BUREAU OF RECLAMATION

CGB-EA-2024-012

Final Environmental Assessment

Twitchell Dam Pilot Project

California – Great Basin Region

The U.S. Bureau of Reclamation (Reclamation) has considered several key factors mandated by the National Environmental Policy Act (NEPA). This Environmental Assessment (EA) represents Reclamation's expert judgement and good-faith effort to prioritize analysis and documentation of the most important factors required by the statute and fulfills NEPA's requirements within the congressionally mandated page and time limits. Any factors addressed briefly or unaddressed were, in Reclamation's judgement, comparatively not of a substantive nature that meaningfully informed the environmental effects and the resulting decision on how to proceed.

This effort is now substantially complete and in Reclamation's expert opinion, the analysis has thoroughly considered the key factors mandated by NEPA and is adequate to inform and reasonably explain Reclamation's decision regarding the proposed Federal action.

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Mission Statements

The U.S. Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors 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.

Contents

Page

Section 1. Introduction **1**
1.1 Background 1
1.1.1 Public Law 774 2
1.2 Purpose and Need for the Proposed Action 3
Section 2. Alternatives Including Proposed Action **6**
2.1 No Action Alternative 6
2.2 Proposed Action 6
2.2.1 Supplemental Releases 6
2.2.2 Monitoring 9
2.2.3 Other Alternatives Considered and Evaluated 9
Section 3. Affected Environment and Environmental Consequences **11**
3.1 Resources Eliminated from Further Analysis 11
3.2 Biological Resources 12
3.2.1 Affected Environment 12
3.2.2 Environmental Consequences 21
3.3 Water Resources 40
3.3.1 Affected Environment 40
3.3.2 Environmental Consequences 44
Section 4. Consultation and Coordination **48**
4.1 Agencies and Persons Consulted 48
4.2 Public Involvement 48
4.3 Endangered Species Act (16 U.S.C. § 1531 et seq.) 51
Section 5. References **52**

Table 1 Federally Listed Threatened and Endangered Species 13
Table 2. Comments Received on the Draft EA 48

Figure 1. Proposed Action Area - Twitchell Reservoir Inflow and Downstream 4
Figure 2. Proposed Action Area including Potential Upstream Steelhead Migration Waterways 5
Figure 3. Diagram of Relationship between flows at the confluence and the Santa Maria River at the Guadalupe Gage 8
Figure 4. Proposed Action Area Hydrologic Features and Management Boundaries 43

Appendix A. Twitchell Pilot Project Hydrologic Modeling

Section 1. Introduction

This Environmental Assessment (EA) is being prepared by the South-Central California Area Office located in Fresno, California, under environmental documentation number CGB-ED-2024-012.

Reclamation provided the public with an opportunity to comment on the Draft Environmental Assessment between October 29, 2024, and December 10, 2024. Twenty-three comments were received. Changes between this Final EA and the Draft EA, which are not minor editorial changes, are indicated by vertical lines in the left margin of this document.

1.1 Background

Reclamation's Santa Maria Project, which was authorized September 3, 1954, (Public Law 83-774, 68 Stat. 1190 ["Public Law 744"]), is located about 150 miles northwest of Los Angeles, California and consists of Twitchell Dam and Reservoir and a system of river levees constructed by the U.S. Army Corps of Engineers (Figure 1). Constructed in 1958, Twitchell Dam[1] is the key feature of the Santa Maria Project which was built with the authorized purposes of flood control and water conservation.

The Santa Maria River is formed by the confluence of the Cuyama and Sisquoc Rivers in Santa Barbara County. The Cuyama River is dry for much of the year, with considerable streamflow occurring only following wet season storms. Twitchell Dam is located on the Cuyama River, about 6 miles upstream from its confluence with the Sisquoc River, and forms Twitchell Reservoir. Twitchell Reservoir captures water during wet season storms and stores it for release in the dry season to help recharge the Santa Maria Valley groundwater basin. Impounded waters are later released down the river channel at a predetermined rate to permit maximum percolation into the ground-water basins. The objective of the project as authorized is to release regulated water from storage as quickly as it can be percolated into the Santa Maria Valley ground-water basin. Because water is generally released from storage to maximize percolation into the groundwater basin, Twitchell Reservoir is often empty.

In 1959, Reclamation transferred the operation and maintenance (O&M) of Twitchell Dam and Reservoir to the Santa Barbara County Water Agency, whom in turn, and

[1] Formerly named Vaquero Dam and Reservoir

through mutual agreement with Reclamation, transferred the O&M to the Santa Maria Valley Water Conservation District (Santa Maria Valley WCD). Santa Maria Valley WCD has been performing the O&M ever since.

Reclamation is proposing to modify Twitchell Dam's Standard Operating Procedures (SOP), through a Temporary Standing Order, to increase passage opportunities in the Sisquoc River below the confluence with the Cuyama River, by improving the flow regime for the Southern California Steelhead (*Oncorhynchus mykiss*) Distinct Population Segment (DPS), a species of fish considered "endangered" under the Endangered Species Act ("ESA," 16 USC §1531 *et seq*., with implementing regulations under 50 CFR Part 402). The temporary modification to Twitchell Dam's SOP is referred to as the "Twitchell Dam Pilot Project" or "Pilot Project."

1.1.1 Public Law 774

The Santa Maria Project has been operated pursuant to the purposes set forth and authorized by Public Law 774 since 1962[2] (a baseline of more than 60 years). Whether Public Law 774 grants sufficient discretion to Reclamation to consult under Section 7 of the Endangered Species Act (ESA) for listed steelhead purposes has been litigated.[3] The U.S, District Court in the Central District of California concluded that Public Law 774 did not grant Reclamation sufficient discretion to reoperate Twitchell Dam for ESA purposes. However, on appeal, the U.S. Court of Appeals for the 9th Circuit opined that Public Law 774 contained an "other purposes" clause in its list of secondary purposes, granting Reclamation some discretion over Twitchell Dam operations for Section 7 of the ESA to apply. The court added that, "Twitchell Dam can readily be operated to provide modest releases at certain times of the year and during certain water years, while still satisfying the dam's primary purpose of conserving water for consumptive purposes," remanding further hearing and action to the District Court. Subsequently, the Defendant-Intervenors (City of Santa Maria and Golden State Water Company) filed a petition with the U.S. Supreme Court for reconsideration (*writ of certiorari*) which was denied, leaving the 9th Circuit opinion intact.

Through subsequent discussions, Reclamation and Plaintiffs (San Luis Obispo Coast Keeper and Los Padres ForestWatch) reached a Stipulated Motion for Stay of Litigation (Stay Agreement). The Stay Agreement is based on a report prepared for the California Ocean Protection Council and California Department of Fish and Game conducted by Stillwater Sciences that was published in 2012 (The "Stillwater Report"). The Stillwater Report aims to improve conditions for steelhead in the Sisquoc River by showing that

[2] The Dam was completed in 1958; however, the dam was not fully operated until 1962 due to a drought from 1959-1962 (TMA and MNS Engineers, Inc., 2010).
[3] *San Luis Obispo Coastkeeper* et al *v. Santa Maria Valley Water Conservation District* et al.

reoperating Twitchell Dam to include "modest" releases from the Cuyama River between December and April (herein referred to as "Supplemental Releases") could improve passage for adult steelhead in the Sisquoc River. The Stillwater Report was relied on by plaintiffs throughout the litigation, and by the 9th Circuit's opinion. The Stay Agreement was approved by District Court Order on October 12, 2023.

1.2 Purpose and Need for the Proposed Action

The Temporary Standing Order is needed to comply with the Stipulated Motion for Stay of Litigation. The purpose of the Temporary Standing Order is to provide "modest" releases from Twitchell Dam to increase steelhead migration opportunities through the Santa Maria River to high quality habitats in the upper Sisquoc River and smolts to the Pacific Ocean.

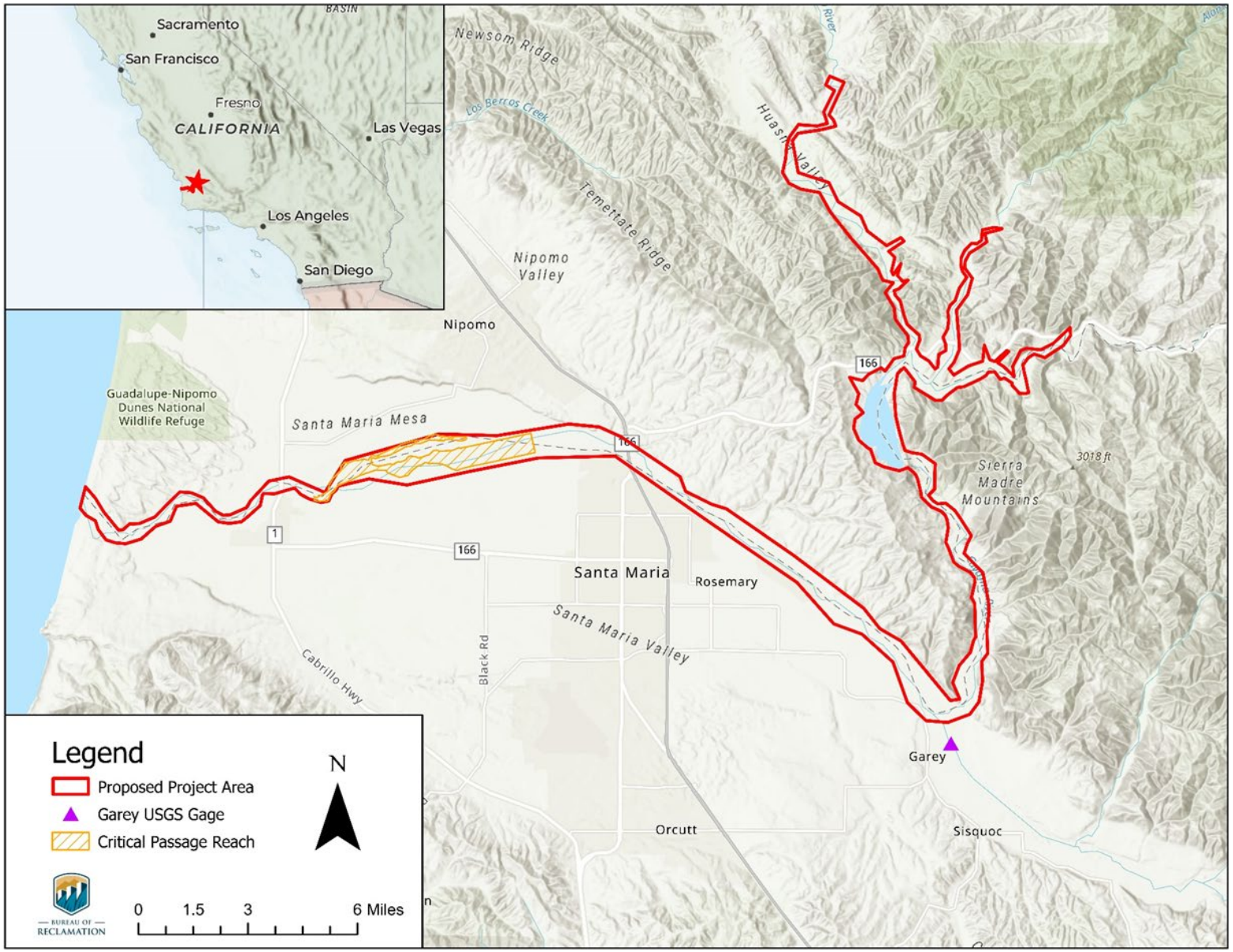

Figure 1. Proposed Action Area - Twitchell Reservoir Inflow and Downstream

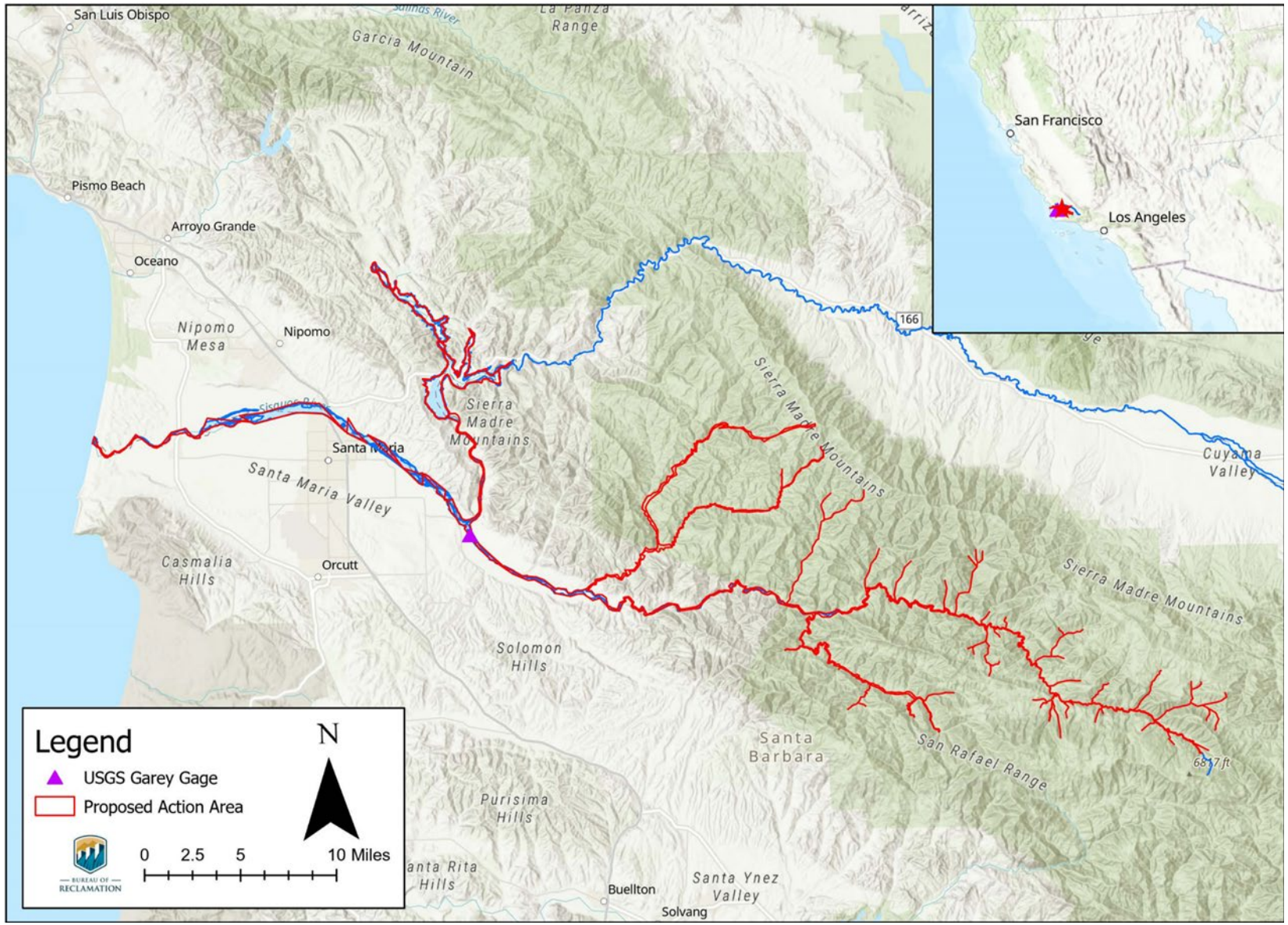

Figure 2. Proposed Action Area including Potential Upstream Steelhead Migration Waterways

Section 2. Alternatives Including Proposed Action

2.1 No Action Alternative

Under the No Action alternative, Reclamation would not approve a Temporary Standing Order modifying the operations of Twitchell Dam to implement the Twitchell Dam Pilot Project. The operating procedures would not be modified and, therefore, the Supplemental Releases to increase passage opportunities for endangered steelhead under certain hydrologic conditions would not be initiated. Reclamation would continue to operate Twitchell Dam for the purposes authorized under Public Law 774, maintaining baseline conditions.

2.2 Proposed Action

Reclamation proposes to approve a Temporary Standing Order modifying the operations of Twitchell Dam, implementing the Twitchell Dam Pilot Project (Proposed Action) for a period of up to 15 years, to make Supplemental Releases from Twitchell Dam to increase passage opportunities for federally endangered steelhead. Reclamation expects up to 15 years may be needed to experience several years where Supplemental Releases would be triggered. The Proposed Action is based on the recommendations in the Stillwater Report, with some modifications. These include a detailed, structured approach that emphasizes clear operational criteria, real-time adjustments based on flow conditions, and monitoring. The Proposed Action area includes all areas where water released for the Twitchell Dam Pilot Project would flow (Figure 1), as well as areas upstream where steelhead access may be improved by the Proposed Action (Figure 2).

2.2.1 Supplemental Releases

Under the Proposed Action, Reclamation would initiate, continue, and end Twitchell Dam Supplemental Releases for steelhead passage purposes as described below:

A. INITIATE SUPPLEMENTAL FLOW RELEASES: Between December 1 and May 31, when either the total accumulated inflow into Twitchell Reservoir or Twitchell Reservoir storage is greater than or equal to 13,000 acre-feet and average daily streamflows in the lower Sisquoc River, as measured at the Garey gage (U.S. Geologic Survey [USGS] gage #11140000), are between 350 and 550 cubic feet per second ("cfs"), and have already remained at or above that level for at least

two previous days, releases from Twitchell Dam, up to 400 cfs, will be made such that the combined streamflows at the confluence of the Sisquoc and Cuyama rivers will target approximately 600 cfs.

