 years, primarily during the summer period. For more than 20 of those years I have hosted an annual float & camp party around the 4th of July using the group camp at Pigeon Point. During that same period I've watched the local rafting companies flourish with the improved summer flows, helping the local economy and providing summer jobs. These activities will certainly be compromised under the newly proposed release schedule. I also understand that there is only so much water available, and absolutely agree with the priority to protect and improve the Trinity fish runs. But I am writing to request consideration of some type of periodic recreational flow releases through the summer period. The Trinity River corridor is popular and so well suited for recreational water activities, and current heat waves and drought conditions just make it all that much more	Section 3.7 Recreation

Topic(s)	Individual or Organization	Comment Text	Concerns Addressed in EA
		precious. So I would like to suggest some modifications to your proposed flow releases that could allow some summer use periods without impacting the water budget in a major way. In my experience, I think a minimum flow target for most recreational boating on these sections of river would be from around 1500 to 2000 cfs, measured at the Burnt Ranch gauge. The majority of summer boating occurs from Pigeon Point campground down to the bridge above Burnt Ranch, a length of about 20 miles. Perhaps a system of short duration recreational flow releases could be timed to reach this area on weekends, to coincide with maximum potential usage. It would be helpful to have releases last for a 48 hour period, to alleviate the boater crowding that occurs on the South Fork American river when the flow rises for just a few hours a day. According to your new proposed release schedule, it would be beneficial to have these weekend flow releases start sometime in June and continue maybe into August. I think this would provide sufficient flows to make the river an important destination for recreation and continue the commercial benefits in the local area.	

Extended Comments

Letter from George Zengal

Winter Flow Scoping
c/o TRRP
P.O. Box 1300
Weaverville, Ca. 96093

Re: Trinity River waterflow changes Date: 6/2/2021

FYI, I received one mail announcement on 5/21 and another on 5/26. I am very concerned as to the potential effect your flow modifications and any change in current established water flows will have on my properties along the Trinity river!

I also believe the less than 30 day written response notice is totally time inadequate to address an issue as major as this. The gravity of the issue and long list of public concerns can not be expected to be ~~solved~~ resolved in less than 30 days. This matter should have public hearings where questions can be raised and answered by your staff. I feel that this matter is being shoved down my throat without any opportunity to solve individual property owner concerns!

Some of my questions and concerns are as follows:
1) will proposed flow changes be into perpetuity?
2) will proposed flow changes result in water levels above existing designated 2016 FEMA floodway boundary?
3) will proposed flow changes result in water flow levels at or above existing 2016 designated 100 year boundary?
4) if 2 and/or 3 answers are yes, then for how long a period/year will this occur and what months?
5) if 2 and/or 3 answers are yes, then my existing Trinity County grandfathered on site pump/or well currently non conforming due to FEMA changes in 2016 will be underwater due to your proposal. How will I be able to service/maintain, access, use my pump/and well? If this happens I expect like kind replacement due to damage to my property.
6) will your project water flow level changes affect temporarily/permanently Trinity County restrictions on locations for septic tank, leach field or water sources. I have two parcels that could be effected by these limitations. I would expect full compensation for loss of these rights!

7) This proposal could have adramatic affect on property values if water flow releases as suggested diminish usability, change in highest and best use of property, and decrease in marketability or saleability of the property.

I don't care about your project deadline whenever that is. It is imperative you provide the general public reasonable time to respond to your request and provide them with the opportunity to express their property owner rights.

Please reconsider your method of addressing this issue and allow reasonable time for public response.

George Bagel, property owner

Letter from Mike Michalak, The Fly Shop

The Fly Shop

Redding, California

Winter Flow Scoping
% TRRP
P.O. Box 1300
Weaverville, CA 96093

Response & comment to the Trinity River Restoration Program Winter Flow Scoping Proposal:

The Fly Shop is arguably the largest single, private, stakeholder in the local/regional business and recreation community affected by the Trinity River Restoration Program (TRRP) proposal. According to the Bureau of Land Management, our business conducts an average in excess of 20% of the reported guided steelhead fishing trips on the permitted section of the Trinity River during the December to March window which is the focus of our critical comment.

Prior to specific criticism it is important to examine and evaluate the objectives and the results of previous Trinity River Restoration proposals. The Record of Decision creating the implementation of the TRRP states the purpose is to restore the Trinity River and its fish and wildlife populations.

By any objective appraisal they have been a dismal failure.

As the published Trinity River Hatchery Returns show, since the implementation of the TRRP in 2000, the Chinook Salmon, Silver Salmon, and Steelhead escapement has plummeted:

Graph 1	Spring Run Chinook	Fall Run Chinook	Coho Salmon	Steelhead
2004	6,550	13,129	10.983	5,731
2019	4,478	1,586	649	386
2020	882	3,926	952	590

Consequently, we agree wholeheartedly with the Headwaters Corporation Organizational Assessment Report of the TRRP, November 29, 2018, which cites many problems inherent to the TRRP; lack of a shared organizational goal among the member groups, a lack of clearly defined organizational decision making, and a lack of a rigorous scientific process including ethical peer review. Absolutely nothing has been done since that report has been published to correct the problems or administer the suggested solutions cited in that scathing report.

Moreover, the TRRP has consistently focused on salmon to the exclusion of the other species of fish in the system, particularly steelhead. Evidence to this is the fact that the TRRP Scoping Proposal document cites the benefits to salmon eight times and all but ignores the impact to steelhead (listed only once in the entire document. This is alarming and is a further indication of their myopic, one-dimensional perspective.

As we see, the question is simple (When should water be released to best serve the fishery?) and the answers only slightly more complex. The TRRP proposal to accelerate high-flow events no earlier than June is not controversial and should have been included in earlier proposals. However, the bulk of the proposal, (recommendation of elevated winter flows during December through February/March) lacks both objective and subjective rationale and fails the test of even the most elementary scrutiny.

Begin with the fact that it's totally unnecessary. Substantial tributary inflow below Lewiston Dam, augmented by a number of small streams in the Junction City area, and the North Fork already accomplishes the goal of regular rearing habitat inundation. These proposed flow increases would substantially affect only the few miles above Rush Creek in the top sections of the river. This is not a major spawning area and is typically the only section that remains clear enough for recreational angling after major storms. Allocation of that water would reduce the amount available in the spring and negatively mitigate the impact of those releases.

The Fly Shop's concerns are based upon what we have witnessed in the past 40+ years fishing and guiding on the Trinity River watershed prior to and subsequent to the implementation of the Trinity River Restoration Program (TRRP). More to the point, we are understandably skeptical of the methods proposed, and the scientific basis used to select, implement, and monitor the various projects, the lack of transparency by TRRP, and what appears to be a "dartboard" approach to problem solving that lacks both common sense and consideration of other factors. Beyond transparency is a lack of TRRP accountability. Specifically, the Oregon Gulch project. During this project the water turbidity exceeded levels allowed by the permitting process, and destroyed the fishing conditions downstream of the project work area.

The TRRP Oregon Gulch project drastically remapped the river and eliminated prime adult salmon and steelhead holding water. These are runs we have fished in and caught steelhead for decades. Gravel injection has drastically reduced the average depth of the river from the top of the river down to Douglas City. This has made navigating many sections of the river problematic at the low winter releases and eliminated many adult fish holding areas. Even this would be palatable if we were seeing adult fish returning in greater numbers. Instead the reverse is true.

The documentation the TRRP provided in the scoping solicitation lacked most of the essential supporting information and there was a total lack of transparency in the criterion used to form the basis for their decision or the scientific rationale to develop the proposal. A government funded organization should operate transparently. No independent peer review has been cited in the scoping proposal and this fact alone should render their recommendations unacceptable. In fact, since the dissolution of the Trinity River Adaptive Management Group in 2019, little information has been allowed to flow publicly.

Moreover, no publicly provided documentation associated with this scoping document addresses effects on any species directly other than Chinook Salmon, What little documentation is provided deals with one very specific age class and a single run of that one species.

By all analysis, TRRP has treated the public and all interested parties like mushrooms. Essentially, keeping us in the dark and feeding us manure. Worst of all is a track record that includes nothing in the way of accomplishment and far more in the category of failure (Graph #1). If TRRP existed in the world or private enterprise, it would be bankrupt and no longer exist.

It is irrefutable that all other considerations should fall below the health of the fishery. But that is not to say that all other issues, including financial impact and recreational angling should not be considered.

The Fly Shop's business and a large portion of our guide work is focused on fishing the Trinity River for steelhead. Historically the Trinity has been a dependable destination during and after major storms because of the nature of the section of river above the major tributaries, specifically the section from the Old Lewiston Bridge to Rush Creek. This portion nearly always remains clear enough to fish and guide while the lower sections of the rivers are too turbid from runoff. Many of our guided fly fishing clients book annual trips to fish for steelhead on the Trinity River well in advance of the trip, some as much as two years in advance. With an already dwindling steelhead resource, the added uncertainty associated with these proposed releases

will further erode angler participation in an already fragile, post- pandemic business environment.

Using (BLM) verifiable data, a reasonable approximation of the total number of guided anglers alone fishing the Trinity in only the permitted section during that period is greater than 2,000. A significant number of those anglers stay at least one night (and usually two) in Lewiston, Douglas City, or Weaverville. Add to that the far larger number of non-guided local and out-of-the-area anglers who fish on their own for winter steelhead on the Trinity during those winter months. Then consider the corresponding guide income, retail sales, hotels, bed taxes, license sales, tackle sales, restaurant, gasoline, as well as other ancillary income, and you can begin to grasp the millions of dollars involved and overall financial threat to the local and surrounding communities.

Speaking for myself, my staff, and my entire team of independent guides, and given that the TRRP over time has demonstrated no ability to enhance the numbers of returning fish, has negatively impacted much of the river from a recreational standpoint, has no apparent accountability, and is not forthcoming with information regarding their processes, we cannot support any proposed actions the TRRP recommends beyond the obviously necessary reallocation of water to increase the base flow from mid-October through mid-April in this scope without more transparency and scientific proof of success.

Very sincerely,

Mike Michalak
The Fly Shop, Inc.

Director of Outfitters,
The Fly Shop, Inc.

Andrew Harris, Trout Unlimited

TROUT UNLIMITED

June 16, 2021

Statement from Shasta Trinity Cascades Chapter of Trout Unlimited regarding the Trinity River Restoration Program's Winter Flow Project Scoping Proposal:

Trout Unlimited is the largest coldwater conservation organization in North America. Our regional chapter - Shasta Trinity Cascades Chapter (#960) - is composed of nearly 300 members from Shasta, Trinity, Humboldt, Siskiyou, and Tehama Counties.

We have examined the Trinity River Restoration Project (TRRP) proposal for Winter Flow Variability. This proposal contains three distinct changes to the annual flow regime on the Trinity River. TRRP proposes to 1) move the spring high-flow event forward and end it sooner, 2) have a period of elevated and variable releases February-April, and 3) have an occasional large release mid-winter that would piggy-back on a natural storm. Our Chapter supports one of these changes and has serious concerns about the other two. We also have serious concerns due to lack of transparency at TRRP and the difficulty and inability for outside organizations to peer-review supporting documents.

Changes to Spring High-Flow Event: TRRP proposes to move the main spring high-flow event about a month earlier and return the river to base flows no later than early June. The rationale for this change is to grow salmon smolts bigger and faster by avoiding unseasonal cold-water releases and to get the salmon smolts out of the Trinity River before water quality deteriorates on the Lower Klamath mid-summer. Our Chapter supports this change as it promises to be beneficial to the salmon fishery and should increase angling opportunity on the Trinity River.

February-April Flow Variability: TRRP proposes elevated and variable flows from February 15 to April 15. The stated rationale for this change is to grow more food for salmon smolts by increasing habitat and regularly inundating rearing habitat. Our chapter questions the necessity of this action. The Trinity River already experiences elevated and variable flows February-April due to tributary inflow downstream from Lewiston Dam. These tributary inflows are significant in the Junction City area and much greater below the confluence with the North Fork. It seems that TRRP's proposed flows would just recreate these same conditions farther upstream. Our chapter also anticipates considerable negative impacts to recreational fishing due to this action. The first ten miles of the Trinity River below Lewiston Dam is very popular with anglers because it is dependably "fishable" - meaning that flows are almost always conducive to wade fishing. TRRP's proposed variable flows range from 750-lS00cfs in dry years to 1000-2000cfs in wet years. These flows would severely diminish angling opportunity during a popular time of year for anglers. Releases of l000cfs would make wade fishing impossible in most areas and boat fishing would probably be out of the question above 1500cfs. The

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proposal as it stands would make for very difficult fishing on a stretch of river that is popular with trout and steelhead anglers at that time of year. When you combine TRRP's proposed flows with natural inflows from downstream tributaries, the entire river below Lewiston Dam would often be very difficult if not impossible to fish from mid-February through mid-April.

Mid-Winter Spike: TRRP proposes a mid-winter flow spike that would piggy-back on a natural storm event. It would not happen every year and would be triggered by weather forecasts and water availability forecasts. The stated rationale is to accomplish stream bed scour, riparian scour, habitat creation, and geomorphic work at the appropriate time of year. Our Chapter is concerned that this action effectively takes water away from the spring high-flow event. We believe that the high spring flows dictated by the Record of Decision (ROD) have been beneficial for the river and anadromous fish on the Trinity. These high flows are critically important to facilitate alluvial flow within the mainstem of the Trinity River, allowing for a dynamic river system below the dams. We are concerned that the mid-winter spike, by shifting some of the ROD allotment to mid-winter, would reduce the efficacy of the spring high flow event. We are also highly concerned about this action's impact on recreational fishing. December through February is the heart of the steelhead fishing season on the Trinity River. This big 6500cfs spike would blow out the river for 10-14 days when scores of anglers would otherwise be able to fish the river. The proposed benefits of this action do not seem to be worth the cost in terms of lost angling opportunity.

Alternative Actions: TRRP seems intent on shifting some of the ROD allotment to the winter months. Our Chapter would support an alternative mid-winter use of this water, which would be to maintain minimum instream flows (MIFs) of 450cfs throughout the winter. As it stands, the river flows at a minimum of 450cfs from April 15 to October 15th. Throughout the fall and winter the release from Lewiston Dam drops to 300cfs. We believe that adding an additional 50% throughout the fall and winter would provide more fishery benefits for all anadromous species than the proposed Winter Flow Variability and Mid-Winter Spike experiments.

Additional Concerns: The documentation the TRRP provided in the scoping solicitation lacked most of the information used to form the basis for their decision and the scientific rationale to develop the proposal. We are fortunate to have contacts with the right connections and were eventually able to obtain some of the documents used by the TRRP for this scoping proposal. A 3rd party forwarded sample hydrographs from the past 17 years that illustrated the proposed changes. These hydrographs should have been included in the scoping solicitation. These oversights by TRRP reflect a profound lack of transparency. We advocate for increased public accountability and independent technical peer review of TRRP's proposals. Given the overall lack of transparency and accountability for the program and our lack of confidence in a positive

outcome for the winter flow variability and mid-winter spike experiments, we do not support any major changes to release schedules that will negatively impact recreational fishing.

For more information on our position, please contact Andrew Harris, President of the Shasta Trinity Cascades Chapter of Trout Unlimited, at pres@stc-tu.org or 530-632-3465.

Signed,



Andrew Harris
Chapter President
Trout Unlimited Shasta Trinity Cascades Chapter

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CC:
Trinity County Board of Supervisors
Trinity County Journal
Congressman Jared Huffman (CA 2nd District)

Email Correspondence with Jed Fish

Hello, Chad,
I've received and read through the proposal emailed today, thanks for the opportunity to provide feedback, which I will also do through the specific channels.
I do have a clarifying question, but first, my background and interest.
I fish the river for steelhead primarily between Pigeon Point and Lewiston, but farther downstream as well, 20-30 days a season, October through March.
I also own property on the river just downstream of Rush Creek.
At first glance, I'm supportive of the proposal, both for the scientific reasons laid out (synchronization between tribs and main stem flows when they are at their most variable, raising the water temperature in spring and early summer) but also because the river often seems so "dead" during the current winter flows of ~300 cfs at the dam, unless of course there's a significant rain.
Anadromous fishermen are always looking for changes in the flow to get fish moving. On freestone rivers, rain is everything. On the Trinity, the controlled flow dominates the upper river.
My question: the Flow Synchronization Period statement says " **Between December 15 and February 15, ROD water equivalent to 60,000-acre-feet would be released from Lewiston Dam when forecasting tools at downstream gages anticipate a rise in river levels of 4,500 to 12,000 cubic feet per second (cfs)".**
At first read, I understood this to mean that the dam releases would perhaps be tied to (short term) weather events forecast to cause a rise in downstream flows due to contributions from the tributaries, so would mimic the variability of flows in a river at the mercy of the weather.
The sample hydrograph, however, shows a single "monolithic" release tapering off over several weeks, not unlike the current wet year peak spring releases.
I can understand how the former (smaller releases tied to weather) might be difficult to administer, but this would be great if possible, and obviously the most natural.
If it's the latter (one big release) then I could see getting a lot of pushback from the fishing community, especially guides, as the river would effectively be "blown out" for several weeks right in the middle of steelhead season.
Which is the proposed approach?
As a property owner, I would miss the occasional cleansing of the flood plain via the big wet year spring releases (I leave that area completely undeveloped and unlandscaped except for 2 seep wells) but I know there's only so much water.
Thanks for your time.
Jed Fish, Lewiston

Hello Jed - Thanks for your quick read and response to the document we've distributed. I also appreciated gr you telling me a little bit about your connection to the river and how you recreate on it to better understand your frame of reference.

Your interpretation of the Proposed Action is pretty spot-on. We wanted to create the sample graph during scoping to help the reader visualize the action, but it may lead people to believe that this one hypothetical hydrograph is what would occur every year if we implement winter releases above base flow.

<image.png>

The hydrograph for the "Elevated Baseflow Period" would likely be developed by the Flow Workgroup, so it would vary in a similar manner to our spring release hydrographs that the workgroup has developed since the early 2000's. The "Flow Synch Period", as you have picked up on, might be more rigid in how it is applied. We want to create the most geomorphic benefit when we piggyback flows to a winter weather event, but we've been instructed that 6000 cfs is what we can work with for now as a maximum release. This means the ramp up to 6,000 cfs would likely look the same in the years we have a piggybacking event during that period, but there would likely be flexibility to create a bench at that release level for longer so the descending limb doesn't extend several weeks like you noted.

A geomorphic event between Dec and Feb would disturb the riverbed, improving food availability after fry emergence. We also want to shift enough water to winter so we're not suppressing juvenile salmonid growth by dumping cold water on them after April 15. There'll still be plenty of water to move after April 15, but we hope to move enough in winter to show a temperature benefit post-April 15.

I'm a fisherman too, but I'm relatively new to the area and my fishing experience on Trinity is limited. What cfs do steelhead fishers like to see in the reach below Lewiston during the winter fishery? Or another way to put it; what river level would not be considered "blown out"? You're part of what I consider an important constituency - a riverfront owner and regular user of the resource - so please share your opinion.

Last, you probably notice I condition my response a lot with "could" "would likely" "might". We scope to help flesh out the action, and thus there are very few absolutes at this point in the process. It's good to share your opinion NOW, as we're early in the decision process.

Since you're a riverfront owner, you'll see a mailing from us on this action in the next few days. The envelopes were stuffed yesterday actually. If you're interested, I'd like to have a phone conversation wtih you. My work mobile is 530/739-8257.

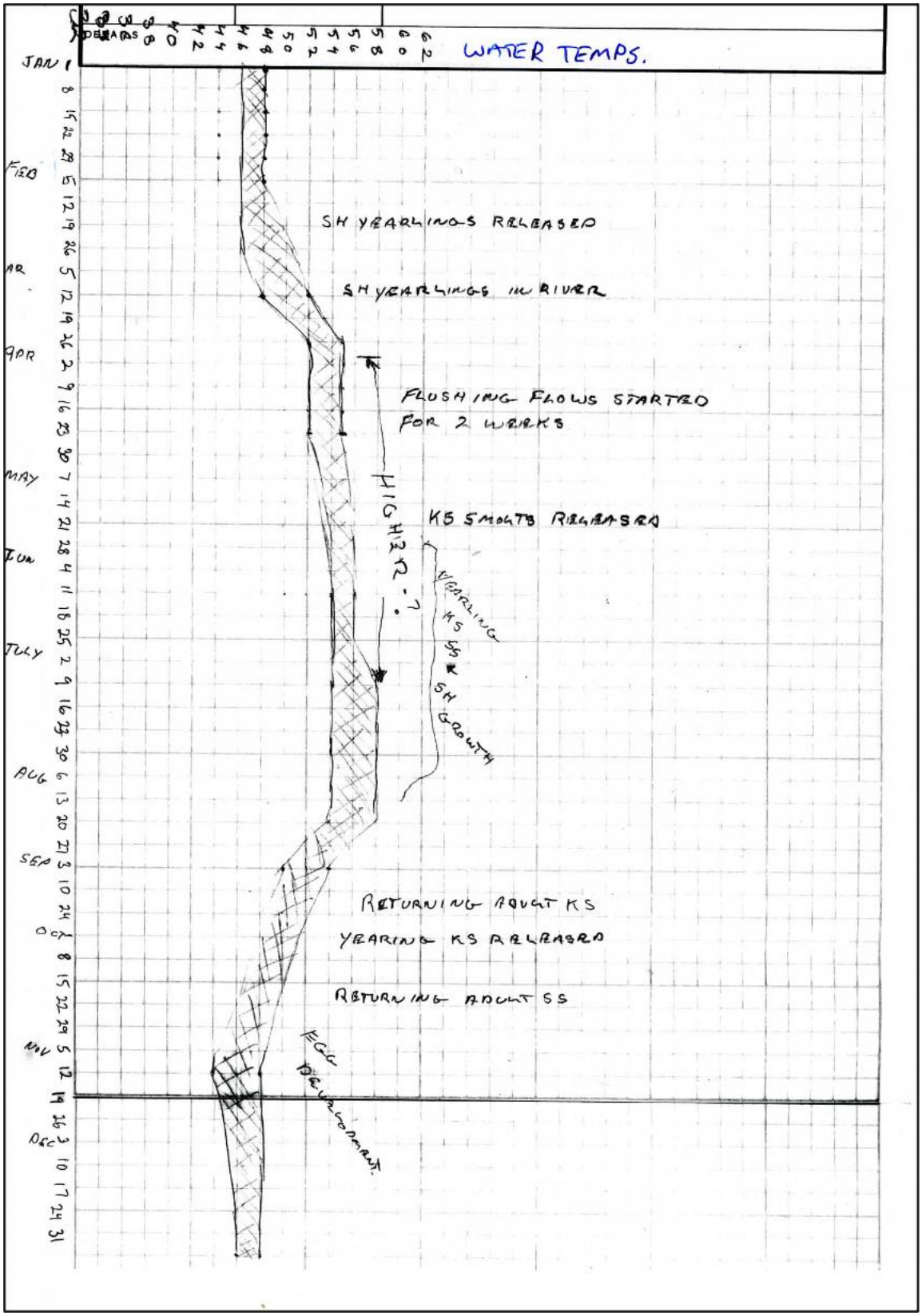
Chad Abel | Implementation Branch Chief | Trinity River Restoration Program | U.S. Bureau of Reclamation
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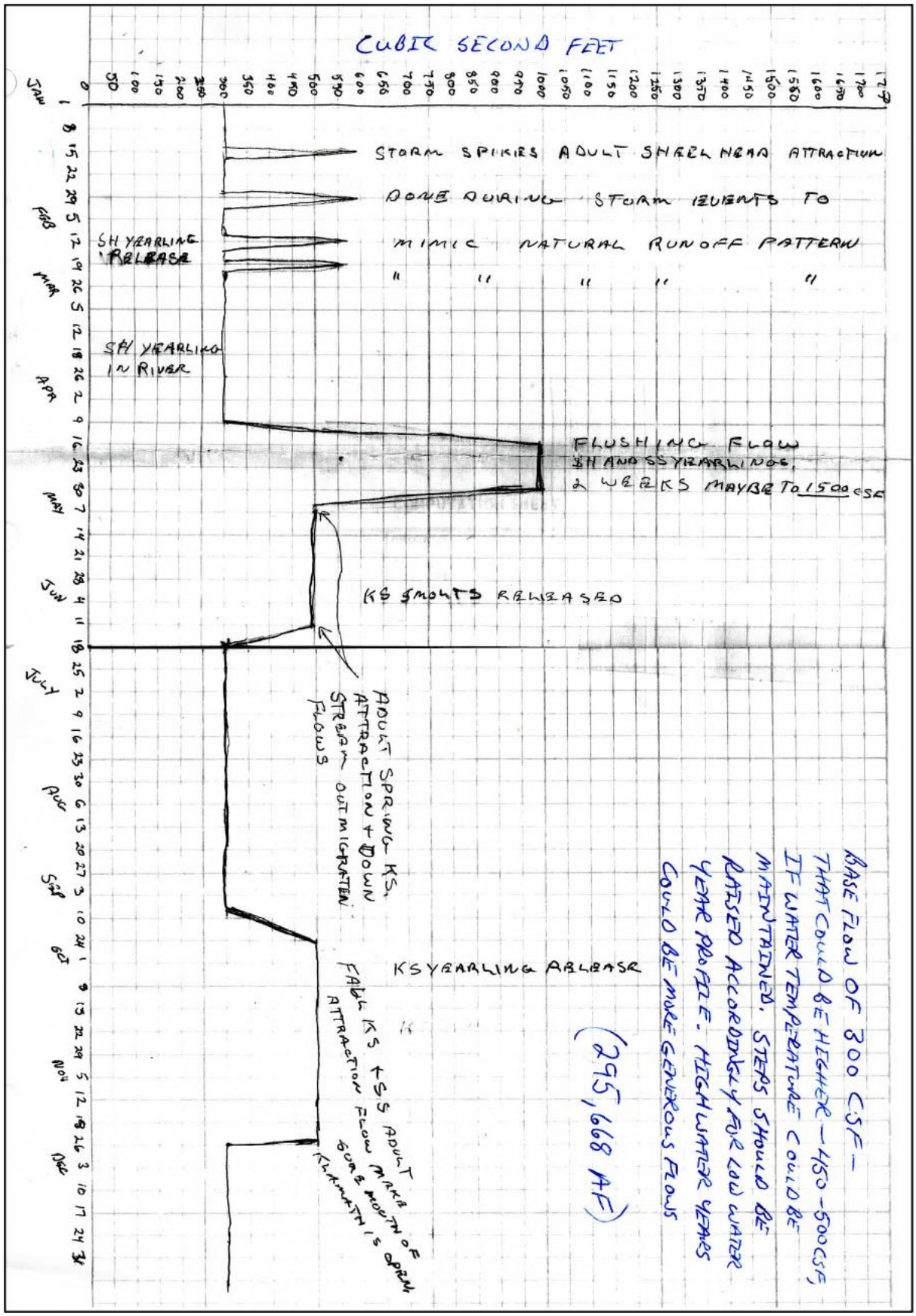
Hello, Chad,
Thanks for your thorough response. I understand better now the Flow Synchronization goal - to leverage a (probably single) natural winter high water event to get the most benefit out of a 6000 cfs release, make sense in terms of maximum gravel movement, algae scour, etc.
I've thought a bit about my "blown out" comment, and I probably was premature.
The answer to what's blown out is complicated and will get different answers from different folks. Blown out usually refers to a condition that's unfishably high and/or too muddy or full of debris picked up as the river rises for fish to see or move to a fly.
In a freestone situation, a river that blows out from a big storm will recover pretty quickly after the storm clears, and most steelhead fishermen will likely say that the period after a blowout will yield very good fishing; for whatever reasons, fish are moving and more aggressive when a river is clearing and dropping.
Obviously, the upper Trinity rarely blows out as it's dam controlled, but it does happen. I've seen Rush Creek fill the main stem with mud (and gravel, but that's another story specific to that area) and after the Carr fire Deadwood creek has been known to blow silt into the river. Normally, this would last a day or two and we'd fish on.
As for levels, I almost never see guide boats out above ~3000 cfs in the upper river, but these conditions are very rare in winter. They usually only happen from the spring releases, so I'm not even sure they're targeting steelhead specifically, possibly looking for brown trout along the slower edges and back channels.
I'd think guide boats, most of whom are drifting flies under indicators and have no need to get out of their boats, would be fine at 2000 - 3000 feet or maybe more in the upper river during steelhead season, but you'd have to ask them. People certainly fish (and look for) much higher flows below the South Fork but the river channel is much bigger there.
I fish a little differently, I use my boat to float from run to run, then get out and wade, stepping down through the run swinging a fly. I've done this at ~3500 cfs in spring just for a lark. The wading can be a challenge, but it would be worthwhile if there were steelhead in the system - we all have to adjust to the conditions, just part of fishing.
I tell some of my neighbors who complain about trees falling into the river during big releases that "real rivers have log jams" and I tell myself that real rivers change every day...
Hope this helps, and thanks again for your communications and for all you folks do.
I'm happy to speak on the phone. I have relatives in town next week, but propose a time that works for you and we'll see.
Jed

Additional Materials from Allen Houston

In 1996 I was asked by the California Department of Fish and Game to prepare a report and graph of the river flow releases and how said releases affect salmon and steelhead in the river, including mortality, fertility, depredation, and growth. This report was based on about 300,00 acre feet of water being sent down the river annually, I worked at Trinity River Hatchery from February, 1973 to June, 2012. Most of the time from 1975 as a Fish Culturist. This report and graphs are attached.

In my opinion, based on my education (BS in Fisheries from Humboldt) and many years of working at the fish hatchery, it is much better to time flushing flows with natural storm events than non-natural out of season flows during the summer and fall. This would be a much more common sense way of proceeding with water flows down the Trinity River than bowing to special interest groups demanding high flow and cold water out of season. Such artificial conditions adversely affect growth and survivability of salmon and steelhead making their way down the waterway to the ocean and again as they travel upstream to spawn.