B. CONTINUE SUPPLEMENTAL RELEASES: Through monitoring of conditions, and subject to the non-storage provisions and limitations of "A," above, and "C," below, daily adjustment to Supplemental Releases, up to 400 cfs, may be made when Reclamation determines it is needed to preserve a minimum of 250 cfs through the "Critical Passage Reach" (the reach of the Santa Maria River that begins about one mile downstream of Highway 1 and continues past Bonita School Road) or may be reduced to prevent the loss of life or significant damage to property, through monitoring of conditions. Discrete wading measurements will be performed by U.S. Geologic Survey (USGS) and/or others in the Santa Maria River near the Highway 1 Bridge, when conditions are safe, to ensure that 250 cfs is achieved in the "Critical Passage Reach."

C. END SUPPLEMENTAL RELEASES: Twitchell Dam Supplemental Releases will cease when flows in the lower Sisquoc River, as measured at the Garey gage, fall below 150 cfs, but shall be reinitiated pursuant to the Garey gage flow conditions in "A," above, until 10 consecutive days of approximately 600 cfs at the confluence of the Sisquoc and Cuyama have been achieved, or 8,000 acre-feet of cumulative Twitchell Dam Supplemental Releases have been made during any December 1 to May 31 period.

D. RAMP DOWN: When Twitchell Dam Supplemental Releases are triggered to cease, as described above, releases from Twitchell Dam will be ramped down in two approximate 50 cfs increments per day (depending on lake level) conducted at least four hours apart, until Twitchell releases reach approximately 100 cfs. Once Twitchell releases reach approximately 100 cfs, there will be one final reduction from 100 cfs to zero (due to the operational capabilities of the gates at Twitchell Reservoir). The transition from 100 cfs to zero will occur on a day in which no other flow reductions have been conducted.

The 13,000 AF accumulated inflow *or* storage requirement was included in the Pilot Project to ensure enough water for the proposed Supplemental Releases, as well as active dredging operations that maintain the operational condition of the gates. The Stillwater Report notes that "Flow augmentation to more closely mimic pre-dam flow patterns require stored water in Twitchell Reservoir" (page 105, Stillwater 2012). The Cuyama River is drier than the Sisquoc River and historically contributed about one-third of the flow in the Santa Maria River before Twitchell Dam was operational (page ES-4,

Stillwater 2012). Generally, years with higher flows in the Sisquoc align with higher inflows into Twitchell Reservoir via the Cuyama.

While reservoir operations affect storage in Twitchell Reservoir, they do not control inflow, and either (storage or inflow) may trigger Supplemental Releases. This requirement can also shift releases later into the migration season, following early rainfall that connects the estuary and ocean, which is crucial for steelhead migration.

Under the Proposed Action, Supplemental Releases will only be initiated after average daily streamflows at the Garey Gage in the lower Sisquoc River remain between 350-550 cfs for at least two consecutive days. This aims to extend passable flows in the Santa Maria River to at least three days to support steelhead upstream migration.

Once triggered, Supplemental Releases from Twitchell Dam of up to 400 cfs will continue to target a flow rate of approximately 600 cfs at the confluence of the Sisquoc and Cuyama Rivers. This target accounts for estimated transmission losses of about 350 cfs in the Santa Maria River (Stillwater 2012), ensuring that flows of 250 cfs reach Guadalupe (Figure 3).

When flows at the Garey Gage drop below 150 cfs, Supplemental Releases from Twitchell will cease, as the lower Sisquoc River will no longer be passable for steelhead. Additionally, releases will end once the total Supplemental Releases reach 8,000 AF in a single Supplemental Release season, or after 10 consecutive days of approximately 600 cfs at the confluence (with or without Supplemental Releases)[4]. These criteria ensure increased opportunities for fish passage while allowing Twitchell Dam to continue its primary role in water conservation for groundwater recharge and consumptive purposes.

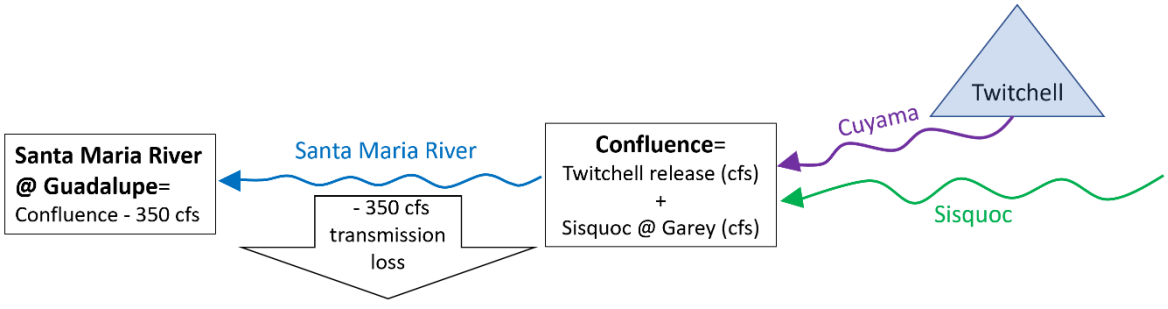

Figure 3. Diagram of Relationship between flows at the confluence and the Santa Maria River at the Guadalupe Gage

[4] Note that 10 days at 600 cfs equates to a volume of 7,200 AF which is less than the 8,000 AF single year provision.

The Proposed Action would primarily supplement intermediate-type water years, in which supplementation is expected to have the greatest benefit (pages 94-95, Stillwater 2012). Supplementation would generally not be triggered in very wet years that already have ample migration and passage opportunities. The timeframe selected for this Pilot Project was tailored specifically for the observed pre-dam hydrology of the Santa Maria watershed, and the hydrology of the lower Sisquoc River. The 15-year duration of the Pilot Project would provide an opportunity to determine how Supplemental Releases from Twitchell Dam affect the migration of steelhead through the Santa Maria River to high quality habitats in the upper Sisquoc River and smolts to the Pacific Ocean.

2.2.2 Monitoring

Supplemental Releases will be monitored using data collected at existing USGS gages. The Garey gage will be used to determine if the 600 cfs target at the Confluence is being met, which is presumed to provide a net flow of 250 cfs in the Critical Passage Reach of the Santa Maria River (page ES-5, Stillwater 2012). The USGS Suey Gage (gage #11140585) may also be used to monitor flow conditions in the Santa Maria River, however, the mainstem of the Santa Maria River has a highly mobile sandy bed, which precludes most analytical techniques for measuring passable flows for fish (pages 44-45, Stillwater 2012). Reclamation conferred with the USGS and the County of Santa Barbara on the efficacy of installing a gage within the Critical Passage Reach and Reclamation will follow their recommendation which states that "While installation of a streamgage is not feasible in the critical reach, weekly discrete wading measurements might be able to be completed near the Highway 1 Bridge if conditions are safe, in order to confirm that continued supplemental releases maintain a minimum discharge of 250 cfs."

In addition to USGS gage monitoring, field surveys will be conducted at Twitchell Dam, Garey Gage, Bonita Crossing, Guadalupe Crossing, and the lagoon/river mouth. Surveys should occur once prior to Supplemental Releases, during Supplemental Releases, and during ramp-down releases. Field surveys are intended to assess hydraulic connectivity or potential barriers in the river as well as observations related to flow and the rivers flow path.

2.2.3 Other Alternatives Considered and Evaluated

Stillwater Recommended Action Alternative

The Stillwater Report presents a general framework with broader operational "rules" related to flows, historical patterns, and fish passage, emphasizing long-term management strategies. The Stillwater Report includes the initiating criteria, requiring flows of 350-550 cfs or greater in the lower Sisquoc River for two previous days before initiating a release, but does not include inflow or storage requirements. Beyond the steelhead passage season (December to April), the recommendations do not include a

timeframe for implementation (the Proposed Action would occur for up to 15 years). The specific cessation criteria include when (a) discharges fall below 150 cfs in the lower Sisquoc River, or (b) 12 or more days of steelhead-passable conditions have been achieved during the current water year.

Recommendations from the Stillwater Report also include direct field monitoring in the Critical Passage Reach during any flow augmentation from Twitchell Dam, aiming to verify surface flow and subsequent modification of release rates to ensure steelhead passage. The wide, dynamic channel coupled with its flashy flows and high turbidity severely compromises the effectiveness of many monitoring methods; though, as described in the Proposed Action, discrete wading measurements may be taken when it is safe to do so. Additionally, the currently low population of steelhead expected to navigate the river further complicates any meaningful assessment. The recommendation for monitoring steelhead response in the Santa Maria River is likely impractical due to physical and logistical challenges.

NMFS Technical Assistance Recommended Action Alternative

Technical assistance provided by NMFS recommended that Supplemental Releases be initiated whenever average daily flow measured in the Sisquoc River at the Garey gage is greater than or equal to 150 cfs from December 1 to June 30 of each year. The NMFS recommended criteria were modeled for the period from 1962-2023 for comparison with the Stillwater Recommended Action, Reclamation's Proposed Action, and baseline conditions without supplementation (No Action).

The NMFS Recommended Action excludes the Proposed Action's 13,000 AF storage or inflow requirement to initiate Supplemental Releases. Modeling indicates that 46.8% of the Supplemental Releases under the NMFS Recommended Action would have happened when the reservoir has less than 13,000 AF stored, which would not ensure that there is enough water to complete Supplemental Releases (as well as active dredging operations that maintain the operational condition of the reservoir gates). In addition, nearly 20% of Supplemental Releases under NMFS Recommended Action would be triggered when there is no water stored in Twitchell Reservoir. No release can be made without sufficient water.

Additionally, modeling results show that the NMFS Recommended Action to remove the requirement for at least two prior days of Sisquoc River flow greater than or equal to 350 cfs before initiating Supplemental Releases is expected to *increase* the number of "failed" migration events for smolts and steelhead compared to current baseline conditions without supplementation. Reclamation based the definitions of successful and "failed" migration events for steelhead and smolts on the assumptions used in the Stillwater Report to characterize potential impacts of the actions analyzed in this EA.

Reclamation understands that the minimum migration periods and passage thresholds used in the Stillwater Report are conservative, and that successful migration may still occur under events classified in this EA as "failed" migration events. The definitions of successful and "failed" migration events used in this EA are intended only to compare potential effects of the actions analyzed in this EA, and shall not be applied outside of the analyses in this EA.

For the analysis in this EA, a successful steelhead migration event is assumed to require, "at least three days of flow greater than or equal to 250 cfs through the critical reach of the mainstem Santa Maria River, as measured in the vicinity of the Bonita School Road and Highway 1 crossings" (page 112, Stillwater 2012). A successful smolt migration event is assumed to require, "at least one day of flow greater than or equal to 150 cfs through the critical reach of the mainstem Santa Maria River, with at least two preceding days of passable flows in the upstream Sisquoc River. (page 112, Stillwater 2012). The additional "failed" migration events under NMFS' suggested criteria may increase the risk of steelhead and smolt stranding compared to current baseline conditions without supplementation.

Section 3. Affected Environment and Environmental Consequences

3.1 Resources Eliminated from Further Analysis

Reclamation analyzed the affected environment and determined that the Proposed Action did not have the potential to cause adverse effects to the following resources:

Climate Change
The Proposed Action does not include construction of new facilities or modification to existing facilities. No pumping would be necessary for these Supplemental Releases and no additional electrical production beyond baseline conditions would occur. However, the flow regime established in the Proposed Action may be influenced by climate change, which introduces uncertainties into water management strategies. The predicted magnitude of supplemental flows from Twitchell Reservoir is based on an assumption of stable rainfall patterns and consistent flow dynamics observed during the benchmark period (1941-1961). Climate change is expected to alter these patterns through increased variability in precipitation and runoff. As a result, the stability that underpins the forecasts for supplemental flows could be compromised, making it

unlikely that the historical benchmarks will remain valid in the future. Consequently, the projections for the supplemental flows necessary to achieve fish-passage discharges will likely require continuous reevaluation as climate conditions evolve. This necessity for ongoing adjustment underscores the challenges of relying on a fixed operational framework in an increasingly unpredictable climate. Since Reclamation operations and allocations are flexible, any changes in hydrologic conditions due to global climate change would be addressed within Reclamation's operation flexibility.

Cultural Resources

There would be no impact to cultural resources as a result of implementing the Proposed Action as the Proposed Action would facilitate the flow of water through existing facilities to existing users. No new construction or ground disturbing activities would occur as part of the Proposed Action. Reclamation has determined that these activities have no potential to cause effects to historic properties pursuant to 36 CFR Part 800.3(a)(1).

Indian Sacred Sites

Executive Order 13007 (May 24, 1996) a requires that federal agencies accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoids adversely affecting the physical integrity of such sacred sites. The Proposed Action would not limit access to and ceremonial use of Indian sacred sites on Federal lands by Indian religious practitioners or affect the physical integrity of such sacred sites. There would be no impacts to Indian sacred sites as a result of the Proposed Action.

Indian Trust Assets

Indian Trust Assets are legal interests in assets that are held in trust by the United States for federally recognized Indian tribes or individuals. There are no Indian reservations, rancherias or allotments in the Proposed Action area. The nearest Indian Trust Asset is the Santa Ynez Band of Chumash Mission Indians reservation which is about 29 miles to the south of the Proposed Action area. The Proposed Action does not have a potential to affect Indian Trust Assets.

3.2 Biological Resources

3.2.1 Affected Environment

Reclamation obtained official lists of federally listed species and critical habitat that may occur within the project area and/or which may be affected by the Proposed Action. An official species list was obtained from the National Marine Fisheries Service (NMFS) on July 24, 2023, via letter request. An official species list was also obtained from the United States Fish and Wildlife Service (USFWS) via the website, http://ecos.fws.gov/ipac,

(Project Code: 2023-0121143) on August 24, 2023. This list was updated on October 2, 2024. The California Department of Fish and Wildlife's California Natural Diversity Database (CNDDB) was also queried for records of protected species in and near the project area (CNDDB 2024).

The official species lists are summarized in Table 1 and were generated for a polygon that encompassed the entire project area.

Table 1 Federally Listed Threatened and Endangered Species

Species	Status[1]	Effects[2]	Potential to occur and summary basis for ESA determination[3]
INVERTEBRATES			
Monarch butterfly *Danaus plexippus*	C	NE	Possible. There are records of overwintering monarch butterflies adjacent to the Proposed Action Area (outside of the rivers). The Proposed Action is not expected to affect habitat conditions outside of the Cuyama and Santa Maria Rivers. The Proposed Action would have *No Effect* on this species.
Vernal pool fairy shrimp *Branchinecta lynchi*	T, X	NE	Absent. There is no vernal pool habitat or designated Critical Habitat for this species within the Proposed Action Area. The Proposed Action would have *No Effect* on this species or its designated Critical Habitat.
FISH			
Southern California Steelhead Distinct Population Segment (DPS) *Oncorhynchus mykiss*	E, X	MAA	Present. Southern California Steelhead migrate into the middle and upper reaches of the Sisquoc River watershed during high flow events (70 Fed. Reg. 52488, 52508). Designated critical habitat for Southern California Steelhead is present in the project area. The Proposed Action is expected to improve migration opportunities for steelhead and smolts and reduce the frequency of "failed" migration events, as those events are defined in the Stillwater Report (2012) and used here for comparative purposes relative to baseline conditions. While the effects of the Proposed Action on the Southern California Steelhead DPS, and its designated critical habitat, are expected to be mostly beneficial, there is some potential for fish stranding in the Cuyama and Santa Maria Rivers when Supplemental Releases are ramped down; therefore, the Proposed Action *May Adversely Affect* the Southern California Steelhead DPS.
Tidewater goby *Eucyclogobius newberryi*	E, X	NLAA	Present. This species, and its designated critical habitat, are present in the project area within the

Species	Status[1]	Effects[2]	Potential to occur and summary basis for ESA determination[3]
			Santa Maria River estuary. The proposed Supplemental Releases would occur between December and May, generally after the sandbar has already been breached by natural flows from the Sisquoc River. Because the proposed Supplemental Releases are aligned with the natural hydrology to which tidewater gobies are adapted, the effect of these releases on tidewater goby and its designated critical habitat would be insignificant. The Proposed May Affect but is *Not Likely to Adversely Affect* this species and its designated critical habitat.
AMPHIBIANS			
Arroyo Toad *Anaxyrus californicus*	E, X	NE	Unlikely. There is a population of this species in the upper Sisquoc River within the Los Padres National Forest; however, this species is not expected to occur in the Cuyama or Santa Maria Rivers. The Proposed Action would have no effect on flows within the Sisquoc River. There is no designated critical habitat for this species within the Proposed Action Area. The Proposed Action would have *No Effect* on this species or its designated critical habitat.
California red-legged frog *Rana draytonii*	T, X	NLAA	Present. There are multiple records of this species in and near the Proposed Action Area; however, there is no designated Critical Habitat for this species in the Proposed Action Area. The proposed Supplemental Releases are consistent with the natural hydrology of the area. California red-legged frogs are adapted to this natural hydrology, while non-native species like bullfrogs are not. These releases will likely occur before California red-legged frogs have deposited their eggs and may wash away bullfrog tadpoles from the previous season if any are present in the Cuyama or Santa Maria Rivers. Reclamation has determined that the Proposed Action May affect, but is *Not Likely to Adversely Affect*, the California red-legged frog.
California tiger salamander Central California DPS *Ambystoma californiense*	T, X	NE	Unlikely. Although there is a population of California tiger salamanders near the Proposed Action Area, rivers do not provide suitable habitat for California tiger salamanders. There is no designated Critical Habitat for this species in the Action Area. The Proposed Action would

Species	Status[1]	Effects[2]	Potential to occur and summary basis for ESA determination[3]
			have *No Effect* to this species or its designated Critical Habitat.
California tiger salamander Santa Barbara County *Ambystoma californiense*	E, X	NE	Unlikely. Although there is a population of California tiger salamanders near the Proposed Action Area, rivers do not provide suitable habitat for California tiger salamanders. There is no designated Critical Habitat for this species in the Action Area. The Proposed Action would have *No Effect* to this species or its designated Critical Habitat.
Foothill yellow-legged frog *Rana boylii*	PE	NE	Absent. This species requires perennial water sources and is therefore not expected to occur in the Proposed Action Area, which is an intermittent stream. This species may be present in the upper Sisquoc; however, the Proposed Action would have no effect on flows in that area. There would be *No Effect* to this species.
Western spadefoot toad *Spea hammondi*	PT	NLAA	Possible. There are records of this species in backwater pools and gravel pits along the Sisquoc River, and the species may occur along the Santa Maria or Cuyama Rivers. The proposed Supplemental Releases are consistent with the natural hydrology of the area, to which western spadefoot toads are adapted. Reclamation has determined that the Proposed Action May affect, but is *Not Likely to Adversely Affect*, this species.
REPTILES			
Southwestern pond turtle *Actinemys pallida*	PT	NLAA	Possible. There are records of this species in backwater pools and gravel pits along the Sisquoc River, and there is also a record of this species in Twitchell Reservoir. The proposed Supplemental Releases are consistent with the natural hydrology of the area, to which this species is adapted. Reclamation has determined that the Proposed Action May affect, but is *Not Likely to Adversely Affect*, the southwestern pond turtle.
BIRDS			
California clapper rail *Rallus longirostris obsoletus*	E	NE	Absent. The only remaining populations of this species occur around San Francisco Bay. This species does not occur within the Proposed Action Area; therefore, the Proposed Action would have *No Effect* on this species.

Species	Status[1]	Effects[2]	Potential to occur and summary basis for ESA determination[3]
California condor *Gymnogyps californianus*	E, X	NE	Absent. The Proposed Action Area does not contain suitable nesting or foraging habitat for this species. There is no designated Critical Habitat for this species in the Proposed Action Area. The Proposed Action would have *No Effect* to this species or its designated Critical Habitat.
California least tern *Sterna antillarum browni*	E, X	NE	Present. This species is known to nest at the mouth of the Santa Maria River and is present in near the Action Area between April and September. Releases for the Proposed Action would occur between December 1 and May 31 when this species is largely absent from the Action Area. The sandbar would already be breached during these releases. There is no designated Critical Habitat for this species in the Proposed Action Area. The Proposed Action would have *No Effect* on this species or its designated Critical Habitat.
Hawaiian petrel *Pterodroma sandwichensis*	E	NE	Absent. This species nests in Hawaii and does not occur in the Proposed Action Area. There would be *No Effect* to this species.
Least bell's vireo *Vireo bellii pusillus*	E, X	NE	Possible. There are records of this species from the late 1970s upstream of the Santa Maria River confluence along the Sisquoc River. This species prefers mulefat scrub and early successional habitat, which is present in the Action Area. Least Bell's vireo winter in Mexico; therefore, this species is expected to be absent from the Proposed Action Area during the proposed releases. The Proposed Action would have *No Effect* on this species.
Marbled murrelet *Brachyramphus marmoratus*	T, X	NE	Unlikely. Suitable forest nesting habitat for this species is absent from the Proposed Action Area. This species forages in the ocean and rarely visits rivers. There is some potential for this species to forage in/near the estuary. There is no designated Critical Habitat for this species in the Proposed Action Area. There would be *No Effect* to this species.
Short-tailed albatross *Phoebastria (Diomedea) albatrus*	E	NE	Unlikely. There is no breeding habitat for the species in the Proposed Action Area. This species generally forages in the ocean. Individuals may occur near the estuary occasionally but would not be affected by the Pilot Project. There would be *No Effect* to this species.

Species	Status[1]	Effects[2]	Potential to occur and summary basis for ESA determination[3]
Southwestern willow flycatcher *Empidonax traillii extimus*	E, X	NE	Unlikely. There are no records of this species, nor designated critical habitat for this species, in the Action Area. This species requires dense riparian vegetation adjacent to surface water or saturated soils. The intermittent nature of the system makes it unlikely that this species would be present in the Santa Maria or Cuyama Rivers, though the species may occur in the upper Sisquoc River where perennial flows and dense riparian vegetation are present. The Proposed Action would have *No Effect* on this species or its designated Critical Habitat.
Western snowy plover *Charadrius nivosus nivosus*	T, X	NE	Present. A population of western snowy plovers is known to nest on the Mussel Rock dunes just south of the Santa Maria River estuary, and designated critical habitat for this species overlaps with the Proposed Action Area (at the mouth of the Santa Maria River). The Proposed Action would not change the sandy beach and dune habitats that this species uses. The Proposed Action would have *No Effect* on western snowy plover or designated critical habitat for this species.
Yellow-billed cuckoo *Coccyzus americanus*	T, X	NE	Unlikely. There are no records of this species occurring in the Action Area. This species requires multi-layered riparian habitats with dense cover and nearby water. The intermittent nature of the system makes it unlikely that this species would be present in the Santa Maria or Cuyama Rivers, though the species may occur in the upper Sisquoc River where perennial flows and dense riparian vegetation are present. The Proposed Action would have *No Effect* on this species or its designated Critical Habitat.
MAMMALS			
Giant kangaroo rat *Dipodomys ingens*	E	NE	Absent. This species does not occur in the Proposed Action Area. The Proposed Action would have *No Effect* on this species.
Southern Sea Otter *Enhydra lutris nereis*	T	NE	Absent. Sea otters live in ocean kelp forests within about 1.2 miles of shore and are not expected to occur in the Proposed Action Area. The Proposed Action would have *No Effect* on this species

Species	Status[1]	Effects[2]	Potential to occur and summary basis for ESA determination[3]
PLANTS			
California jewelflower *Caulanthus californicus*	E	NE	Absent. This species grows in upland areas and there are no occurrences of this species within the Proposed Action Area. There would be *No Effect* to this species.
Gambel's watercress *Rorippa gambellii*	E	NE	Absent. There are only two known populations of this species remaining and neither is located in the Proposed Action Area. There would be *No Effect* to this species.
Gaviota tarplant *Deinandra increscens ssp. villosa*	E, X	NE	Absent. This species grows in upland areas and there are no occurrences of this species, or designated critical habitat for this species, within the Proposed Action Area. There would be *No Effect* to this species or its designated critical habitat.
La Graciosa thistle *Cirsium loncholepis*	E, X	NLAA	Present. This species, and designated critical habitat for this species, are present along the lower Santa Maria River near the estuary and in the adjacent dunes. The proposed Supplemental Releases would result in additional surface water reaching the areas where La Graciosa thistle grows, with minimal reductions in groundwater recharge. Because the proposed Supplemental Releases are consistent with the natural hydrology of the Santa Maria River, potential effects to this species are expected to be insignificant. The Proposed Action May Affect but is *Not Likely to Adversely Affect* this species and its designated critical habitat in the Action Area.
Marsh sandwort *Arenaria paludicola*	E	NE	Absent. This species does not occur within the Proposed Action Area. There would be *No Effect* to this species.
Salt marsh bird's-beak *Cordylanthus maritimus ssp. Maritimus*	E	NE	Absent. This species does not occur within the Proposed Action Area. There would be *No Effect* to this species.
Spreading Navarretia *Navarretia fossalis*	T, X	NE	Absent. This species and its designated critical habitat do not occur within the Proposed Action Area. There would be *No Effect* to this species or its critical habitat.

[1] Status = Status of federally protected species protected under the ESA.
E: Listed as Endangered
T: Listed as Threatened
PE: Proposed to be Listed as Endangered
PT: Proposed to be Listed as Threatened
X: Critical Habitat designated for this species

[2] Effects = ESA Effect determination
NE: No Effect anticipated from the Proposed Action to federally listed species or designated critical habitat
NLAA: Proposed Action Not Likely to Adversely Affect federally listed species
MAA: Proposed Action May Adversely Affect federally listed species

[3] Definition of Occurrence Indicators
Present: Species recorded in area and suitable habitat present.
Possible: Species recorded in area and habitat suboptimal.
Absent: Species not recorded in study area and suitable habitat absent.

The Proposed Action Area includes Twitchell Reservoir, the Cuyama River below Twitchell Dam to the Confluence with the Sisquoc River, and the Santa Maria River below the Confluence of the Sisquoc and Cuyama Rivers to the Pacific Ocean. The Proposed Action Area also includes the Sisquoc River (and its tributaries) from its confluence with the Cuyama River upstream to the natural limit of steelhead anadromy (i.e., the farthest upstream that steelhead can travel before encountering complete barriers). The upper Sisquoc River is included in the Proposed Action Area because the Pilot Project is expected to improve steelhead access to this area; however, the Pilot Project would have no effect on flows or any other habitat conditions in the upper Sisquoc River and its tributaries.

The Cuyama River is dry for much of the year, with considerable streamflow occurring only following wet season storms. Twitchell Reservoir captures water during these wet season storms and stores it for release in the dry season to help recharge the Santa Maria Valley groundwater basin. Water is released from storage to maximize percolation into the groundwater basin; therefore, Twitchell Reservoir is often empty. The Cuyama River is the driest in the Santa Maria watershed and, on average, typically receives about half as much precipitation as the Sisquoc River (Stillwater 2012; Booth *et al* 2014). Below Twitchell Dam, the Cuyama River is bordered by agricultural lands and grassland/oak woodland habitat which contains multiple stock ponds and ephemeral pools (with unknown hydroperiods).

The lower Sisquoc River is a braided sandy channel which is seasonally dry for long periods of time. About ten miles upstream from its confluence with the Cuyama River, the Sisquoc River has perennial flow, riparian cover and diverse aquatic habitats (page 21, Stillwater 2012; Booth *et al* 2014) and is bordered by mostly undeveloped lands.

The Santa Maria River flows west from the confluence of the Cuyama and Sisquoc Rivers to the Pacific Ocean. The river is bordered to the south by agricultural lands and the cities of Santa Maria and Guadalupe and is bordered to the north by agricultural lands and steep bluffs. The Santa Maria River is a braided sand-bed channel that is generally dry (i.e., more than 90% of the time on average) (Stillwater 2012; Booth *et al* 2014).

When the Santa Maria River does have flow, the channel morphology changes rapidly due to high bed mobility in the sandy channel.

Sand and gravel mining operations have occurred in and along the Santa Maria River and Sisquoc River since the early 1900s and are still ongoing (Santa Barbara County & San Luis Obispo County 1998; CDFW 2022). The Santa Maria River is also bordered by active agricultural fields, and its estuary is contaminated with pesticides which are toxic to aquatic life. Organophosphate and pyrethroid concentrations in the water and sediments of the estuary are at levels associated with toxicity, and levels of organochlorine pesticides found in fish tissues exceeded fish consumption criteria (Central Coast Water Board 2014). The most recent available water quality results found that sediment samples collected from the Santa Maria River estuary in 2020 were toxic to invertebrate growth and survival; however, there was a statistically significant increase in invertebrate survival observed in the estuary from 2005 to 2020, suggesting that water quality is improving (Central Coast Water Quality Preservation, Inc. 2023).

The Santa Maria River contains miles of levees along its banks to protect the Cities of Santa Maria and Guadalupe from flooding. Large floods in the river have breached or damaged these levees several times over the years. Most recently, the levee along the river breached in 2023 and flooded the Cities of Santa Maria and Guadalupe; emergency work was conducted in 2023-2024 to remove sediment and vegetation from the Santa Maria River, realign the river away from the City and install gabion flood barriers filled with sand, dirt, or gravel to protect from future flooding (O'Connor 2023; USFWS 2024).

Status of Southern California Steelhead in the Action Area

Steelhead are anadromous fish that rely on both freshwater and saltwater habitats during their life cycle. The fish are born in freshwater, migrate to the ocean as adults, and then return to freshwater to spawn.

Southern California Steelhead are listed as "endangered" under the ESA and currently are at risk of extinction throughout all or a portion of its range. Past and ongoing man-made activities, including altered hydrology and the introduction of migration barriers have destroyed or altered much previously available habitat and have blocked access to the species' historical spawning and rearing areas. This destruction and alteration of habitat is primarily responsible for the current small population size and limited distribution of Southern California steelhead, which creates a disproportionately higher risk of extinction for this DPS relative to larger populations.

NMFS' most recent 5-Year Review: Summary & Evaluation of South-Central California Coast Steelhead (NMFS, 2023) reaffirms that the species is at risk of extinction, with survival and recovery of the species remaining tenuous and highly susceptible to

impacts of ongoing and new anthropogenic activities. Shifting climatic conditions are expected to intensify the impacts of man-made activities on this population. Preventing extinction involves ensuring that habitat in essential watersheds supports various life-history pathways for the species' survival and recovery. As explained in the Southern California Steelhead Recovery Plan (NMFS, 2012), the Santa Maria River population of Southern California Steelhead has been identified as a Core 1 population, meaning that it is the highest priority for recovery actions and is one of the populations that is most likely to contribute to the long-term persistence of the DPS (NMFS, 2012).

3.2.2 Environmental Consequences

No Action

Under the No Action Alternative, Twitchell Dam will continue to be operated as it has been since 1962, and no Supplemental Releases will be conducted. Releases from Twitchell Dam will continue to be conducted in a manner that maximizes percolation into the groundwater basin underlying the Santa Maria River; therefore, most releases (over 90%) will occur when flows in the Sisquoc River, as measured at the Garey Gage, are less than 250 cfs to achieve more uniform flows through the Santa Maria River (Stillwater 2012). Water released from Twitchell Reservoir will generally only make it about as far as the Critical Passage Reach in the Santa Maria River due to groundwater infiltration.

If no action is taken, the condition of special-status wildlife species and habitat in the Action Area would remain as they are under existing baseline conditions.

Proposed Action

With implementation of the Proposed Action, Supplemental Releases from Twitchell Reservoir would be conducted between December 1 and May 31 for the next 15 years, when all criteria for a release are met. Modeling of the Proposed Action for the 62-year period from 1962-2023 shows that a total of 29 Supplemental Releases would have been made during this time.

The proposed Supplemental Releases would have been conducted in about 35.5% of years in the period from 1962-2023, and on average, there would be about 1.9 years between Supplemental Release years. The Supplemental Releases would last for one to ten days, with an average of 4.9 days per Supplemental Release. Most of the Supplemental Releases would be conducted in February (41%) and January (31%) and would be least common in May (0%) and December (7%). Outside of the proposed Supplemental Releases, Twitchell Reservoir would be operated as it is under current baseline conditions to maximize groundwater recharge.

Southern California Steelhead DPS and Critical Habitat The Pilot Project is expected to improve conditions and increase opportunities for upstream and downstream migration of Southern California Steelhead through the Santa Maria River and lower Sisquoc River when considered along with over 60 years of ongoing baseline Twitchell Dam operations. The inflow criteria and flow requirements for the lower Sisquoc River (as measured at the Garey gage) ensure that releases from Twitchell Dam are correlated with elevated flows from the Sisquoc River, to better approximate conditions before Twitchell Dam was constructed. These releases will target the "Critical Passage Reach" of the Santa Maria River, which is the first section to lose surface flows and, which, is considered the most limiting for steelhead migration.

In the Santa Maria River and lower Sisquoc River, as in other naturally intermittent rivers, flows are generally the primary factor limiting fish passage (Booth *et al* 2014). It is noted, however, that steelhead in the Santa Maria River watershed have very low population numbers which may also reduce the potential response to the proposed Supplemental Releases. In the Santa Maria River, fish passage opportunities have naturally been rare and episodic due to infrequent flows in the system, even prior to the existence of Twitchell Dam. The Santa Maria River and lower Sisquoc River do not provide suitable spawning or rearing habitat due to their lack of year-round flow and highly mobile sandy channel; however, during storm flows, these reaches serve as a migration corridor to abundant high-quality spawning and rearing habitat in the upper Sisquoc River (page 11, Stillwater, 2012).

The effects of the Pilot Project on steelhead immigration and smolt emigration are examined in further detail in the following sections.

Upstream Steelhead Migration Upstream immigration of steelhead from the ocean into freshwater is dependent on connectivity between the ocean and the river/estuary. The Pilot Project will increase connectivity of the ocean and the Santa Maria and Sisquoc Rivers beyond current baseline conditions by coordinating releases from Twitchell Reservoir with times of passable flow in the lower Sisquoc River. This increased connectivity is expected to improve conditions for upstream migrating steelhead by allowing river entry and upstream migration to occur, and by providing greater attraction flows which serve as a natural cue for steelhead to begin their upstream migration. The Pilot Project is expected to provide passage opportunities for Steelhead similar to those that occurred under pre-dam conditions, prior to the existence and operation of Twitchell Dam.

The Pilot Project would improve conditions for upstream migrating steelhead by increasing the number of suitable migration *events* instead of just increasing the number of days with passable flow. Based on observed steelhead migration speeds and the

travel distances in the Santa Maria and Sisquoc Rivers, it is conservatively estimated to take at least 3 days for steelhead to travel from the ocean upstream to spawning and rearing habitat in the Sisquoc River (page 72, Stillwater 2012). Stillwater generally deems periods with less than 3 contiguous days of upstream passable flow unsuitable for successful upstream migration; these are referred to as "failed" migration events (page 111, Stillwater 2012). The Pilot Project would increase the number of three (3) contiguous day *and longer* upstream migration events while reducing the number of "failed" migration events with less than three (3) contiguous days of passable flow when compared to the No Action alternative (Stillwater 2012; Appendix A).

Modeling for the period from 1962-2023 shows that, under the Proposed Action, the number of successful migration events would increase from 54 under the No Action alternative to a total of 61 with the Proposed Action. In addition, the average length of successful steelhead migration events would also increase from eight (8) consecutive days under the No Action alternative to nine (9) consecutive days with the Proposed Action (Appendix A).