WATER TEMPS.
DEGREES
JAN
FEB
MAR
APR
MAY
JUN
JULY
AUG
SEP
OCT
NOV
DEC
SH YEARLINGS RELEASED
SH YEARLINGS IN RIVER
FLUSHING FLOWS STARTED FOR 2 WEEKS
HIGH 12R - 7
KS SMOLTS RELEASED
YEARLING KS & SH GROWTH
RETURNING ADULT KS
YEARING KS RELEASED
RETURNING ADULT SS
EGG PLANT INCUBATION


CUBIC SECOND FEET
STORM SPIKES ADULT SHEEL NEAR ATTRACTION
DONE DURING STORM EVENTS TO
MIMIC NATURAL RUNOFF PATTERN
SH YEARLING RELEASE
SH YEARLING IN RIVER
FLUSHING FLOW SH AND SS YEARLINGS, 2 WEEKS MAYBE TO 1500 CFS
KS SMOLTS RELEASED
ADULT SPRING KS. ATTRACTION + DOWN STREAM OUTMIGRATEN FLOWS
KS YEARLING RELEASE
FALL KS + SS ADULT ATTRACTION FLOW MARK OF SCOUR & MOUTH IS OPEN KLAMATH
BASE FLOW OF 300 CFS - THAT COULD BE HIGHER - 450 - 500 CFS IF WATER TEMPERATURE COULD BE MAINTAINED. STEPS SHOULD BE RAISED ACCORDINGLY FOR LOW WATER YEAR PROFILE. HIGH WATER YEARS COULD BE MORE GENEROUS FLOWS
(295,668 AF)

RIVER FLOW AND TEMPERATURE REQUIREMENTS
AT TRINITY RIVER HATCHERY

At Trinity River Hatchery the two most sensitive species in regards to temperature are the Steelhead and Coho or Silver salmon. The problem areas can occure during outmigration of yearling steelhead and spawning of silver salmon. The Spring and Fall Kings seem to handle temperature ranges better.

Yearling steelhead have been volitionally released starting March 15 and the residue planted two to three weeks later. Steelhead show desire to leave starting in mid-Feb, especially if the water temperature starts to rise from 45 towards 50 degrees. With the use of demand feeders the steelhead reach the release size by the end of January. With the steelhead of size and wanting to leave they should be volitionally released starting in mid-Feb and all be in the river by mid-March.

Allowing the river temperature to rise to 52-53 degrees and holding it there about two weeks after the steelhead are in the river will help them migrate out of the upper river area. Raising the flows at this time would move the remainder on downstream and out of the upper river area. The upper river area is where most stranding problems caused by dropping flows occur.

In the years when we have had cold water during yearling coho and steelhead release we end up with lots of them climbing the fish ladder and dying in the spawning house flumes and round tanks by the thousands. 1993 was the most recent bad year, water temperatures averaged 49-50 degrees from mid-March to mid-April when it started dropping to 45-46 degrees. This temperature drop was due to high flushing flows and water export.

The steelhead and coho were all in the river by April 12. Water temperature was 50 degrees. Large numbers of yearlings climbed the ladder and entered the flumes and round tanks of the spawning area. They died by the thousands causing a clean-up problem and an unsightly mess besides the loss of the fish.

In 1994 the water temperature was averaging 51 degrees the last week of March when most of the yearlings had left the ponds and climbed to 52-53 degrees the first week of April. Most of the yearling steelhead and coho had left the upper river area by this time and very few fish entered the ladder and losses were few. The river flow was increased April 9 and very few yearlings remained in the upper river area. We expect to see very good returns from these fish.

In 1995 virtually all of the 800,000 plus yearling steelhead were of release size by the end of January in spite of cold

water temperatures during most of the year. Had they been allowed to leave on their own starting mid-Feb most would have left and we would have saved money on feed. Water temperatures were rising and them the flows were increased and the temperature dropped. Had we had two weeks before the flow increase the fish would have went out better. As it was they stayed around for awhile before moveing downstream. Some are still in the area. Water temperatures went from 48-49 degrees to 44 degrees at the hatchery, river temperatures may have been lower.

The adult steelhead come into the hatchery better when the water is warmer, around 50-52 degrees than 44-46 degrees. With the otter depredation problem, the more active the adult steelhead are the better they can escape the otters and the more we will have to spawn.

Changes in river flows also seem to encourage the adults to enter the ladder. Especially if timed with storm events. Either that or it messes up the otter's pattern. Ideally, if the flows could be adjusted up and down from 300 to 600 cfs during storm events, mimicking natural flow patterns during the months of January to March, more adult steelhead would enter the ladder. During low return years more adults could be critical to the hatchery steelhead egg supply.

The river otters are hitting the adult steelhead hard in both the river and ladder-trap areas at this time and if the yearlings were in the river during late February, maybe this would confuse the otters and more adults would be able to spawn.

For Coho or Silver salmon water temperature is critical to the survival of both adults and eggs. For example, in mid-November 1991 the water temperature reached 56-57 degrees for almost a week. The eggs spawned during that time and for a couple of weeks afterward suffered very high mortality, as high as 90%. Fertility and the hatchablilty was both affected. The adults suffered higher than normal handling losses also. Water temperature during silver salmon spawning should be below 50 degrees, preferably 48 degrees or lower. A good range would be 45-48 degrees. This would be from November to mid or late January.

Pond rearing temperatures would be best between 52-58 degrees. Lower temperatures cause slower growth, longer time spent on smaller more expensive feeds, harder to start fry to feed, and maybe an outbreak of cold water virus.

For adult King salmon, the returning spring kings tend to spread out more and enter the ladder over a longer period of time when the river temperatures are 50 degrees or less. This can cause more of an overlap of spring and fall spawning king salmon. Warm water, above 55 degrees, congregates the

spring kings in the upper area of the river (Lewiston area) and makes it easier to tell the difference between the spring and fall runs. On the downside, the fish get more copepods and suffer more loss at spawning time. They have to be babied more. Poaching is more of a problem when they are more congregated. Egg quality and fertility doesn't seem to be affected that much by warmer temperatures.

WATER TEMPERATURE AND RIVER FLOW DURING YEAR.

Jan. to mid-Feb. 46-48 degrees 300 cfs with storm event spikes to 600 cfs

Mid-Feb. to mid-March rising to 48-52 degrees 300 cfs

Mid-March to mid-April 52-55 degrees 300 cfs going to 1000-1500 cfs

Mid-April to May 52-55 degrees 1000-1500 cfs

May to Mid-June 52-58 degrees 500 cfs

Mid-June to Sept. 52-58 degrees 300 cfs

Sept. to mid-Nov. 52-55 degrees dropping to 44-48 degrees 500 cfs

Mid-Nov. to Jan. 44-48 degrees 300 cfs

Letter from David Steinhauser, Trinity River Rafting

Thank you for the opportunity to comment on the Winter Variable Flow proposal. I am both an whitewater rafting outfitter/guide and a recreational boater on the Trinity River since 1988. I served on the TAMWG during it's entire duration, and made comments early in the flow study evaluation process that resulted in the ROD. My wife and business partner also served many years on the TAMWG representing the Big Bar Community Development Group. These Winter Variable Flow comments include four main points. Our support of the Winter Flow proposed changes, the acknowledgment that the proposed changes effect whitewater users, discussion of flows that we prefer, and examples of possible areas of common ground between Salmon restoration flows and whitewater flows.

Support of Proposed Winter Flows

We are supportive of flows that benefit Salmon restoration and follow the latest science. Winter flow proposal flows have two parts. Peak augmentation flows prior to water-type designation in April have been sought by the TRRP for a long time, and we are glad that a way has been find to make this a possibility. The second bench flows, especially designed to mobilize macro invertebrate food for juvenile Salmon is also important. Success of juvenile fish have long been a priority of the Restoration Program.

Changes Affect Whitewater Users

Whitewater boaters have greatly enjoyed and are grateful for the flows of the 5 year water-type hydrographs that have been implemented by the TRRP under the ROD, as well as increased flows in during the flow evaluation study. The proposed Winter Variable Flows will make less water available during Springtime higher-water releases, and are likely to result in a quicker ramp down to baseline Summer flows. According to the sample hydrograph in the scoping document, the Summer baseline flow of 450 cfs will remain not change other than possibly being reached earlier in the Summer. We understand that there are still 5 water year types and winter peak flow triggers will not be met every year. We also understand that specific hydrographs will be determined annually by the flow committee and TMC as they have been in the current adaptive management process.

Preferred Flows for Whitewater

Flows affect whitewater, particularly summer commercial rafting, in two main ways. There are the fun and exciting higher flows, and there a re the minimum baseline flows that are essential to be able to commercially raft.

Essential Baseline Flows

When I first started rafting on the Trinity in 1988 the flow was just 300cfs, and we had a low-key operation with only around 50-70 customers the entire summer seasons at that flow. We used small 10' rafts that I guided giving directions from a kayak. In 1990 I purchased a 12' raft, which is now a small commercial raft, and as tributary flows decreased, it was too big to get through tighter channels such as the entrance to "Upper Tidy Bowl Rapid." We saw a number of dead Salmon and "whiteheads" were the norm for the Chinook we saw. In the following year the baseline flow increased to 450cfs for the flow evaluation study, and commercial rafting increased 1,000%, and continued to grow in future years. Whitewater rafting became a viable business with the 450 baseline flows. The 450 cfs flow is challenging and technical, the water is seasonally warm, and the water is clear and beautiful. It is a popular flow. In 2020 the flow seemed lower than in other dry water years, and it was challenging to squeeze a 13' raft through tight slots. This is likely to be, at least in part, because of extra draw from the River and tributaries from more complete exploitation of water rights, and possibly illegal water diversions for agricultural and other purposes.

Higher flows

Outfitters and recreational boaters enjoy a variety of flows, and it is hard to pin down a single optimal flow or hydrograph. We appreciate the flow variability that was established with the ROD. Big Water flows, i.e. 4,500cfs and above at the NBR, or Cedar Flat gauge are really fun and exciting. They are a little high for our typical mid-summer rafting clientele. In May and early June, though, the Big Water Flows have been relished and appreciated. There are a range of medium flows, 850-4500cfs, which have a lot of splash and energy, and are great fun for rafters. In this range, 2,000cfs and below are the safest flows for rafting because rocks are well covered, holes are much less likely to flip rafts, and routes are more straightforward. Technical flows, where demanding maneuvering around rocks are from 450 to 800cfs. Water is seasonally warm for jumping into the water. Splash and energy of the water is diminishing. It is nice to have at least 600cfs to make the tightest moves go more smoothly, and to allow for larger and heavier rafts.

Examples of Fishery Management that may be Consistent with Preferred Rafting Flows
I will mention several management actions that may have common ground with whitewater flows: Two infrastructure fixes, baseline temperature considerations, and possible habitat improvements.

Higher Flows Further into the Summer
As I understand the latest science, juvenile growth is benefited by avoiding prolonged exposure to cold water. Early in the season, dam release flows are warmer than natural atmospheric flows, but at some point they become colder, and thus higher flows are detrimental to the juvenile fish. This date can be pushed back if the gates in Trinity Dam are fixed to allow for releases from higher elevation, and thus warmer water. Warmer water flows are also a trigger for juveniles to move out towards the Ocean, and thus higher flows will not be a detriment to this trigger.

Flow Variations
Frequent and diurnal flow fluctuations are not currently possible because the motors in the gates at Lewiston Dam need repair to operate in this way. Diurnal or frequent variations in flow can help prevent bands of vegetation that form at consistent and extended flows, such as the 450cfs baseline flow. Flows could fluctuate that are timed with additional whitewater flows, and water riparian growth at different levels, or provide different temperatures.

Concerns about Baseline Flows
On many years where water has reached baseline flows by early July, the temperature standards of 60 degrees at Douglas City have not been met. This question has been addressed and the Bureau of Reclamation has interpreted the standard related to temperature to have been set at 450cfs. We are very appreciative of this baseline standard flow. There may be implications, however, of increased diversions in both the mainstem and tributaries of decreasing the effect of the 450cfs release. The closer to the North Fork Trinity one gets, the more likely the water will become increasingly warm at lower flows. The Bureau should compensate for diversions. In the mainstem Trinity, one diversion change is that the Weaverville Community Service District is taking cool water from the Trinity instead of the warmer water of Weaver Creek which was the case when the 450cfs standard was established in 1991-1992. We realize that further studies are anticipated balancing the holding Spring-Run Chinook's need for adequately cool temperatures to avoid pr-spawning mortality while not having to overstress their energy reserves and decrease gamete production by holding in place in stronger currents. Possibly future restoration sites will be designed to significantly increase habitat that helps to meet these holding-Chinook needs that is compatible with extra flows.

These are examples of flow related concerns. Restoration scientists and management may be awa re of others that will also benefit whitewater boating stakeholders. We wish the TRRP, the Tribes,

stakeholders, and the Salmon success.

Sincerely,

David Steinhauser
co-owner of Trinity River Rafting

Letter from Theresa Lorejo-Simsimon, American Whitewater Association

AMERICAN WHITEWATER

Theresa L Lorejo-Simsiman • California Stewardship Director • 12155 Tributary Point Drive #48 • Gold River, CA 95670
916-835-1460 • theresa@americanwhitewater.org

June 15, 2021

Winter Flow Scoping
c/o TRRP
PO Box 1300
Weaverville, CA 96093

RE: Comments of American Whitewater on Winter Flow Project Proposal

To the Trinity River Restoration Program,

American Whitewater respectfully submits these comments on the Winter Flow Project Proposal.

Background and Interest

American Whitewater is a national non-profit 501 (c)(3) river conservation organization founded in 1954 with over 6,000 members and 100 locally based affiliate clubs, representing whitewater enthusiasts across the nation. American Whitewater's mission is to conserve and restore America's whitewater resources and to enhance opportunities to enjoy them safely. A significant percentage of our members reside in and travel to California for its whitewater resources. This includes travel to whitewater boating resources on the Trinity River found on the boating reaches of Pigeon Point, Big Flat to Hayden Flat and Hayden to Cedar Flat. Additionally, our California affiliate clubs Gold Country Paddlers and Loma Prieta Paddlers hold annual spring/summer or July 4th paddling trips to the Trinity River.

Comments

Natural Hydrograph

American Whitewater received a virtual presentation for the flow proposal from Seth Naman representing the National Oceanic and Atmospheric Administration and Kyle De Juilio representing the Yurok Tribe. The presentation highlighted benefits of shifting to a more natural hydrograph in the watershed including timely scouring of the rock bottom which improves habitat for the insects that fish eat and flow cues that encourage native fish to continue their lifecycle journeys downstream. For nearly three decades, these are the very same principles of the natural hydrograph that American Whitewater has encouraged on hydropower projects across California including the North Fork Feather, the Mokelumne and most recently on the San Joaquin River. In each case recreational flow has been successfully implemented within the tenets of a natural hydrograph and protection of biota. Based on this, American Whitewater finds merit in the Winter Flow Variability Action.

Impacts to Recreational Summer Flows

For the Trinity River reaches below Lewiston Dam that have a potential for impact, American Whitewater ran a HEC-DSSVUE analysis based off historical data from USGS Trinity River gauges 11525500 and 11527000 between the years 2001 through 2020 and a model of the Winter Flow Variability proposal

AMERICAN WHITEWATER

Theresa L. Lorejo-Simsiman • California Stewardship Director • 12155 Tributary Point Drive #48 • Gold River, CA 95670
916-835-1460 • theresa@americanwhitewater.org

provided by Kyle De Juilio. We highlighted the parameters of water year type; the paddling flow range; and the approximate date flows fall out of paddling range based on the proposed flow model. (See HEC-DSSVUE Graphs in Appendix A)

Overall, this analysis shows little impact in the Summer to the number of boatable days between the minimum, optimum and high river flow ranges outlined in the "holy grail" of whitewater boating guidebooks, Lars Holbeck and Chuck Stanley's *The Best Whitewater in California* and more recently in Dan Menten's *The New School Guide to Northern California Whitewater*. The boatable flow range for this section of the Trinity River are identified as 500 cfs minimum, 1500 cfs optimum and 4000 cfs high measured at USGS 11527000.

However, there is impact to the magnitude or amount of flow released during any given day in the summer period since more flow is shifted to the winter and spring months. In other words, there is potential to shift to the lower boatable range of flows as opposed to the optimum or higher boating flow range as you get later into the summer months.

Request for Consultation

American Whitewater understands that the model of the Winter Flow Variability Proposal does not necessarily equate to the actual hydrograph schedules that the TRRP flow workgroup will develop annually. Since the workgroup would have discretion to address stakeholder interests within the annual process, we ask that American Whitewater be contacted for consultation. Information sharing would be the sole goal of this annual consultation to ensure recreational paddling interests are considered in the decision-making process.

Conclusion

Overall, the TRRP directive to restore the fisheries of the Trinity River impacted by dam construction and diversions is a goal shared by American Whitewater. Given the limited impact to the number of boatable days within identified paddling flow ranges we can support the Winter Flow Variability Proposal, provided that paddling stakeholder interests continue to be considered when developing annual hydrograph schedules. We look forward to being a part of the flow conversations going forward and thank the TRRP for this opportunity to comment.

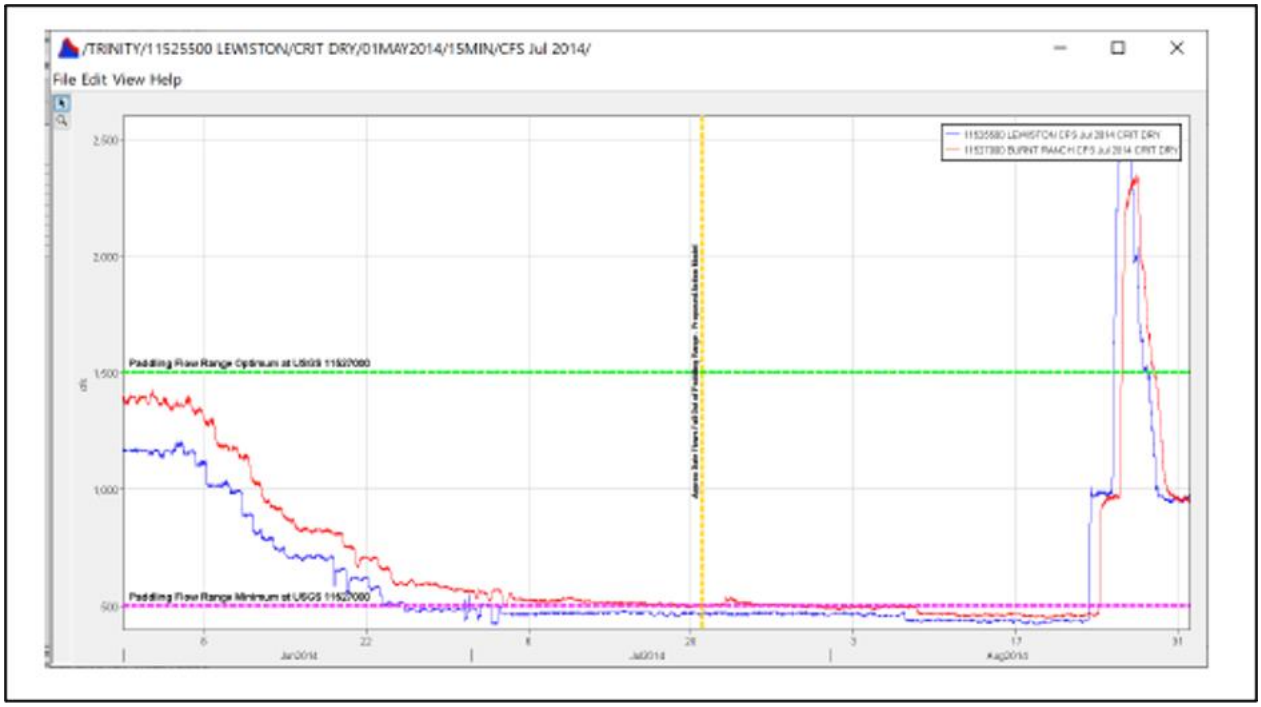
Sincerely,

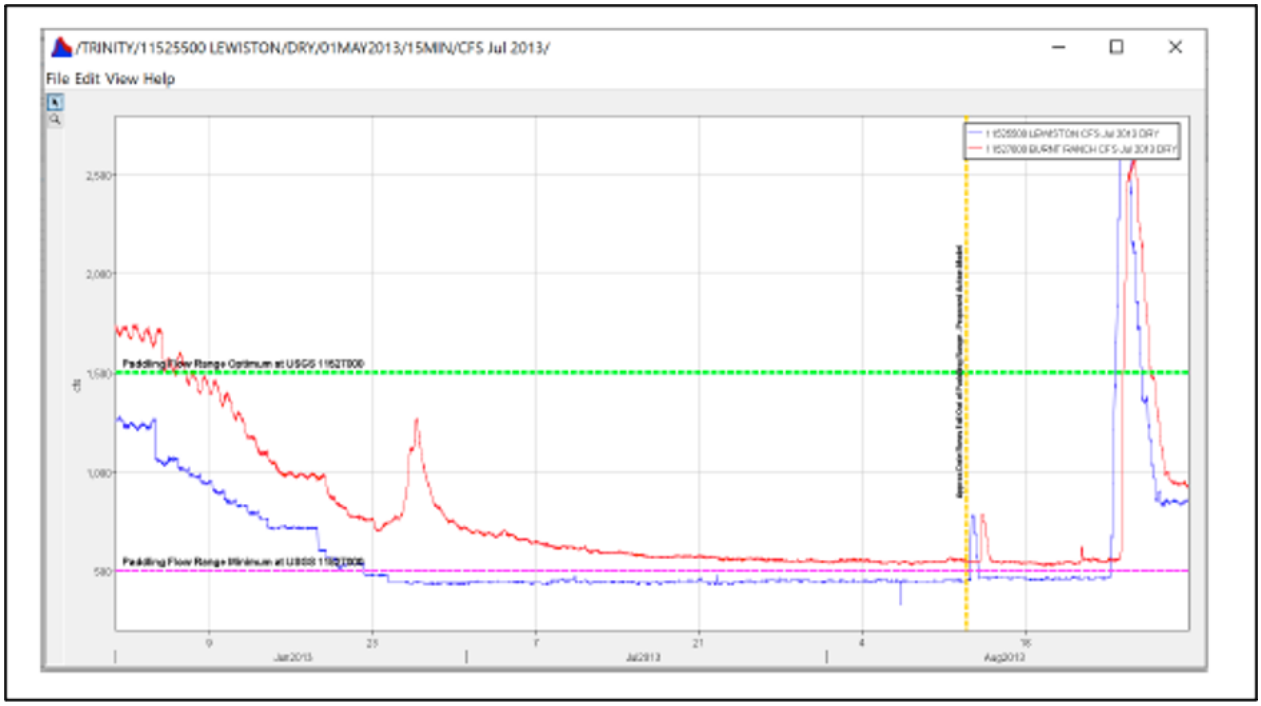
Theresa L. Lorejo-Simsiman

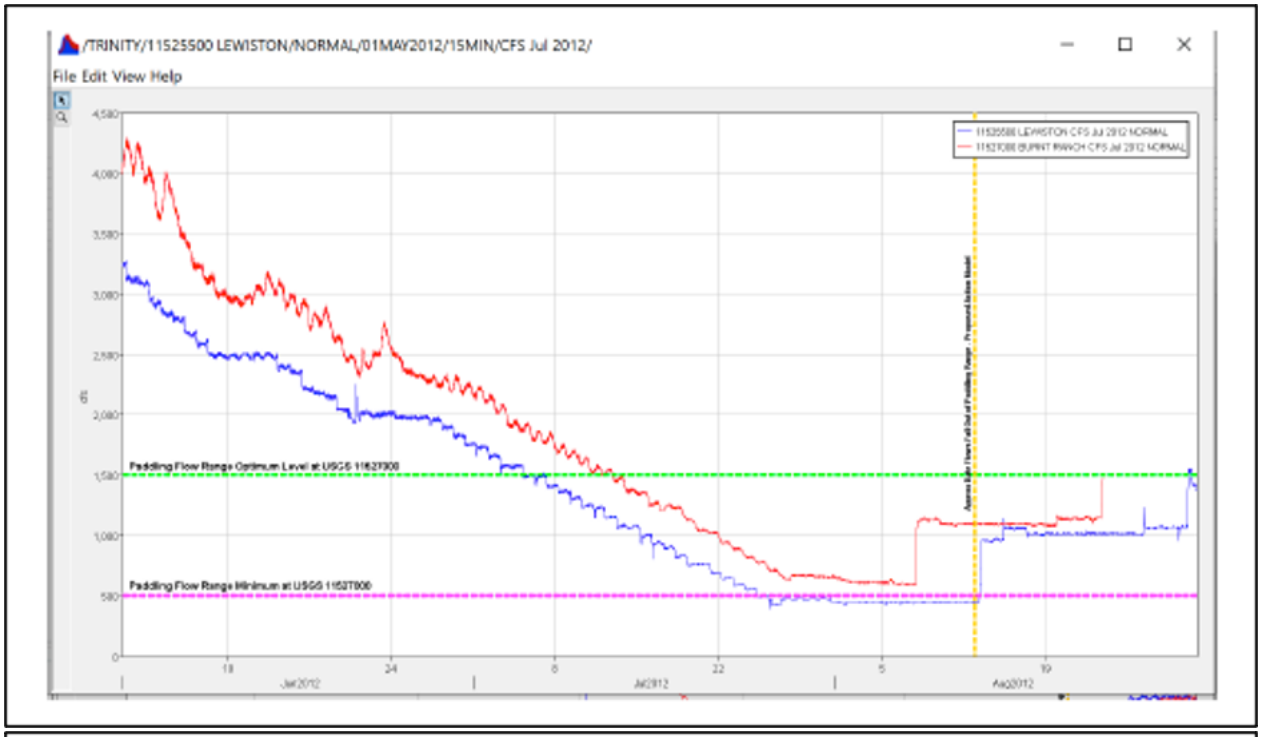
Theresa L. Lorejo-Simsiman
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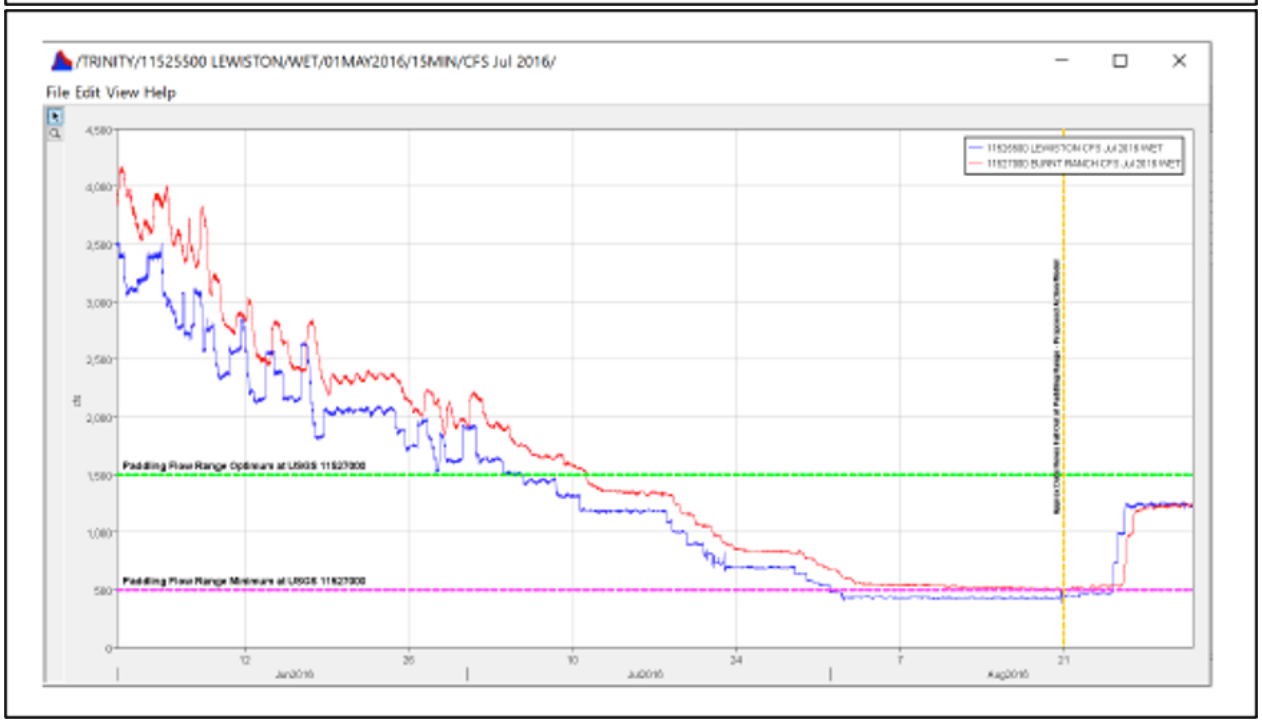
Appendix A
HEC – DSSVUE
Analysis of USGS 11525500 and 11527000 Historical Recreational Flow Data from 2001-2020 by Representative Water Year Types

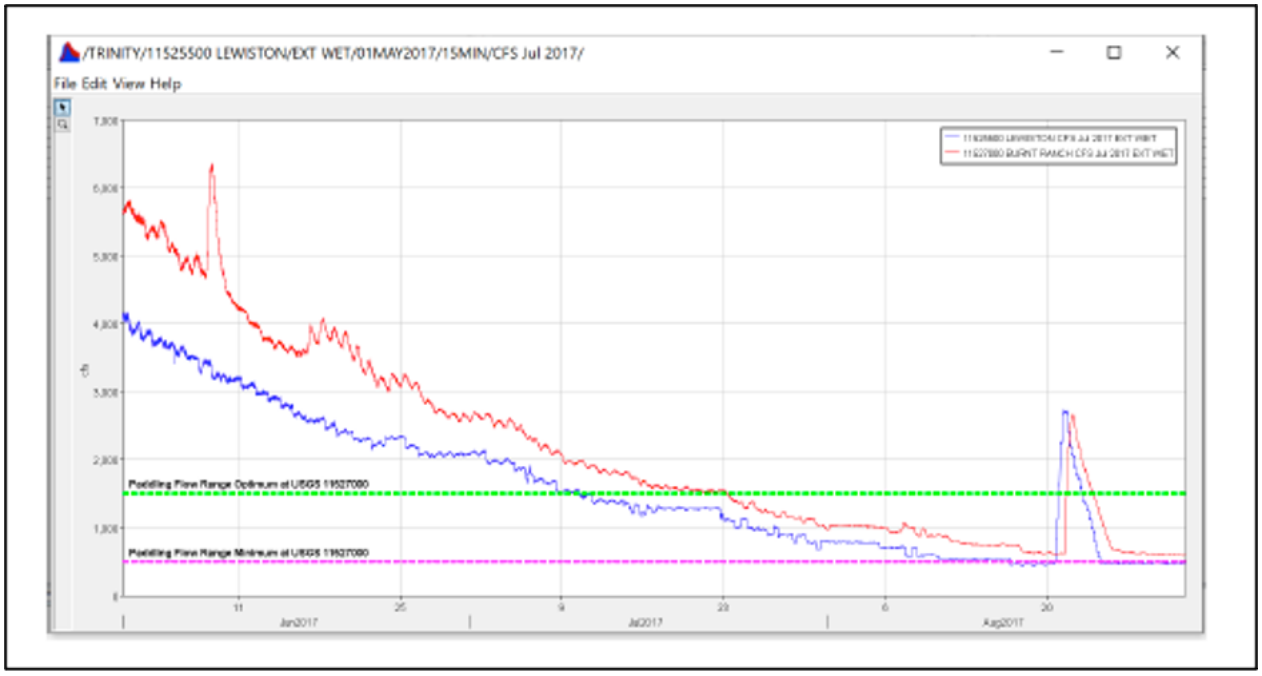
Provided for
Trinity River Restoration Program
Winter Flow Project Proposal Scoping
June 16, 2021


/TRINITY/11525500 LEWISTON/CRIT DRY/01MAY2014/15MIN/CFS Jul 2014/
File Edit View Help
Paddling Flow Range Optimum at USGS 11527000
Paddling Flow Range Minimum at USGS 11527000
Jun2014
Jul2014
Aug2014


/TRINITY/11525500 LEWISTON/DRY/01MAY2013/15MIN/CFS Jul 2013/
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Jul2013
Aug2013


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Padding Flow Range Minimum at USGS 11527300
Jun2016
Jul2016
Aug2016


/TRINITY/11525500 LEWISTON/EXT WET/01MAY2017/15MIN/CFS Jul 2017/
File Edit View Help
Paddling Flow Range Optimum at USGS 11527000
Paddling Flow Range Minimum at USGS 11527000
Jun2017
Jul2017
Aug2017

Letter from Chairman Byron Nelson, Jr., Hoopa Valley Tribe

HOOPA VALLEY TRIBAL COUNCIL
Hoopa Valley Tribe
Post Office Box 1348 Hoopa, California 95546
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Chairman Byron Nelson, Jr.