Between 1962-2023, the Proposed Action would have extended six "failed" passage periods with less than three (3) consecutive days of steelhead passable flow each (which occurred under baseline conditions) into six upstream migration opportunities, with three (3) or more contiguous days of passable flow each (Appendix A). The number of consecutive days in these six supplemented steelhead migration events would have ranged from 4 to 14 days, with an average of 8.3 contiguous days of a steelhead passable flow per event. This represents a substantial increase in the frequency of opportunities for successful upstream steelhead migration beyond baseline (i.e., No Action) conditions and may also reduce the potential for stranding of upstream migrants by reducing the number of "failed" upstream migration events.

The Pilot Project is also expected to modestly increase the frequency of longer duration conditions (i.e., 12 days or longer) suitable for upstream steelhead migration. Modeling shows that, over the 62-year period analyzed, the Pilot Project would result in two additional 12-day, or longer steelhead migration events compared to the No Action alternative. The Proposed Action would result in an additional 18 steelhead migration events lasting more than seven (7) consecutive days (Appendix A).

The Santa Maria River and lower Sisquoc River are seasonally dry for about seven months each year, and do not provide suitable spawning or rearing habitat. The Pilot Project would substantially improve passage conditions between the ocean and the upper Sisquoc River, which contains an abundance of high-quality spawning and rearing habitat. Improvement of upstream passage opportunities may increase the number of steelhead spawning in the upper Sisquoc River and its accessible tributaries. This

potential increase in steelhead is expected to be beneficial as it could increase the number of *O. mykiss* produced in the system and can provide for greater genetic diversity to strengthen the population's resilience. Greater *O. mykiss* production coupled with an increase in downstream migration opportunities could also lead to greater production of smolts that successfully reach the ocean and become steelhead.

At times during Supplementation Releases and/or ramp down, Twitchell releases may be higher than natural flows in the Sisquoc River. When the Cuyama River is flowing at a higher rate than the Sisquoc River, some upstream migrating steelhead may be attracted to migrating up the Cuyama River, where they would be blocked by Twitchell Dam. The likelihood of this is considered low as steelhead returning upstream to spawn presumably originated from the Sisquoc River and are imprinted on flows from the Sisquoc River; however, this could be a greater risk for steelhead that has strayed to the Santa Maria River from other systems.

The Cuyama is much drier than the Sisquoc and, based on its record of low rainfall and limited records of historical *O. mykiss* presence, is not believed to have been an important upstream destination for steelhead prior to the existence of Twitchell Dam (Booth *et al* 2014). Under the Pilot Project, it is expected that steelhead would be less likely to travel up the Cuyama River because releases from Twitchell Dam would be correlated with naturally passable flows in the Sisquoc River, which has always provided higher quality spawning and rearing habitat for steelhead before and after Twitchell dam. In addition, there are two partial barriers (road culvert crossings) located in the Cuyama River about 0.6 miles upstream of its confluence with the Sisquoc River which may limit steelhead movement into the Cuyama River below Twitchell Dam (CDFW 2023); the flow rate needed for successful passage over these barriers is unknown. Because the Cuyama River below Twitchell Dam lacks suitable spawning habitat and contains partial barriers to migration, and because steelhead return to their natal rivers to spawn, it is considered unlikely that steelhead would migrate up the Cuyama River below Twitchell Dam. Although unlikely, there is still some potential for the proposed Supplemental Releases to attract steelhead individuals to the Cuyama River in areas where they may become stranded once the releases are ramped down and/or ceased.

Downstream Smolt Migration Elevated flows in the Sisquoc River are the primary cue that triggers downstream smolt migration (page 91, Stillwater 2012). Under the Proposed Action, elevated flows in the Sisquoc River would be better correlated with conditions that are suitable for downstream migration to and from the ocean, as occurred prior to the operation of Twitchell Dam. The Pilot Project would increase the frequency of conditions that are suitable for downstream smolt migration, and it is expected that, with the exception of natural drought periods, there would be no more

than two consecutive years that lack conditions suitable for downstream smolt migration (page 102, Stillwater 2012).

Successful emigration (i.e., downstream migration) of smolts requires continuous flows from the Sisquoc River tributaries all the way to the ocean. The Pilot Project would substantially increase connectivity between the Sisquoc River, the Santa Maria River, and the ocean beyond current baseline conditions. The Stillwater Report assumes that, "*downstream juvenile passage requires at least one day of flow greater than or equal to 150 cfs through the critical reach of the mainstem Santa Maria River, with at least two preceding days of passable flows in the upstream Sisquoc River*. (page 112, Stillwater 2012). The Stillwater Report also concluded that larger flow events would likely provide the best opportunity for emigration due to stronger hydrologic cues and longer periods for migration (page 73, Stillwater 2012).

Results of the modeling show that the Pilot Project would increase the number of successful smolt emigration events (as defined in the Stillwater Report) from 53 under baseline conditions to 55. The average duration of these events would be extended from 9 days under baseline conditions to 12 days under the Proposed Action. The Pilot Project would also substantially reduce the number of potential "failed" smolt migration events from 49 under baseline conditions to 41 with the proposed Supplemental Releases (Appendix A); this reduction in "failed" smolt migration events is expected to improve emigration opportunities and may reduce the potential for smolt stranding.

Over the modeled period, the Pilot Project would also result in five additional long-term smolt migration events lasting more than 12 consecutive days (Appendix A). The Supplemental Releases are expected to benefit downstream smolt migration by increasing river-ocean connectivity and increasing flows in the Santa Maria River during times when the Sisquoc River is connected with upstream tributaries. This substantial increase in the frequency, magnitude, and duration of suitable smolt migration periods (and decrease in "failed" smolt passage periods) may increase the number of smolts that successfully reach the ocean and become steelhead. Successful smolt emigration to ocean is of extreme importance for the conservation of the Southern California Steelhead DPS.

The proposed ramping rates would result in a more gradual decline in flows and are expected to reduce the potential for conditions that may cause fish stranding in the Santa Maria River and Cuyama River following the Supplemental Releases. While the ramping rates would result in a more gradual flow decline than if no ramping was implemented, even with ramping, there is some potential for downstream migrating smolts to become stranded in the Santa Maria River in areas that subsequently dry or become impassable following the proposed Supplemental Releases. It should, however,

be noted that fish stranding is considered to be *less* likely with the implementation of the Pilot Project as compared to baseline conditions because the Pilot Project would substantially reduce the number of "failed" smolt migration events and would extend the frequency and duration of flows suitable for successful smolt emigration in the Santa Maria River.

Critical Habitat Designated Critical Habitat for Southern California Steelhead is present in the Pilot Project Action Area. The Action Area contains the following physical and biological features (PBFs) of Critical Habitat which are essential for the conservation of the species: freshwater migration corridors and estuarine areas. The Action Area in the Santa Maria River and lower Sisquoc River does not contain suitable freshwater spawning or rearing PBFs of Critical Habitat due to the intermittent hydrology of the system and the fact that the river is generally dry for at least seven months each year; however, these PBFs are present in the upper portions of the Sisquoc River.

The Pilot Project would supplement flows which naturally cue upstream and downstream migration of steelhead and smolts in the Santa Maria River and is expected to mimic conditions that existed prior to the construction and operation of Twitchell Dam, while also meeting the goal of avoiding significant impacts to the water supply.

Analysis presented both in the Stillwater Report and that performed by Reclamation indicate that the Pilot Project will improve conditions and increase passage opportunities for Southern California Steelhead beyond existing and historic baseline conditions by better correlating natural passable conditions in the Sisquoc River with Supplemental Releases to the Cuyama River from Twitchell Dam. This improved correlation of Sisquoc and Cuyama River flows will increase and extend passage opportunities downstream of their confluence into the Santa Maria River.

The Pilot Project would extend the duration of passable flows in the Santa Maria River and is expected to increase the number of successful migration events that allow enough time for migrating steelhead to effectively complete their journey to and from high quality spawning and rearing habitat in the upper Sisquoc River. The Pilot Project is also expected to benefit designated Critical Habitat for Southern California Steelhead in the Santa Maria River through improvement of the freshwater migration corridor.

Even under natural conditions, and regardless of Twitchell Dam operations, the potential for stranding exists, and while the Pilot Project is expected to improve passage conditions for Southern California Steelhead, there is still some potential for stranding of upstream migrating steelhead and downstream emigrating smolts following ramp down and cessation of the Supplemental Releases.

It is expected that the Pilot Project will have a largely beneficial effect on the Southern California Steelhead DPS and its Critical Habitat; however, because there is some potential for stranding of steelhead and smolts under any release schedule due to the nature of this system, out of an abundance of caution, Reclamation has determined that the Pilot Project *May Adversely Affect* the Southern California Steelhead DPS. No adverse effects to critical habitat are expected.

California Red-legged Frog California red-legged frogs may use remnant pools and backwater areas in the Cuyama, Sisquoc and Santa Maria Rivers as summer aquatic habitat. California red-legged frogs may also use some of these areas for breeding; however, it is likely that the vernal pools and agricultural ponds in lands adjacent to the Action Area provide more suitable aquatic breeding habitat for this species.

Bullfrogs are a significant threat to California red-legged frogs, and there are multiple records of bullfrogs occurring in the project area (CNDDB 2024). The proposed Supplemental Releases would occur between December and May, during the wet season when there are naturally higher flows in the system. Streams in Southern California naturally experience occasional scouring flood flows during these months, which can considerably reduce bullfrog populations while only slightly affecting California red-legged frogs (Doubledee *et al* 2003).

During naturally timed high flows, bullfrog adults and tadpoles stay in streams while native California red-legged frogs move into upland areas and are uncommon or absent from streams (Doubledee *et al* 2003). California red-legged frogs may delay breeding in streams due to high winter and spring flows (USFWS 2022). Based on these behavioral adaptations, the proposed Supplemental Releases are generally expected to occur before California red-legged frogs have deposited their eggs.

If bullfrogs breed in the Cuyama or Santa Maria Rivers, their tadpoles from the preceding summer would still be restricted to aquatic habitat and could be washed away and/or killed by elevated flows from the proposed Supplemental Releases (Doubledee *et al* 2003). Hydrologic modeling of the Proposed Action shows that the proposed Supplemental Releases would occur most frequently in February, when flows in the Cuyama River were naturally highest under pre-dam conditions.

If California red-legged frogs do *not* breed in the Cuyama River or Santa Maria River and instead use the nearby agricultural ponds and ephemeral pools for breeding, then the Proposed Releases are not expected to have any effect on the species. California red-legged frogs would be at breeding ponds outside of the project area or moving through upland habitats in the months when the proposed Supplemental Releases are conducted.

The Proposed Action is not expected to alter the suitability of Twitchell Reservoir as habitat for California red-legged frogs. Due to frequent changes in water surface elevation, red-legged frogs are not expected to breed in the reservoir, neither currently nor with implementation of the Pilot Project.

Because the Proposed Action involves Supplemental Releases that are more in tune with the natural hydrology of the system, and which favor native species, Reclamation has determined that the Proposed Action May Affect, but is *Not Likely to Adversely Affect*, California red-legged frogs.

Tidewater Goby and Critical Habitat Under the Proposed Action, conditions for tidewater gobies in the Santa Maria River estuary would be similar to current baseline conditions. In wet years, flows would be sufficient to breach the sandbar at the estuary without any Supplemental Releases from Twitchell Dam and in dry years there would be little to no flow in the Santa Maria River (Stillwater 2012), and the sandbar would presumably remain closed.

The Proposed Action would increase the amount of freshwater reaching the estuary, primarily in intermediate type water years. Observational data from the Santa Maria River, and calculations of estuary volume, show that flows of 150-250 cfs in the critical reach of the Santa Maria River will breach the sandbar in less than one day (Stillwater 2012). Due to the criteria that there must be at least two previous days with flow in the lower Sisquoc River greater than or equal to 350-550 cfs, the sandbar at the mouth of the estuary will likely already be open once the proposed Supplemental Releases are triggered. In the event that the sandbar is closed when the Supplemental Releases are triggered, the estuary is expected to open less than one day after a Supplemental Release begins.

Although inflows from the Sisquoc River (and Orcutt Creek, which also flows into the estuary) will likely breach the sandbar before Supplemental Releases are initiated, the Proposed Action may increase the frequency of sandbar breaching above current baseline conditions.

The Supplemental Releases are intended to mimic conditions prior to the existence and operation of Twitchell Dam and would only be made between December and May, which is the time of year when the sandbar would naturally be breached. Tidewater gobies are adapted to the natural cycle of lagoon habitats, in which a sandbar generally develops in late spring and summer to form a lagoon and is occasionally breached by high flows in winter or early spring. Tidewater goby reproduction is at a natural low point during this time due to the colder weather and hydrologic fluctuations (USFWS 2005). During this season, tidewater gobies generally use calm backwaters and

tributaries near the estuary as winter refuge against high flows and draining of the lagoon (USFWS 2005).

Because the proposed Supplemental Releases are consistent with the natural hydrology of the system, and tidewater gobies are adapted to these seasonal lagoon cycles; any slight increase in the frequency of sandbar breaching from the proposed Supplemental Releases is expected to have a negligible effect on tidewater goby and its designated critical habitat. Reclamation has determined that the Proposed Action May Affect, but is *Not Likely to Adversely Affect*, the tidewater goby and its critical habitat.

La Graciosa Thistle Under the Proposed Action, conditions for La Graciosa thistle along the Santa Maria River estuary would be similar to current baseline conditions.

La Graciosa thistle along the river would continue to be subjected to periodic adverse effects from droughts and extreme flooding in the Proposed Action Area. The proposed Supplemental Releases would not be made in very dry years, nor in very wet (flood) years. These natural stressors would continue with or without implementation of the Proposed Action, and their frequency would not be affected by the proposed Supplemental Releases.

The proposed Supplemental Releases would result in more surface water reaching the estuary of the Santa Maria River in certain years. Because the groundwater level in the lowermost nine miles of the Santa Maria River is close to the surface and confined by an underlying clay layer, much of the additional water reaching this area from the Supplemental Releases is expected to flow out to the ocean instead of percolating into the groundwater table (Stillwater 2012).

The proposed Supplemental Releases would only be made between December 1 and May 31, with most releases expected to occur in January and February. The proposed Supplemental Releases are consistent with the natural hydrology of the Santa Maria River system, to which La Graciosa thistle is adapted. Observations have found that most La Graciosa thistle seeds in this area germinate in March (Lea 2002, USFWS 2020), and the species requires moist soil conditions with groundwater close to the surface. A study in this area found that La Graciosa thistle in moister conditions along the Santa Maria River grew larger and produced more seeds than individuals in drier more upland areas (Lea 2002, USFWS 2020). Based on these observations, and the timing of the proposed Supplemental Releases, it is expected that the releases may benefit La Graciosa thistle by providing additional surface flows and moisture to support successful germination and growth of La Graciosa thistle along the river in Supplemental Release years. The additional water provided by the Supplemental Releases reaching the portions of the

river where this species grows may also result in larger plants capable of producing more seeds.

Declining groundwater levels are a primary threat to La Graciosa thistle, and most occurrences of this species (i.e., 19 of 23 occurrences) are located within the Santa Maria Valley Groundwater Basin (USFWS 2020). Twitchell Reservoir is operated to recharge the Santa Maria Valley groundwater basin. Under the Proposed Action, some of the water used for Supplemental Releases would flow out to the ocean instead of being used to recharge the groundwater basin. Modeling of the Proposed Action from 1962-2023 shows that the amount of water used for Supplemental Releases would range from 0 to 8,000 AF per year. An average of 3,499 AF of water was used per year in years with at least one Supplemental Release, which is equivalent to approximately 8.7% of the average annual storage in Twitchell Reservoir and the total annual yield of the Cuyama River (page 89, Stillwater 2012). With the criteria provided for the Supplemental Releases, this is not expected to have a material effect on groundwater levels in the project area; therefore, potential adverse effects from reduced groundwater recharge are considered discountable.

The Proposed Action may temporarily improve conditions for La Graciosa thistle along the Santa Maria River in years when Supplemental Releases are conducted and would not have any effect on the frequency of drought or flooding in the Proposed Action Area. The proposed Supplemental Releases are aligned with the natural timing of elevated flows in the system and are not expected to have any adverse effect on designated critical habitat for this species. Reclamation has determined that the Proposed Action May Affect, but is *Not Likely to Adversely Affect*, La Graciosa thistle and its critical habitat.

Southwestern Pond Turtle Southwestern pond turtles may occur in Twitchell Reservoir and have been observed using backwater areas and gravel pits along the Sisquoc River (CNDDB 2024). This species may also occur in the Cuyama and Santa Maria Rivers, though there are no recorded observations of southwestern pond turtles in these areas.

Under the Proposed Action, conditions in Twitchell Reservoir would be similar to current baseline conditions, though fluctuations in water surface elevation may become slightly more frequent during the Supplemental Release season.

The Supplemental Releases would occur during the wet season, when flows in the Sisquoc River and Santa Maria River are naturally elevated. Southwestern pond turtles that use intermittent streams generally move into upland habitats or ponds above the high-water line to overwinter in response to the first storms of the wet season (USFWS

2023a). Southwestern pond turtles, if present in the Cuyama or Santa Maria Rivers, would likely move out of these habitats as flows increase; therefore, by the time Supplemental Releases are initiated, southwestern pond turtles will likely already be in overwintering habitat outside of the Proposed Action Area.

Outside of the Proposed Action, Twitchell Reservoir would be operated as it is under current baseline conditions; therefore, if southwestern pond turtles use aquatic habitat supported by dry season releases from Twitchell Dam, this habitat would still be available, similar to baseline conditions. Because the proposed Supplemental Releases are consistent with the natural seasonality of elevated flows in the Proposed Action Area, potential effects from these releases on southwestern pond turtles would be negligible. Reclamation has determined that the Proposed Action May Affect, but is *Not Likely to Adversely Affect*, the southwestern pond turtle.