June 18, 2021

Winter Flow Scoping
C/O TRRP
P.O. Box 1300
Weaverville, CA 96093

Subject : Hoopa Valley Tribe Comments – Trinity River Restoration Program - Winter Flow Variability Proposed Action

Winter Flow Scoping Team:

Please find attached comments from the Hoopa Valley Tribe (HVT) regarding the Trinity River Restorations Program's (TRRP) proposed action to modify the existing 2000 Trinity River Record of Decision (ROD) that was concurred in by the HVT and Secretary of Interior Babbitt as required by the Central Valley Project Improvement Act (CVPIA) (PL 102-575). The HVT views the CVPIA, especially Section 3406 b (23), as a contemporary treaty between the United States and HVT and we take any action to modify or diminish the original purpose of the statue very seriously. Accordingly, we submit our comments on TRRP proposed action to shift a portion of the ROD water used for restoration releases to the winter period (i.e. from October 1 through April 1).

The TRRP recently published an Environmental Assessment (EA) scoping notice about a "new flow management proposal" for fishery restoration water releases from reservoirs of the Central Valley Project's Trinity River Division (TRD). The proposal would require a change in the flow release hydrographs established for the TRRP pursuant to the HVT's provision of the 1992 CVPIA, P L 102-575 §3406(b)(23)[1] and the 2000 Trinity River ROD. Moreover, the 2000 ROD

[1] (23) In order to meet Federal trust responsibilities to protect the fishery resources of the Hoopa Valley Tribe, and to meet the fishery restoration goals of the Act of October 24, 1984, Pub. L. 98-541, provide through the Trinity River Division, for water years 1992 through 1996, an instream release of water to the Trinity River of not less than 340,000 acre-feet per year for the purposes of fishery restoration, propagation, and maintenance and,

> (A) By September 30, 1996, the Secretary, after consultation with the Hoopa Valley Tribe, shall complete the Trinity River Flow Evaluation Study currently being conducted by the U.S. Fish and Wildlife Service under the mandate of the Secretarial Decision of January 14, 1981, in a manner which insures the development of recommendations, based on the best available scientific data, regarding permanent instream fishery flow requirements and Trinity River Division operating criteria and procedures for the restoration and maintenance of the Trinity River fishery; and

is a solemn agreement between the Secretary and HVT pursuant to the mandate and authority of the CVPIA's HVT provision. Upon the Secretary and HVT reaching that agreement, the HVT provision requires that the instream fishery releases "shall be implemented accordingly." The ROD's flow release hydrographs may not (emphasis added) be changed without HVT concurrence. For the following reasons, HVT does not concur in the proposed modification of ROD flow release hydrographs as currently proposed.

First, Trinity River restoration has four fundamental requirements:

> 1) Meet Federal trust responsibilities to protect the fishery resources of the Hoopa Valley Tribe (Pub. L. 102-575 §3406(b)(23);
>
> 2) Restore Trinity River fish populations to the "levels approximating those which existed immediately before the start of the construction" of the CVP's Trinity River Division (Pub. L. 98-541 §2);
>
> 3) Rehabilitate fish habitats in the Trinity River between Lewiston Dam and Weitchpec (*id.*);
>
> 4) Modernize and otherwise increase the effectiveness of the Trinity River Fish Hatchery (TRH) so that it can best serve its purpose of mitigation of fish habitat loss above Lewiston Dam while not impairing efforts to restore and maintain naturally reproducing anadromous fish stocks within the basin. (Pub. L. 98-541 §2, as amended by Pub. L. 104-142(c) (1996)).

In 2004--seventeen years ago--the Ninth Circuit Court of Appeals wrote:

> Twenty years have passed since Congress passed the first major Act calling for restoration of the Trinity River and rehabilitation of its fish populations, and almost

> (B) Not later than December 31, 1996, the Secretary shall forward the recommendations of the Trinity River Flow Evaluation Study, referred to in subparagraph (A) of this paragraph, to the Committee on Energy and Natural Resources and the Select Committee on Indian Affairs of the Senate and the Committee on Interior and Insular Affairs and the Committee on Merchant Marine and Fisheries of the House of Representatives. If the Secretary and the Hoopa Valley Tribe concur in these recommendations, any increase to the minimum Trinity River instream fishery releases established under this paragraph and the operating criteria and procedures referred to in subparagraph (A) shall be implemented accordingly. If the Hoopa Valley Tribe and the Secretary do not concur, the minimum Trinity River instream fishery releases established under this paragraph shall remain in effect unless increased by an Act of Congress, appropriate judicial decree, or agreement between the Secretary and the Hoopa Valley Tribe. Costs associated with implementation of this paragraph shall be reimbursable as operation and maintenance expenditures pursuant to existing law. (Emphasis added.)

> another decade has elapsed since Congress set a minimum flow level for the River to force rehabilitative action. Flow increases to the River have been under study by the Department of the Interior since 1981. "[R]estoration of the Trinity River fishery, and the ESA-listed species that inhabit it . . . are unlawfully long overdue."

Westlands Water Dist. v. U.S. Dep't of Interior, 376 F.3d 853, 878 (9th Cir. 2002) concluded that "restoration of the Trinity River is unlawfully long overdue, which remains the case. It has been 21 years since the Secretary and Hoopa signed the ROD. To date, many of the fundamental requirements have not been met, and in particular, the continued degraded state of the Trinity River fishery. Urgent action must be taken to remedy this dire situation to the Trinity River fishery..

Second, the TRRP provides for Adaptive Environmental Assessment and Management (AEAM) of the TRRP, including ROD flow release management. The current variability flow release proposal would use ROD flows that are prescribed for specific restoration outcomes as described in the 1999 Trinity River Flow Evaluation Study Final Report (TRFEFR). However, that water is not available for any purpose or use other than the ROD prescription. As proposed, this flow modification proposal is not framed as an adaptive management experiment as intended by the ROD, but appears to be proposed as a long-term or permanent modification of the ROD flow prescription. To modify the ROD flow prescription beyond a year-specific adaptive management experiment must meet a higher bar of scientific justification and an administrative process that includes the HVT's concurrence. We offer recommendations later in our comments on how to meet this higher bar. .

Third, the act that authorized the Central Valley Project's TRD (Pub. L. 84-386 1955) expressly allocated TRD water for use within the basins and further established a priority for TRD water needs in the basin over diversions to the Central Valley. Provisos 1 and 2 of section 2 of identify those uses.

Proviso 1 establishes a duty on the Secretary of the Interior to use as much TRD water as is needed for the preservation and propagation of fish and wildlife in the Trinity River basin. In establishing the ROD restoration flows, with HVT concurrence, the Secretary did not exhaust his or her authority to use Proviso 1 water for additional fishery preservation and propagation activities. *San Luis & delta-Mendota Water Authority v Haugrud*, 848 F.3d 1216, 1229-1232 (9th Cir. 2017). Additional TRD Proviso 1 water is available for use for the winter flow variability proposal without disturbing the volumes of water dedicated to the ROD. The Secretary simply has to allocate additional water for that purpose.

Proviso 2 establishes a right for the benefit of Humboldt County and downstream water users, which includes HVT, to 50,000 Acre-Feet of TRD water annually. Under acceptable terms and conditions, the beneficiaries of Proviso 2 water could agree to temporary use of that water for the winter variable flow as an AEAM experiment. In the event the AEAM experiment has favorable outcomes, the Secretary then would cease use of Proviso 2 water and allocate a comparable amount of Proviso 1 water over and above ROD flow releases for winter variable flow purposes.

For the foregoing reasons, HVT does not concur in the winter flow variability proposal as currently proposed to the extent that it would use ROD water supplies. If the proposal was modified for use in a single year under a structured AEAM process as described in the ROD and TRFEFR, ideally using Proviso 2 water for the AEAM experiment, the HVT would consider supporting that experiment pending our technical review and concurrence. If ROD water was used for the AEAM experiment, the HVT may be willing to support the proposed experiment provided that the EA analyzes and assures that the moved water volumes would not negatively impact objectives for which that water was originally allocated for in the ROD.

Lastly, if the proposal intends to be a longer-term management change rather than a structured, short-term AEAM experiment, then HVT has identified the following requirements needed for the proposal prior to implementation:.

- Conduct the scientific and administrative process as identified in the ROD and the Implementation Plan (Appendix C of the Final EIS/EIR) to clearly conduct this flow modification effort as a process within the existing ROD;
- Completion of the Flow Synthesis report, including a rigorous scientific peer review to a similar level as conducted by the TRFEFR that meets the "best available science" standard required by the 1992 CVPIA;
- The EA process must conduct a careful and complete evaluation of ecological tradeoffs of moving ROD flows earlier in the year to ensure that ROD management objectives of the original hydrographs are still being met and/or that the overall benefits of the proposed management actions significantly outweigh the potential impacts of moving water from the original ROD hydrographs.
- Once the scientific and NEPA process is completed, conduct an administrative process consistent with the ROD that documents the scientific basis and decision-making process for assessing and implementing the flow management revision, including HVT concurrence.
- Thoroughly monitor and document the effects of the action and evaluate if the predicted benefits were realized. These information would then be used to inform future actions.

June 18, 2021
Page 5

In summary, the HVT is concerned with the chronically impaired Trinity River fishery, and supports the best available science and AEAM to make improvements in ROD flow management to improve the fishery, as long as it is conducted within the framework of the existing ROD and meets the statutory requirements described above. While we realize that these requirements may delay implementation of the flow modification proposal, it is imperative that the science and administrative process is conducted within the framework of the ROD.

Sincerely,

for Byron Nelson Jr.
Chairman, Hoopa Valley Tribe

Cc: Ernest Conant BOR

Letter from Mary Nishioka and Jim Tornillo, Shasta Trinity Fly Fishers

June 18, 2021

Shasta Trinity Fly Fishers, Inc.

Response to the TRRP's Winter Flow Project Scoping Proposal:

Shasta Trinity Fly Fishers (STFF) is the local fly fishing club for Shasta and Trinity Counties with 264 members throughout the state of California. Our members have a vested interest in the preservation of the Trinity River system as a viable fishery for both conservation and economic reasons.

Full disclosure, the Shasta, Trinity, Cascades Trout Unlimited Chapter serves as our club's conservation entity.

Changes to Spring High-Flow Event: TRRP proposes to move the main spring high-flow event about a month earlier and return the river to base flows no later than early June. The rationale for this change is to grow salmon smolts bigger and faster by avoiding unseasonal cold-water releases and to get the salmon smolts out of the Trinity River before water quality deteriorates on the Lower Klamath mid-summer. We support this change as it promises to be first, beneficial to the salmon fishery and second, should increase angling opportunity on the Trinity River.

February-April Flow Variability: TRRP proposes elevated and variable flows from February 15 to April 15. The stated rationale for this change is to grow more food for salmon smolts by increasing habitat and regularly inundating rearing habitat. We do not support this proposed change. The Trinity River already experiences elevated and variable flows February-April due to tributary inflow downstream from Lewiston Dam. These tributary inflows are significant in the Junction City area and much greater below the confluence with the North Fork. Our club anticipates considerable negative impact to recreational fishing due to the proposed action. The first ten miles of the Trinity River below Lewiston Dam is very popular with anglers because it is dependably "fishable" – meaning that flows are almost always conducive to wade fishing. TRRP's proposed variable flows range from 750-1500cfs in dry years to 1000-2000cfs in wet years. These flows would severely diminish angling opportunity during a popular time of year for anglers. Releases of 1000cfs would make wade fishing impossible in most areas and boat fishing would probably be out of the question above 1500cfs. The proposal as it stands would make for very difficult fishing on a stretch of river that is popular with trout and steelhead anglers at that time of year. When you combine TRRP's proposed flows with natural inflows from downstream tributaries, the entire river below Lewiston Dam would often be very difficult if not impossible to fish from mid-February through mid-April.

Mid-Winter Spike: TRRP proposes a mid-winter flow spike that would piggy-back on a natural storm event. It would not happen every year and would be triggered by weather forecasts and water availability forecasts. The stated rationale is to accomplish streambed scour, riparian scour, habitat creation, and geomorphic work at the appropriate time of year. Our Chapter is concerned that this action effectively takes water away from the spring high-flow event. STFF believes that the high spring flows dictated by the Record of Decision (ROD) have been beneficial for the river and anadromous fish on the Trinity. These high flows are critically important to facilitate alluvial flow within the main stem of the Trinity River, allowing for a dynamic river system below the dams. We are concerned that the mid-winter spike, by shifting

some of the ROD allotment to mid-winter, would reduce the efficacy of the spring high flow event. We are also highly concerned about this action's impact on recreational fishing. December through February is the heart of the steelhead fishing season on the Trinity River. This big 6500cfs spike would blow out the river for 10-14 days when scores of anglers would otherwise be able to fish the river. The proposed benefits of this action do not seem to be worth the cost in terms of lost angling opportunity.

Alternative Actions: TRRP seems intent on shifting some of the ROD allotment to the winter months. STFF supports an alternative mid-winter use of this water, which would be to maintain minimum stream flows (MIFs) of 450cfs throughout the winter. As it stands, the river flows at a minimum of 450cfs from April 15 to October 15th. Throughout the fall and winter the release from Lewiston Dam drops to 300cfs. We believe that adding an additional 50% throughout the fall and winter would provide more fishery benefits for all anadromous species than the proposed Winter Flow Variability and Mid-Winter Spike experiments.

Sincerely,

Mary Nishioka

President 2020 – 2021

Shasta Trinity Fly Fishers, Inc.

Jim Tornillo

Director 2009 - present

Shasta Trinity Fly Fishers, Inc.

Letter from Friends of the Trinity River

18 June 2021

To: Winter Flow Scoping - TRRP

From: Friends of the Trinity River

Subject: Winter Flow Variability Comments during Public Scoping Process

Friends of the Trinity River (FOTTR) is expressing our interest and recommendations concerning the Winter Flow Variability Action – Proposed for Implementation in 2022. We support strategies to increase smolt growth and cue outmigration at the appropriate times.

Based upon the limited information that is currently available to the public on the overall project implementation plan and specific proposed water year type hydrographs, the following comments are submitted:

1. There is a lack of published studies on why the subject approach on the Trinity River will meet the stated goals and objectives. There are studies on similar rivers, such as the Shasta River, but where is the data and analysis specifically for the Trinity River. From our understanding, there has been extensive analysis completed by members of the TRRP, but the information has not been made available to the public.
2. Any increased flows from February 15th to April 15th should be commensurate with fisherman and fishing guides ability to adequately fish and float within the confines of the upper portions of the Trinity River. The variable flow high mark and duration must allow fisherman access to fishable river conditions to minimize the economic impact on Trinity County and downtown Weaverville, as the 2000 ROD states "to improve the economic well-being of the Trinity Basin and North Coast as a whole".
3. The "trigger event" from December 15th - January 15th must be based upon an actual weather event and not a National Oceanic and Atmospheric Administration (NOAA) weather event "prediction". More often than not, the NOAA prediction changes significantly as the actual weather event occurs. The "trigger event" can be quickly evaluated and a decision can be made regarding what specific variable flow hydrograph to follow.
4. The proposed Winter Flow Variability (Proposed Actions) Goals and Objectives listed in the public scoping project proposal must increase juvenile salmon growth and survival rates and "meet the statutory and trust obligations of the Department to restore and maintain the Trinity River's anadromous fishery resources" (2000 ROD). The proposed actions must include a continued program commitment to measure juvenile salmonoid fork length as outmigration occurs. The data must show increased fork length and growth rates and be incorporated into future variable flow refinements under the overall program adaptive management process.
5. The entire proposal must be reviewed by the TRRP Science Advisory Board and gain independent support.

6. It appears likely the Trinity River temperature objectives in the "Water Quality Control Plan for the North Coast Region" during critically dry years would not be met, which would be a violation of the federal Clean Water Act and California's Porter-Cologne Act, as well as a significant negative impact to summer holding and fall spawning Spring Chinook salmon. Any changes to the flow regime must meet temperature objectives. In order to ensure enforceability, those temperature objectives must be fully incorporated into Reclamation's state water permits.

Thank you for the opportunity to submit comments during the public scoping phase of the overall National Environmental Policy Act process.

Sincerely,

Friends of the Trinity River	friendsofthetrinityriver@gmail.com
Armand Castagna	mondotrinity@gmail.com
Kyle Catanese	kylecatanese17@gmail.com
Paul Catanese	pcatanese@dhscott.com
Russ Giuntini	rukim1259@icloud.com
Tom Mahan	tom@swingwaterflyfishing.com
Scott Stratton	wildsteelhed@gmail.com
Jim Smith	jwsmith48@hotmail.com
Clark Tuthill	cltuts@att.net
Trent Tuthill	tutsplace@yahoo.com
Darrin Victorine	trinityriverfly@gmail.com

cc: Congressman Huffman
Ernest A. Conant, Regional Director
Don Bader, Manager NCAO
Humboldt County Board of Supervisors
Trinity County Board of Supervisors
TMC Members

Appendix B– Draft Supplemental Information Report

RECLAMATION

Managing Water in the West

Draft Supplement Information Report Two Year Trinity River Flow Variability Pilot Project Approved Under the 2000 Trinity River Restoration Program Environmental Impact Statement

U.S. Department of the Interior
Bureau of Reclamation
Mid-Pacific Region

December 2017

1

Mission Statements

The mission of the Department of the Interior is to protect and manage the Nation's natural resources and cultural heritage; provide scientific and other information about those resources; and honor its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated 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.

2

Supplemental Information Report

Trinity Mainstem Fishery Restoration Environmental Impact Statement

1.	**Proposed Project /Action Title:**	Pilot Project - Trinity River Flow Variability for FY18 and FY19
2.	**Existing Environmental Documents:**	Trinity Mainstem Fishery Restoration Environmental Impact Statement.
3.	**NEPA Lead Agency Name/Address:**	United States Bureau of Reclamation (Reclamation) 16349 Shasta Dam Blvd Shasta Lake, CA 96019
4.	**Contact Person and Phone Number:**	Paul Zedonis Bureau of Reclamation Northern California Area Office 16349 Shasta Dam Blvd Shasta Lake, CA 96019 530-276-2047

5. **Purpose of Supplemental Information Report:**
According to CEQ, Agencies shall prepare supplements to either draft or final environmental impact statements if: (i) the agency makes substantial changes in the proposed action that are relevant to environmental concerns; or (ii) there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts (40 CFR 1502.9(c)). To determine if a supplemental statement is needed, Reclamation prepared this Supplemental Information Report (SIR) to document consideration of whether the change in project description met these criteria.

6. Description of Proposed Modifications to the Original Project / Action:
Since 2000, annual flow release schedules of the Trinity River Restoration Program (TRRP) have been assessed for their intended purposes. More recently, it has been recommended by member agencies of the Trinity Management Council (Bureau of Reclamation (Reclamation), United States Fish and Wildlife Service (USFWS), Hoopa Valley Tribe, Yurok Tribe, California Natural Resource Agencies, United States Forest Service (USFS), National Marine Fisheries Service (NMFS), and Trinity County) that the TRRP implement a pilot project to varying flow above base flow levels between February 1 and April 21. The intent of rescheduling water during this time is to increase foraging opportunities and available habitat at a time when the largest numbers of Chinook salmon juveniles are rearing in the first 40 miles below Lewiston Dam in the Trinity River. In doing so, the TRRP would exercise the adaptive management framework to improve the design of future flow releases to better meet program goals.

Because of the timing on when a water year type is designated for annual flow allocations to the Trinity River, and the volume available for use for the following year occurs later (early April), the water quantity to be used in the pilot project would be limited to that portion of the flow allocation deemed "available" for use by the TRRP when considering all other flow-related objectives the TRRP considers each year. The TRRP has determined that in the trial years of 2018 and 2019 (and perhaps beyond), that variable flow releases from Lewiston Dam would be limited to the redistribution of 34,000 acre-feet (af) from May to early July to between February 1st and April 21st of the same calendar year. From an accounting perspective, the 34,000 af of rescheduled water would come from the rising limb, spring flow peak, and /or recessional limb, as recommended by the TRRP in each year. During this time, and due to scheduled maintenance at Trinity Dam hydropower infrastructure, the magnitude of proposed pulse releases would be capped at 1,800 cfs, which is half of Trinity power plant capacity of approximately 3,600 cfs.

The specific distribution of the 34,000 af between February 1 and April 21 would be subject to TRRP work group recommendations and Trinity Management Council approval. The redistribution of flow is anticipated to include multiple short-term increases to flow from Lewiston Dam above the base flow of 300 cfs. Each flow increase period would be defined (magnitude and duration) by the TRRP Flow Work Group but would be subject to not only the flow cap of 1,800 cfs, but also the most contemporary flow ramping rate guidelines when increasing or decreasing flow. Extensive monitoring and formal hypothesis testing of the effects of the pilot flow variability study would occur in each year. These results will inform the ongoing Adaptive Environmental Assessment and Management (AEAM) program of the TRRP.

7. Discussion:

The Central Valley Project Improvement Act of 1992 directed the Secretary, after consultation with the Hoopa Valley Tribe, to complete the Trinity River Flow Evaluation Study (TRFES) currently being conducted by the U.S. Fish and Wildlife Service under the mandate of the Secretarial Decision of January 14, 1981, in a manner which insures the development of recommendations, based on the best available scientific data, regarding permanent instream fishery flow requirements and Trinity River Division operating criteria and procedures for the restoration and maintenance of the Trinity River fishery (Title 34 section 3406 (23)(A)). The TRFES, under Rearing and Spawning Microhabitat Management Objectives (8.2.2.1), specifically stated relative to winter base flows that "Recommendations based on current rearing and spawning microhabitat data will have to be re-evaluated through an adaptive management process…" As described in the TREIS, the Flow Evaluation Alternative, coupled with additional watershed protection efforts, including the AEAM program, was identified as the preferred alternative. The AEAM program, guided by the TMC, will ensure the proper implementation of the following measures:

- Variable annual instream flows for the Trinity River from the TRD based on forecasted hydrology for the Trinity River Basin as of April 1st, of each year, ranging from 369,000 af in critically dry years to 815,000 af in extremely wet years;

- Physical channel rehabilitation, including the removal of riparian berms and the establishment of side channel habitat;

- Sediment management, including the supplementation of spawning gravels below the TRD and reduction in fine sediments which degrade fish habitats;

- Watershed restoration efforts, addressing negative impacts which have resulted from land use practices in the Basin; and

- Infrastructure improvements or modifications, including rebuilding or fortifying bridges and addressing other structures affected by the peak instream flows provided by the Record of Decision.

Additionally, included as part of the AEAM program, appropriate scientific monitoring and evaluation efforts are to be conducted along with recommendations of possible adjustments to the annual flow schedule within the designated flow volumes or other measures to ensure that the restoration and maintenance of the Trinity River anadromous fishery continues based on the best available scientific information and analysis.

The 2000 TREIS environmental analysis resulted in the determination that the Flow Evaluation Alternative along with watershed protection efforts and the AEAM program, represented the best overall approach to substantially increasing natural production of anadromous fish and fishing opportunities, while allowing for continued water exports and flood control.

The impacts of the proposed winter flow releases are all within those analyzed for the Percent Inflow, Maximum Flow, and Flow Evaluation alternatives in the 2000 TREIS, and have the potential to affect the TRRP, CVP operations, water supply, power generation, recreation, and fish and wildlife resources discussed therein. Effects to these resources were evaluated and found to be minor, as summarized in the following bullets.

- ***Trinity River Restoration Program Objectives***

The quantity and timing of rescheduling water is that amount that the TRRP has determined through analysis of the spring and early summer hydrograph can be rescheduled without loss of being able to meet other priority objectives important to the TRRP in each year. In doing so, the implementation of this action would allow the TRRP to critically scrutinize, with formal hypothesis testing, the efficacy and need of rescheduling water in a manner consistent with the AEAM approach of the ROD. The ROD specifically states (page 12), *the recommended flow regimes link two essential purposes deemed necessary to restore and maintain the Trinity River's fishery resources: 1) flows to provide physical fish habitat (i.e., appropriate depths and velocities, and suitable temperature regimes for anadromous salmonids), and 2) flows to restore the riverine processes that create and maintain the structural integrity and spatial complexity of the fish habitats.* Point 2 is important in that the change in the proposed action is closely associated to this goal. More specifically, implementing the action would allow testing to evaluate flow- habitat functions as they related to fish forage availability. Furthermore, the ROD states (also on page 12) that ***releasing water on a daily basis, according to that year's hydrology, may be adjusted*** *but the annual flow volumes established may not be changed.* The change in the proposed action would not change the permanent instream fishery flow requirements or endorse changing the annual allocated volume by water year type as directed by the ROD. Evaluations of impacts from the Maximum Flow alternative and Percent Inflow

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Alternatives as reviewed in the TREIS included Lewiston Dam releases up to 3,000 cfs and 2,600 cfs, respectively. The analyses are provided in that environmental review and are still believed to provide a basis of comparison for the period of interest.

- ***CVP Operations and Water Supply***

Implementing peak flows to 1,800 cfs from Lewiston Dam from February to April would not be precedent setting. Safety of Dam (SOD) releases of greater magnitude routinely occur within the proposed time frame of the action. For example, since the year of signing the ROD, SOD releases have occurred in 2000, 2004, 2006, and 2017, and during these releases a peak release of 5,400 cfs occurred.

Similarly, when SOD releases have occurred the volume of water released from Lewiston Dam above base flow have been significantly larger than the volume contemplated in this action. In the years of SOD releases described herein, the approximate volume released in water years 2000, 2004, 2006, and 2017 was 207,000, 84,000, 256,000 and 36,000 af, respectively.

Rescheduling 34,000 af of water from May through June in any water year to February to late April as proposed will not have a significant effect to operations of the Central Valley Project that were not already reviewed in the TREIS. The total volume of the ROD flow allocation remains the same, only a shift of a portion of that water would occur earlier in the year.

However, there could be minor beneficial effects to CVP supply under certain conditions. More specifically, the benefit could occur when flow from Lewiston Dam are greater than 300 cfs and overlap with conditional release of water to meet SOD target storage elevations in certain water years. Presently the Central Valley Operation and Criteria Plan (OCAP) provides target storage schedule for Trinity Reservoir that if exceeded, require additional release from storage as described above. In consideration of this potential overlap in operations and TRRP flow requests in the future, it is conceivably that Central Valley Operations could integrate SOD releases with the pilot flow scheduling. In doing so, the CVP supply stored in Trinity Reservoir could conceivably be enhanced simply because water that would have otherwise been released to the Trinity River as part of SOD releases could then be accounted toward the Trinity River ROD annual allocation. The result would be a commensurate increase in CVP supply for use later in the year or the following year. The frequency upon which these associations may occur is not clear and certainly difficult to predict and would be subject to CVO's review of the then current hydrological conditions.

- ***Export Schedule & Power Generation***

The rescheduling of water would only have a minor but likely a beneficial effect to exporting water to the Sacramento Basin. The quantity and distribution of water to earlier in the year would allow for greater flexibility in water export later in spring and early summer because demand to the Trinity River would be lowered while demand for exports increases. Greater capacity for exports would occur commensurate to the reduction of flow rescheduled. A side benefit to increased flexibility in operations in the early spring and early summer is the commensurate increased flexibility to export water during a time when cold water beneficial uses of the Sacramento River basin are in effect.