Western Spadefoot Toad Western spadefoot toads are primarily terrestrial, and only use aquatic habitats for breeding and egg and tadpole development. Areas of flowing water are not suitable breeding habitat for western spadefoot toads (USFWS 2023b). While a majority of western spadefoot toads likely breed in the seasonal pools and farm ponds in lands adjacent to the Action Area, there is some potential for western spadefoot toads to breed in non-flowing backwater areas, cut-off side channels or remnant pools along the Santa Maria River, Sisquoc River, and/or Cuyama River.

The Proposed Action would increase flows in the Cuyama and Santa Maria Rivers at times when flows are naturally elevated in the Sisquoc River, between the months of December and May. In these months, western spadefoot toads come out of their burrows in response to rainfall events to move to aquatic breeding habitats that fill with rain (USFWS 2023b).

The proposed Supplemental Releases would result in continuous flows through the Critical Reach of the Santa Maria River to the ocean in some years. The lower portions of the Santa Maria River have lower infiltration rates and groundwater closer to the surface, so these releases may temporarily increase the extent of backwater areas and remnant pools that could provide breeding habitat for this species.

Reclamation has determined that the Proposed Action May Affect, but is *Not Likely to Adversely Affect*, western spadefoot toads.

Stillwater Recommended Action

The Stillwater Recommended Action is similar to the Proposed Action and would therefore have effects on special-status species and designated critical habitat that are similar to those described above for the Proposed Action. Modeling of the Stillwater

Recommended Action for the 62-year period from 1962-2023 shows that a total of 44 Supplemental Releases would have been made during this time.

The proposed Supplemental Releases would have been conducted in about 37% of years in the period from 1962-2023, and on average, there would be about 1.6 years between Supplemental Release years. The Supplemental Releases would last for one to eleven days, with an average of 4.7 days per Supplemental Release. Most of the Supplemental Releases would be conducted in February (41%) and January (36%) and the Supplemental Releases would be least common in April (7%) and December (7%). Outside of the proposed Supplemental Releases, Twitchell Reservoir would be operated as it is under current baseline conditions to maximize groundwater recharge.

The slight increase in Supplemental Releases under the Stillwater Recommended Action is due to the 12-consecutive day limit on Supplemental Releases (instead of the Proposed Action's 10-consectuive day limit) and the removal of the 13,000 AF inflow/storage requirement and 8,000 AF annual limit on Supplemental Releases. Because there is no storage or inflow requirement, under the Stillwater Recommended Action some releases may be triggered when there is not enough water in Twitchell Reservoir to make a release. Modeling for the 62-year period from 1962-2023 shows that 10 of the 44 releases under the Stillwater Recommended Action would not be possible because they would have been triggered when there was less than 13,000 AF of inflow or water stored in Twitchell Reservoir. Two (2) of these 10 triggered releases would have occurred when no water was stored in Twitchell Reservoir.

Southern California Steelhead DPS and Critical Habitat Effects of the Stillwater Recommended Action on the Southern California Steelhead DPS and its designated critical habitat would be similar to those described for the Proposed Action. The differences in expected effects to the upstream and downstream migration are described in the following sections.

Upstream Steelhead Migration Modeling for the period from 1962-2023 shows that the Stillwater Recommended Action would have increased the number of successful steelhead migration events (as defined in the Stillwater Report) from 54 under baseline conditions without supplementation to a total of 62 (i.e., one additional steelhead migration period over this 62-year period when compared to the Proposed Action). The average length of successful steelhead passage periods would increase from 8.3 consecutive days under baseline conditions to 11 with implementation of the Stillwater Recommended Action (Appendix A). Additionally, the Stillwater Recommended Action would also extend 10 "failed" migration events into 10 migration opportunities, with three (3) or more contiguous days of passable flow each (Appendix A).

The Stillwater Recommended Action would increase the frequency of longer duration conditions (i.e., 12 days or longer) suitable for upstream passage. Over the 62-year period analyzed, the Stillwater Recommended Action would result in an additional three 12-day or longer steelhead migration events compared to baseline conditions. The Stillwater Recommended Action would also result in 22 additional steelhead migration events lasting more than 7 consecutive days (Appendix A)

Downstream Smolt Migration The Stillwater Recommended Action would increase the number of successful smolt emigration events (as defined in the Stillwater Report) from 53 under baseline conditions to 55, which is the same as the Proposed Action; however, under the Stillwater Recommended Action the average duration of these events would be increased from 9.3 days under baseline conditions to 13 days (i.e., one more day on average, as compared to the Proposed Action). The Stillwater Recommended Action would also reduce the number of "failed" smolt passage periods from 49 under baseline conditions to 38 (Appendix A). The Stillwater Recommended Action would also increase the number of long-term smolt migration events lasting more than 12-consecutive days from 9 under baseline conditions to 17.

The Stillwater Recommended Action does not include ramp down of releases, so Supplemental Releases would simply end once terminating criteria are met. The lack of ramp down would likely increase the potential for conditions that may result in fish stranding in the Santa Maria River and Cuyama River when the releases are stopped.

Similar to the Proposed Action, the Stillwater Recommended Action is expected to be largely beneficial to the Southern California Steelhead DPS and its critical habitat; however, due to the potential for fish stranding following the releases, this action *May Adversely Affect* the Southern California Steelhead DPS.

California red-legged frog The effects of the Stillwater Recommended Action on California red-legged frogs are expected to be very similar to those described for the Proposed Action, with a slight increase in the frequency and duration of Supplemental Releases.

Tidewater Goby The effects of the Stillwater Recommended Action on tidewater goby and its designated critical habitat are expected to be very similar those described for the Proposed Action, with a slight increase in the frequency and duration of Supplemental Releases.

La Graciosa Thistle The effects of the Stillwater Recommended Action on La Graciosa thistle and its designated critical habitat are expected to be similar to the effects described for the Proposed Action, with a slight increase in the frequency and duration of Supplemental Releases.

The Stillwater Recommended Action would use more water than the Proposed Action, so less water would be available for groundwater recharge under this alternative. Some portion of the water used for Supplemental Releases would flow out to the ocean instead recharging the groundwater. Modeling from 1962-2023 shows that the amount of water used for Supplemental Releases under the Stillwater Recommended Action would range from zero to 10,297 AF per year. In years with at least one Supplemental Release, an average of 4,608 AF would be used annually, this is equivalent to about 11.5% of the average storage in Twitchell Reservoir and the average annual yield of the Cuyama River (Page 89, Stillwater 2012). The amount of water used is still relatively modest and is not anticipated to have a large adverse effect on groundwater levels in the project area.

The Stillwater Recommended Action May Affect but is *Not Likely to Adversely Affect* La Graciosa thistle and its designated critical habitat.

Southwestern Pond Turtle The effects of the Stillwater Recommended Action on California red-legged frogs are expected to be very similar to those described for the Proposed Action, with a slight increase in the frequency and duration of Supplemental Releases.

Western Pond Turtle The effects of the Stillwater Recommended Action on western pond turtles are expected to be very similar to those described for the Proposed Action, with a slight increase in the frequency and duration of Supplemental Releases.

NMFS Technical Assistance Recommended Action

The NMFS Recommended Action would result in Supplemental Releases from Twitchell Dam, between December 1 and June 30, whenever flows in the Sisquoc River are greater than or equal to 150 cfs. Modeling of the NMFS Recommended Action for the 62-year period from 1962-2023 shows that a total of 203 Supplemental Releases would have been made during this time (Appendix A).

The NMFS Recommended Action releases would be conducted in about 69% of years in the period from 1962-2023, and on average, Supplemental Release years would be less than one year apart. The NMFS Recommended Action Supplemental Releases would last from 1 to 30 days, with an average of 4.5 days per Supplemental Release (Appendix A). Most of the releases under the NMFS Recommended Action would occur in March (27%) and February (25%) and Supplemental Releases would be least common May (3%) and June (<1%).

The NMFS Recommended Action removes almost all criteria for Supplemental Releases, including the 13,000 AF inflow or storage requirement. Removal of the inflow or storage requirement means that some of the releases triggered under the NMFS Recommended

Action would not be possible to implement due to insufficient inflow or stored water to conduct a release. Modeling from 1962-2023 shows that approximately 46% of releases triggered under NMFS Recommended Action criteria would not be implementable; this would remove 92 supplementation events, equivalent to 174 supplementation days, from the modeled releases for the NMFS Recommended Action (Appendix A). Many of the Supplemental Releases called for under the NMFS Recommended Action will not be possible to implement because of insufficient water stored in Twitchell Reservoir to carry out the releases.

Southern California Steelhead and Critical Habitat The effects of the NMFS Recommended Action on steelhead and smolt migration and critical habitat are discussed in the following sections.

Upstream Steelhead Migration Modeling for the period from 1962-2023 shows that the NMFS Recommended Action would have increased the number of successful steelhead migration events (as defined in the Stillwater Report) from 54 under baseline conditions to a total of 80; however, it should be noted that about 36% (i.e., 52 of 143) of the Supplemental Releases involved in these successful steelhead migration events would not be possible to implement due to insufficient water in Twitchell Reservoir to make a release. The average length of each successful steelhead migration event would increase from 8.3 consecutive days to 17 days under the NMFS Recommended Action (Appendix A). These releases would increase connectivity between the ocean and the river and would provide greater attraction flows for upstream migrating steelhead. The NMFS Recommended releases are expected to increase migration opportunities beyond those naturally provided under pre-dam conditions.

While the NMFS Recommended Action would create more successful steelhead migration events, it would also substantially increase the number of "failed" steelhead passage events from 47 under baseline conditions to 61 under the NMFS Recommended Action (Appendix A). The increase in "failed" steelhead passage events of less than three contiguous days under the NMFS Recommended Action is the result of removing the criteria requiring flows of greater than or equal to 350-550 cfs in the lower Sisquoc River for at least two previous days before initiating a release; both the Proposed Action and the Stillwater Recommended Action include this requirement and substantially reduce the number of "failed" steelhead passage events below baseline conditions.

The NMFS Recommended Action would greatly increase the frequency of longer duration conditions (i.e., 12 days or longer) suitable for upstream migration. Modeling shows that, over the 62-year period analyzed, the NMFS Recommended Action would increase the number of 12-day or longer steelhead migration events from eight (8)

under baseline conditions to 29; however, as described above, several of the releases involved in these longer duration events would not have been possible to implement due to insufficient water to make a release. These longer duration events are likely beneficial for steelhead migration; however, there is currently a lack of scientific findings on the importance of very long-term passage events to steelhead populations (page 108, Stillwater 2012).

Similar to the Proposed Action, there may be times when Twitchell releases are higher than natural flows in the Sisquoc River and steelhead may be attracted to migrate up the Cuyama River where they would be blocked by Twitchell Dam. This is considered somewhat more likely to occur under the NMFS Recommended Action due to the decreased flow threshold in the Sisquoc River for triggering a release (i.e., 150 cfs instead of 350-550 cfs) and the removal of the 400 cfs limit on Supplemental Releases from Twitchell Dam.

The NMFS Recommended Action includes ramping to mimic the natural flow recession in the Sisquoc River. Implementation of the NMFS Recommended Action would still be subject to the operational constraints of Twitchell Dam facilities (i.e., minimum possible flow adjustments, minimum allowable gate openings, etc.). While ramp down of the Supplemental Releases may minimize stranding of steelhead and smolts, stranding of smolts and steelhead following a Supplemental Release is still possible, even with ramping.

Downstream Smolt Migration Modeling from 1962-2023 shows that the NMFS Recommended Action would increase the number of successful smolt emigration events (as defined in the Stillwater Report) from 53 under baseline conditions to 61; however, it should be noted that about 33% (i.e., 42 of 126) of the Supplemental Releases involved in these successful smolt migration periods would not have been possible to implement due to insufficient inflow/stored water in Twitchell Reservoir. The average duration of successful smolt migration events would be extended from 9 days under baseline conditions to 20 days under the NMFS Recommended Action. This large increase in the frequency, magnitude, and duration of suitable smolt migration periods may increase the number of smolts that successfully reach the ocean and become steelhead.

The NMFS Recommended Action would substantially increase the number of "failed" smolt passage events, as defined in this EA, from 49 under baseline conditions to 77. The increase in "failed" smolt passage periods under the NMFS Recommended Action results from excluding the requirement that flows in the lower Sisquoc River be greater than or equal to 350-550 cfs for at least two previous days before initiating a release. Without at least two preceding consecutive days of flows greater than or equal to 350 cfs in the lower Sisquoc River before initiating a Supplemental Release, smolts may not

have enough time (or sufficient triggering flows) to reach the confluence and benefit from NMFS Recommended Supplemental Releases. The increase in "failed" smolt passage events under the NMFS Recommended Action may also increase the potential risk of smolt stranding compared to current baseline conditions without supplementation.

Over the modeled period, the NMFS Recommended Action would greatly increase the number of long-term smolt migration events lasting more than 12-consecutive days from 9 under baseline conditions to 30. These longer-term migration events may be especially important for smolt migration; however, there is currently a lack of scientific findings on the importance of very long-term passage events to steelhead populations (page 108, Stillwater 2012).

While the NMFS Recommended Action would substantially increase the frequency and duration of successful migration periods for steelhead and smolts, including longer duration events lasting longer than 12 consecutive days, it would also substantially increase the number of "failed" passage periods above baseline conditions. Increasing the number of "failed" passage periods may result in Supplemental Releases that do not provide the intended benefits for smolt migration and may also increase the potential risk for stranding of steelhead and smolts. In addition, there is also some potential for stranding when releases are ramped down. Due to the potential risk for stranding of steelhead and smolts, Reclamation has determined that the NMFS Recommended Action *May Adversely Affect* the Southern California Steelhead DPS and its Critical Habitat.

California Red-legged Frog The NMFS Recommended Action would extend the frequency, duration and magnitude of flows in the Santa Maria and Cuyama Rivers. Most of the releases under the NMFS Recommended Action would occur between January and March, which corresponds with the time when flows in this system are naturally elevated. Similar to the Proposed Action, California red-legged frogs are expected to move out of the flowing portions of the river and therefore are not expected to be adversely affected by these flows. The flows may wash away bullfrog tadpoles if any are present in the Cuyama or Santa Maria Rivers, which could indirectly benefit California red-legged frogs. Some of the longer duration Supplemental Releases under the NMFS Recommended Action may sustain backwater areas that could provide suitable breeding habitat for red-legged frogs. The NMFS Recommended Action May Affect, but is *Not Likely to Adversely Affect*, California red-legged frogs.

Tidewater goby and Critical Habitat The NMFS Recommended Action would extend flows and may increase the frequency and duration of sandbar breaching at the mouth of the Santa Maria River. Generally, these releases would be conducted during the wet

season, which is the natural time of year for sandbar breaching; however, the NMFS Recommended Action extends into June, which is a time when sandbar breaching could adversely affect tidewater gobies.

The NMFS Recommended Action is expected to increase the frequency and duration of sandbar breaching at the mouth of the Santa Maria River. Because the NMFS Recommended Action requires Supplemental Releases anytime flows in the lower Sisquoc River are greater than or equal to 150 cfs, releases under this action are more likely to breach the sandbar when it would not otherwise have been breached under baseline conditions. Infiltration losses between the confluence and the critical reach of the Santa Maria River are estimated to be approximately 350 cfs (Stillwater 2012); therefore, flows of less than 350 cfs at the Garey gage are not sufficient to make it past the critical reach of the Santa Maria River and breach the sandbar.

Under the NMFS Recommended Action, there will be times when a Supplemental Release is initiated and then terminated the next day due to flows in the Sisquoc River falling back below 150 cfs. The sandbar at the mouth of the Santa Maria River is expected to open less than one day after a Supplemental Release is initiated (if it has not already been breached by flows from Orcutt Creek), which would drain the estuary. There would be no additional freshwater inflow to the estuary from the Santa Maria River until flows in the Sisquoc River increase above 150 cfs again and another Supplemental Release is initiated. The sandbar would breach again within less a day of initiating another Supplemental Release.

Most releases (i.e., over 95%) under the NMFS Recommended Action would occur between December and April, which is compatible with the natural seasonality for sandbar breaching; however, the NMFS Recommended Action extends into June, which is a time when sandbar breaching could adversely affect tidewater gobies.

If flows greater than 150 cfs, but less than 350 cfs, occur in the lower Sisquoc River in May or June, the NMFS Recommended Action Supplemental Releases are expected to breach the sandbar. Breaching of the sandbar in late spring or summer can adversely affect tidewater gobies by stranding gobies or dewatering their breeding burrows. Because further freshwater inflow is naturally absent at this time, salinity levels in the estuary can become very elevated, which degrades habitat quality for tidewater gobies. Analysis of lower Sisquoc River flows measured at the Garey Gage shows that between 1962-2024 there was only one year with flows in the lower Sisquoc River greater than 150 cfs in the month of June; the year was 1998, which is the wettest year on record for the Santa Maria River.

While the NMFS Recommended Action is expected to increase breaching of the sandbar, almost all Supplemental Releases are expected to occur during the natural wet season. Modeling shows that releases in May and June would be very rare and would typically occur in very wet years in which the sandbar has already been breached for an extended amount of time. Based on this, Reclamation has determined that the NMFS Recommended Action May Affect, but is *Not Likely to Adversely Affect* tidewater goby and its designated critical habitat.

La Graciosa Thistle and Critical Habitat The NMFS recommended action would greatly increase the amount of surface flow passing through the estuary of the Santa Maria River. In the Action Area, La Graciosa thistle has only ever been observed growing along the lowermost portions of the Santa Maria River where the groundwater table is closer to the surface (Stillwater 2012; CNDDB 2024; USFWS 2024).

Most releases under the NMFS Recommended Action would occur in March, February, and January. This is consistent with the natural timing of elevated flows in the Action Area and may aid in germination of La Graciosa thistle along the Santa Maria River. The additional surface water may produce larger plants capable of producing more seeds (USFWS 2020).