The maximum flow from Lewiston Dam is projected to be 1,800 cfs, which is less than the maximum capacity (3,600 cfs) for power generation at Trinity Dam. As such, the proposed action would not exceed the current and scheduled flow capacity to generate power. In addition, the time when water is rescheduled earlier would also be subject to less power bypass because flows to Lewiston would be lowered, resulting in an overall increased capacity to generate power later in spring and early summer at multiple power plants. While there are complexities to determining the exact effects of such an action, it is generally perceived that a slight but positive effect to overall power generation could occur. However, again the rescheduling of this water and allowance of potentially increased power production is not perceived as being a significant shift relative the prior TREIS review.

- ***Recreation***

Per TREIS, the primary recreation season is defined as the period between Memorial Day (last week in May) to Labor Day (first week in September). The effects of the rescheduling water are not believed to be significant. Rescheduling flows from the primary recreation season to earlier in the year will likely result in slightly positive impacts to recreational fishing and boating in the Trinity due to slightly decreased magnitude of releases and improved safety during that period.

The use of rescheduled water earlier in the year is not anticipated to have a significant change to recreational opportunities. Aside from the typical peak recreational season, the increase in flow can both afford greater access to boaters but at the same time the frequently increasing and decreasing flows associated with the action may limit wading sports (e.g. fly fishing) and drift boat fishing for up to 6-12 days in the upper river.

- ***Fish and Wildlife***

The fish species of concern to this action are the same as those that were reviewed in the TREIS and serve as the basis of that environmental review.

Implementing this action is consistent with the intent of the program and the AEAM approach of the TRRP. Initial hypotheses suggest the proposed action will improve fish habitat and prey food availability for juvenile salmonids that lead to increased size and survival of juveniles to return to freshwater to spawn. In contrast, the anticipated reductions in flow from rescheduling during spring and early summer would not have a significant effect that was not considered in the decision to reschedule such water. As an example, the TRRP has recognized that the slight temperature increases (most notable in Critically Dry years) that would be expected in late spring and early summer of certain years, would still provide at least marginally suitable temperatures for the various species of concern.

Higher flows and variable releases earlier in the year are expected to: 1) inundate additional juvenile rearing habitat, 2) increase invertebrate drift (available food) for juvenile fish, and 3) to assist in juvenile outmigration as the ROD release schedule originally intended. Lewiston Dam releases of 1,800 cfs would be well below the threshold (~4,500 cfs) for river channel scour so that mortality to incubating eggs of any of the salmonid species would not be anticipated to occur. Additionally, the TRRP technical work groups have determined that stranding of juvenile salmonids from the rise and fall of flow in support of the action is not anticipated to occur.

In addition, slight beneficial effects to the Foothill Yellow-Legged frog (FYLF), *Rana boylii*, are expected with a reduction in peak flow during May and June and the increase in flow from February to through April. Lowered spring and early summer releases are anticipated to result in lowered risk of scour of egg masses and desiccation when flows drop. In contract, the increased flow in the late winter and early spring are anticipated to delay the onset of FYLFs breeding that would also reduce risk of scouring or desiccation of egg masses as flows increase and decrease as part of the action or typical higher flows of the spring hydrographs in most water year types.

8. Summary of Findings related to Modification of the Original Project / Action:
Analysis of the change in flow timing indicates that the proposed changes to the TRRP flow schedule would not diverge significantly from the selected alternative of the TREIS. Alternatives analysis in the TREIS included these types of flows, and Reclamation reviewed that analysis and determined that it is still relevant to the proposed changes. Because this information was part of the TREIS, the analysis is still relevant, and the proposed changes do not constitute substantial changes in the proposed action that are relevant to environmental concerns, Reclamation has determined that a supplemental EIS is not warranted (40 CFR 1502.9(c)).

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Appendix C – TRRP to NCAO Memo on Flow Variability

Trinity River Restoration Program

P.O. Box 1300, 1313 South Main Street, Weaverville, California 96093
Telephone: 530-623-1800, Fax: 530-623-5944

NC-150

MEMORANDUM

To: Don Bader
NCAO Area Manager

From: Mike Dixon
Executive Director

MICHAEL DIXON Digitally signed by MICHAEL DIXON
Date: 2020.09.09 13:02:04 -07'00'

Subject: Trinity Management Council Proposal to Analyze Increased Restoration Flow Release Flexibility

Background: A growing body of scientific literature, as well as research conducted within the Trinity River watershed, indicates that there are important and incontrovertible reasons to move a portion of the water allocated under the 2000 Trinity River Mainstem Fishery Restoration Record of Decision (ROD) for use during the late fall to early spring period. This was anticipated in the ROD, which stated "Based on subsequent monitoring and studies guided by the Trinity Management Council, the schedule for releasing water on a daily basis, according to that year's hydrology, may be adjusted but the annual flow volumes established in Table 1 [volume by water year class] may not be changed."

Situation: Interagency Trinity River Restoration Program (TRRP) staff began investigating avenues for winter flow variability in 2017. There are preliminary analyses indicating that moving ROD volume earlier in the year could increase juvenile salmon growth and survival, increase the ability to meet geomorphic objectives, and, potentially increase water availability for the Central Valley Project by freeing up storage prior to major winter storms and spring snowmelt. However, due to the amount of staff time that will be required to move the variable flow concept forward, the TRRP Flow Work Group is requesting preliminary approval of the concept from Reclamation prior to undertaking further detailed analyses. The TRRP Flow Work Group developed a briefing paper on a conceptual action for a targeted release of ROD water during the winter or spring months. The briefing paper was then presented to the TRRP Interdisciplinary Team, who recommended that the proposal be advanced to the Trinity Management Council.

On September 2, 2020, the TMC received a presentation on the conceptual action and passed the following motion:

> *Dave Hillemeier made a motion that we forward the flow WG memo to the appropriate Reclamation staff within NCAO and CVO to evaluate the concept to determine its feasibility and potential obstacles. If initial review by CVO indicates it's feasible, then the TRRP should begin development of the appropriate environmental documentation to implement such releases.*

The motion passed 5-1, with Reclamation abstaining and the Hoopa Valley Tribe opposed. The Hoopa Valley Tribe supports the concept of additional flow variability prior to the current April 15 ROD flow start date, but would like to achieve that objective using additional Proviso 1 or Proviso 2 water. The U.S. Forest Service was absent but previously expressed support for this concept.

Recommendation: I recommend that we present the conceptual action proposed in the attached briefing paper to Central Valley Operations and, barring major operational concerns, present it to the Regional Director. The latter is prudent given the opposition of the Hoopa Valley Tribe to using ROD water for winter flow variability. If no major concerns are raised, we should proceed with developing an Environmental Assessment and associated analyses in the upcoming fiscal year.

Attachment

Conceptual Plan to Develop Environmental Documents for Peak Flow Synchronization in the Trinity River

Background

- Peer reviewed literature and research by TRRP partners and staff since the ROD has been implemented indicate that there are fisheries and ecosystem benefits from providing flow releases from Lewiston Dam that more closely mimic natural flow patterns than the current flow schedule.
- At its December 5, 2019 meeting, the Trinity Management Council (TMC) made a motion to direct the TRRP to "*continue and/or [initiate] studies to analyze the effects of synchronizing Lewiston Dam flows and tributary flows on TRRP goals, contingent on available funding, that assist in the development of potential environmental documents.*"
- Significant improvement in both the quantity of water and changes to the simplistic flow regime released from Lewiston Dam occurred as a result of the research and work of USFWS and HVT (1999), the Mainstem Trinity River Fishery Restoration Environmental Impact Statement and the implementation of the ROD in 2000. However, the ROD still results in one peak flow in the spring, and a baseflow of 300 cfs for approximately seven months of the year (October to May) when streams in the region experience their largest and most variable flow events
- Through monitoring of implementation of the ROD, TRRP scientists have recognized that several alternative hypothesis presented in USFWS and HVT 1999 provide opportunity to improve upon the ecological benefits of Lewiston Dam flow releases. The need for increased synchronization of environmental flows with natural hydrology is supported by both observations of monitoring efforts during implementation of the ROD and literature published since 1999.
- This memorandum is intended to serve as a primer for BOR NCAO and BOR CVO in an effort to work collaboratively, and to receive approval of the concept prior to TRRP staff and partners undertaking additional effort on this important subject.
- Following approval of this conceptual plan, TRRP would begin modeling and data analysis needed to produce an EA under NEPA and other required regulatory documents to ensure sufficient legal and regulatory compliance prior to implementing the action.

Conceptual Proposed Action

- In order to help meet ROD objectives, the action would utilize 60 TAF of ROD water volume from the amount typically reserved for spring peak flows for releases above winter baseflow between December 15 and April 21.
- As stated in the Trinity River Flow Evaluation Study, "*No high-flow release(s) are planned, but synchronization of peak releases with stormflows should be evaluated through the adaptive management program to assess opportunities to maximize benefits of high-flow releases while conserving water.*" This action is in keeping with the Trinity

River Flow Evaluation Study and ROD because the adaptive management process would be used to efficiently utilize water and maximize benefits to river ecology and fish habitat.

- Spring ROD flows would be reduced by 60 TAF, regardless of water year type which is determined on April 1.
- The releases above 300 cfs between December 15 and April 15 would be largely predetermined and the remaining water volume would be distributed after 15 April as is done for the current ROD spring release.
- In keeping with the objectives of the ROD, the purpose of the action would be to 1) maximize geomorphic change within the Trinity River for the long-term benefit of fish habitat during a seasonally appropriate period; and 2) provide better temperatures for rearing salmonids during the spring juvenile growth period. Other benefits include increasing the quantity and quality of juvenile rearing habitat by increasing access to productive areas like floodplains, and providing seasonally appropriate disturbance of the macroinvertebrate community to provide optimal food resources for rearing salmonids. Reducing the volume of water released in the spring and allowing water temperatures to warm up earlier in the year would also reduce potential for impacts to reproductive cycles of other aquatic and riparian species such as Foothill Yellow Legged Frog, ground nesting birds and bank denning mammals.
- The peak flow would be synchronized with a storm event. The action would not occur in the rare chance that there were no substantive storm events during the December 15 to April 21 time period.
- Peak flow for the action would be capped at a certain flow level (e.g. 8,000 cfs) to ensure flood control downstream of Lewiston Dam would not be exceeded. Discharge predictions from the California Nevada River Forecast Center for the Trinity River at Junction City would be used to ensure peak flow from Lewiston Dam did not contribute to flooding of property, roads, or facilities.
- The target for implementation of this action would be WY 2022 (Earliest date of December 15th 2021), but the proposed action would be crafted as a multiyear action that may occur in any year after 2022.

Summary

- We are asking BOR NCAO and BOR CVO to evaluate this concept and determine if the concept would be supported for implementation in WY 2022 and subsequent years, if the needed environmental documents and legal coverage were in place prior to December 15th 2021.
- Following BOR's preliminary approval, TRRP would begin development of NEPA and ESA documents to evaluate the effect of the action on the human and natural environments.
- Below are example hydrographs:

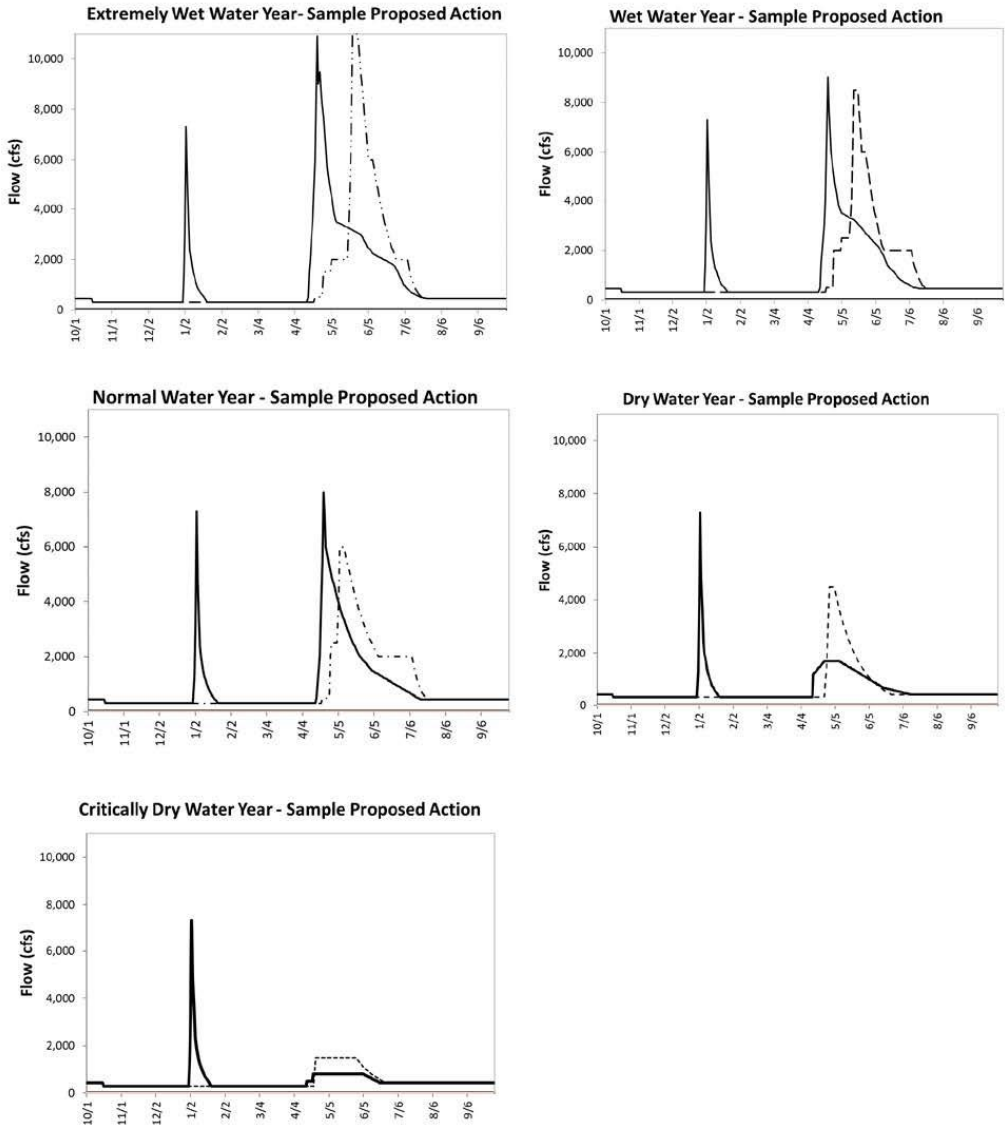


Figure 1. Example hydrographs with a 60 TAF winter peak flow release from Lewiston Dam and the resulting spring flow release reduced proportionally by 60 TAF. These are examples provided as a concept and are not intended to reflect the final proposed action.

Reference

USFWS and HVT (U.S. Fish and Wildlife Service and Hoopa Tribal Fisheries). 1999. Trinity River Flow Evaluation Final Report. Report to the Secretary, U.S. Department of the Interior. Washington, D.C. Available: http://www.fws.gov/arcata/fisheries/reportsDisplay.html. Accessed August, 2020.

Appendix D – Shifting a Portion of Trinity River Spring Releases from Lewiston Dam to the Winter Period

A Flow Management Action to Benefit Juvenile Salmonid Habitat Availability, Growth, and Outmigrant Timing

Shifting a Portion of Trinity River Spring Releases from Lewiston Dam to the Winter Period: A Flow Management Action to Benefit Juvenile Salmonid Habitat Availability, Growth, and Outmigrant Timing

Trinity River Restoration Program Collaborating Authors: Chad Abel, USBR; Kyle de Juilio, Yurok Tribe; Ken Lindke, CDFW; Seth Naman, NOAA; Justin Alvarez, Hoopa Valley Tribe (2021)

Background

Congress authorized construction of the Trinity River Division (TRD) in Northern California for the Central Valley Project (CVP) in 1955 (Public Law 386, 84th Congress, 1st Session). TRD began operations in 1963, blocking 109 miles of important salmonid habitat above Lewiston and exporting as much as 90% of inflows of the Trinity River into Trinity Lake to the Sacramento River Basin (ROD 2000). Fisheries resource managers observed an almost-instantaneous decline in the numbers of naturally produced adult salmonids returning to spawn in the Trinity River basin (declines of 53-96%, depending on the salmonid species) (USFWS & HVT 1999).

In an effort to address the precipitous fishery declines, numerous pieces of legislation and a decades-long study led to the completion of the Trinity River Flow Evaluation study by USFWS and Hoopa Valley Tribe (1999) and the subsequent Trinity River Mainstem Fishery Restoration EIS/EIR (2000) and Record of Decision (ROD) (2000). The ROD recognized that salmon recovery required, "rehabilitating the river itself" by "restoring the attributes that produce a healthy, functioning alluvial river system" and selected a course of action that included variable annual instream flows, physical channel rehabilitation, sediment management, watershed restoration, and infrastructure improvements guided by an Adaptive Environmental Assessment and Management (AEAM) program.

Following the ROD, the U.S. Department of Interior (DOI) established the Trinity River Restoration Program (TRRP or Program) to restore the fisheries of the Trinity River affected by dam construction and related diversions. Administered by U.S. Bureau of Reclamation (USBR), TRRP is a partnership of federal and state resource agencies, Tribes, and Trinity County. The purpose of the Program is to mitigate impacts of the Trinity River Division of the Central Valley Project on anadromous fish populations in the Trinity River by successfully implementing the ROD and achieving congressionally mandated restoration goals (www.trrp.net). The long-term goals of the Program are to: 1) restore the form and function of the Trinity River; 2) restore and sustain natural production of anadromous fish populations in the Trinity River to pre-dam levels; and 3) to facilitate full participation by dependent tribal, commercial, and sport fisheries through enhanced harvest opportunities (www.trrp.net).

Problem Statement

Flow regulation by dams on many California rivers has caused a distortion of the natural winter-flood, summer-drought hydrograph (Powers 1997). As a consequence, peak winter storm flows, particularly flows competent to mobilize riverbed substrates, are much reduced and summer base flows are artificially enhanced (Mount 1995). Flow regulation on the Trinity River after construction of the TRD removed nearly all high flows that are important for forming and maintaining the alluvial river and, notably, the scour by winter floods downstream of Lewiston Dam (Figure 1; USFWS & HVT 1999). Operation of the

TRD also changed the thermal regime of the Trinity River, providing warmer water temperatures during the winter and colder water temperatures during the late spring/summer than were present prior to the TRD because of hypolimnetic releases[1] from Trinity Dam (USFWS & HVT 1999).

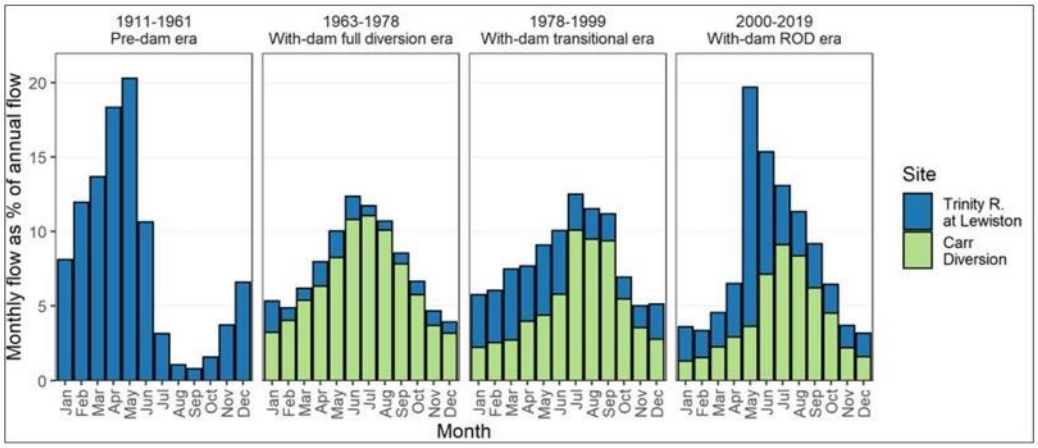


Figure 1. Changes to the proportion of water upstream of Lewiston available to the Trinity River over time (from Asarian et al., in review).

Variable annual instream flows (aka restoration flows or restoration releases) were first implemented by TRRP in 2004. ROD-recommended flow releases attempt to mimic snowmelt hydrology, create a more natural cycle of flow variability, promote alluvial processes, and provide water temperature and habitat benefits for fisheries resources (TRRP 2013). These restoration releases occur after the water year type[2] is determined in mid-April[3], based on an approved hydrograph developed by TRRP. Variable releases typically extend to early summer before returning to baseflow conditions and then remain at baseflow until the following April when a new water year is determined.

As implemented, the vast majority of flow is released after April 15 (Figure 1, ROD era), followed by a baseflow of 300 cubic feet per second (cfs) for seven months of the year (October to April), when unregulated streams in the region generally experience their largest and most variable flow events (Figure 1, pre-dam era). Undammed tributaries to the Trinity River naturally flow higher during winter storm events, and as high-elevation snowpack melts in early spring. Thus, natural flow contributions to the Trinity River from its tributaries are often receding by the time ROD flow releases from Lewiston Dam occur after mid-April (Figure 2).

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[1] The crest of Trinity Dam stands at an elevation of 2,370 ft., but the dam's outlet works intake is deep in the impoundment at an elevation of 2,100 ft. The reservoir thermally stratifies, forming a cool bottom layer known as the hypolimnion or cold-water pool, at the depth of the outlet works intake structure.

[2] TRRP uses five water year types to determine how much water will be available to the Trinity River each year. The five water year types are: Critically Dry, Dry, Normal, Wet, and Extremely Wet. A wetter water year means more water is available for restoration flow releases.

[3] The water year type is determined by the California Department of Water Resources' B120 (ca.gov) water supply forecast.

The thermal regime issue identified by USFWS and HVT in 1999 due to the hypolimnetic releases from Trinity Dam has not been resolved through the implementation of restoration releases. In fact, thermal impacts in late spring and early summer now extend farther downstream due to high magnitude flow releases under ROD management. Modifying the dam to include a temperature control structure or installation of a bulkhead with a multi-level intake structure would come at significant expense and is not currently being considered by USBR. Being limited to hypolimnetic releases is an operational reality when implementing variable flows in the Trinity River.

The asynchrony between flow management and the natural variability of pre-dam flows has cascading impacts on the river's form and ecology, and perhaps the most detrimental of the impacts is to young salmon. Pacific salmon's life history has adapted to the natural seasonal variability of flows and water temperature for millions of years (Groot & Margolis 1991). Current flow management keeps river conditions unnaturally cold, which suppresses metabolic rates during the key period of growth for young salmon. Later in the spring, the unnaturally cold river delays environmental cues that trigger smolts to outmigrate to the ocean before conditions in the lower Klamath River become too warm to support salmon migration. Maintaining baseflow through mid-April under current flow management also means that the inundation of rearing habitat, including floodplains, side channels and alcoves constructed by TRRP, does not occur until the majority of parr are downstream of the restoration reach (Petros et al. 2017).

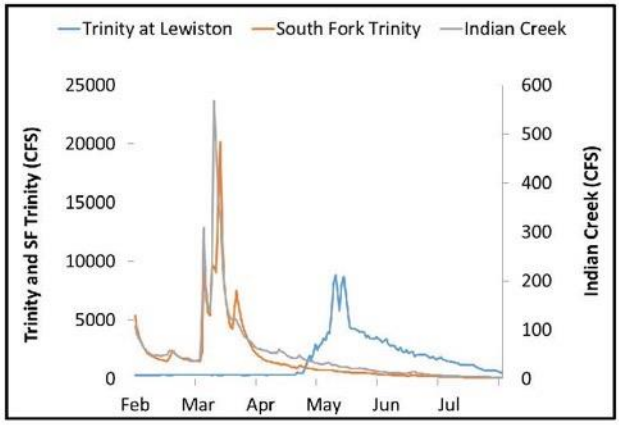


Figure 2. 2016 hydrograph comparing flow timing of two tributaries to the Trinity River (South Fork Trinity and Indian Creek) to dam releases at Lewiston.

Objectives

- Increase growth of salmon fry and parr
- Synchronize flows of the regulated mainstem with its free-flowing tributaries
- Provide thermal cues for smoltification and downstream migration earlier in the year
- Increase nursery habitat availability for juvenile salmon
- Provide seasonally appropriate disturbance of the macroinvertebrate prey species for rearing salmonids
- Reduce effects of temperature suppression on growth of rearing salmonids
- Improve geomorphic response to restoration releases in areas where the greatest habitat gains can be achieved

Proposed Action

Purpose and Need Statement: *To refine the timing of restoration flows using the principle of AEAM to better meet geomorphic, fish habitat, temperature, and floodplain habitat objectives of the ROD.*

The Implementation Plan and AEAM Plan, included as Appendix C of the 2000 Final EIS, states that the TRRP "will provide recommendations for the flow modifications for the Operations Criteria & Plan of the TRD of the Central Valley Project, if necessary." The ROD further describes that these recommendations are to be "based on subsequent monitoring and studies guided by the Trinity Management Council, the schedule for releasing water on a daily basis, according to that year's hydrology, may be adjusted but the annual flow volumes established in Table 1 [volume by water year class] may not be changed." As stated in the Trinity River Flow Evaluation Study (1999), "No high-flow release(s) are planned, but synchronization of peak releases with stormflows should be evaluated through the adaptive management program to assess opportunities to maximize benefits of high-flow releases while conserving water." The Proposed Action is in keeping with TRRP's foundational documents.

TRRP proposes to shift a portion of ROD flows to the winter period as an initial step towards natural flow variability in the regulated river system. Intended benefits of this action to the growth and survivability of juvenile salmon include inundating floodplains and other productive off-channel rearing habitats prior to fry emergence, reducing the effects of temperature suppression caused by high magnitude dam releases in late spring and early summer, creating seasonally appropriate disturbance of macroinvertebrate prey species to promote primary production and drift foraging opportunities, and providing thermal cues that encourage smolts to outmigrate prior to deterioration of environmental conditions in the lower Klamath River by allowing the river to warm earlier. Intended geomorphic benefits of this action include timing restoration releases when tributary events are likewise delivering flow and sediment to the mainstem and increasing bedload transport in reaches below Douglas City where the greatest habitat gains could be made through high-magnitude flow events. Under the Proposed Action, USBR would shift a portion of the ROD water for release during the winter to two distinct periods termed the Flow Synchronization Period and the Elevated Baseflow Period (Figure 3).

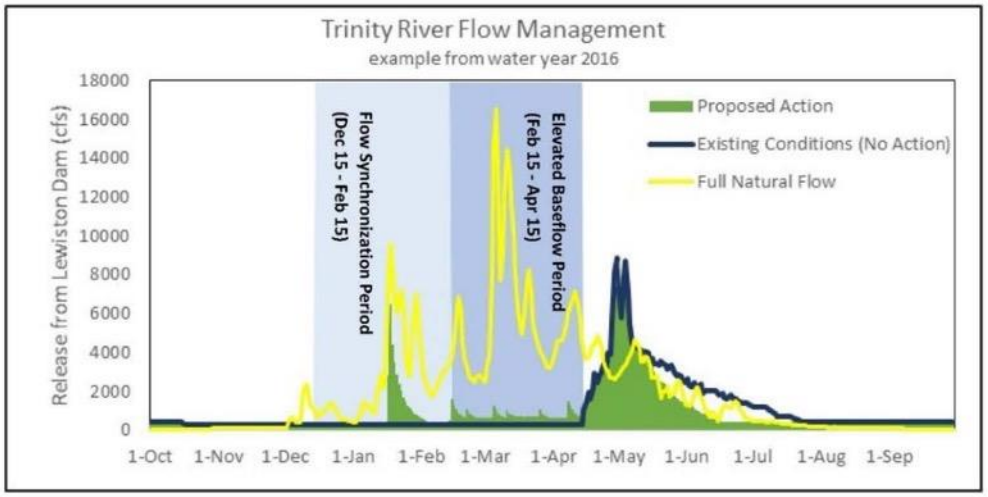


Figure 3. The Proposed Action to current flow management, using the wet water year in 2016 as an example. The blue line represents the hydrograph that was implemented in 2016. Green represents the timing of hypothetical water releases that could occur under the Proposed Action. This graph also shows the full natural flow[4] (in yellow) from the 2016 water year for perspective.

Flow Synchronization Period

The purpose of the proposed flow action during this period is to synchronize a high magnitude dam release with a winter high flow event in the tributaries to mimic elevated flows that would have likewise occurred in the mainstem from the blocked watershed area above Lewiston Dam. Between December 15 and February 15, ROD water equivalent to 60,000-acre-feet (af) would be released from Lewiston Dam when forecasting tools at the North Fork gage anticipate a rise in river levels of 4,500 to 12,000 cfs. USBR set 6,500 cfs as the maximum flow from Lewiston Dam during this period when TRRP began investigating the winter flow action, and 60,000 af was determined to be the volume required for a peak of that allowed magnitude when EIS ramping rates for the ascending limb and naturally observed ramping rates on the descending limb were applied. Under current floodway infrastructure constraints, if the flow forecast exceeds 12,000 cfs at the North Fork gage, the synchronized flow release of 6,500 cfs would not be implemented until the receding limb of the flow event was predicted to be 12,000 cfs or less at the North Fork gage. Synchronizing flow releases from the dam to the receding limb of natural accretion events from tributaries is a more conservative approach that will avoid impacts to downstream properties and structures because there is no longer uncertainty in the peak magnitude of the flow event. Flow magnitude thresholds would be re-evaluated as floodway infrastructure constraints change.

[4] The full natural flow is the unimpeded contributions from the blocked watershed above Lewiston Dam which demonstrates when peaks in flow would have naturally occurred prior to dam construction.