Over the 62-year modeled period, the NMFS Recommended Action would release much more water from Twitchell Reservoir than the Stillwater Recommended Action (an almost fivefold increase) and the Proposed Action (an almost sevenfold increase), which would leave much less water available to recharge the groundwater basin. Declining groundwater levels are a primary threat to La Graciosa thistle, and most occurrences of this species (i.e., 19 of 23 occurrences) are located within the Santa Maria Valley Groundwater Basin (USFWS 2020). Some proportion of the water used for Supplemental Releases would flow out to the ocean instead of recharging the groundwater. Modeling from 1962- 2023 shows that under NMFS Recommended Action, zero to 36,534 AF would be used annually for Supplemental Releases. In years with at least one Supplemental Release, an average of 12,469 AF of water would be used for Supplemental Releases, which is equivalent to approximately 31.2% of the average annual storage in Twitchell Reservoir and the average annual yield of the Cuyama River (Page 89, Stillwater 2012). Twitchell Reservoir is operated to recharge the Santa Maria Valley groundwater basin. Groundwater levels may decline under the NMFS Recommended Action, due to reduced groundwater recharge, which could adversely affect La Graciosa thistle, especially in dry years when there are no Supplemental Releases.

The NMFS Recommended Action may benefit La Graciosa thistle via increased surface water during the wet season when Supplemental Releases are conducted; however, this

action also has the potential to adversely affect La Graciosa thistle plants and their designated critical habitat via reduced recharge of groundwater in the Santa Maria Valley groundwater basin. Because of this, NMFS Recommended Action *May Adversely Affect* La Graciosa thistle and its designated critical habitat.

Western Spadefoot Toad Under the NMFS Recommended Action, releases would occur primarily during the wet season. Flowing areas of the Cuyama and Santa Maria Rivers would not provide suitable breeding habitat for western spadefoot toads; however, the releases may help to support backwater areas or pools that could be used for breeding. Because the releases would occur during the wet season when flows are naturally elevated, the NMFS Recommended Action is not expected to have any adverse effects on western spadefoot toads. Reclamation has determined that the NMFS Recommended Action may affect but is *Not Likely to Adversely Affect* the western spadefoot toad.

Southwestern pond turtle Under the NMFS Recommended Action, releases would primarily occur during the wet season when flows are naturally elevated. Southwestern pond turtles occupying intermittent streams and rivers generally move into upland habitat or ponds above the high water line following the first storms of winter and spring (USFWS 2023a). Because the NMFS Recommended Action Supplemental Releases are generally aligned with the natural hydrology of the system, these releases are not expected to have any adverse effects on southwestern pond turtles. Reclamation has determined that the NMFS Recommended Action may affect but is *Not Likely to Adversely Affect* the southwestern pond turtle.

3.3 Water Resources

3.3.1 Affected Environment

Twitchell Dam and Reservoir

Twitchell Dam was constructed to capture and release storm flows from the Cuyama River to replenish groundwater levels in the Santa Maria Valley groundwater basin, and for flood control during rare high flow events. Generally, water is only stored in Twitchell Reservoir on a short-term basis. The operation of Twitchell Dam has not substantially altered the overall pattern of flows in the Santa Maria River in dry or very wet years; the hydrologic effects of the dam's operation occur primarily in intermediate water year types.

The operation of Twitchell Reservoir has continued to effectively conserve runoff for subsequent groundwater recharge (Luhdorff & Scalmanini 2023). However, sedimentation has greatly reduced the reservoir's effective storage capacity, filling what

was once considered the dead pool storage below the conservation pool. The drainage basin comprises an area of approximately 290,000 hectares (1,115 square miles) above Twitchell Dam, and lies along the southern boundary of San Luis Obispo County and the northern edge of Santa Barbara County (Figure 4). Twitchell's annual yield is approximately 32,000 AF per year (Luhdorff & Scalmanini 2023, Stillwater 2012). From 2012 to 2016, precipitation levels were notably below average, leading to minimal Twitchell Reservoir storage and releases, with Sisquoc River flows also falling well below average during this time. Although rainfall and Sisquoc River flows were above average in 2017 and 2019, the figures for 2020 through 2022 returned to below-average levels. Notably, there were no releases from Twitchell Reservoir in 2022.

Water Resources

According to the California Department of Water Resources (DWR), the Central Coast Hydrologic Region has historically been distinguished for having the highest ratio of groundwater usage in relation to total water use among all hydrologic regions in the state (DWR 2021). There are 60 groundwater basins within the Central Coast Hydrologic Region, 19 of which are required to have Groundwater Sustainability Plans (GSP) under the Sustainable Groundwater Management Act of 2014 (SGMA) due to being designated as medium and high priority basins. The Santa Maria River Valley groundwater basin (Basin) (DWR Basin Number 3-012.01) is located within the Central Coast Hydrologic Region.

The Basin has been designated as very low priority by DWR and, therefore, a GSP is not required. However, the Basin is an adjudicated groundwater basin (that is, legal proceedings have previously been conducted to define and establish the rights to extract groundwater from the Basin), with requirements implemented as part of a court-approved stipulation resulting from the Santa Maria Valley Groundwater Litigation (Lead Case No. 1-97-CV-770214) (Superior Court of California 2008). The court holds continuing jurisdiction over the Basin regarding the disposition of groundwater. The Basin was subdivided into three[5] management areas Santa Maria Valley Management Area (Management Area) was established as one of within the Basin, and is administered by the Twitchell Management Authority (TMA). Pursuant to requirements stipulated in the Basin's adjudication, as well as requirements of SGMA (see Water Code section 10720.8), the Twitchell Management Authority (TMA) submits annual reports on groundwater conditions within the Management Area.

The Cuyama River, with its principal tributaries Alamo Creek and the Huasna River, is the main source of water for the area. In late summer, the streams have little or no flow; in

[5] The others are the Nipomo Mesa Management Area and the Northern Cities Management Area.

winter the runoff occurs almost immediately after precipitation, owing to the absence of snowpack. The Sisquoc River, which joins the Cuyama river below Twitchell Reservoir at Fugler Point to form the Santa Maria River, drains an area of approximately 124,300 hectares (480 square miles) and is a large contributor of uncontrolled flows to the project area. As noted previously, the Santa Maria River and lower Sisquoc River are seasonally dry for about seven months each year.

Percolation of Santa Maria River flows, controlled in part by releases from Twitchell Dam, provides recharge for the Santa Maria Valley portion of the Basin (DWR 2002). Groundwater in the Basin area is Groundwater flow is generally westward toward the Pacific Ocean. Annual recharge from flow in the Santa Maria and Sisquoc Rivers is estimated to have been about 6,000 AF during 1978 through 1980 (Lipinski 1985). Groundwater levels beneath Santa Maria Valley generally declined during 1945 through 1977, with record low levels in the late 1960s. Groundwater levels recovered by about 1986, declined again until about 1992, recovered to near-historic high levels in 2002, and has been steadily declining since then, except for more rapid drops during drought years (DWR 2002, Santa Barbara County 2024). As of 2024, water levels are above spring 2022 levels measured prior to two consecutive above-average years of precipitation and are above historic lows.

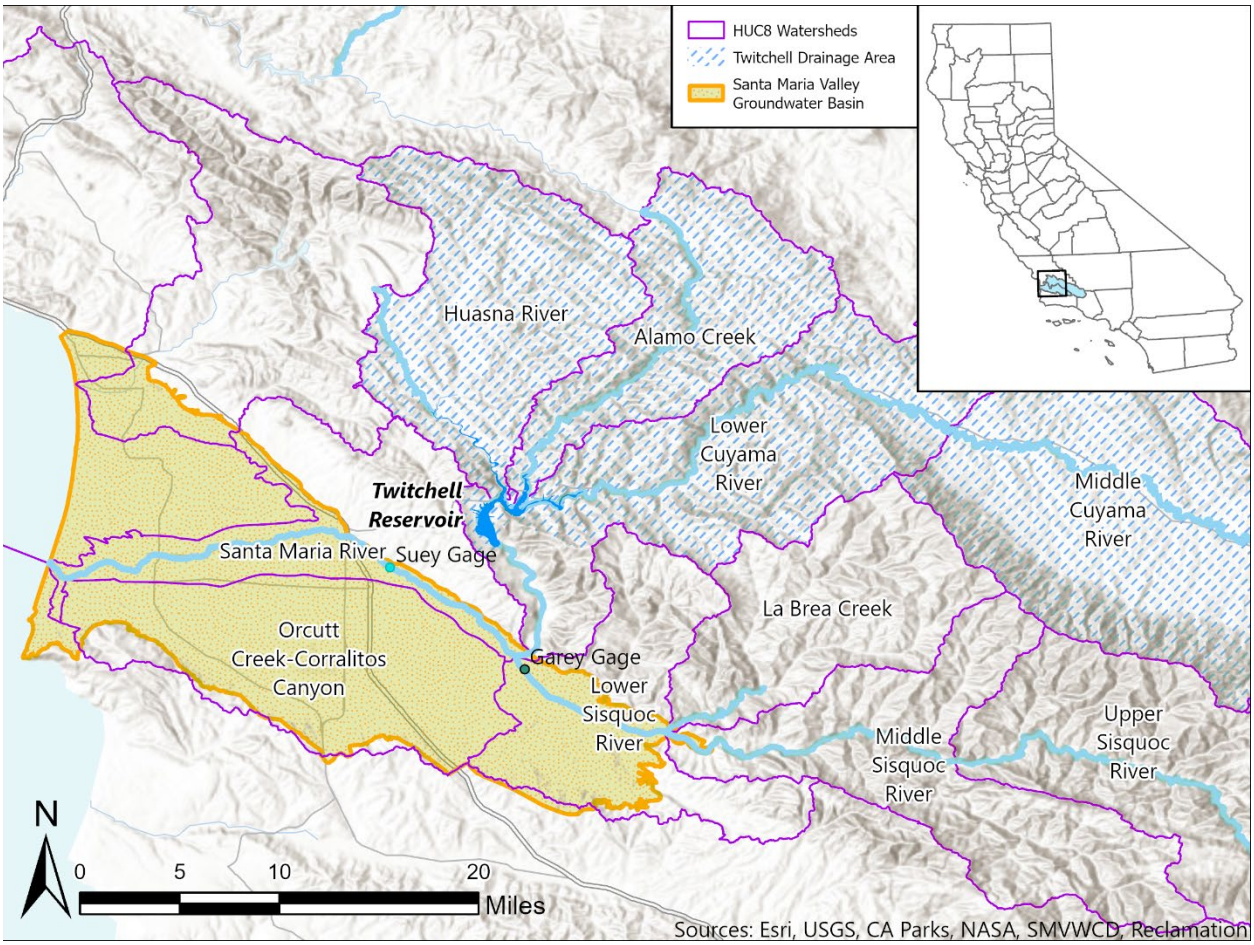

Figure 4. Proposed Action Area Hydrologic Features and Management Boundaries

The Management Area (Figure 4) includes approximately 206 square miles of the Basin's 265 square mile area, and is primarily comprised of native and built environment features, including agricultural areas and the urban areas of Santa Maria and Guadalupe, as well as other smaller developments (Luhdorff & Scalmanini 2024).

The definition of depth zones in the Basin's underlying aquifer, consisting of a shallow unconfined zone and a deep semi-confined zone, was developed for monitoring of the Management Area and based on historical and geological data. According to the 2023 Annual Report of Hydrogeologic Conditions, Water Requirements, Supplies, and Disposition, the total groundwater extractions from the adjudicated basin during Water Year 2023 was 101,255 AF, a decrease of 25,100 AF (19.8%) from Water Year 2022. (Luhdorff & Scalmanini 2024)., Supplemental recharge water was released from Twitchell Reservoir for basin recharge in 2017 (52,640 AF), 2018 (12,140 AF), and 2019 (46,190 AF). In 2023, 171,483 AF was released with 31,120 AF of this total from the flood control pool. The average annual release for the period 1967 through 2023 is 46,800 AF per year (Santa Barbara County 2024). In WY2024, 32,000 AF of water was captured, and 30,100

AF was slowly released from the conservation pool for groundwater recharge (Santa Barbara County 2024). Compared to the spring 2023 data, the spring 2024 data indicates that all wells within the shallow and deep aquifer have increased. The most substantial increases are within the Twitchell Recharge Area, where increases in water levels of over 100 feet were observed (Santa Barbara County 2024).

Water Quality

Groundwater quality data is collected as part of an ongoing Management Area Monitoring Program and is characterized in the annual reports submitted by the TMA. The Monitoring Program is currently undergoing revisions (Luhdorff & Scalmanini 2024). In general, groundwater quality is somewhat better and shows less variability in the deep aquifer zone than in the shallow zone. Historically, the Basin has been subject to high nitrate concentrations, particularly in the vicinity of the City of Santa Maria and in Guadalupe (SBCWA 1999; 2001; DWR 2002). High TDS, sulfate or chloride content impairs groundwater in some parts of the basin (DWR 2002). Nitrate concentrations have been elevated for the shallow aquifer zone (Luhdorff & Scalmanini 2024)

Agricultural Resources

Historically, water released from Twitchell Dam has been used to replenish the groundwater supplies from which the Santa Maria Water District customers pump their water supply. From this, the Santa Maria Project area's total water requirement, as it stood in the 1950's and upon which project planning was based, was 82,200 AF per year. Of that, approximately 60,000 AF filled irrigation needs, 6,500 AF filled municipal and industrial needs, and 4,900 AF was used to prevent sea water intrusion into the basin. By the 1990's, irrigation and municipal needs would skew these figures, increasing their demands drastically and causing a 15,000-30,000 AF annual overdraft. In 2022, approximately 108,090 AF of water supplies available in the Santa Maria Valley Management Area were devoted to agricultural uses (including 4,500 AF of drainage and 18,809 AF of return flows). Seventy-five percent of the supply in the Santa Maria Valley goes to irrigation, watering crops such as strawberries, alfalfa, and, more recently, grapes.

3.3.2 Environmental Consequences

No Action

Under current operations, releases from Twitchell Dam are made when there is little to no inflow from the Sisquoc River and the Santa Maria River would otherwise be dry. This has resulted in less surface water connection to the estuary (page ES-4, Stillwater 2012). Under the No Action Alternative, there would be no impacts to water supply or water quality, as the baseline conditions would be maintained.

Proposed Action

The Proposed Action is adapted from the Stillwater Report and targets the Critical Passage Reach in the Santa Maria River. For a period of up to 15 years, Supplemental releases would occur between December and May of each year, as described in Section 2.2. Once triggered, Supplemental Releases from Twitchell Dam of up to 400 cfs would be made to target a flow rate of approximately 600 cfs at the confluence of the Sisquoc and Cuyama Rivers. The 400 cfs rate was chosen as the maximum rate for Supplemental Releases from Twitchell Reservoir because releases above this rate flood properties downstream of the dam and adjacent to the river (pages 22-23, Stillwater 2012). The Twitchell Dam Pilot Project is intended to mimic the frequency, magnitude, and duration of passage opportunities available prior to the construction and operation of Twitchell Dam, as based on flow records from the Cuyama, Sisquoc, and Santa Maria Rivers from 1941-1961 (page ES-3, Stillwater 2012).

Modeling of proposed Supplemental Releases from 1962-2023 shows that a total of 29 Supplemental Releases would have been made over this 62-year period (Appendix A). Most of these releases would have occurred in February (44.4%) and January (25.9%). Supplemental Releases would be least common in May (0%) and December (7.4%). The duration of each Supplemental Release ranged from 1 to 10 days with the average Supplemental Release lasting about 4.9 days. The modeling shows that Supplemental Releases would have been made in 35.5% of years (i.e., 22 years) in the period from 1962-2023. The number of consecutive years without a Supplemental Release ranged from 0 to 5 years for this time period, with an average of 2.6 consecutive years between releases. Generally, the years without Supplemental Releases would have occurred during naturally dry periods.

Similar to current baseline conditions, Twitchell Reservoir would continue to experience large fluctuations in water elevation under the Proposed Action. The Supplemental Releases would occur between December and May once the criteria described in Section 2.2 have been met. The Proposed Action could increase the variability of water surface elevations in Twitchell Reservoir when Supplemental Releases are made and there is subsequent inflow to the lake (i.e., water elevation may decrease, increase, and decrease again). Conversely, the simultaneous inflow could reduce the magnitude of these fluctuations caused by Supplemental Releases. Approximately 76,987 AF of Supplemental Releases would have occurred for the model timeframe (1962-2023).

The amount of water used for Supplemental Releases would range from 0 to 8,000 AF per year. An average of 3,556 AF of water was released per year in years with at least one Supplemental Release. On average, approximately 24% of water released during Supplemental Releases would percolate into the groundwater aquifer. Thus, an average of 2,697 AF of water would be unavailable for recharge, during years when

Supplemental Releases occur, which is equivalent to approximately 5.7% of the average annual releases from Twitchell Reservoir and 2.7% of groundwater extractions from the basin in water year 2023. This water would only be unavailable during years when Supplemental Releases occur, approximately every 2.6 years over the 15-year Proposed Action.

Outside of the proposed Supplemental Releases, Twitchell Reservoir would be operated as it is under current baseline conditions to maximize groundwater recharge. Based on the release criteria, Supplemental Releases would generally be conducted in intermediate-type water years. Dry years, when recharge is critical, would not have sufficient flow to provide fish passage or trigger Supplemental Releases and very wet years would continue to provide passable flows in the Santa Maria River without contribution from Supplemental Releases (Stillwater 2012). With the Proposed Action, Twitchell Dam releases and inflows from the two tributaries are more likely to coincide. As the Santa Maria River generally only flows during these months and is dry the remainder of the time, impacts of the Proposed Action on water and agricultural resources would be minimal.