The flow synchronization period would provide geomorphic benefits by increasing bedload transport to areas of the mainstem that have the highest potential for habitat gains and are more influenced by tributary accretions – generally below Douglas City, and by mobilizing tributary deposits from the accretionary event with elevated mainstem flows. Flow management in this period would also create seasonally appropriate disturbance (i.e., scour) of the macroinvertebrate community to promote primary production.

Flow Forecasting during the Flow Synchronization Period

For implementing flow synchronization, the Program would need to know the uncertainty in the forecasts of streamflow to prevent flooding of downstream structures from synchronized releases. NOAA's California Nevada River Forecast Center (CNRFC) produces Hydrologic Ensemble Forecast Service (HEFS) products for use by water management agencies, such as the following example for New Bullards Bar in the Yuba River: https://www.cnrfc.noaa.gov/ensembleProduct.php?id=NBBC1&prodID=2. Notice this product is strongly predictive even four days prior to precipitation events, allowing the 72-hour notice that TRRP would provide USBR to orchestrate a winter synchronization event. The TRRP has requested this product be created for the Trinity River gage above the confluence of the North Fork because all major tributary accretions contributing to flood events in the TRRP focal reach enter the river by that point.

Elevated Baseflow Period

Between February 15 and April 15 under the proposed action, ROD water would be released from Lewiston Dam based on, and in proportion to, the Department of Water Resource's 90% exceedance B120 water supply forecast[5]. Using the 90% exceedance B120 would prevent the overuse of ROD water should the water year end up being drier than expected.

The Program would rely on the Decision Tree (Appendix 1) to determine the volume of water appropriate for release twice annually during the elevated baseflow period; the first time with DWR's posting of the February B120, and the second with the posting of the March B120. DWR typically makes the B120 available about 8-10 days after the beginning of the new calendar month. The first point of divergence in the decision tree accounts for whether a 60,000 af flow trigger occurred during the Flow Synchronization Period. Accounting for that volume and whether it was released in the Flow Synchronization Period determines whether an additional release will occur from Lewiston Dam in February, based on the B120's prediction of the water year type. For example, if a flow trigger of 60,000 af did occur, the prediction of Dry or Critically Dry would mean no February release, while a Normal water year prediction would implement an additional 60,000 af release and a Wet or Extremely Wet water year prediction would prescribe a 120,000 af release. Should no weather event occur that would initiate a flow trigger during the Flow Synchronization Period that year, a B120 water year prediction of Critically Dry or Dry would result in a 60,000 af release in February, a Normal water prediction a 120,000 af release, and a Wet or Extremely Wet prediction a 180,000 af release.

[5] The 90 percent exceedance B120 water supply forecast indicates that there is a 90 percent chance that the water supply will exceed the forecast, and a 10 percent chance that it will fall short of the forecast.

The process described in the above paragraph for February would be repeated the following month with DWR's posting of the 90% exceedance B120 water supply forecast. The Decision Tree guides the Program on the volume of release to be implemented, but it should also be considered a balance sheet that ensures the volume shifted during the winter period will represent the March 90% B120 prediction of water year type, and that volume prescribed in the winter period for that water year type is consistent across years (Table 1, third column). In other words, regardless of whether a flow trigger of 60,000 af was implemented, the overall volume of 120,000 af would be shifted to the winter period when the March 90% B120 water supply forecast predicts a Normal water year (Table 1, third column). This flow management action has been designed to safeguard against the possibility that the actual water year determination (made in April each year) ends up being less wet than predicted, as the overall volume of water to be shifted to the winter period (Table 1, fourth column) is considerably less than the ROD volume for that water year type. Much of the reason behind this initial winter flow management action would be to determine the degree of risk and the operational capability to pursue natural flow variability in the TRD while strictly adhering to ROD volumes.

Prior to this period, hydrographs would be developed by TRRP to schedule the elevated baseflow releases for the range of forecasts that could be expected.

Water Year Type	ROD Water Volume (af)	ROD Volume Shifted to Winter Period under Proposed Action (af)	Percent ROD Volume Shifted from Summer to Winter under Proposed Action
Critically Dry	369,000	60,000	16
Dry	453,000	80,000	18
Normal	647,000	120,000	19
Wet	701,000	180,000	26
Extremely Wet	815,000	220,000	27

Table 1. Water volumes shifted under the proposed action for each water year type.

B-120 to Predict Water Year Type during Elevated Baseflow Period

Under the Proposed Action, additional baseflow increases would occur during the Elevated Baseflow Period after February 15, based on the predicted water year type. Since the implementation of ROD flows in 2004, the February and March 90% exceedance B-120 water supply forecast has never overpredicted the observed water year determination (Table 2). Table 2 shows that the B-120 often underestimates the April water year determination. This is denoted by the negative values of -1 and -2 in numerous years; a -1 in the "February Comparison to Observed" column for 2004, for example, means that a Normal water year was predicted when a Wet water year was observed. Likewise, in 2006 the February 90% exceedance B-120 water supply forecast predicted a Normal water year but the observed was Extremely Wet (-2). Using the B-120 90% confidence prediction to determine water volumes for elevated base flows after February 15 is conservative and would not result in "overspending" ROD volumes based on the available record.

B-120 Water Year Predictions post-ROD							
Year	February 90% Forecast (taf)	February 90% Water Year Type	February Comparison to Observed	March 90% Forecast (taf)	March 90% Water Year Type	March Comparison to Observed	Observed Water Year Type
2004	1050	Normal	-1	1360	Wet	0	Wet
2005	910	Dry	-1	920	Dry	-1	Normal
2006	1278	Normal	-2	1531	Wet	-1	Extremely Wet
2007	550	Critically Dry	-1	795	Dry	0	Dry
2008	813	Dry	-1	880	Dry	-1	Normal
2009	386	Critically Dry	-1	643	Critically Dry	-1	Dry
2010	386	Critically Dry	-2	1055	Normal	0	Normal
2011	1040	Normal	-1	1125	Normal	-1	Wet
2012	425	Critically Dry	-2	455	Critically Dry	-2	Normal
2013	860	Dry	0	730	Dry	0	Dry
2014	145	Critically Dry	0	180	Critically Dry	0	Critically Dry
2015	600	Critically Dry	-1	830	Dry	0	Dry
2016	1030	Normal	-1	1085	Normal	-1	Wet
2017	1515	Wet	-1	1770	Wet	-1	Extremely Wet
2018	500	Critically Dry	0	345	Critically Dry	0	Critically Dry
2019	810	Dry	-2	1060	Normal	-1	Wet
2020	635	Critically Dry	0	500	Critically Dry	0	Critically Dry

Table 2. The reliability of DWR's B120 since the beginning of ROD restoration releases in 2004.

Spring ROD Releases

Under the proposed action, after April 15, the remaining ROD water would be released to the Trinity River using the same methodology that currently exists for the scheduling of restoration flows. Table 1 provides the restoration flow in acre feet and percent of restoration flow that would be shifted under each water year type. ROD objectives (i.e., peak magnitudes) can still be met under the Proposed Action by shortening the duration of the peak or truncating the receding limb of the historic hydrograph. In the 2016 water year example (Figure 3), shifting water to the winter period while maintaining peak flows after April was accomplished by truncating the receding limb so the river returned to 450 cfs summer baseflow by mid-June instead of the beginning of August.

Justification for Winter Flow Action

Habitat Availability

The timing of restoration releases is not conducive to juvenile fishes' use of naturally occurring and program-created rearing habitat (Table 3), as the lateral gains in rearing habitat occur when discharge increases and overspills from the river channel to the surrounding margins and floodplains (Table 4). Investigations into juvenile Chinook Salmon outmigration found that from 2003 to 2016, 60% (range 49% to 87%) had reared and outmigrated from the restoration reach prior to the increases in ROD flows at the end of April (Petros et al. 2017) and, thus, prior to any habitat gains above the 300 cfs baseflow (Table 4). As such, the majority of juvenile Chinook salmon are currently not able to access productive floodplains that provide habitat with vegetative cover, bolstering growth of juveniles (Sommer et al. 2005; Jeffres et al. 2008), nor can they take advantage of increases in drift forage opportunities that can occur with changes in discharge prior to outmigration.

Year	% Outmigration (February 1)	Spring Flow Release Date	% Outmigration (release date)
2003	11%	April 30	74%
2005	14%	April 22	72%
2006	0%	April 12	50%
2007	0%	April 27	53%
2008	1%	April 23	46%
2009	2%	April 27	50%
2010	8%	April 23	62%
2011	14%	April 22	58%
2012	1%	April 21	49%
2013	5%	April 21	53%
2014	0%	April 23	47%
2015	16%	April 22	83%
2016	46%	April 21	87%
Averages	9%	April 22	60%

Table 3. Comparison of percent juvenile Chinook Salmon outmigration at Pear Tree rotary screw traps by Feb 1 and the percent juvenile Chinook outmigration by onset date for spring flow releases above winter baseflow (from Petros et al. 2017).

Discharge (cfs)	Change in Predicted 40-Mile Habitat Capacity	Habitat Units with Predicted Capacity Increases
300	0	0
500	3%	58%
700	7%	61%
900	10%	66%
1100	14%	72%
1300	19%	78%
1500	25%	81%

Table 4. Predicted change (%) in habitat capacity for the 40-mile restoration reach, and the percentage of individual habitat units within the restoration reach predicted to have increased habitat capacity (from USFWS & NOAA Memo 2018). Changes are relative to the 300 cfs baseflow discharge that is currently implemented in each year during the period targeted by the winter flow action.

Food Availability

River food webs benefit from riverbed scour caused by flood disturbance (Wootton et al. 1996; Parker & Power 1997). Shortly after flood scour, stream insects are dominated by fast-growing taxa (e.g., chironomids and mayflies) that are vulnerable to predation by juvenile fish (Parker & Power 1997). These early successional species are reduced over many months as larger, slow-growing taxa, which are less vulnerable to predation, increase contributions to invertebrate assemblages and reduce prey availability (Parker & Power 1997).

Periodic channel bed scour is an objective of spring variable flow releases on the Trinity River (EIS/EIR 2000), but the timing of these scour events (often in May) might not temporally support prey availability when juvenile fish are present in the upper river (Table 3). While these disturbance events have similar benefits in providing land-borne nutrients to the system and resetting primary production, increases in macroinvertebrate species productivity and drift foraging for juvenile fish are mostly beneficial in the near term. A study of food web response following a controlled flood on the Colorado River found that concentrations of invertebrate drift increased 148% in the months following disturbance (Cross et al., 2016), but drift, like primary succession following disturbance, is most impactful to food availability in the short-term.

The extent to which the asynchrony between natural hydrology and imposed ROD flows impacts the overall macroinvertebrate assemblage and biomass on the Trinity River is unknown, but it is likely that juvenile fish in the regulated Trinity mainstem cannot take advantage of the short-term responses in primary production and increased drift forage that often occur prior to and during fry emergence in unregulated systems. Peak densities of juvenile salmonid prey species (e.g., chironomids) have been shown to be higher in ephemeral habitats continuously inundated for between 5 and 10 weeks (Merz et al. 2012), but that duration of inundation is currently not accomplished when most juveniles in the focal reach are foraging in ephemeral habitats (Table 3). Furthermore, hypolimnetic releases from Trinity Dam artificially lower water temperature, which increases the generation time of important prey species. Chironomidae generation time drops from 36 days to 25 days when water temps are doubled from 7.5 °C

to 15 °C, with Baetidae generation time dropping from 250 days to fewer than 100 days (Asarian et al., in review). The effects of cold-water releases are discussed further in the next section of this report.

Temperature & Growth

Temperature is one of the most important environmental influences on salmonid biology (Carter 2006). Most aquatic organisms, including salmon and steelhead, are poikilotherms, meaning their temperature and metabolism are determined by the ambient temperature of the surrounding water (Carter 2006). Temperature targets are widely used by fishery managers to accommodate the various life stages of Pacific salmonids (Carter 2006). Table 5 shows the various temperature targets for the Trinity River.

Source	Reach	Dates	Target
Basin Plan for the North Coast Region (North Coast RWQCB 2011) and WR 90-5	Lewiston to Douglas City	July 1–September 15	≤60 °F (15.5 °C)
	Lewiston to Douglas City	September 15–30	≤56 °F (13.3 °C)
	Lewiston to North Fork	October 1–December 31	≤56 °F (13.3 °C)
Springtime Objectives of the ROD for the TREIS/EIR (USFWS et al. 2000)	Lewiston to Weitchpec	**Normal & Wetter Water Years**	
		April 15–May 22	≤55.0 °F (12.8 °C)
		May 23–June 4	≤59.0 °F (15.0 °C)
		June 5–July 9	≤62.5 °F (17.0 °C)
		Dry & Critically Dry Water Years	
		April 15–May 22	≤59.0 °F (15.0 °C)
		May 23–June 4	≤62.5 °F (17.0 °C)
		June 5–July 9	≤68.0 °F (20.0 °C)

Table 5. Trinity River temperature "targets".

Although these temperature values are often considered "objectives" or "targets", they are more accurately thought of as thresholds because any water temperature lower than those in Table 5 would suffice (Naman et al. 2020). Consistently low water temperatures are assumed by most fishery managers to be either positive or at least not harmful, but anomalously cool water can limit growth (Lusardi et al. 2019). A recent publication illustrates the potential synergy between seasonally warm and perennially cool habitats, with fish that traverse these two types of thermal habitats growing much more than fish that were restricted to either habitat alone (Armstrong et al. 2021), but seasonally warm thermal habitats are largely unavailable on the Trinity River until floodplains are inundated by ROD restoration flows in mid-April. Lusardi et al. (2019) found that juvenile coho salmon growth rates peaked at a mean water temperature of 16.6 °C and Maximum Weekly Maximum Temperature (MWMT) of 21.1 °C and were six times greater than those observed at the coolest reach, which exhibited a mean temperature of 13.0 °C and MWMT of 16 °C. Naman et al. (2020) recommended utilizing a 7-Day Average of the Daily Average (7DADA) of 13 °C -16.5 °C (55.4°F to 61.7°F) as rearing temperature targets in the Trinity River

upstream of the North Fork Trinity River from April 1 – July 31, though currently the Trinity River does not have established temperature targets for juvenile rearing.

Recent Trinity River water temperatures at the North Fork Trinity River are shown in Figure 4, along with the recommended target range developed by Naman et al. (2020). Note that for most water year types, just as the Trinity River begins to achieve the recommended targets in the optimal rearing range for juvenile salmonids, there is a large reduction in temperatures of 5°F to 7°F that occurs in the end of April. This is due to the large volume of water that is released annually from Lewiston Dam in accordance with the TRRP restoration flow releases. In some cases, water temperatures are nearly 10°C less than the recommended juvenile salmonid rearing temperature range.

In many regions throughout the US, a positive relationship between stream order and water temperature has been reported, unless the stream has a high baseflow index (Segura et al. 2015). However, due to the constant releases from Lewiston Reservoir, as well as the current temperature thresholds imposed by regulatory processes, the mainstem Trinity River is now colder than most, if not all, of the tributaries upstream of the North Fork Trinity River. For example, in 2017 (Extremely Wet water year) and 2018 (Critically Dry water year), Rush Creek was often 10°C warmer than the mainstem Trinity River (Figure 5). Low water temperatures can mean slow fish metabolism and slower growth (Iwama & Tautz 1981). This is important because larger Chinook smolts are thought to have a better chance at survival during ocean entry (Pearcy 1992), as well as through the first ocean winter (Beamish and Manken 2001).

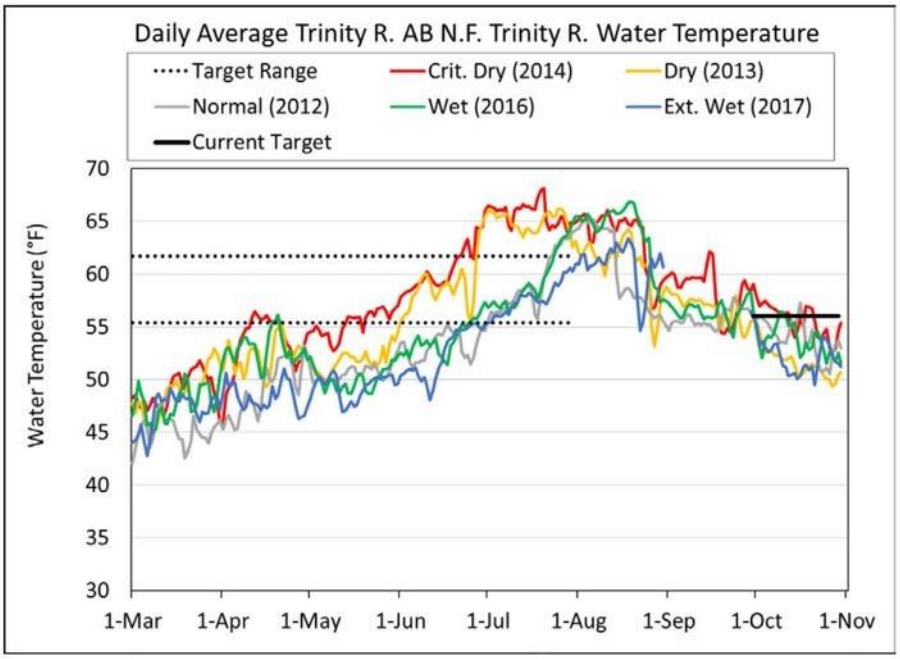


Figure 4. Water temperatures for one of each of the five water year types in the Trinity River above the North Fork Trinity River. Note the 5°F to 7°F reduction in temperature that occurs in all water year types in the end of April coincident with the onset of TRRP restoration flow releases from Lewiston Dam (from Naman et al. 2020).

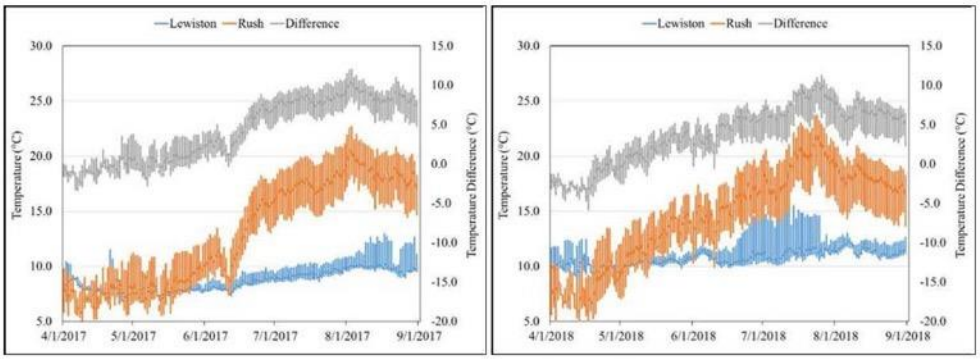


Figure 5. Water temperature and temperature difference of the Trinity River at Lewiston and Rush Creek from April - September of 2017 (left graph) in an Extremely Wet year and 2018 (right graph) in a Critically Dry year (from Naman et al. 2020).

Figure 6 depicts the temperature dependence function for Chinook salmon for the normal range of temperature recorded at the Pear Tree/Helena station during the modeling period (2005-2016) used by Thomas Gast & Associates (2021). The highest proportion of the maximum potential food consumption (Cmax) is achieved between 15 °C (59 °F) and 18 °C (64 °F). The proportion of Cmax (pCmax) that a Chinook can consume at 5 °C is approximately a third of that at 15 °C. Food consumption does not translate directly into growth since additional energy is required for metabolism, egestion, and excretion; however, the maximum potential for growth does occur at the temperatures where Cmax is near 1.0 (Thomas Gast & Associates 2021).

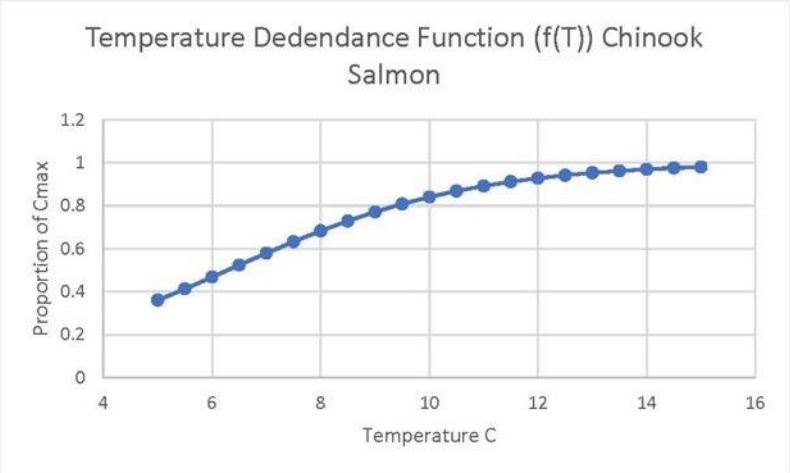


Figure 6. Temperature dependence function for Chinook Salmon for the normal range of temperature recorded at the Pear Tree/Helena station during the 2005-2016 modeling period (from Thomas Gast & Associates 2021).

Thomas Gast & Associates (2021) also developed a multiple regression model to assess the influences of population density and river flow on the total food consumption by juvenile Chinook Salmon caught at Willow Creek rotary screw trap in week 22, as predicted by the bioenergetics simulations (2005-2016). The results suggest that higher discharge in February, March and April positively influences consumption, whereas the number of redds and discharge in May negatively influence consumption (Figure 7). Discharge in April (+), discharge in May (-), and number of redds (-) were the most important factors. Including Year, either as a random or fixed effect, did not improve this model (likelihood ratio tests; p=0.158 and p=0.635), indicating that changes in consumption over time were best explained by the predictors in Figure 7.

To drive the point home on how elevated hypolimnetic releases post ROD have negatively influenced stream temperatures, Figure 8 demonstrates the effect of cold-water suppression on juvenile fish caught in the Willow Creek rotary screw trap by Julian week (Pinnix et al. 2021). Individual fork length values were pooled by week of the year across the pre-ROD (1989-2003) and post-ROD (2004-2018) periods for the Willow Creek trap site to create pre-ROD and post-ROD time series of mean weekly fork length of non-adipose fin-clipped age-0 Chinook Salmon. Only weeks of the year 10-39 (approximately March through September) were used as this is prior to the October release of hatchery fish. Comparisons of fork length at Willow Creek pre-ROD vs. post-ROD showed significant differences in most weeks (Figure 8). Post-ROD fork length was significantly larger than pre-ROD values in weeks 13, 15, 16, and 18. Pre-ROD fork length was significantly larger in weeks 20 and 22 through 36. Week 20 correlates to the calendar month of May, which has the highest release volumes for the post-ROD flows. In both pre-ROD and post-ROD periods, fork length increased significantly in week 23 and 24 due to the arrival of unmarked hatchery fish.

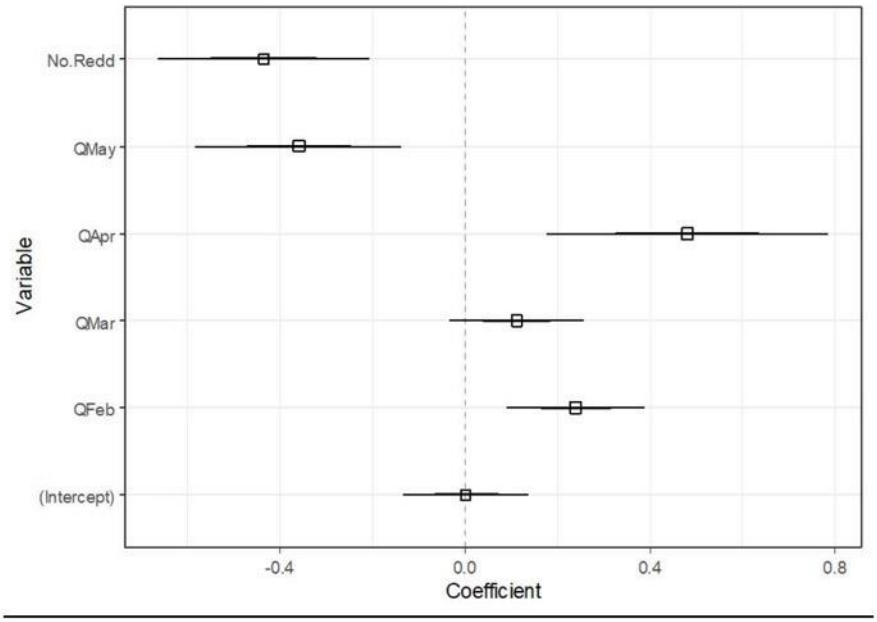


Figure 7. Coefficient plots showing the value of the standardized regression coefficient ± 2 SE for each fixed effect included in the generalized least squares GLM model for describing changes in juvenile Chinook Salmon consumption, along with the 95% confidence interval for fixed effects (from Thomas Gast & Associates 2021).

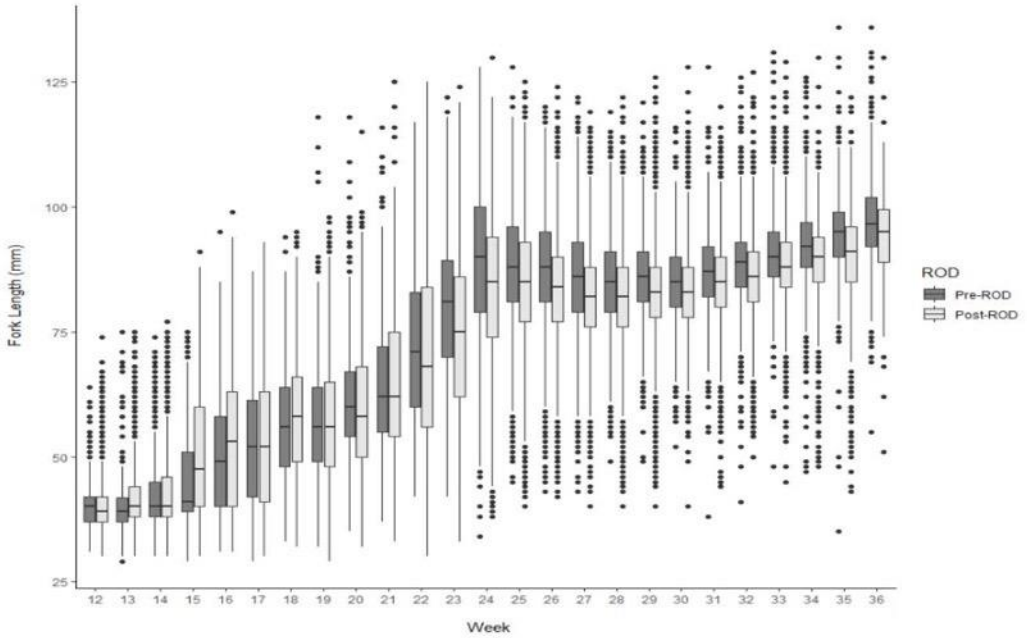


Figure 8. Box plot of non-adipose fin-clipped age-0 Chinook Salmon captured at the Willow Creek trap site grouped by week and ROD period (from Pinnix et al. 2021).

Outmigrant Timing

The Willow Creek outmigrant trap on the Trinity River has been operated annually since 1989. It was installed and continues to be operated primarily to assess outmigration timing and duration of salmonids, Chinook in particular. Hayden and Heacock (2014) developed the HDAT Model that predicts RT80 (which is defined as the point when 80% of the Chinook juveniles have passed the trap) based on accumulated daily averaged water temperatures at Hoopa. In quantifying the predictive ability of the HDAT Model, Thomas Gast and Associates (2021) found that the best single-variable model for predicting RT80 used a threshold accumulated daily averaged thermal unit (ATU) determined from the Pear Tree temperature time series. The Pear Tree site is further upstream, where the water temperature is colder than at Hoopa, and may be more indicative of the temperature that initiates outmigration. These analyses suggest that warmer water temperatures during the initial time of the ROD-flows would encourage earlier outmigration (Thomas Gast and Associates 2021).

Redd Scour

A perceived concern for implementing peak flow releases during the winter rainy season is predicting the potential scour of redds downstream of Lewiston Dam. To address this issue, an understanding of the relationships among river discharge, bed mobility, and scour depths in areas of the streambed heavily utilized by spawning salmon is needed (May et al. 2007). Spatial patterns of bed mobility based on model-predicted Shields stress at Sheridan Bar near Junction City indicate that a zone of full mobility is limited to a central core along the thalweg, which expands with increasing flow strength (May et al. 2007). Statistical analysis indicates that redds are preferentially located in shallow, high velocity areas

with relatively coarse substrate and in close proximity to streambanks. These site selection preferences correspond to areas of the streambed that are least likely to become mobilized or risk deep scour during high flow events because the bed is not fully mobile, and the scour potential line does not exceed the average depth to the top of egg pocket (23 cm) (May et al. 2007).

Evenson (2001) measured egg pocket depths on the Trinity River using freeze core sampling and documented an average depth of 23 cm to the top of the egg pocket, and an average of 30 cm to the bottom of the egg pocket. Results from 268 scour chain measurements indicate that scour was not widespread and was rarely deep enough to result in redd scour at the range of flows experienced during the study (May et al. 2007). The study indicates that Chinook salmon are well adapted for reproductive success in flood-prone systems (May et al. 2007).

Conclusion

The need to shift regulated flow releases to an earlier period that better-mimics the observed natural seasonal variability of unimpeded tributaries to the Trinity River has been increasingly accepted by TRRP program partners in recent years. This white paper was drafted to evaluate the shortcomings of current flow management and suggest meaningful adjustments so the underlying issues could be reassessed. With the completion of this paper, Reclamation is moving forward with the proposed action as an initial step to implement a more natural flow regime using releases from Lewiston Dam. A draft EA based on this paper is expected for public release in September 2021.