Stillwater Recommended Action

The Stillwater Recommended Action is similar to the Proposed Action and would therefore have similar effects on water resources to those described above for the Proposed Action. The Stillwater Recommended Action comes from recommendations in the *Santa Maria Instream Flow Study: Flow Recommendations for Steelhead Passage* prepared by Stillwater Sciences (Stillwater Report) in 2012, which targets the Critical Passage Reach in the Santa Maria River. Under the Stillwater Recommended Action, Supplemental releases would occur between December and April.

The Stillwater Recommended Action is intended to mimic the frequency, magnitude, and duration of passage opportunities available prior to the construction and operation of Twitchell Dam, as based on flow records from the Cuyama, Sisquoc, and Santa Maria Rivers from 1941-1961 (page ES-3, Stillwater 2012). With the Stillwater Recommended Action, Twitchell Dam releases and inflows from the two tributaries are more likely to coincide. As the Santa Maria River generally only flows during these months and is dry the remainder of the time, impacts of the Stillwater Recommended Action would be negligible. For all Supplemental Release scenarios, a portion of downstream flows is assumed to be going to recharge of the Santa Maria River groundwater basin.

There would be an approximately 45% increase in Supplemental Releases under the Stillwater Recommended Action due to the removal of the 13,000 AF inflow/storage requirement and the 12-consecutive day limit on Supplemental Releases (instead of the Proposed Action's 10-consectuive day limit). Because there is no storage or inflow

requirement, under the Stillwater Recommended Action some releases may be triggered when there is not enough water in Twitchell Reservoir to make a release without impacting groundwater replenishment later in the year. Approximately 109,387 AF of Supplemental Releases would have occurred under the Stillwater Recommended Action for the model timeframe (1962-2023).

Modeling for the 62-year period from 1962-2023 (Appendix A) shows that approximately 110,593 AF of Supplemental Releases would have occurred under the Stillwater Recommended Action. Of these Supplemental Releases, 10 of the 42 releases would have been triggered when there was less than 13,000 AF of inflow or stored water in Twitchell Reservoir (even more, 2 of those 10 would have occurred when *no water* was available in Twitchell Reservoir), meaning that there would be Supplemental Releases under the Stillwater Recommended Action that would have reduced storage in Twitchell Reservoir, potentially reducing the ability to provide releases to replenish groundwater later in the year. Because of these additional Supplemental Releases, impacts to water resources in the Action Area under the Stillwater Recommended Action would be greater than those of the Proposed Action.

NMFS Recommended Action

The NMFS Recommended Action would result in Supplemental Releases from Twitchell Dam, between December 1 and June 30, whenever flows in the Sisquoc River are greater than or equal to 150 cfs. A majority of releases under the NMFS Recommended Action would occur in January, February, and March, which aligns with the natural timing of higher flows in the Action Area. The NMFS Recommended Action would release a larger portion of water from Twitchell Reservoir (in some cases more than available inflow or storage) than the Stillwater Recommended Action and the Proposed Action, which would leave less water available to recharge the groundwater table. This would potentially increase the amount of surface flow reaching estuary of the Santa Maria River, reducing water available for groundwater recharge.

Modeling from 1962-2023 shows that under NMFS Recommended Action, zero to 36,534 AF would be used annually for Supplemental Releases. In years with at least one Supplemental Release, an average of 12,469 AF of water would be used for Supplemental Releases, which is equivalent to approximately 31.2% of the average annual storage in Twitchell Reservoir and the average annual yield of the Cuyama River (page 89, Stillwater 2012). Many of the Supplemental Releases called for under the NMFS Recommended Action would not be possible because of insufficient water supplies at Twitchell Reservoir to carry out the releases. For the model timeframe (1962-2023), a total of 536,173 AF of Supplemental Releases would have occurred under the NMFS Recommended Action. For all Supplemental Release scenarios, a portion of

downstream flows is assumed to be going to recharge of the Santa Maria River groundwater basin.

While some of the water used for these releases will percolate into the groundwater, much of the water released under the NMFS Recommended Action would flow out to the ocean instead of recharging groundwater. Groundwater pumping is the primary source of water in this area and is expected to continue with or without the Proposed Action. The large amount of water used for the NMFS Recommended Action may cause a decline in the groundwater table, adversely affecting the local and downstream groundwater users. Because of these additional Supplemental Releases, impacts to water resources in the Action Area under the NMFS Recommended Action would be much greater than those of the Proposed Action.

Section 4. Consultation and Coordination

4.1 Agencies and Persons Consulted

Reclamation coordinated with the Plaintiffs of the Stay Agreement, the Santa Maria Valley Water Conservation District, and the California Department of Fish and Wildlife in the preparation of this EA.

Reclamation consulted with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service in the preparation of this EA.

4.2 Public Involvement

Reclamation provided the public with an opportunity to comment on the Draft Environmental Assessment between October 29, 2024, and December 10, 2024. Twenty-three comment letters were received. Table 2 below presents commenters and associated agencies or groups that submitted comments on the Draft EA. Comment letters are available upon request.

Table 2. Comments Received on the Draft EA

Comment	Commenter(s)	Date Received
A	Coalition of Labor, Agriculture and Business of Santa Barbara and San Luis Obispo Counties (COLAB)	11/23/2024
B	Santa Barbara County Farm Bureau	11/26/2024
C	G Manni Ranch, LLC	12/02/2024

Comment	Commenter(s)	Date Received
D	California Giant Inc.	12/02/2024
E	Central West Produce (JDB Pro, Inc. dba)	12/02/2024
F	E. Apalategui	12/02/2024
G	Guadalupe Cooling Company (D. Vincent)	12/02/2024
H	DRAM Ag Consulting (D. Jelderks)	12/02/2024
I	D. Mehlschau	12/02/2024
J	Satellite Farms LLC (R. Sharer)	12/03/2024
K	Durant Harvesting ,Inc. and Destiny Farm, LLC (T. Durant)	12/03/2024
L	Valent BioSciences (S. Easterby)	12/03/2024
M	Bank of America, N.A. (as Trustee of the Eugene Rene Leroy Trust)	12/03/2024
N	Santa Barbara County Water Agency (via Santa Barbara County Executive Office)	12/03/2024 (dated 12/02/2024)
O	Driscoll's, Inc. (G. Blandino)	12/03/2024
P	Lakota Resources, LLP	12/03/2024
Q	Santa Maria Valley Water Conservation District, Golden State Water Company, and City of Santa Maria	12/04/2024
R	National Marine Fisheries Service	12/04/2024
S	Santa Barbara County Cattlemen's Association	12/04/2024
T	San Luis Obispo Coastkeeper and Los Padres ForestWatch (via Aqua Terra Aeris Law Group, Sycamore Law, and the Environmental Defense Center)	12/04/2024
U	California Department of Fish and Wildlife	12/04/2024
V	Grower-Shipper Association of Santa Barbara and San Luis Obispo Counties (via Somach Simmons & Dunn | Attorneys at Law)	12/04/2024
W	C. Pasquini	12/04/2024

Several of the comment letters included conclusory position statements about the Twitchell Pilot Project. None of these comments address the analysis in the EA, and as such, no responses to these statements are necessary. Substantive comments, many with similar themes, related to Reclamation's Proposed Action and analysis are summarized and addressed below.

4.2.1 Must Demonstrate the Presence of Endangered Southern California Steelhead (DPS) in the Project Area

Adjustments were made to Table 1 of the EA. Per 70 Federal Register 52488, 52508, NMFS considers Southern California Steelhead Distinct Population Segment (DPS) *Oncorhynchus mykiss* present in the Sisquoc River and its tributaries. Southern California Steelhead migrate into the middle and upper reaches of the Sisquoc River watershed, via the Santa Maria River, during high flow events. Additionally, designated critical habitat for Southern California Steelhead is present in the project area.

4.2.2 Reclamation Must Quantify the Impact of the Supplemental Releases on the Groundwater Aquifer and Agricultural Resources

See Section 3.3.2 of the EA. Reclamation has quantified the amount of water that would be unavailable for recharge during years when Supplemental Releases occur.

4.2.3 Supplemental Releases Would Increase the Potential for Flooding Downstream

Reclamation disagrees with the assertion that Supplemental Releases under the Proposed Action would increase the potential for damaging floods. Supplemental Releases are limited to a maximum release rate of 400 cfs and would target a combined flow rate of 600 cfs when added to natural flows from the Sisquoc River; this is expected to result in flows of approximately 250 cfs through the Santa Maria River. Supplemental Releases would not occur when Sisquoc River flows are greater than 600 cfs. The target flow rates for Supplemental Releases are magnitudes lower than release rates used during flood control releases (see graphs of baseline releases and Santa Maria River flows) and are not expected to result in flood damage to the Cuyama or Santa Maria Rivers. For comparison, during the recent floods in 2023 flows in the Santa Maria River (as measured at the USGS Suey Gage #11140585) reached a daily average of 14,800 cfs, and a maximum rate of well over 30,000 cfs.

4.2.4 Supplemental Releases Would Lead to Exacerbation of Drought Conditions

Reclamation disagrees with the assertion that Supplemental Releases under the Proposed Action would exacerbate drought conditions. Supplemental Releases under the Proposed Action have trigger conditions including inflow/storage levels in Twitchell Reservoir and flow requirements in the Sisquoc River. Supplemental Release triggers are unlikely to be met during dry years/drought conditions.

4.2.5 Supplemental Releases Would Significantly Alter the Availability of Groundwater

Reclamation disagrees with the assertion that Supplemental Releases under the Proposed Action would significantly alter the availability of groundwater. See Section 3.3.2 of this EA. Reclamation has quantified the amount of water that would be unavailable for recharge during years when Supplemental Releases occur.

4.2.6 Historical and Legal Background associated with the creation and operation of Twitchell Dam Should be Discussed When Formulating Alternative and Determining Feasibility of Making Supplemental Releases

Reclamation has discretion to operate Twitchell Dam for "other purposes" that potentially include adjusting discharges in support of migration and reproduction of steelhead. Reclamation has formulated the Proposed Action as a demonstration project

in efforts to comply with the requirements of the Stay Agreement and the District Court Order, as described in Section 1 of the EA.

4.2.7 Ramp Down Following a Supplemental Release Should be Calculated and Included

The amount of water used for ramp-down varies and is dependent on the amount of water being released from the dam when Supplemental Releases end and ramp-down begins. If ramp-down begins while the dam is releasing 400cfs (maximum release allowed), than the ramp-down process would use approximately 1,200 acre-feet. Ramp-downs beginning at a release of less than 400 cfs would use less water.

4.2.8 Changes Should Be Made to the Proposed and Alternative Actions

Reclamation is not making changes to the Proposed or Alternative Actions. The purpose of the Proposed Action is to comply with the Stay Agreement.

4.3 Endangered Species Act (16 U.S.C. § 1531 et seq.)

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

On July 12, 2024, Reclamation requested to initiate formal consultation with the National Marine Fisheries Service for potential effects to the Southern California Steelhead DPS and its designated critical habitat. *Formal consultation is ongoing*.

On November 6, 2024, Reclamation requested concurrence from the U.S. Fish and Wildlife Service with the determination that the Proposed Action is *Not Likely to Adversely Affect* the California red-legged frog, tidewater goby and its designated critical habitat, La Graciosa thistle and its designated critical habitat, the western spadefoot toad, and the southwestern pond turtle. *Consultation is ongoing*.

Reclamation will not make a determination until consultations have concluded.

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Appendix A. Twitchell Pilot Project Hydrologic Modeling

1.Twitchell Pilot Project Hydrologic Modeling

Three scenarios for supplementing flows in the Santa Maria River to aid steelhead migration through the Sisquoc River were modeled for the period from 1962-2023 (a total of 62 years). The Supplemental Release scenarios that were modeled are:

- The Bureau of Reclamation's Proposed Action for the Twitchell Pilot Project (Pilot Project);
- The recommended action in the Santa Maria Instream Flow Study: Flow Recommendations for Steelhead Passage prepared by Stillwater Sciences in 2012; and
- The criteria recommended by NMFS in the technical assistance letter dated June 14, 2024.

The descriptions of criteria for each Supplemental Release scenario are summarized in Table 1 on the following page.

1. Assumptions used in the Modeling

The following assumptions were used in the hydrologic modeling of the three Supplemental Release scenarios and for the modeling of baseline conditions without Supplemental Releases from Twitchell Reservoir:

- Without supplementation from Twitchell releases, Sisquoc River flows of 600 cfs or greater (measured at the USGS Garey Gage) provide flows suitable for natural steelhead (and smolt) passage through the critical reach of Santa Maria River (i.e., 250 cfs).
- The modeling does not account for the operational release capabilities of Twitchell Dam. The smallest increment that Twitchell Dam releases can be adjusted by is approximately 25 cfs (depending on the amount of water in the reservoir).
- Modeling of baseline conditions only considers Sisquoc River flows measured at the USGS Garey Gage and does not include historical releases from Twitchell Dam.
- The Stillwater and NMFS actions do not include storage or inflow criteria for releases. The modeling assumes that enough water in storage would be available to carry out the modeled releases; however, this would not always be

true and there are instances where there would not have been enough stored water available to make these releases when triggered, especially earlier in the season supplementation season.

- The modeling is only for the Supplemental Releases and does not include water needed to conduct ramp down.
- Steelhead require 3-continuous days or more of 250 cfs in the critical reach of the Santa Maria River for successful upstream migration (page ES-5, Stillwater 2012).
- Smolt require 1-day or more of 150 cfs in the critical reach of the Santa Maria River, preceded by at least two consecutive days of Sisquoc River flows greater than 350 cfs to cue downstream migration and reach the confluence, for successful downstream passage (page ES-5 and page 92, Stillwater 2012).

Table 1. Summary of Supplemental Release Criteria for the Three Supplementation Scenarios

Reclamation's Proposed Action	**Stillwater Recommended Criteria**	**NMFS Recommended Criteria**
December 1 – May 31 *Initiate Flows when:* Twitchell Reservoir storage or inflow ≥ 13,000 AF	December 1 – April 30 *Initiate Flows when:* (No inflow or storage criteria)	December 1 – June 30 *Initiate Flows when:* (No inflow or storage criteria)
Sisquoc River daily average flow measured at the Garey Gage is 350-550 cfs and has remained at or above this level for at least two previous days	Sisquoc River daily average flow measured at the Garey Gage is 350-550 cfs and has remained at or above this level for at least two previous days	Sisquoc River daily average flow measured at the Garey Gage is ≥ 150 cfs
Releases from Twitchell up to a maximum release rate of 400 cfs	No maximum release rate specified for Twitchell releases. The maximum release was assumed to be about 450 cfs based on: the 250 cfs flow target in the critical reach, 350 cfs estimated channel losses between the confluence and critical reach, and the end of releases at Sisquoc flows of < 150cfs (i.e., 150cfs Sisqouc + 450cfs Twitchell=600cfs @ confluence-350 cfs channel losses =250 cfs at the critical reach).	No maximum release rate specified for Twitchell releases; however, the maximum release is assumed to be about 450 cfs based on: the 250 cfs flow target in the critical reach, 350 cfs estimated channel losses between the confluence and critical reach, and the end of releases at Sisquoc flows of < 150cfs (i.e., 150cfs Sisqouc + 450cfs Twitchell=600cfs @ confluence-350 cfs channel losses =250 cfs at the critical reach).
Maintain 250 cfs in the Santa Maria River mainstem (assumed to be achieved when Sisquoc flows plus Twitchell releases are about >= 600 cfs). Discrete wading measurements	Maintain 250 cfs in the Santa Maria River mainstem (assumed to be achieved when Sisquoc flows plus Twitchell releases are	Maintain 250 cfs daily average flow as measured in the Santa Maria River critical reach. "*The specific location of the Santa Maria River critical reach measurement point of*

Reclamation's Proposed Action	Stillwater Recommended Criteria	NMFS Recommended Criteria
will likely be performed by others (.e.g, USGS) in the Santa Maria River near the Highway 1 Bridge, when conditions are safe, to ensure that 250 cfs is achieved in the critical passage reach of the Santa Maria River.	about >= 600 cfs). Field monitoring of Supplemental Releases is recommended.	*compliance is to be determined. The 2012 Stillwater study recommended evaluation at the Bonita School Road crossing is likely to be representative*." (Note, the County of Santa Barbara determined that the Bonita School Road crossing is not suitable for spot measurements or a gage.)
Stop releases when: Sisquoc flows are < 150 cfs *or* 10 consecutive days of approximately 600 cfs at the confluence have been achieved *or* 8,000 AF of Supplemental Releases have been made in a December - May period.	*Stop releases when:* Sisquoc flows are < 150 cfs *or* 12 consecutive days of steelhead passable conditions have been achieved	*Stop releases when:* Sisquoc flows are < 150 cfs
Ramp Down releases in two 50 cfs cuts per day down to 100 cfs, and then one final cut from 100 cfs to zero.	No ramping considered.	Ramp Down releases to match the natural rate of river recession in the Sisquoc River.

Table 2. Summary of Supplemental Releases under each Supplementation Scenario for Water Years 1962-2023

	Reclamation's Proposed Action			**Stillwater Recommended Action**			**NMFS Recommended Action**		
	Days of Supplemental Release	***Number of Supplemental Releases***	***Water Released[1] (AF)***	***Days of Supplemental Release***	***Number of Supplemental Releases***	***Water Released (AF)[1]***	***Days of Supplemental Release***	***Number of Supplemental Releases***	***Water Released[1] (AF)***
TOTAL	140	29	78,239	200	44	111,693	912	203	541,248
Average Annual Supplementation (all years)	2	0	1,262	3	1	1,802	15	3	8,730
Average Annual Supplementation (excluding non-supplementation years)	6	1	3,556	8	2	4,654	21	5	12,587
Range of Annual Supplementation (excluding non-supplementation years)	2 – 15	1 - 4	1,009 - 8,000	2 - 18	1 - 4	959 - 10,322	1 - 77	1 - 11	622 - 36,559

[1] The total released in AF does include water needed to conduct ramp down which is approximate at 25 AF per Supplemental Release Event .