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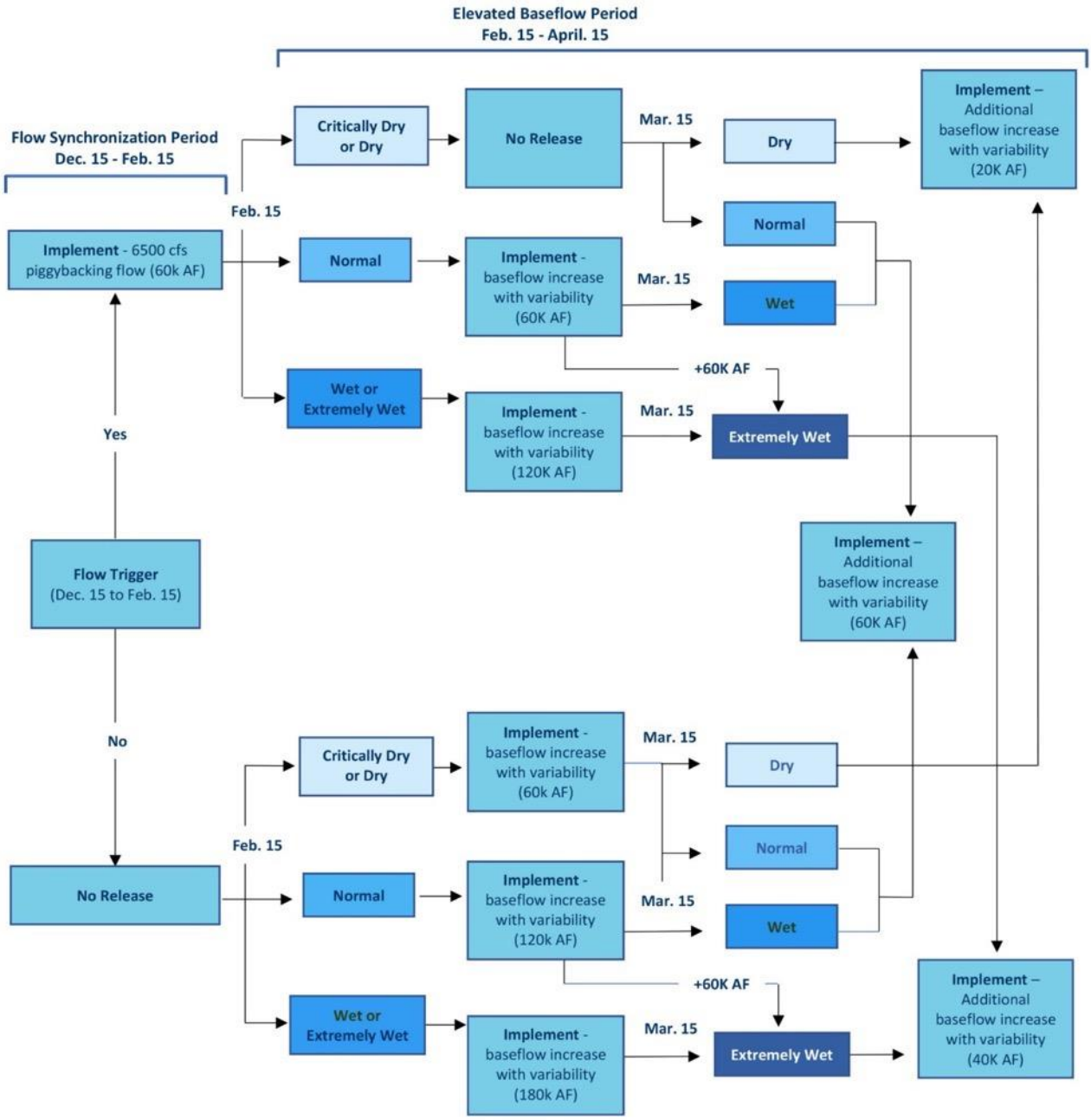
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Appendix 1

Decision Tree for Winter Flow Action

60 thousand-acre feet (TAF) in Critically Dry, 80 TAF in Dry, 120 TAF in Normal, 180 TAF in Wet and 220 TAF in Extremely Wet



Appendix E – Resource Analysis Method and Results

Trinity River Restoration Program
Winter Flow Variability Project Environmental Assessment

INTRODUCTION

This technical appendix provides an in-depth description of the methods used and the result of resource analyses completed for the Trinity River Restoration Program (TRRP) Winter Flow Variability Project Environmental Assessment (Project). Resources included in the analyses are geomorphology, water quality, vegetation, fisheries resources, and power and utilities.

Federal and state Responsible and Trustee agencies that supported and contributed to this effort include: TRRP, the Bureau of Reclamation (Reclamation), the Yurok Tribe fisheries program, the Hoopa Valley Tribe (HVT) fisheries program, National Marine Fisheries Service (NMFS), California Department of Fish and Wildlife, and the U.S. Fish and Wildlife Service (USFWS). The primary objective of the Project is to increase spawning and rearing habitat for anadromous salmonids in a manner that benefits Coho Salmon and other special-status fish species.

DETERMINING THE RELEASE VOLUME AND TIMING USING B120 FORECASTING

Annual water volumes released to the Trinity River from Lewiston Dam are determined by the projected inflow to Trinity Reservoir for the October 1 to September 31 water year by the Bulletin 120 (B120) forecast issued by the California Department of Water Resources. Each of the five water year types defined in the ROD, from Critically Dry to Extremely Wet, is determined by the April 1 B120 forecasted inflow and allocated a specific water volume (Table E- 1), which are commonly referred to as "ROD water volumes."

The proposed action moves some volume of these allocations prior to April 1, and B120 forecasts for February 1and March 1 will be used to determine how much water will be moved in any given year. Because the ultimate amount of water available for release to the Trinity River from Lewiston Dam in any given year depends on the April 1 B120 forecast, and forecasts in earlier months are not always the same as the April 1 forecast, it is necessary to understand how often earlier forecasts would predict more or less water than will ultimately become available.

Forecasted water volume inflows to Trinity Reservoir are available starting in water year 2004 and have been used to determine ROD water volumes each year since then. We compiled B120 forecasts for February, March, and April each year from 2004 to 2020 to evaluate the accuracy of February and March forecasts as compared to the April forecast, which determines ROD water volumes each year. For February and March forecasted volumes, we identified the water year type, and thus the ROD water volume, that would be available for release from Lewiston Dam if the forecasted volume were equal to the April forecast. Because annual ROD volumes are determined by the April forecast, this becomes our frame of reference when considering February and March forecasts in term of whether these earlier forecasts overpredict or underpredict ROD allocations. Table E- 4 includes forecasted inflow volumes to Trinity Reservoir from B120 reports from 2004 to 2021, water year types that determine ROD water volumes, and indicators of how February and March forecasts compare to final water year determinations based on April forecasts. Indicators show how far February or March forecasts are from the final determination. For example, if a March forecast indicates a dry water year but the ultimate determination is a wet water year, "-2" indicates an underforecast of two water year types. Likewise, if a dry water year is forecasted in March and the final determination is a dry water year, a "0" indicates that the March forecast was equal to the final determination.

Table E- 1. Water Year Types and Trinity River Inflow.

Water Year Type	Trinity Reservoir Inflow (acre feet)
Critically Dry	<650,000
Dry	650,000 - 1,024,999
Normal	1,025,000 - 1,349,999
Wet	1,350,000 - 1,999,999
Extremely Wet	≥2,000,000

Geomorphology and Soils

Bedload Yield

Bedload transport (in tons) in winter by flows that would occur under the No Action alternative and if variable winter flows are implemented under the Proposed Action alternative on the Trinity River were estimated at Lewiston, Limekiln Gulch, and Douglas City using methods in Buxton (Buxton, TH. 2021). The estimates were made for the same period from December 15 to February 15 for both alternatives in water years 2006, 2008, 2015 to 2017, and 2019 using flows projected at these stations for each alternative by RBM10 (Jones,). The results indicated discharges under the Proposed Action transported a substantially larger mass of sediment than discharges that would occur if the No Action alternative is maintained (Table E- 2).

Table E- 2. Bedload yield (in tons) estimated for the No Action alternative and Proposed Action alternative.

Water Year	Lewiston		Limekiln Gulch		Douglas City	
	No Action	Proposed Action	No Action	Proposed Action	No Action	Proposed Action
2006	0	247	42.6	485	1372	3780
2008	0	269	0	290	34	1524
2015	0	133	0.1	281	262	1594
2016	0	136	3.6	372	242	4051
2017	0	276	4.7	263	397	5208
2019	0	173	1.5	156	39	2603

Course Bedload Analysis

Coarse bedload transport has been used as a surrogate to measure geomorphic work accomplished by prescriptive environmental flows since the time of the Trinity River Flow Evaluation (USFWS) and HVT 1999). Many hypotheses were presented how increases in coarse bedload transport would result in increases in juvenile salmonid rearing habitat through planform change and transport of large delta deposits. However, these hypotheses have not been verified since implementation of the Record of Decision (ROD) in 2004. Coarse bedload yield is presented here to disclose possible impacts of the Proposed Action on both the environment and the progress towards ROD objectives.

Coarse bedload mobilized during water years 2004 through 2019 was estimated for the Proposed Action and No Action alternatives using daily average flows predicted by River Basin Model-10 (RBM-10; Table E- 3, Figure E- 1, Table E- 2). Bedload was calculated using 2015 sediment rating curves (Gaeuman, D. and R.L. Stewart. *Sediment transport in the Trinity River, CA: Data synthesis 2004-2015*. TRRP Technical Report TR-TRRP-2017-1, Trinity River Restoration Program, (Weaverville, CA, 2017). for the reaches where rating curves existed. Where

information was not available, the nearest sediment rating curve was applied. This resulted in the most downstream rating curve, located near Douglas City, being applied to the two reaches downstream.

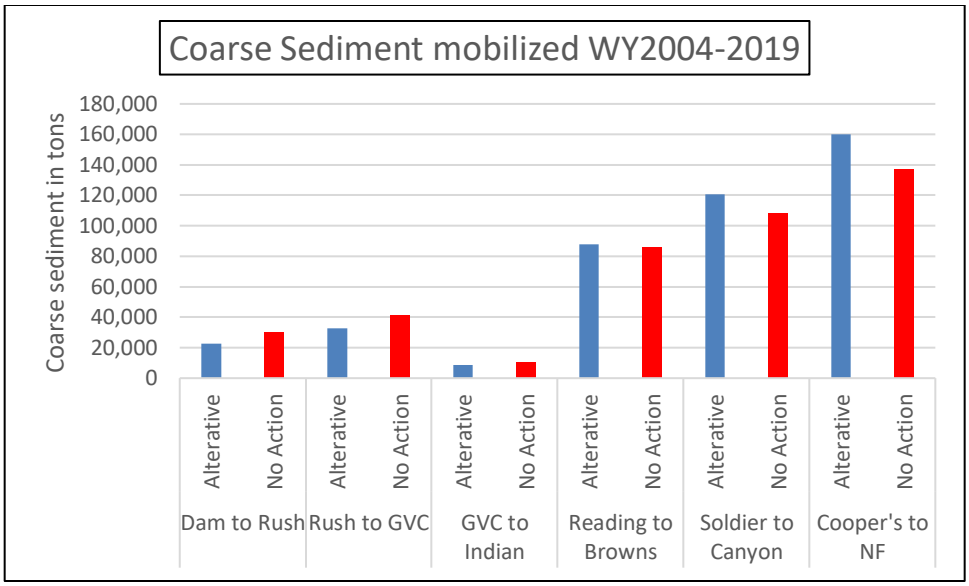
For both the No Action and Proposed Action there is a general increase in the downstream direction for coarse bedload, with the notable exception of the Grass Valley Creek (GVC) to Indian Creek Reach. The differences between the No Action and Proposed Action vary by water year and location, but generally over the entire period analyzed, the Proposed Action results in a decrease of coarse bedload mobilized for upstream reaches, and an increase for downstream reaches, with the transition occurring near Douglas City.

It is unclear how these changes would influence progress toward the objectives in the ROD. Currently, habitat is relatively plentiful in upstream reaches compared to downstream reaches. Increasing geomorphic work in lower reaches through piggybacking on tributary accretion to address this habitat bottleneck could be a desirable outcome of the Proposed Action. However, deltas that were targeted for mobilization occur in the upper reaches where there is an overall decrease in estimated coarse bedload mobilized for the Proposed Action. It is unknown if timing flow release with delivery of sediment from tributaries will more efficiently mobilize potential delta deposits or if reduced flow volumes during spring geomorphic releases will result in less effective mobilization of these same sediments. Also, spring release volume distribution will be subject to the discretion of the TRRP Flow Workgroup, Trinity Management Council (TMC), and Reclamation, and could be redistributed or prioritized under the Proposed Action to better accomplish geomorphic work than the hypothetical hydrographs that were developed for this analysis.

Table E- 3. Estimates of coarse bedload mobilized during water years 2004-2018 for the Proposed Action and No Action alternatives using daily average flows predicted by RBM-10.

Water Year	Dam to Rush		Rush to GVC		GVC to Indian		Reading to Browns		Soldier to Canyon		Cooper's to NF	
	Proposed Action	No Action	Proposed action	No Action	Proposed action	No Action	Proposed action	No Action	Proposed action	No Action	Proposed action	No Action
WY2004	255	422	709	1,083	245	344	4,686	4,395	6,463	5,477	8,667	6,987
WY2005	2,079	600	3,169	1,404	812	470	6,606	5,835	7,791	7,227	9,060	8,679
WY2006	4,251	7,458	6,364	10,456	1,707	2,533	17,014	19,151	25,052	24,907	34,823	32,392
WY2007	4	18	27	123	13	55	658	1,348	928	1,570	1,277	1,857
WY2008	442	373	1,118	932	375	304	4,863	3,853	5,691	4,310	6,546	4,804
121`Y2009	2	8	26	85	14	46	791	1,379	1,125	1,772	1,541	2,230
WY2010	433	434	1,069	1,077	365	365	5,080	5,024	6,420	6,098	7,847	7,251
WY2011	5,378	9,905	6,648	11,156	1,512	2,309	9,980	11,781	12,493	13,402	15,228	15,238
WY2012	159	160	548	514	222	190	4,248	3,522	5,620	4,323	7,190	5,330
WY2013	2	4	15	46	8	23	513	888	679	1,039	902	1,239
WY2014	0	0	0	0	0	0	93	69	181	111	297	177
WY2015	548	793	975	1,216	290	301	3,408	2,298	4,740	2,824	6,293	3,571
WY2016	1,950	1,881	3,113	2,857	857	720	8,912	6,407	12,476	8,303	16,800	10,936
WY2017	5,830	6,794	7,215	8,161	1,659	1,816	13,853	13,131	20,291	17,926	28,254	24,208
WY2018	0	0	0	0	0	0	197	148	419	289	713	495
WY2019	1,175	1,376	1,880	2,217	512	598	6,985	6,423	10,348	8,848	14,414	11,937
SUM for all WY	22,508	30,226	32,875	41,328	8,593	10,076	87,888	85,651	120,718	108,425	159,852	137,331
% No action	74		80		85		103		111		116	

Note: Reaches are ordered from upstream to downstream moving from left to right. Bedload was calculated using 2015 sediment rating curves from Gaeuman, D. and R.L. Stewart. *Sediment transport in the Trinity River, CA: Data synthesis 2004-2015*. TRRP Technical Report TR-TRRP-2017-1, Trinity River Restoration Program, (Weaverville, CA, 2017). using the rating curve most applicable to the reach. Where information was not available, the nearest bedload rating curve was applied, resulting in the most downstream rating curve, located near Douglas City, being applied to the two reaches further downstream.



Note: Bedload was calculated using 2015 sediment rating curves from Gaeuman, D. and R.L. Stewart. *Sediment transport in the Trinity River, CA: Data synthesis 2004-2015*. TRRP Technical Report TR-TRRP-2017-1, Trinity River Restoration Program, (Weaverville, CA, 2017). using the rating curve most applicable to the reach.

Figure E- 1. Coarse sediment mobilized at different locations within the restoration reach for WY2004-2019 for the Proposed alternative and No Action alternative.

Water Quality – Temperature

The Program has maintained water temperature objectives for protecting adult spring Chinook Salmon upstream of the North Fork Trinity River as measured at Douglas City and the North Fork Trinity River (adult holding targets) and out-migrating juvenile salmonids throughout the mainstem river, as measured at Weitchpec (outmigration targets), since its inception in 2000. A recent evaluation of programmatic objectives and targets resulted in a recommendation for an additional temperature objective for rearing juvenile salmonids in the mainstem Trinity River, upstream of and measured at the North Fork Trinity River (rearing target). The rearing temperature target has not yet been formally adopted by the Trinity Management Council. However, it is evaluated for proposed action because temperatures during the critical rearing period is a central focus of the proposed action to move ROD water volumes prior to April 1.

Compliance with adult holding and outmigration temperature targets have been evaluated annually by calculating the degree day exceedances of the targets (Table E- 4). Positive differences between daily average temperatures and a given target are summed over the period defined by the target to produce an estimate for each target in each year. Compliance with the rearing target is evaluated in the same way for the upper threshold of 16.5° C; the lower threshold is evaluated in a similar manner by summing daily deviations below the minimum temperature range of 13° C. In addition, the rearing target is evaluated using the seven-day moving average of the daily average (7DADA) rather than using the observed daily average temperatures.

To evaluate the effects of the proposed action on compliance with temperature objectives, we used daily average temperatures estimated from RBM10 from 2004 to 2019 for the observed hydrograph (No Action alternative) and hypothetical hydrographs consistent with the Proposed Action. Exceedances were calculated separately for each temperature target for each year for the observed hydrographs and the hypothetical Proposed Action hydrographs (Table E- 5, Table E- 6, Table E- 7; Figure E- 2, Figure E- 3, Figure E- 4).

Table E- 4. Median (50%) and 90% exceedance of forecasted inflow volumes to Trinity Reservoir (thousand acre-feet), associated ROD water year type (WY Type), and accuracy of water year forecast relative to realized water year ROD allocation based on the median April forecast.

Year	February					March						April		
	Median (50%)	WY Type1	WY Accuracy[2]	90%	WY Type[1]	WY Accuracy[2]	Median (50%)	WY Type[1]	WY Accuracy[2]	90%	WY Type[1]	WY Accuracy[2]	Median (50%)	WY Type[1]
2004	1440	W	0	1050	N	-1	1675	W	0	1360	W	0	1580	W
2005	1286	N	0	910	D	-1	1140	N	0	920	D	-1	1245	N
2006	1776	W	-1	1278	N	-2	1836	W	-1	1531	W	-1	2105	EW
2007	830	D	0	550	CD	-1	1000	D	0	795	D	0	835	D
2008	1255	N	0	813	D	-1	1130	N	0	880	D	-1	1065	N
2009	711	D	0	386	CD	-1	866	D	0	643	CD	-1	852	D
2010	807	D	-1	386	CD	-2	1310	N	0	1055	N	0	1310	N
2011	1334	N	-1	1040	N	-1	1295	N	-1	1125	N	-1	1800	W
2012	760	D	-1	425	CD	-2	650	D*	-1	455	CD	-2	1025	N
2013	1235	N	1	860	D	0	955	D	0	730	D	0	828	D
2014	380	CD	0	145	CD	0	340	CD	0	180	CD	0	395	CD
2015	1045	N	1	600	CD	-1	1055	N	1	830	D	0	934	D
2016	1370	W	0	1030	N	-1	1380	W	0	1085	N	-1	1600	W
2017	1825	W	-1	1515	W	-1	2200	EW	0	1770	W	-1	2265	EW
2018	690	D	1	500	CD	0	445	CD	0	345	CD	0	530	CD
2019	1090	N	-1	810	D	-2	1335	N	-1	1060	N	-1	1595	W
2020	870	D	1	635	CD	0	620	CD	0	500	CD	0	515	CD
2021	710	D	1	475	CD	0	570	CD	0	380	CD	0	530	CD

[1] ROD water year type: CD = Critically Dry; D = Dry; N = Normal; W = Wet; EW = Extremely Wet

[2] Indicator of how far off WY type forecast is from the observed median April 1 B120 forecast. Underforecasting is indicated as negative integers and overforecasting as positive integers; e.g., underforecasting of two water year types (dry vs. wet) is indicated by "-2."

Table E- 5. Annual degree day exceedances of adult spring Chinook Salmon holding temperature targets from 2004 to 2019 based on RBM10 temperature modelling of the mainstem Trinity River under observed historical conditions and hypothetical hydrographs consistent with the proposed action.

Year	No Action			Preferred Alternative		
	Douglas City July 1 - Sept 14	Douglas City Sept 15-30	North Fork Oct 1 - Dec 31	Douglas City July 1 - Sept 14	Douglas City Sept 15-30	North Fork Oct 1 - Dec 31
2003	2.57	0.00	0.00	0.00	0.00	0.00
2004	0.00	0.00	0.00	0.00	0.00	0.00
2005	2.28	0.00	0.00	8.73	0.00	0.00
2006	0.29	0.00	0.00	0.29	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.07	0.00	0.00	0.07
2009	0.19	0.13	0.00	1.38	0.13	0.00
2010	0.00	0.00	1.73	6.50	0.00	1.73
2011	0.00	0.00	0.00	0.00	0.00	0.00
2012	0.00	0.00	1.17	0.00	0.00	1.17
2013	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	2.57	5.03	0.04	7.63	5.03
2015	9.08	1.07	0.30	10.22	1.07	1.40
2016	8.91	0.00	0.00	9.49	0.00	0.00
2017	0.00	0.00	0.00	0.00	0.00	0.00
2018	8.20	0.00	0.00	8.20	0.00	0.00
2019	3.29	0.67	0.00	3.49	0.67	0.00

Table E- 6. Annual degree day deviations of juvenile rearing temperature targets from 2004 to 2019 based on RBM10 temperature modelling of the mainstem Trinity River under observed historical conditions and hypothetical hydrographs consistent with the proposed action.

Year	No Action		Preferred Alternative	
	Negative Deviations	Positive Deviations	Negative Deviations	Positive Deviations
2003	-154.14	37.50	0.00	0.00
2004	-108.74	18.96	-104.49	65.31
2005	-152.24	39.77	-116.51	74.91
2006	-230.06	30.33	-170.06	63.04
2007	-79.14	48.61	-66.51	62.20
2008	-153.33	1.84	-133.21	25.80
2009	-82.37	88.94	-79.57	99.47
2010	-218.20	23.89	-182.76	65.81
2011	-211.14	4.63	-170.17	30.51
2012	-158.56	14.26	-121.36	39.31
2013	-71.63	69.54	-44.39	84.09
2014	-29.70	87.97	-26.50	127.77
2015	-34.24	125.86	-14.90	167.01
2016	-85.57	15.17	-69.73	60.36
2017	-204.51	0.67	-166.96	54.14
2018	-55.57	121.09	-51.90	139.93
2019	-127.20	9.37	-113.90	45.94

Table E- 7. Annual degree day exceedances of juvenile outmigration temperature targets from 2004 to 2019 based on RBM10 temperature modelling of the mainstem Trinity River under observed historical conditions and hypothetical hydrographs consistent with the proposed action.

Year	WY type	No Action			Preferred Alternative		
		steelhead May 22	Coho June 4	Chinook July 9	steelhead May 22	Coho June 4	Chinook July 9
2004	Wet	62.7	1.3	25.1	42.2	33.3	176.0
2005	Norm	1.3	2.7	13.8	1.2	8.0	54.5
2006	ExWet	5.0	0.0	12.4	11.2	1.8	109.9
2007	Dry	0.7	8.7	55.8	21.4	32.2	65.3
2008	Norm	14.4	0.0	4.3	21.1	1.7	111.3
2009	Dry	11.0	5.1	56.3	18.0	21.0	64.1
2010	Norm	0.7	0.2	30.9	2.9	1.0	77.9
2011	Wet	0.0	0.0	15.6	0.0	0.0	45.2
2012	Norm	11.8	1.6	13.2	18.1	5.7	70.2
2013	Dry	1.3	8.3	71.9	25.1	22.4	94.4
2014	CritDry	36.7	21.5	88.7	71.1	59.9	132.5
2015	Dry	34.5	8.8	135.4	52.4	56.0	179.1
2016	Wet	8.0	5.0	23.3	14.9	24.8	144.2
2017	ExWet	25.9	9.1	32.7	24.5	29.4	117.9
2018	CritDry	18.7	9.2	67.5	36.0	27.5	79.7
2019	Wet	26.8	10.0	22.3	26.8	16.6	105.5

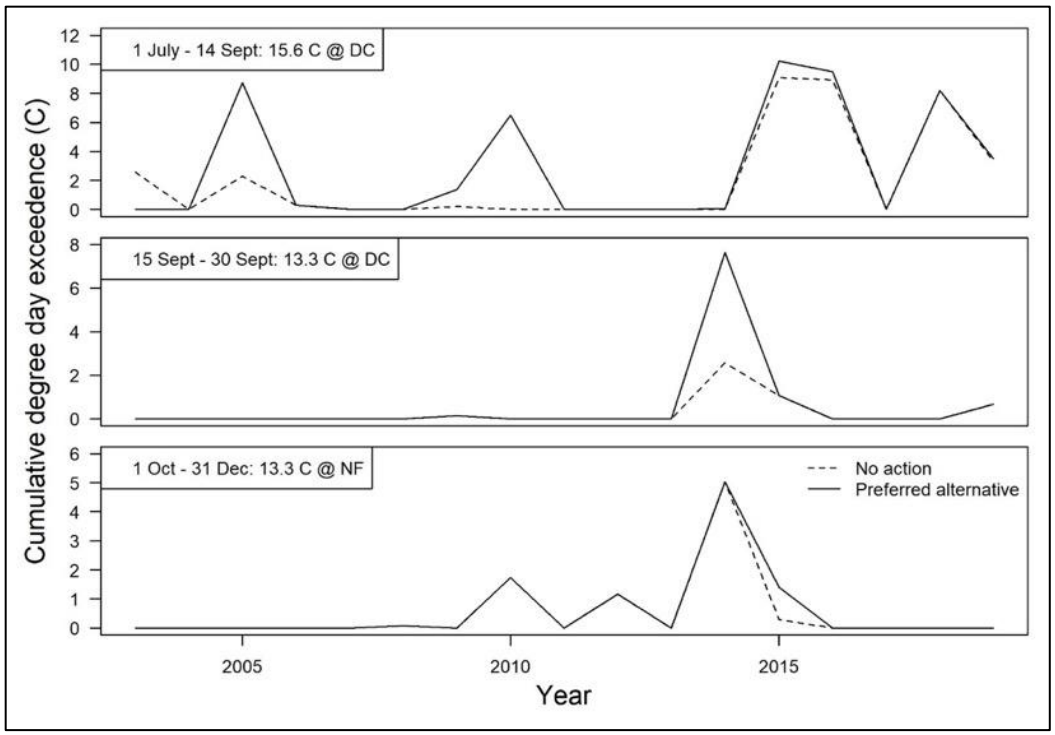


Figure E- 2. Timeseries of degree day exceedances of adult spring Chinook Salmon holding temperature targets for the Trinity River at Douglas City and the North Fork Trinity River for observed hydrographs and hypothetical hydrographs consistent with the proposed alternative.

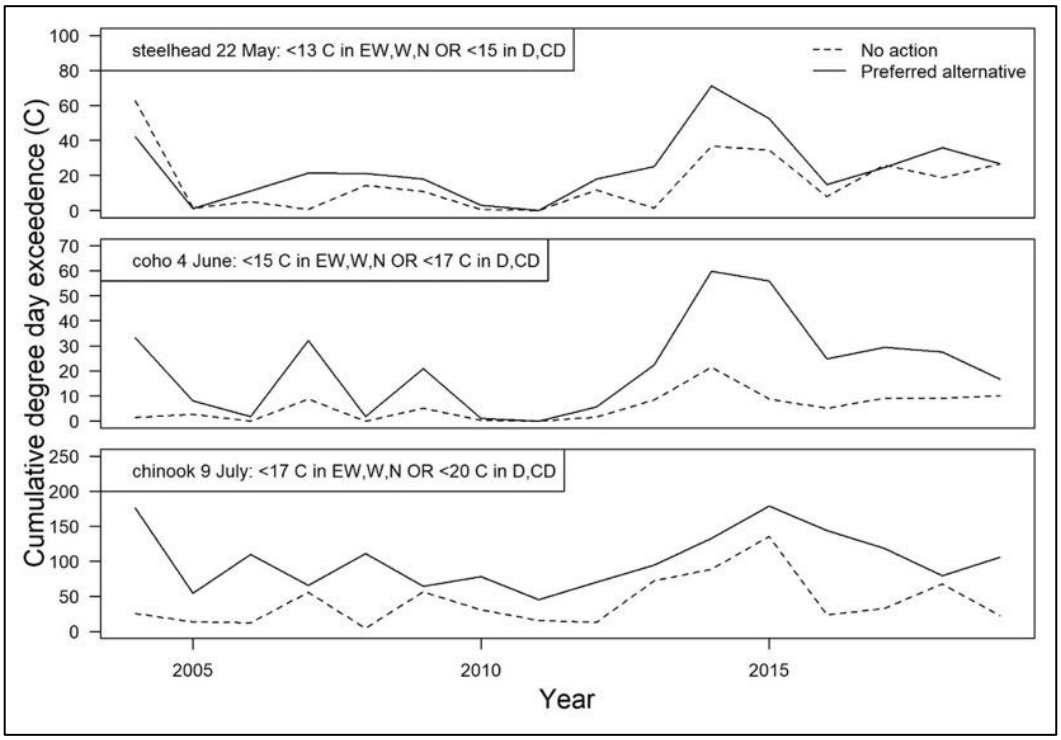


Figure E- 3. Timeseries of degree day exceedances of juvenile salmonid outmigration temperature targets for the Trinity River at Weitchpec for observed hydrographs and hypothetical hydrographs consistent with the proposed alternative.

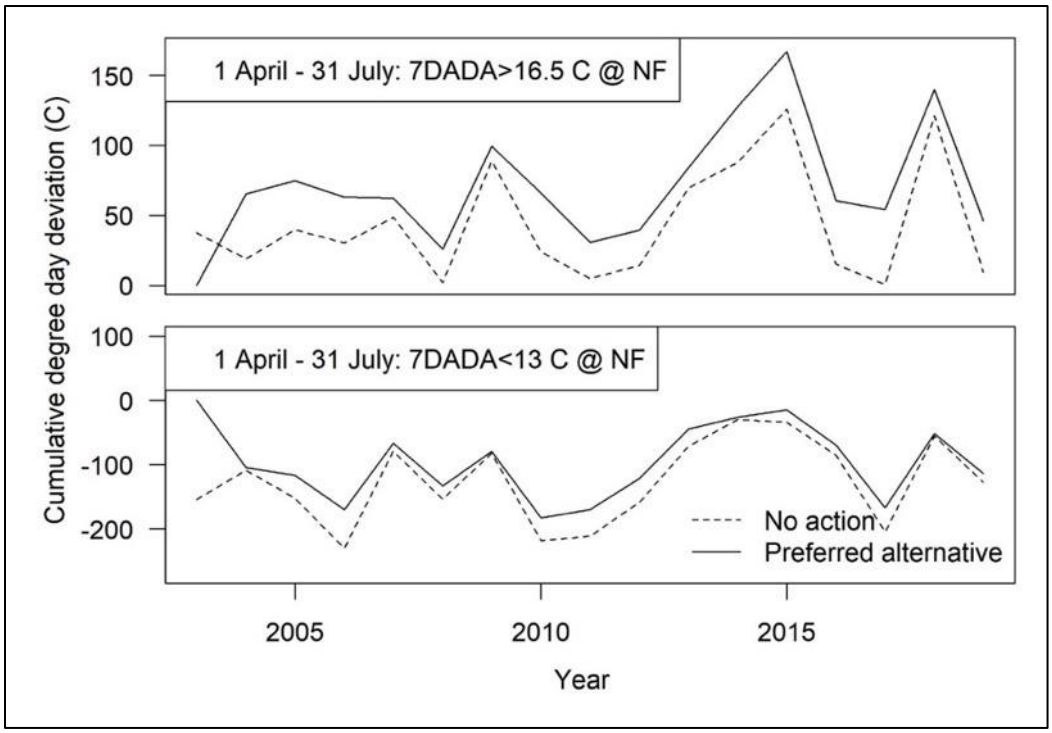


Figure E- 4. Timeseries of degree day deviations of juvenile rearing temperature targets for the Trinity River at the North Fork Trinity River for observed hydrographs and hypothetical hydrographs consistent with the Proposed Action.

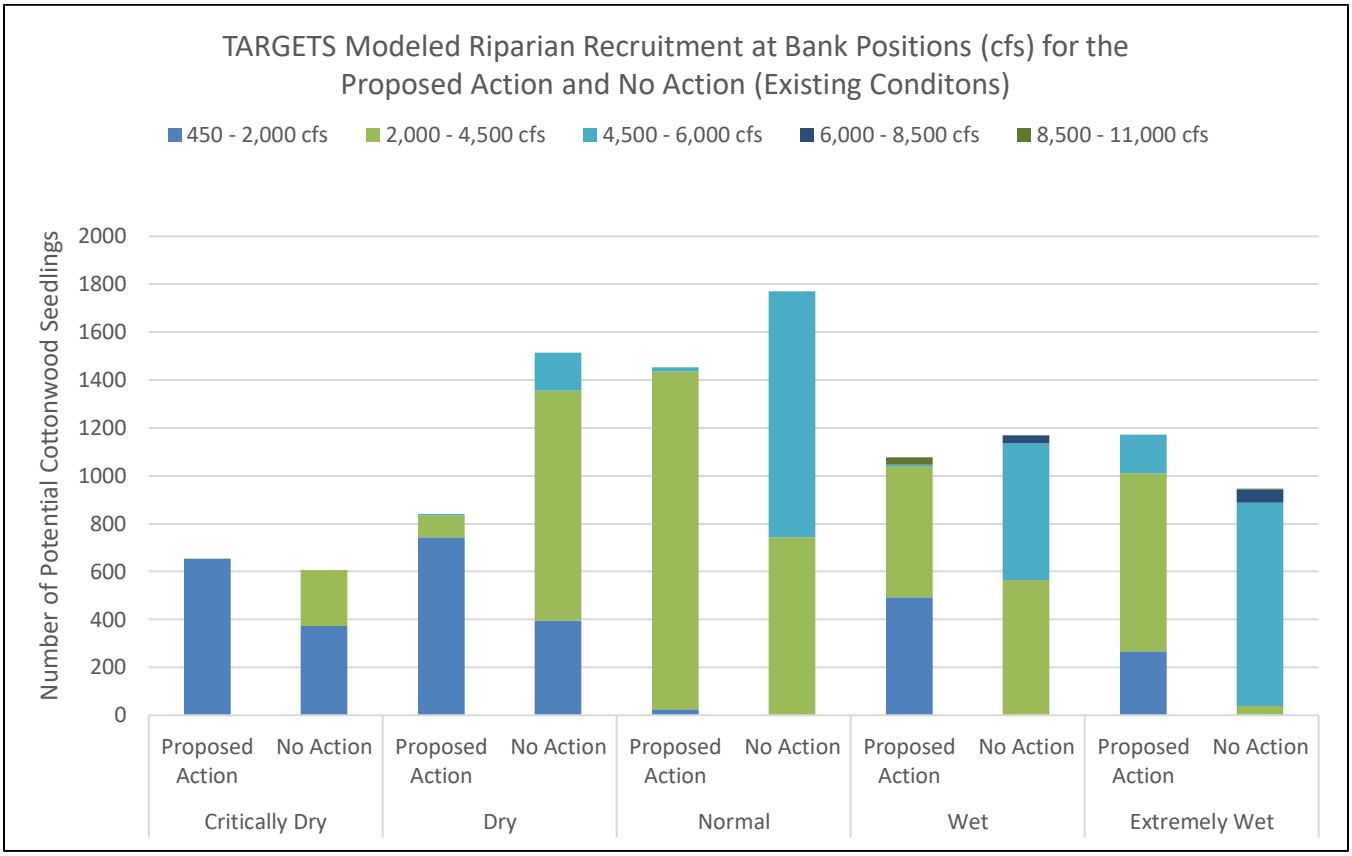
Vegetation – Riparian Recruitment

The TRRP strives to expand the riparian corridor of the Trinity River and reverse riparian between the 1960s and 1990s due to constant flow management and altered channel form of the river. The TRRP prioritizes native tree species for recruitment and uses the Tool for Achieving Riparian Germination and Establishment of Target Species (TARGETS) model to estimate the number of potential seedlings that will be established at specific cross-sections, given scenarios of environmental conditions and management actions. For this evaluation, the TARGETS model was used to assess Black Cottonwood recruitment for the Proposed and No Action alternatives from 2004-2019 at 34 cross sections from nine areas that were distributed throughout the restoration reach from Lewiston Dam to the Trinity Rivers confluence with the North Fork Trinity River near Helena, CA.

Overall, the hydrographs analyzed for the Proposed Action would potentially decrease the total of black cottonwood recruitment for all water year types except for Critically Dry and Extremely Wet, and generally would lower the bank position of recruitment when compared to the existing conditions. Figure E- 5 and Figure E- 6 show analysis results for five bank positions related to discharge (in cubic feet per second [cfs]). The model indicates:

- Bank positions higher than 6,000 cfs (shown in dark blue and dark green) have very low modeled recruitment of black cottonwood seedlings as well as low previously observed successful recruitment under existing conditions and the Proposed Action, particularly at lower flows. This is because these areas are rarely inundated due to being high above the ordinary river flow's elevation, and only experience measurable recruitment during Wet and Extremely Wet years under existing conditions.
- The 4,500 to 6,000 cfs bank position (aqua blue) also has open unpopulated areas, but experiences very low recruitment success due to high bank position and dry conditions unless irrigated. This elevation generally supports riparian vegetation recruitment at Normal, Wet, and Extremely Wet years under existing conditions. Under the Proposed Action, less recruitment would occur at this bank position.

- The 2,000 to 4,500 cfs bank position (light green) offers the greatest general potential for successful recruitment due to open and sparsely vegetated areas and relatively low bank elevation and therefore more frequent inundation, and successful riparian seedling recruitment has been previously observed under existing conditions at this bank position. The Proposed Action would result in a notable increase in recruitment at this bank position in Extremely Wet and Normal water years.
- The 450 to 2,000 cfs bank position (blue) has dense riparian cover and offers little space for recruitment of new seedlings in areas that have not recently been disturbed by channel rehabilitation or flood disturbance. This zone is frequently inundated and can support dense riparian and wetland vegetation. Even still, the Proposed Action increases the riparian recruitment in all water year types.

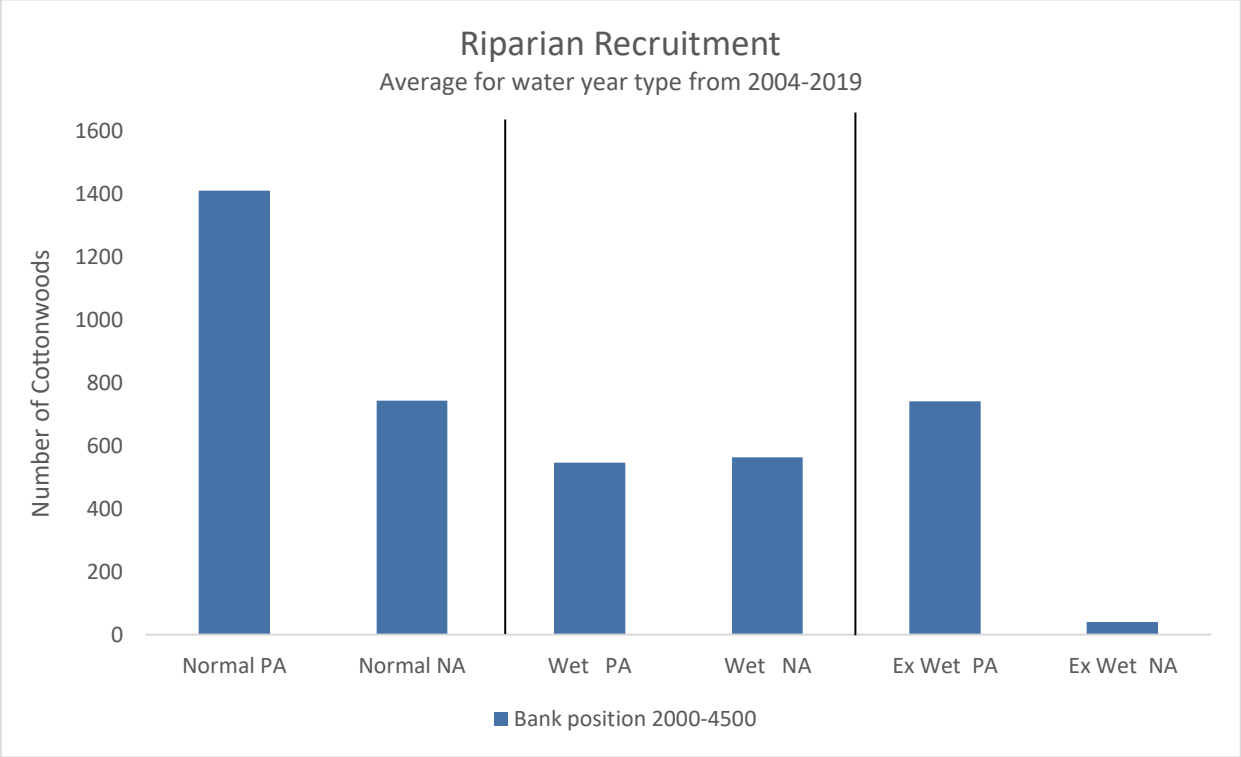


Note: Discharge bins higher than 6000 cfs have very low modeled recruitment and previously observed successful recruitment and are not discussed further. The 450 - 2000 cfs bin (blue) is largely populated by riparian plants and offer little opportunity for recruitment in areas that have not been recently disturbed by channel rehabilitation or flood disturbance. The 2000 - 4500 cfs bin (green) offers the most opportunity for successful recruitment due to open unpopulated areas and previously observed successful recruitment related to this bank position. The 4500 - 6000 cfs bin (blue) also has open unpopulated areas, but experiences very low recruitment success due to high bank position and desiccation without intervention such as irrigation. Note: Riparian recruitment is not a primary objective in Dry and Critically Dry Years.

Figure E- 5. TARGETS model results from 2004-2019 for average nodes of Black Cottonwood recruitment by water year type for both the No Action and Proposed Action alternatives at 34 cross sections located within nine river segments from Lewiston Dam to North Fork Trinity River for five bins of bank position related to discharge (450 - 2000 cfs, 2000 - 4500 cfs, 4500 - 6000 cfs, 6000 - 8500 cfs, and 8500 - 11000 cfs).

In summary, the hydrographs analyzed for the Proposed Action decrease the total nodes of Black Cottonwood recruitment in the model for all water year types, except for Critically Cry and Extremely Wet, and generally lowers the bank position of recruitment when compared to the No Action alternative. Both alternatives result in recruitment of Black Cottonwoods. Yet, the Proposed Action generally increases the recruitment during targeted years of normal and wetter water year types in the targeted bank position (2000-4500 cfs). Thus offering increased

recruitment opportunity in all water year types for desired species within the lowest bank position (450-2000 cfs) that may allow target species to better compete for establishment in freshly disturbed areas like channel rehabilitation sites prior to being out-competed by later establishing and less desired species. While the No Action alternative generally increases recruitment opportunities at the highest bank positions (>4500 cfs), where there is abundant space available for recruitment, but infrequent recruitment success has been previously observed. Additionally, the No Action alternative essentially offers recruitment opportunities only at the lowest bank position in dry and critically wry water years, which may prevent target species from effectively competing in freshly disturbed areas with low bank position and high recruitment potential.



Note: Only the bin related to discharge of 2000 - 4500 cfs is displayed, which has the most desirable combination of uninhabited space and high previously observed success related to riparian recruitment.

Figure E- 6. TARGETS model results from 2004 - 2019 for average nodes of Black Cottonwood recruitment by water year type in normal and wetter years for both the No Action and Proposed Action alternatives at 34 cross sections located within nine river segments from Lewiston Dam to N. Fork Trinity River.

While the analysis presented in this report is informative, the Proposed Action is not limited to the hydrographs analyzed; they are merely hypothetical examples. There will be significant flexibility in the management of water volumes that remain after the winter and early spring flow actions are taken. Results indicate that suitable volumes of water will remain to achieve riparian recruitment objectives during target years at the bank position with the most opportunity for recruitment success. Additionally, while limited in geographic scope, opportunities at low-bank position in recently disturbed areas may occur more frequently due to reduced water volumes. Reducing water volumes later in the year will likely limit the recruitment potential above 4,500 cfs unless the remaining water volume is prioritized for this purpose.

In summary, the Proposed Action generally would increase recruitment in the 2,000 to 4,500 cfs bank position for targeted years of Normal and Extremely Wet water year types when compared to existing conditions. This is important because this bank position has the greatest opportunity for successful recruitment to occur due to the availability of space and the relative frequency of inundation. The Proposed Action may also result in increased

recruitment opportunity in all water year types for desired species within the 450 to 2,000 cfs bank position, which would allow native riparian species to establish in freshly disturbed areas such as the TRRP's channel rehabilitation sites prior to being out competed by non-native species.

Compared to existing conditions, the Proposed Action would generally result in less recruitment at bank positions higher than 4,500 cfs, where there is abundant space available for recruitment but relatively low potential due lack of water and low inundation frequency. Compared to the infrequent recruitment success at these elevations under the existing conditions, the Proposed Action would not result in a substantial loss of recruitment.

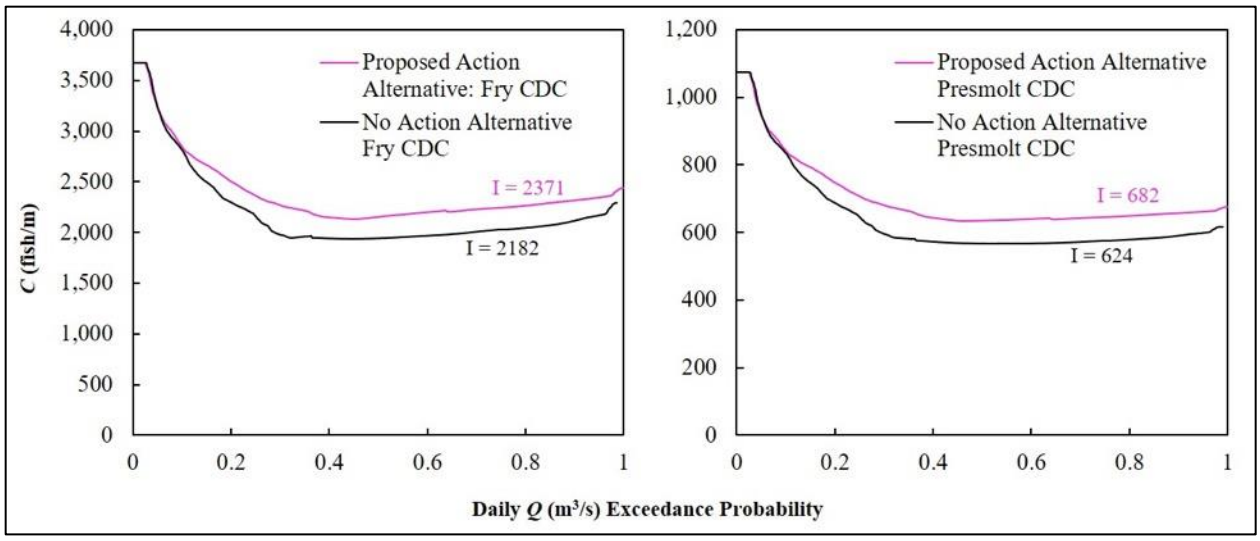
Fishery Resources

Habitat Availability

To quantify juvenile salmonid-rearing habitat according to availability of water depth, velocity, and distance to escape cover, TRRP applied a metric of "capacity." This capacity is normalized by stream length to give a maximum number of fish that would occupy an average habitat available for a one-meter cross section of stream over a given stream length, or *C* here after. The *C* metric has been developed over many years, thousands of observations, and several studies.

We assessed how *C* is affected by the Proposed Action using flow duration analysis of two management scenarios for WY 2004 – 2019. The first scenario is the 'No Action alternative' and the second is the 'Proposed Action alternative, where flows downstream were modeled using RBM10. From these two sets of hydrographs, we developed daily flow duration curves from January through June for the water years 2004 – 2019 for the Trinity River above its confluence with the North Fork Trinity River. Flow duration curves depict the likelihood of a given flow being exceeded over an amount of time from 1% to 100%. These daily flow duration values were then transformed into flow-specific fry and presmolt *C*. Values were interpolated between a range of flows from 4.2 – 99.1 m^3/s with specified *C* estimates as done in Cooper et al. (Cooper et al. (2021 *in review*).

Calculations of *C* were done independently for seven maximum fisheries flow (MFF) reaches (DWR) which have variable hydrology due to contributions from tributaries. We weighted *C* for each MFF reach by its respective proportion of the length of the restoration reach and summed the weighted *C* values across all seven MFF reaches. We plotted capacity duration curves with flow-specific capacity probability (x-axis) and corresponding restoration reach-scale *C* (y-axis) for each hydrologic scenario (Figure E- 7).



Note: Integrated area under the curve (I) is presented next to its respective curves with matching shades of color.

Figure E- 7. Capacity of fry (left) and presmolt (right) Chinook Salmon as it relates to flow duration for a 'No Alternative' (bottom curve) and 'Alternative' (top curve) winter flow regime over the entire Trinity River restoration reach.

Using an integrated area under the curve metric (Cooper et al. (2021 in review), there is a respective 8.7% and 9.3% increase in fry and presmolt capacity over the entire restoration reach from the flow regime with 'the no Action alternative to that with the Proposed Action alternative.

A possible source of mortality for salmonids from elevated flows during the period where salmonid eggs are incubating in gravels (September - April) is from redd scour, excavation of salmonid eggs, or underdeveloped fry during floods prior to natural emergence from gravels. Peak flows on unregulated rivers of our region primarily occur during the incubation period based on an expectation from biologists that through evolution and natural selection salmonids have behavioral practices that mitigate this risk in a natural environment. However, the environment on the Trinity River has been modified in several ways and it is prudent to examine the change in potential risk of redd scour from the Proposed Action.

The set of triggers used to develop hypothetical hydrographs generated for analysis of the impacts of the proposed action only result in additional peak flow events during the incubation period in 6 of the 17 years analyzed. to expand our analysis to the entirety of the restoration reach between Lewiston Dam and the Trinity Rivers confluence with the North Fork Trinity River, we used the methods and findings of *Assessing the Risk of Redd Scour on the Trinity River* (May, C. L., B. Pryor, T. E. Lisle, and M. Lang. 2007) in combination with the Trinity River 40-mile SRH-2D hydrodynamic model (Bradley, D.N., 2018).

Important assumptions related to the relative risk of redd scour are associated with the depth at which salmonid eggs are deposited and the Shields number, which describes the forces acting on the median grain size of the streambed and is used to predict when the streambed will be mobilized and the potential depth to which it can be scoured. Additional details about the Shields number and its computation can be found in May et al. (2007) or any textbook on fluvial geomorphology or sediment transport engineering. We adopt thresholds from literature that assume the streambed begins to move at Shields numbers >0.03, the bed is partially mobile at values >0.045, and the bed is fully mobile and potentially subject to deep scour when the Shields number exceeds 0.06. However, May et al. (May, C. L., B. Pryor, T. E. Lisle, and M. Lang. 2007, May, C. L., B. Pryor, T. E. Lisle, and M. Lang. 2009) determined that the risk of scour deep enough to excavate incubating salmon eggs in the Trinity River is only 4% for locations with Shields numbers between 0.045 and 0.06 and 7% for locations with Shields numbers >0.06.

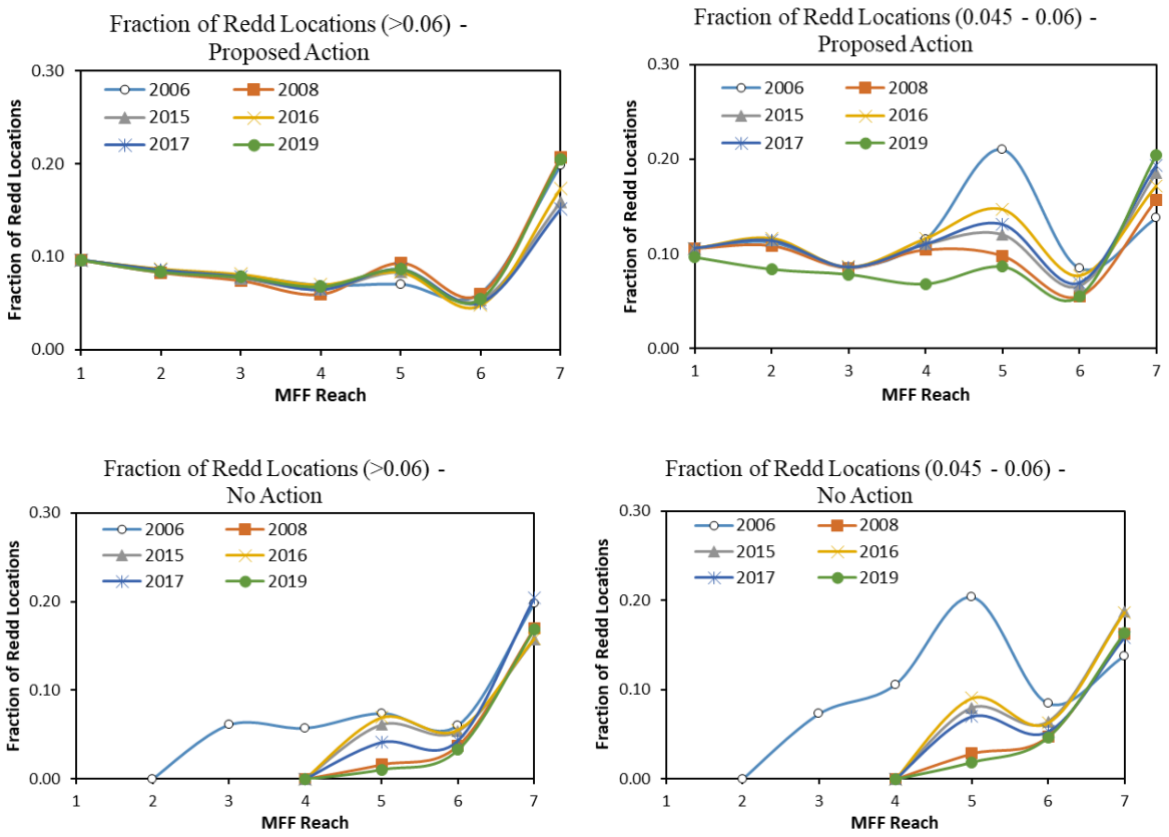


Figure E- 8. Fraction of Redd locations from 2012 and 2014 in each MFF reach where the streambed experiences Shields numbers greater than >0.06 (left) and 0.045-0.06 (right) for the Proposed Action (top) and No Action (bottom) alternatives in the 6 years between 2004 and 2019 when releases would have been triggered during the action period.

The proportion of spawned area of the streambed where Shields numbers increase to >0.045 for the Proposed Action increases over that in the No Action alternative is estimated to be 11.6%. This results in an increased risk of redd scour of 0.7% for the population of redds within the restoration reach. The sub-reach with the most increased risk from the Proposed Action is directly below Lewiston Dam, where 20.2% spawned area expriences Shields numbers >0.45. These sheilds numbers are due to flows related to the Proposed Action resulting in an increased risk of redd scour for the population of redds upstream of Rush Creek of 1.1%.

Table E- 8. Increases in proportion of spawned streambed area with Shields numbers >0.06 in the Proposed Action from the No Action alternative for each MFF reach for each year where a peak flow event would have occurred during the incubation period under the Proposed Action from WY 2004-2019.

Proposed Action	2019	2017	2016	2015	2008	2006	Avg increase in redd locations with Shields >0.06	Avg Risk of Redd Scour
Lewiston	9.6%	9.6%	9.6%	9.6%	9.6%	9.6%	9.6%	0.7%
MFF Reach 2	8.4%	8.6%	8.7%	8.6%	8.3%	8.5%	8.5%	0.6%
Limekiln	7.8%	7.8%	8.1%	7.7%	7.4%	1.9%	6.8%	0.5%
MFF Reach 4	6.8%	6.5%	7.0%	6.5%	6.0%	1.1%	5.6%	0.4%
Douglas City	7.6%	4.5%	1.4%	2.2%	7.7%	-0.4%	3.8%	0.3%
Junction City	2.2%	0.7%	-0.8%	-0.1%	2.2%	0.0%	0.7%	0.0%
Abv North Fork	3.6%	-5.4%	1.5%	0.1%	3.7%	0.0%	0.6%	0.0%
Avg	6.6%	4.6%	5.1%	4.9%	6.4%	3.0%	5.1%	0.4%

Note: At the bottom of the table, is the average area of increase for all reaches and on the right is the average for all years within each reach. The column on the far right uses 7% value for the risk of redd scour from May et al. 2009 for bin of Shields numbers >0.06 to assess the risk to the entire population of redds.

Table E- 9. Increases in proportion of spawned streambed area with Shields numbers 0.045 - 0.06 for the Proposed Action from the No Action alternative for each MFF reach for each year where a peak flow event would have occurred during the incubation period under the Proposed Action from WY 2004-2019.

Proposed Action	2019	2017	2016	2015	2008	2006	Increase in redd locations with Sheilds 0.045-0.06	Risk of Redd Scour
Lewiston	10.6%	10.6%	10.6%	10.6%	10.6%	10.6%	10.6%	0.4%
MFF Reach 2	11.0%	11.4%	11.7%	11.5%	10.9%	11.2%	11.3%	0.5%
Limekiln	8.6%	8.6%	8.6%	8.5%	8.5%	1.3%	7.3%	0.3%
MFF Reach 4	11.4%	11.0%	11.6%	11.0%	10.4%	0.9%	9.4%	0.4%
Douglas City	11.3%	6.1%	5.7%	4.1%	6.9%	0.7%	5.8%	0.2%
Junction City	1.7%	1.6%	1.4%	0.1%	0.7%	0.0%	0.9%	0.0%
Abv North Fork	-0.8%	3.5%	-1.5%	-0.1%	-0.5%	0.0%	0.1%	0.0%
Avg	7.7%	7.5%	6.9%	6.5%	6.8%	3.5%	6.5%	0.3%

Note: At the bottom of the table is the average area of increase for all reaches and on the right is the average for all years within each reach. The column on the far right uses 4% value for the risk of redd scour from May et al. 2009 for bin of Shields numbers from 0.045-0.06 to assess the risk to the entire population of redds.

Food Availability

Scouring flows in lotic systems have ecological effects on biota and play a strong role in species assemblage and succession (Power, M. E., M. S. Parker, and W. E. Dietrich. 2008). Species have variable adaptation to disturbance patterns and respond and recover differently. Current flow management on the Trinity River provides steady low flows during the salmonid spawning, incubation, and early rearing periods. While high flows that scour the channel bed occasionally occur below major tributaries on the Trinity River, floods occur far less frequently and are of lower magnitude than prior to flow regulation. Flood suppression by dam operations is thought to be protective of the early life stages of salmon but current management largely neglects assessment of the impacts of floods on non-salmonid stream biota, on which salmon rely.

After mobilization of the stream bed, the relative abundance of large, long-lived species or non-native species of benthic macroinvertebrates are reduced and abundance of smaller, shorter-lived macroinvertebrates that are more available as prey for salmonids increases. This shift has been observed to result in a larger biomass of rearing juvenile salmonids and other insectivorous fish (Cross, W. F, C. V. Baxter, K. C. Donner, E. J. Rosi-Marshal, T. A. Kennedy, R. O. Hall, Jr., H. A. Wellard Kelly, and R. S. Rodgers. ; Parker, M. S, & Power, M. E. 1997; Power, M. E., M. S. Parker, and W. E. Dietrich. 2008; Wooton et al. 1997). We use thresholds defined in the literature of the Shields number greater than >0.03 and >0.045 as indicators of partial bed disturbance (Wilcock and McArdell 1993) assumed to be sufficient to affect the benthic macro invertebrate community.

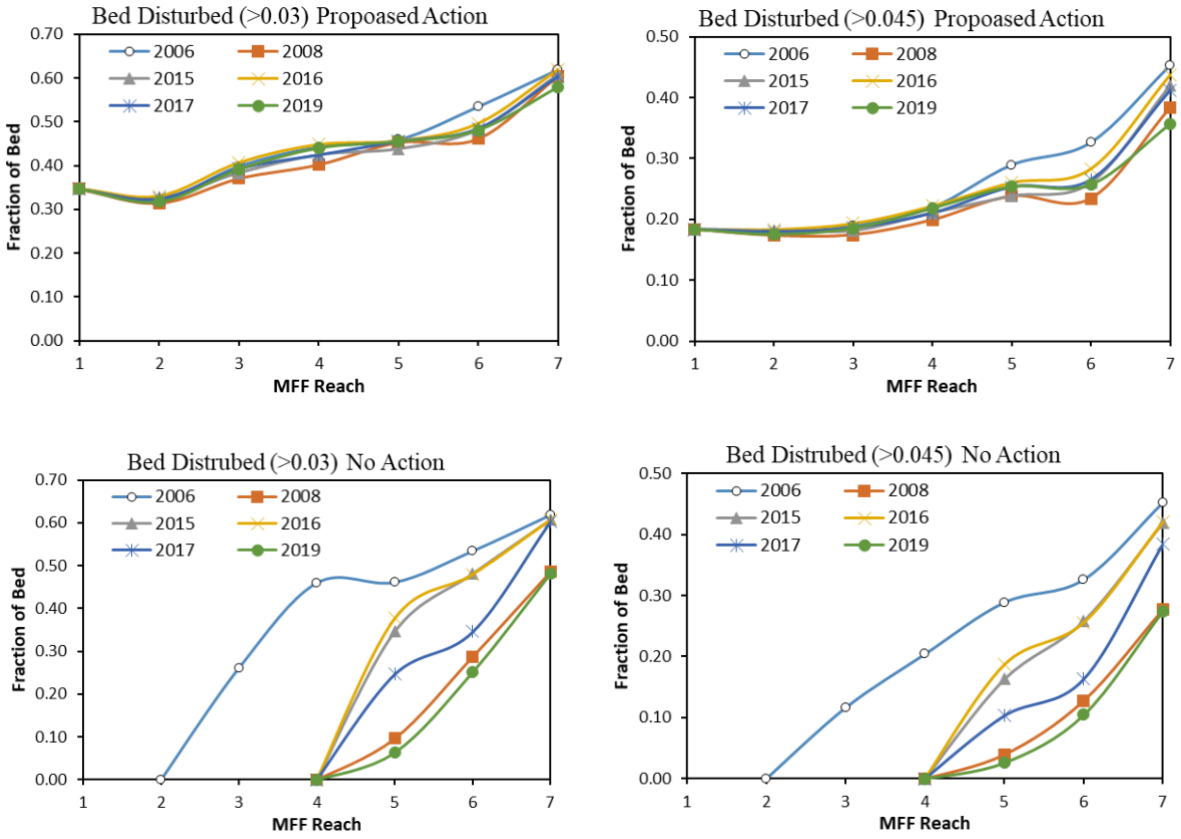


Figure E- 9. Fraction of the streambed that experiences partial mobilization as indicated by Shields numbers greater than >0.03 (left) and >0.045 (right) for the Proposed Action (top) and No Action (bottom) alternatives in the 6 years between 2004 and 2019 when releases would have been triggered during the action period.

Using Shields number >0.03, there is an estimated increase of 24% in area of bed disturbance throughout the restoration reach during years where proposed action results in flow releases between December 15 and February 15. If a more conservative estimate of bed disturbance for Shields number >0.045 is used, the increase in area of bed disturbed by the Proposed Action is estimated to be 13%. In relation to the increases shown for risk of redd scour, areas of streambed disturbance are much larger because they are not limited to where Chinook Salmon spawning occurs. All four reaches above Douglas City see estimated increases in area of disturbed bed of 35% for a Shields number threshold of >0.03 as well as an estimated increase in area disturbed of 18% when the more conservative threshold of Shields number >0.045 is applied (Table E- 10).

Table E- 10. Increases in proportion of streambed area with Shields numbers >0.03 for the Proposed Action from the No Action alternative for each MFF reach for each year where a peak flow event would occur between Dec 15 - Feb 15 under the Proposed Action from WY 2004-2019. At the bottom is the average area of increase for all reaches and on the right is the average for all years within each reach.

	2019	2017	2016	2015	2008	2006	Increase in area of streambed experiencing Shields number >0.03
Lewiston	34.7%	34.7%	34.7%	34.7%	34.7%	34.7%	34.7%
MFF Reach 2	31.7%	32.5%	33.0%	32.6%	31.4%	32.1%	32.2%
Limekiln	39.1%	39.3%	40.6%	38.3%	37.1%	13.8%	34.7%
MFF Reach 4	44.0%	42.5%	44.8%	42.5%	40.2%	-1.7%	35.4%
Douglas City	39.2%	20.9%	7.9%	9.2%	35.7%	-0.2%	18.8%
Junction City	22.9%	13.9%	1.6%	0.1%	17.4%	0.0%	9.3%
Abv North Fork	9.6%	-0.1%	1.1%	0.1%	11.8%	0.0%	3.7%
Average	31.6%	26.2%	23.4%	22.5%	29.8%	11.2%	24.1%

Table E- 11. Increases in proportion of streambed area with Shields numbers >0.045 for the Proposed Action from the No Action alternative for each MFF reach for each year where a peak flow event would occur between Dec 15 - Feb 15 under the Proposed Action from WY 2004-2019. At the bottom is the average area of increase for all reaches and on the right is the average for all years within each reach.

	2019	2017	2016	2015	2008	2006	Increase in area of streambed experiencing Shields number >0.03
Lewiston	18.4%	18.4%	18.4%	18.4%	18.4%	18.4%	18.4%
MFF Reach 2	17.5%	18.0%	18.4%	18.1%	17.3%	17.8%	17.9%
Limekiln	18.5%	18.6%	19.4%	18.1%	17.4%	7.3%	16.6%
MFF Reach 4	21.8%	21.0%	22.2%	21.0%	19.9%	1.6%	17.9%
Douglas City	22.8%	15.0%	7.4%	7.5%	19.9%	0.0%	12.1%
Junction City	15.2%	10.2%	2.8%	0.2%	10.7%	0.0%	6.5%
Abv North Fork	8.2%	2.8%	1.7%	0.1%	10.6%	0.0%	3.9%
Average	17.5%	14.9%	12.9%	11.9%	16.3%	6.4%	13.3%

Temperature

A defining characteristic of ectothermic organisms, which includes stream invertebrates, amphibians, reptiles, and fish, is their core temperature conforms to ambient temperature. For this reason, ability to choose the temperature of their surroundings is of particular importance. This ability is referred to as behavioral thermoregulation and impacts the organism's effectiveness to capture and metabolize food (Armstrong, Jonathan and D. Schindler. 2013. , Watz, J. and J. Piccolo. 2010), reproduce and develop (Railsback), and evade predation (U.S. Environmental Protection Agency (EPA). 2001). For example, well-fed salmonids tend to behaviorally thermoregulate in slightly warmer water than conspecifics consuming lesser ration; the combination of feeding opportunities and warmer water tends to maximize growth. When food is scarce, salmonids will select cooler water to lower their metabolic rate and conserve energy (U.S. Environmental Protection Agency (EPA). 2001). Cold temperatures can reduce foraging salmonids' ability to capture prey, one study found the percent of drifting prey captured by Brown Trout fell from 96% to 53% when temperatures reduced from 14 ˚C to 5.7 ˚C (Watz, J. and J. Piccolo. 2010).

Elsner and Shrimpton (Elsner, RA, Shrimpton) found a mean temperature preference of Fraser River B.C. Coho Salmon of 16.5°C for parr and 15.5°C for smolts. Lusardi et al. (Lusardi, R. A., B. G. Hammock, C. A. Jeffres, R. A. Dahlgren, and J. D. Kiernan, 2019) found that Shasta River, California Coho salmon absolute growth rates peaked at a mean daily average water temperature of 16.6 ºC. (Sullivan K., D.J. Martin, R.D. Cardwell, J.E. Toll, and S. Duke. 2000) found that an MWMT of 13°C to 16.5°C would result in no more than a 10% reduction in maximum growth. Railsback and Rose (Railsback, S. F., and K. A. Rose. 1999) found that predicted growth for rainbow trout varies with fish size and food consumption, but in general, their model predicted growth to be high between 10°C and 22°C, peaking at about 15°C (59°F).

Flow Environmental Assessment Text-Methods

Thermal effects of the No Action and Proposed Action alternatives were evaluated using the RBM10 model predictions at Lewiston, Pear Tree upstream of the North Fork (NF) Trinity River and Hoopa. The RBM10 model simulates daily average river temperatures downstream from Lewiston Dam to the confluence of the Klamath and Trinity Rivers, and from Iron Gate Dam on the Klamath River downstream to the mouth of the Klamath River (Perry, Jones,). The model uses a simple equilibrium flow model, instantly transmitting river flow downstream through each river segment each day. It also uses a heat budget to calculate flux across the air-water interface, using inputs derived from gridded meteorological datasets. Model boundary conditions include flow and temperature for the Trinity River at Lewiston Dam and 14 tributaries to the Trinity River (Jones et al. 2016).

Growth of juvenile Chinook salmon was evaluated using two different methods. To obtain the daily mass (g) of juvenile Chinook salmon, the Ratkowski growth model parameterized by Perry, Plumb, and Huntington (Perry, R.W., J.C. Risley, S.J. Brewer, E.C. Jones, and D.W. Rondorf. 2011. Simulating Daily Water Temperatures of the Klamath River under Dam Removal and Climate Change Scenarios. U.S. Geological Survey Open-File Report 2011-1243:78pp.

Perry, R.W., Plumb, J.M., and Huntington, C.W., 2015 was used. Growth rates of juvenile Chinook salmon produced by the Ratkowski model are similar to growth rates produced at two-thirds of maximum consumption in the Wisconsin bioenergetics model (Perry, R.W., Plumb, J.M., Jones, E.C., Som, N.A., Hetrick, N.J., and Hardy, T.B., 2018). For each year, initial mass at emergence from gravel for Chinook salmon fry is set to 0.3 g on February 1. Thereafter, water temperatures from the RBM-10 model results were fed into the Ratkowski growth model, resulting in daily weight (grams [g]) of Chinook salmon at each of the three locations: Lewiston, Pear Tree upstream of the NF Trinity River, and Hoopa.

To obtain the daily growth rate (g/g/d), the Wisconsin Bioenergetics model (Stewart, D.J., and Ibarra, M., 1991, Plumb, J.M., and Moffitt, C.M., 2015) was used, with parameterization of the model following (Perry, R.W., Plumb, J.M., Jones, E.C., Som, N.A., Hetrick, N.J., and Hardy, T.B., 2018). Mass of juvenile Chinook salmon was set to 3 g, with the proportion of maximum consumption assumed to equal 0.66. The RBM-10 model results were fed into the Wisconsin Bioenergetics model, resulting in g/g/d of juvenile Chinook salmon at each of the three locations: Lewiston, Pear Tree upstream of the NF Trinity River, and Hoopa.

Results

The modeled water temperatures and their effect on modeled Chinook salmon mass (g) showed that in all years (2004-2019), the action results in greater end-of-June mass than the No Action alternative (Figure E- 9 and Table E- 13). Differences in the end-of-June mass for the Proposed Action and No Action alternatives ranged from 1.1 g to 2.2 g (Table E- 13). The resulting differences in mass as a percentage of end-of-June Chinook salmon size ranged from 5.7% to 19.2% over the study period (Table E- 13). The relationship between total water year volume and the percentage difference in end-of-June mass between the alternatives was significant ($R^2 = 0.594$; $P < 0.001$), resulting from the warmer water temperatures that the Proposed Action alternative provides in the spring months relative to that of the No Action alternative. The effect is most pronounced in wetter water year types, as

the Proposed Action moves a large volume of water from the spring juvenile Chinook salmon rearing period to the winter months.

The g/g/d was generally higher for the Proposed Action alternative than the No Action alternative throughout the February to June period, with the largest differences in growth rate between the alternatives in June of wetter years (Figure E- 9 and Table E- 13). This occurs because the proposed action results in shifting a large volume of water from the spring to the winter months, thereby resulting in better (warmer) growth temperatures for Chinook salmon under the proposed action. The differences in daily growth rate of juvenile Chinook salmon between the action and No Action alternative are less in dryer water years than wetter water years, as the water temperatures provided by the two alternatives are more similar to each other.

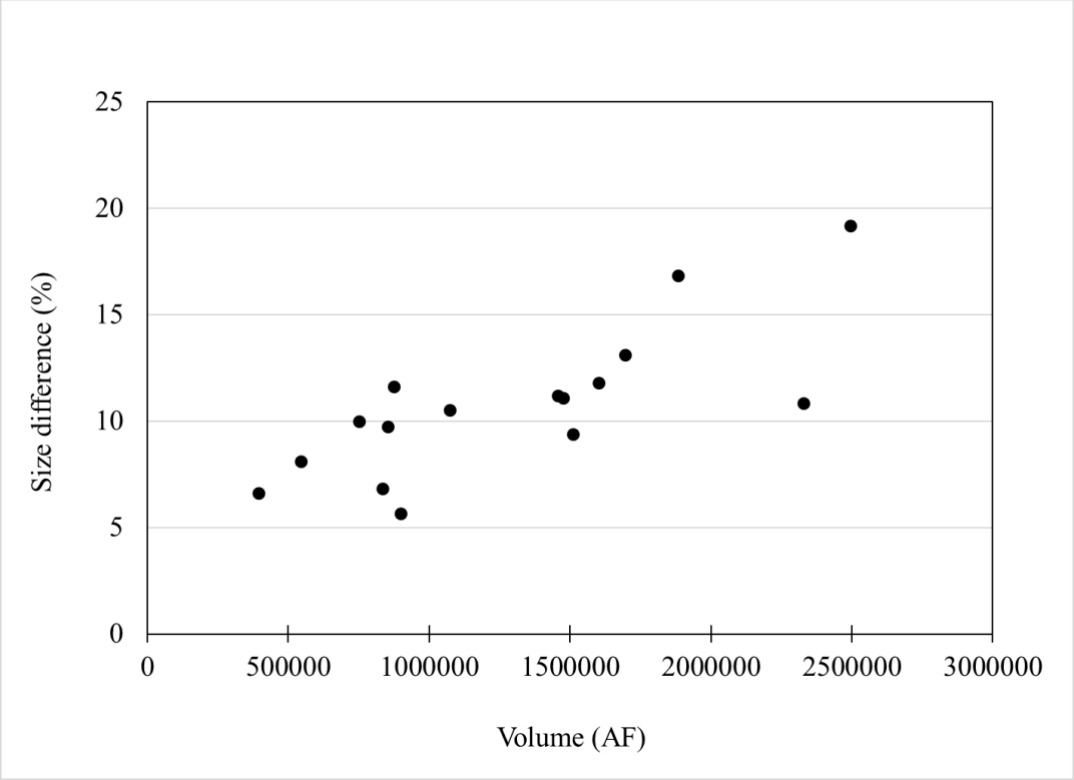
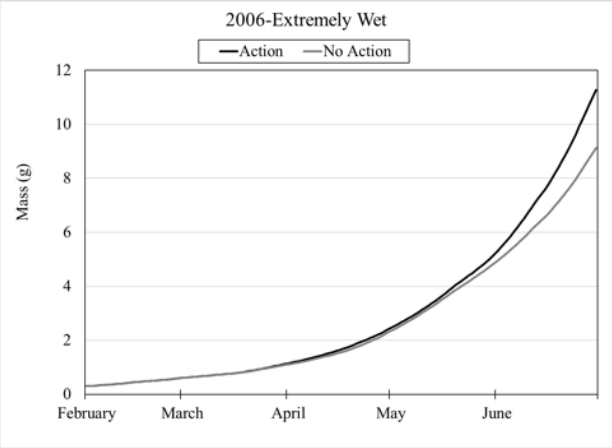
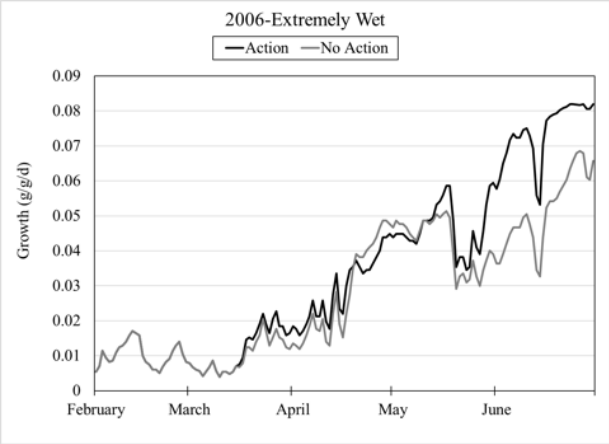


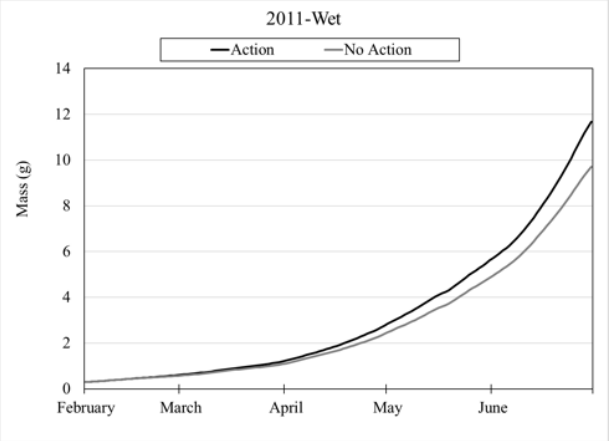
Figure E- 10. Relationship between end-of-June size difference (%) between the action and No Action alternatives (action minus no action), and annual water volumes for water years 2004 to 2019.

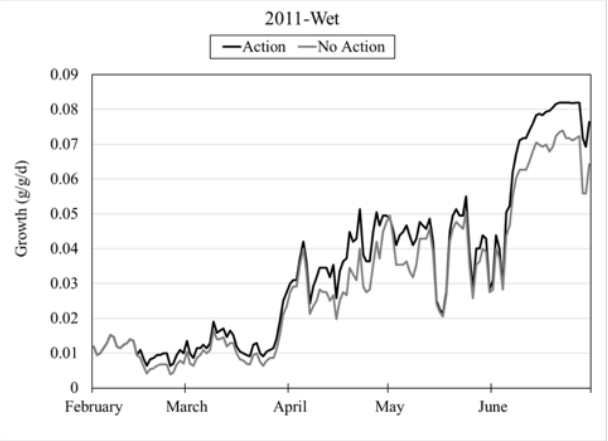
Table E- 12. End-of-June mass (g), and difference between the action and No Action alternatives (action minus no action).

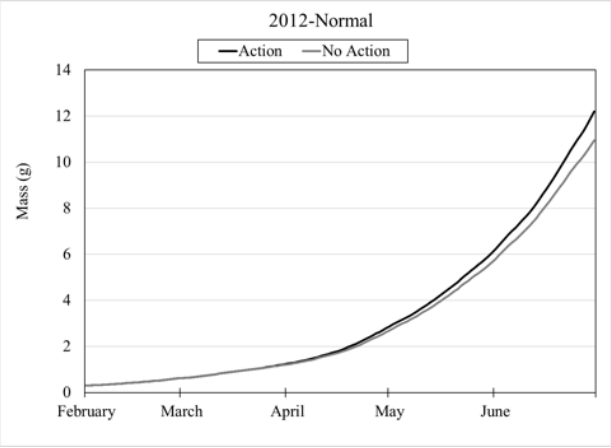
Year	Forecast	Volume	Mass-Action (g)	Mass-No Action (g)	Difference (g)	Difference (%)
2004	Wet	1512000	15.7	14.2	1.5	9.4
2005	Normal	1476000	14.7	13.1	1.6	11.1
2006	Ext Wet	2496300	11.3	9.1	2.2	19.2
2007	Dry	752400	17.2	15.5	1.7	10.0
2008	Normal	874900	13.2	11.6	1.5	11.6
2009	Dry	834500	15.9	14.8	1.1	6.8
2010	Normal	1602200	12.6	11.1	1.5	11.8
2011	Wet	1883000	11.7	9.7	2.0	16.8
2012	Normal	1075400	12.5	11.2	1.3	10.5
2013	Dry	853100	17.3	15.6	1.7	9.7
2014	Crit Dry	396200	20.9	19.5	1.4	6.6
2015	Dry	899800	23.6	22.2	1.3	5.7
2016	Wet	1457500	16.4	14.6	1.8	11.2
2017	Ext Wet	2329200	12.3	11.0	1.3	10.8
2018	Crit Dry	546260	17.7	16.3	1.4	8.1
2019	Wet	1696623	13.6	11.8	1.8	13.1

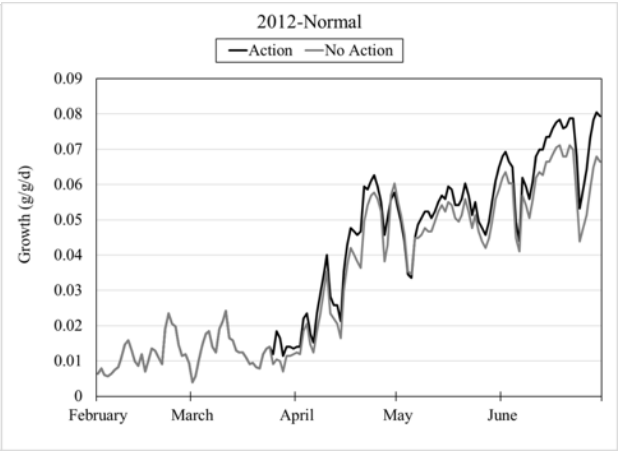

2006-Extremely Wet
Action
No Action
Mass (g)
0
2
4
6
8
10
12
February
March
April
May
June


2006-Extremely Wet
Action
No Action
Growth (g/g/d)
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
February
March
April
May
June


2011-Wet
Action
No Action
Mass (g)
0
2
4
6
8
10
12
14
February
March
April
May
June


2011-Wet
Action
No Action
Growth (g/g/d)
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
February
March
April
May
June


2012-Normal
Action
No Action
Mass (g)
0
2
4
6
8
10
12
14
February
March
April
May
June


2012-Normal
Action
No Action
Growth (g/g/d)
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
February
March
April
May
June

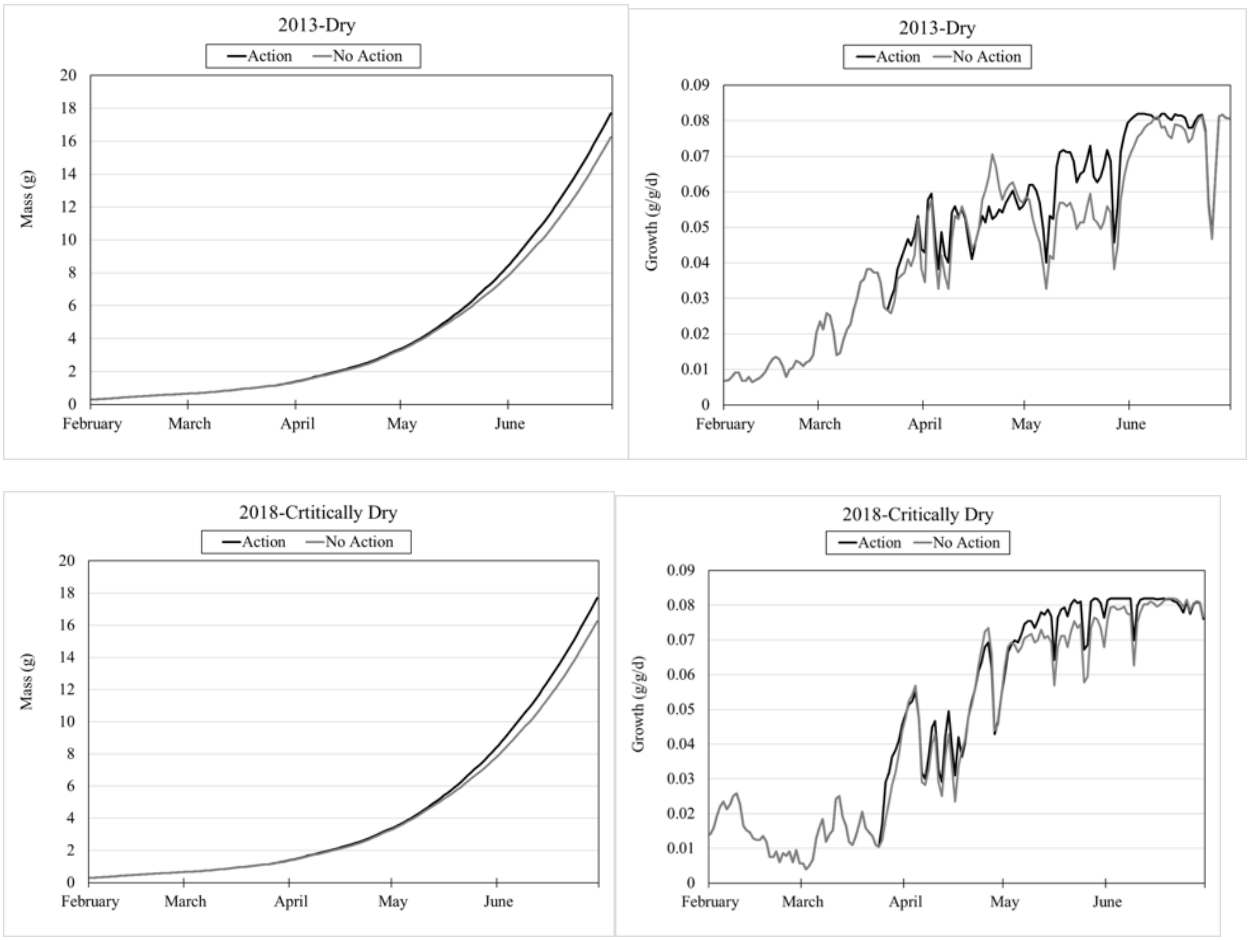


Figure E- 11. End-of-June mass (g), and difference between t/he action and No Action alternatives (action minus no action).

Energy and Utilities

Power impacts were evaluated for the No Action alternative versus the preferred Lewiston release rate. The primary comparison corresponded to the market value of generated power at the Trinity Power Plant, which is dependent on both magnitude of generation and market value of power at the time of generation. We truncated the received RBM10 dataset to the calendar years 2010 through 2019 for which we have known market rates of power. Our evaluation is as follows.

Using the No Action alternative and the preferred Lewiston release rates, we calculated a total Trinity release rate under both scenarios. For the No Action scenario, total Trinity release rate was calculated as the maximum of No Action Lewiston release rate and historically recorded Trinity release rate. This ensures that the Trinity release rate is sufficient to provide the No Action Lewiston release rate and accounts for Trinity River diversions. For the preferred scenario, total Trinity release rate was calculated as the maximum of Preferred Lewiston release rate and historically recorded Trinity release rate minus No action Lewiston release rate plus Preferred Lewiston release rate. This provides the same assurances as in the No action scenario.

Using the No action and preferred total Trinity release rates we calculated a Trinity Power Generation (Gen) release rate under both scenarios. For both scenarios the Trinity Gen release rate was calculated as the minimum of the total Trinity release rate and 3000 cfs, the upper Trinity Power Plant capacity imposed for this analysis.

Using the No action and preferred Trinity Gen release rates, we calculated a magnitude of generation in megawatt hour (MWh) under both scenarios. For both scenarios the MWh was calculated using a linear equation which

estimates the MWh based on Trinity Gen release rates. The equation was developed by applying a linear regression to the historically recorded Trinity Gen and MWh for this same period (see equation below).

Equation 1. The Trinity Power Plant MWh Generation as a function of Trinity Power Plant Generation Flow Rate is:

$$MWh = MAX(0, 0.7463 * Trinity\ Gen - 33.1452)$$

Using the No Action alternative and the Preferred MWh in the Proposed Action alternative, we calculated a Market Value (Value) under both scenarios. For both scenarios, the Value was calculated by multiplying the MWh by the NP15 Market rate of power. Yearly results are shown in Table E- 13..

Table E- 13. Market Value of Generated Power at Trinity Power Plant.

Year	Forecast Type	Trinity Power Plant Generation Market Value ($)			
		No action	Preferred	Difference	% Difference
2010	Normal	10,644,162.17	10,941,695.75	297,533.58	2.8%
2011	Wet	12,463,619.39	12,978,802.48	515,183.09	4.0%
2012	Normal	11,520,696.24	11,329,237.07	-191,459.17	-1.7%
2013	Dry	16,864,590.13	17,370,745.01	506,154.87	3.0%
2014	Crit Dry	16,803,242.49	16,780,864.44	-22,378.05	-0.1%
2015	Dry	10,715,206.64	10,573,047.57	-142,159.07	-1.3%
2016	Wet	8,795,934.51	8,529,983.85	-265,950.67	-3.1%
2017	Ext Wet	13,307,348.08	13,485,593.07	178,244.99	1.3%
2018	Crit Dry	10,109,379.40	10,152,282.01	42,902.61	0.4%
2019	Wet	10,054,086.55	11,722,829.88	1,668,743.33	15.3%
Total		**121,278,265.60**	**123,865,081.11**	**2,586,815.51**	**2.1%**

The results show no clear delineation between the No Action alternative and the preferred Lewiston release rate on the Value of generated power. The variation between the two scenarios is minimal except for calendar year 2019 in which the impact is a significant benefit with a Value increase of 15.3%. Given the unpredictable dynamics of market rates of power, there is no way to predict future impacts of the No Action alternative versus preferred Lewiston release rates on the Value of generated power. In summary, this analysis does not indicate an obvious negative power impact for the preferred Lewiston release rate.

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