Table 3a. Summary Comparison of Smolt Passage Events under the Three Supplementation Scenarios and Baseline Conditions without Supplementation for Water Years 1962-2023

	Baseline Conditions (without Supplemental Release)	**Reclamation's Proposed Action**	**Stillwater Recommended Action**	**NMFS Recommended Action**
Total Smolt Passage Days (i.e. flow at confluence ≥ 500 cfs)	596	724	772	1,407
"Corrected"[1] Total Passage Days	596	724	748	1,124
Total Successful[2] Smolt Passage Periods	53	55	55	61
Average Number of Days in each Successful Smolt Passage Period	9	12	13	20
Number of "Failed"[3] Smolt Passage Periods	49	41	38	77
Ratio of Successful/Failed Passage Periods	1.08	1.34	1.45	0.79
Number of Smolt Passage Periods > 7 Consecutive Days	21	34	36	42
Number of Long Duration Smolt Passage Events (> 12 Days)	9	14	17	30

[1] Corrected total passage days removes passage days created by Supplemental Releases that would not be possible due to insufficient inflow or storage in Twitchell Reservoir (i.e. < 13,000 AF) or supplemented passage days included in failed smolt passage periods.
[2] A successful smolt passage period is defined as 1-day or more of 150 cfs in the critical reach of the Santa Maria River (assumed to be achieved at flows of ≥ 500 cfs at the confluence), preceded by at least two previous consecutive days of Sisquoc River flows > 350 cfs.
[3] A failed smolt passage period is a period with at least one day of smolt passable flow (i.e., ≥ 500 cfs at the confluence) that does not meet the criteria described above for a successful smolt passage period.

Table 3b. Summary Comparison of Steelhead Passage Events under the Three Supplementation Scenarios and Baseline Conditions without Supplementation for Water Years 1962-2023

	Baseline Conditions (without Supplement)	**Reclamation Proposed Action**	**Stillwater Recommended Action**	**NMFS Recommended Action**
Total Steelhead Passage Days (i.e. flow at confluence ≥ 600 cfs)	492	617	686	1,400
"Corrected"[1] Total Passage Days	492	617	662	1,203
Total Successful[2] Steelhead Passage Periods	54	61	62	80
Average Number of Days in each successful A Steelhead Passage Period	8	9	11	17
Number of "Failed"[3] Steelhead Passage Periods	47	41	37	61
Ratio of Successful/Failed Passage Periods	1.15	1.49	1.68	1.31
Number of Steelhead Passage Periods > 7 Consecutive Days	13	31	35	42
Number of Long Duration Steelhead Passage Events (> 12 Days)	8	10	11	29

[1] Corrected total passage days removes passage days created by Supplemental Releases that would not be possible due to insufficient inflow or storage in Twitchell Reservoir (i.e. < 13,000 AF) or supplemented passage days included in failed steelhead passage periods.
[2] A successful steelhead passage period is defined as 3-continuous days or more of 250 cfs in the critical reach of the Santa Maria River (assumed to be achieved when flows at the confluence are ≥ 600 cfs).
[3] A failed steelhead passage period is a period with at least one day of steelhead passable flow (i.e., ≥ 600 cfs at the confluence) that does not meet the criteria described above for a successful steelhead passage period.

Table 4a. Summary of Modeled Supplemental Releases under Reclamation's Proposed Action for Water Years 1962-2023

Year	First Date of Supplemental Release	Last Date of Supplemental Release	Amount Released (AF)	Days of Supplemental Release
1962	2/21/1962	2/26/1962	3,792	6
1967	12/8/1966	12/10/1966	1,785	3
1967	1/26/1967	2/1/1967	5,217	7
1967	4/13/1967	4/17/1967	1,279	5
1969	1/31/1969	2/2/1969	1,765	3
1973	2/14/1973	2/16/1973	1,833	3
1978	2/17/1978	2/18/1978	984	2
1979	2/23/1979	2/26/1979	2,622	4
1979	4/1/1979	4/6/1979	3,463	6
1983	1/26/1983	1/26/1983	323	1
1983	2/2/1983	2/6/1983	2,412	5
1983	2/12/1983	2/12/1983	186	1
1983	2/14/1983	2/21/1983	3,981	8
1986	3/18/1986	3/22/1986	3,223	5
1991	3/30/1991	4/3/1991	2,341	5
1992	2/18/1992	2/24/1992	3,907	7
1993	1/20/1993	1/22/1993	1,732	3
1995	1/31/1995	2/2/1995	1,012	3
1996	2/24/1996	2/29/1996	3,130	6
1997	1/5/1997	1/8/1997	2,809	4
1997	1/17/1997	1/22/1997	3,404	6
2001	3/11/2001	3/14/2001	1,793	4
2005	1/15/2005	1/18/2005	2,019	4
2006	4/11/2006	4/13/2006	1,918	4
2008	2/5/2008	2/13/2008	6,482	9
2011	12/25/2010	12/28/2010	1,694	4
2017	2/9/2017	2/16/2017	3,832	8
2019	2/18/2019	2/23/2019	3,475	6
2023	1/19/2023	1/28/2023	5,629	10

Table 4b. Summary of Modeled Supplemental Releases for the Stillwater Recommended Action for Water Years 1962-2023

Year	First Date of Supplemental Release	Last Date of Supplemental Release	Amount Released (AF)	Days of Supplemental Release
1962	2/21/1962	2/26/1962	3,836	6
1966	12/31/1965	1/1/1966	1,012	2*†
1967	12/8/1966	12/10/1966	1,884	3
1967	1/26/1967	2/1/1967	5,375	7
1967	4/13/1967	4/17/1967	1,279	5
1969	1/23/1969	1/23/1969	438	1*
1969	1/31/1969	1/31/1969	496	1
1973	2/14/1973	2/16/1973	1,847	3
1978	2/17/1978	2/20/1978	2,515	4
1979	2/23/1979	2/26/1979	1,038	4
1979	4/1/1979	4/8/1979	5,248	8
1980	1/14/1980	1/15/1980	817	2*
1980	2/27/1980	2/29/1980	1,676	3
1980	3/12/1980	3/22/1980	7,234	11
1983	1/26/1983	1/26/1983	323	1
1983	2/2/1983	2/6/1983	2,412	5
1983	2/12/1983	2/12/1983	186	1
1983	2/14/1983	2/23/1983	5,655	10
1986	2/18/1986	2/18/1986	333	1*
1986	2/20/1986	2/21/1986	1,012	2*
1986	3/18/1986	3/22/1986	3,251	5
1991	3/30/1991	4/5/1991	3,999	7
1992	2/18/1992	2/26/1992	5,474	9
1993	1/20/1993	1/22/1993	1,783	3
1993	2/11/1993	2/13/1993	349	3
1995	1/13/1995	1/14/1995	1,140	2*
1995	1/31/1995	2/4/1995	2,420	5
1996	2/24/1996	3/2/1996	4,506	8
1997	1/5/1997	1/8/1997	2,920	4
1997	1/17/1997	1/22/1997	3,404	6
2001	3/11/2001	3/16/2001	3180	6
2005	1/2/2005	1/2/2005	204	1*†
2005	1/4/2005	1/5/2005	1,347	2*

Year	First Date of Supplemental Release	Last Date of Supplemental Release	Amount Released (AF)	Days of Supplemental Release
2005	1/15/2005	1/20/2005	3,493	6
2006	4/11/2006	4/15/2006	2,339	5
2008	1/30/2008	2/3/2008	2,799	5*
2008	2/5/2008	2/6/2008	994	2
2011	12/25/2010	12/29/2010	1,999	5
2017	2/9/2017	2/16/2017	3,866	8
2019	2/7/2019	2/12/2019	4,264	6*
2019	2/18/2019	2/25/2019	5,238	8
2023	1/19/2023	1/28/2023	5,802	10

* Insufficient water supplies available in Twitchell Reservoir under the Proposed Action (less than 13,000 AF) to make Supplemental Releases.

† Supplemental Releases that would be triggered with *no water* stored in Twitchell Reservoir.

Table 4c: Summary of Modeled Supplemental Releases under the NMFS Recommended Criteria 1962-2023

Year	First Date of Supplemental Release	Last Date of Supplemental Release	Amount Released (AF)	Days of Supplemental Release
1962	2/8/1962	2/8/1962	831	1*
1962	2/14/1962	2/18/1962	2,555	5*
1962	2/21/1962	2/26/1962	3,836	6
1962	3/7/1962	3/9/1962	2,456	3
1965	4/10/1965	4/11/1965	1,101	2*
1966	12/31/1965	1/1/1966	1,012	2*†
1966	2/5/1966	2/6/1966	1,726	2*†
1967	12/3/1966	12/3/1966	248	1*
1967	12/5/1966	12/5/1966	397	1*
1967	12/8/1966	12/10/1966	1,884	3
1967	1/22/1967	1/22/1967	893	1
1967	1/25/1967	2/1/1967	5,574	8
1967	3/13/1967	3/20/1967	4,741	8
1967	4/4/1967	4/10/1967	4,302	7
1967	4/12/1967	4/17/1967	1,351	6
1967	4/29/1967	5/19/1967	13,549	21
1969	1/19/1969	1/19/1969	415	1*
1969	1/23/1969	1/23/1969	438	1
1969	1/31/1969	2/5/1969	3,471	6
1969	2/14/1969	2/15/1969	305	2
1969	2/17/1969	2/17/1969	365	1
1969	3/13/1969	4/5/1969	9,346	24
1969	4/7/1969	4/26/1969	13,777	20
1969	5/11/1969	5/11/1969	871	1
1970	3/2/1970	3/7/1970	4,062	6
1971	12/21/1970	12/22/1970	1,279	2*†
1972	12/27/1971	12/27/1971	597	1*
1973	1/17/1973	1/18/1973	752	2*
1973	1/20/1973	1/22/1973	2,374	3*†
1973	2/5/1973	2/6/1973	1,444	2*†
1973	2/8/1973	2/8/1973	700	1*†
1973	2/10/1973	2/10/1973	631	1*†
1973	2/14/1973	2/16/1973	1,847	3

Year	First Date of Supplemental Release	Last Date of Supplemental Release	Amount Released (AF)	Days of Supplemental Release
1973	2/28/1973	3/4/1973	3,318	5
1973	3/7/1973	3/9/1973	2,581	3
1973	3/11/1973	3/12/1973	1,698	2
1973	3/20/1973	3/30/1973	8,162	11
1974	1/8/1974	1/8/1974	700	1*†
1974	4/2/1974	4/2/1974	766	1
1975	3/7/1975	3/7/1975	145	1
1975	3/9/1975	3/11/1975	2,315	3
1978	12/29/1977	12/29/1977	841	1*
1978	1/11/1978	1/11/1978	817	1*
1978	1/16/1978	1/16/1978	694	1*†
1978	1/18/1978	1/20/1978	2,436	3*†
1978	2/8/1978	2/8/1978	538	1*†
1978	2/17/1978	2/23/1978	5,078	7
1978	3/1/1978	3/2/1978	1,142	2
1978	3/10/1978	3/26/1978	8,077	17
1978	3/31/1978	3/31/1978	778	1
1978	4/7/1978	4/7/1978	883	1
1978	4/16/1978	4/19/1978	3,231	4
1979	2/14/1979	2/15/1979	895	2
1979	2/21/1979	2/26/1979	3,358	6
1979	3/27/1979	3/27/1979	276	1
1979	4/1/1979	4/8/1979	5,248	8
1980	1/12/1980	1/15/1980	1,478	4*
1980	2/27/1980	2/29/1980	1,676	3
1980	3/2/1980	3/2/1980	891	1
1980	3/11/1980	3/22/1980	7,311	12
1981	3/2/1981	3/3/1981	1,666	2*
1981	3/5/1981	3/6/1981	1,154	2*
1981	3/20/1981	3/20/1981	676	1*†
1981	3/22/1981	3/23/1981	1,605	2*†
1982	3/17/1982	3/19/1982	1,991	3*
1982	4/2/1982	4/5/1982	2,140	4
1982	4/13/1982	4/16/1982	2,626	4

Year	First Date of Supplemental Release	Last Date of Supplemental Release	Amount Released (AF)	Days of Supplemental Release
1983	12/1/1982	12/1/1982	270	1*†
1983	12/22/1982	12/22/1982	436	1*†
1983	12/24/1982	12/24/1982	849	1*†
1983	1/22/1983	1/22/1983	865	1*†
1983	1/26/1983	1/26/1983	323	1
1983	2/1/1983	2/6/1983	2,414	6
1983	2/11/1983	2/12/1983	206	2
1983	2/14/1983	2/26/1983	7,494	13
1983	3/15/1983	3/17/1983	179	3
1983	3/31/1983	4/17/1983	3,497	18
1983	4/23/1983	5/22/1983	18,480	30
1984	12/26/1983	12/27/1983	1,144	2
1986	2/13/1986	2/14/1986	986	2*
1986	2/18/1986	2/18/1986	333	1*†
1986	2/20/1986	2/21/1986	1,012	2
1986	3/10/1986	3/15/1986	3,838	6*
1986	3/17/1986	3/22/1986	3,330	6
1991	3/1/1991	3/2/1991	1,408	2*
1991	3/5/1991	3/5/1991	651	1*
1991	3/23/1991	3/24/1991	60	2
1991	3/30/1991	4/7/1991	5,764	9
1992	1/5/1992	1/6/1992	1,428	2*
1992	2/14/1992	2/14/1992	686	1*
1992	2/18/1992	2/26/1992	5,474	9
1992	3/6/1992	3/7/1992	1,513	2
1992	3/23/1992	4/1/1992	6,912	10
1993	1/7/1993	1/7/1993	20	1*
1993	1/9/1993	1/9/1993	825	1*
1993	1/20/1993	1/22/1993	1,783	3
1993	2/10/1993	2/13/1993	355	4
1993	3/9/1993	3/21/1993	8,329	13
1993	3/24/1993	3/24/1993	420	1
1993	3/31/1993	4/22/1993	12,922	23
1994	2/8/1994	2/8/1994	768	1*†

Year	First Date of Supplemental Release	Last Date of Supplemental Release	Amount Released (AF)	Days of Supplemental Release
1994	2/20/1994	2/20/1994	613	1*†
1995	1/5/1995	1/5/1995	496	1*
1995	1/9/1995	1/9/1995	32	1*
1995	1/13/1995	1/14/1995	1,140	2*†
1995	1/16/1995	1/19/1995	2,356	4*†
1995	1/31/1995	2/14/1995	9,441	15
1995	2/18/1995	2/24/1995	4,423	7
1995	3/9/1995	3/9/1995	121	1
1995	4/2/1995	4/21/1995	11,724	20
1995	5/16/1995	5/16/1995	891	1
1996	2/24/1996	3/12/1996	11,264	18
1996	3/14/1996	3/20/1996	4,441	7
1997	12/11/1996	12/11/1996	147	1*†
1997	12/13/1996	12/13/1996	889	1
1997	12/22/1996	12/23/1996	1,242	2*†
1997	1/5/1997	1/8/1997	2,920	4
1997	1/13/1997	1/13/1997	889	1
1997	1/15/1997	1/15/1997	353	1
1997	1/17/1997	1/22/1997	3,404	6
1997	1/30/1997	2/8/1997	6,305	10
1998	12/6/1997	12/6/1997	734	1*†
1998	1/10/1998	1/11/1998	1,428	2*†
1998	1/16/1998	1/17/1998	1,728	2*†
1998	1/19/1998	1/20/1998	1,749	2*†
1998	3/9/1998	3/24/1998	4,939	16
1998	4/17/1998	5/5/1998	7,904	19
1998	5/7/1998	5/12/1998	2,918	6
1998	5/16/1998	6/10/1998	15,134	26
2000	2/21/2000	2/22/2000	573	2*
2000	2/25/2000	2/25/2000	746	1*†
2000	2/27/2000	2/29/2000	2,065	3*†
2000	3/6/2000	3/12/2000	4,937	7*†
2000	4/17/2000	4/17/2000	752	1*†
2000	4/19/2000	4/19/2000	633	1*†

Year	First Date of Supplemental Release	Last Date of Supplemental Release	Amount Released (AF)	Days of Supplemental Release
2001	2/13/2001	2/14/2001	1,745	2*
2001	2/27/2001	2/28/2001	1,694	2*
2001	3/4/2001	3/4/2001	637	1
2001	3/11/2001	3/24/2001	9,439	14
2001	4/8/2001	4/8/2001	879	1
2003	3/15/2003	3/16/2003	962	2*
2003	5/4/2003	5/6/2003	1,928	3*
2005	12/28/2004	12/28/2004	785	1*
2005	1/1/2005	1/2/2005	442	2*
2005	1/4/2005	1/5/2005	1,347	2*†
2005	1/7/2005	1/8/2005	920	2*†
2005	1/15/2005	1/24/2005	6,849	10
2005	2/19/2005	2/19/2005	103	1
2005	2/27/2005	3/15/2005	9,763	17
2005	3/19/2005	3/20/2005	1,732	2
2005	3/22/2005	3/22/2005	795	1
2005	3/24/2005	3/31/2005	5,399	8
2005	5/6/2005	5/6/2005	760	1
2006	2/28/2006	2/28/2006	278	1*†
2006	3/4/2006	3/4/2006	887	1*†
2006	3/7/2006	3/7/2006	748	1*†
2006	3/29/2006	4/3/2006	3,697	6
2006	4/11/2006	4/22/2006	8,001	12
2008	1/6/2008	1/7/2008	1,248	2*
2008	1/24/2008	1/24/2008	292	1*†
2008	1/30/2008	2/3/2008	2,799	5
2008	2/5/2008	2/14/2008	7,672	10
2008	2/23/2008	2/27/2008	3,396	5
2009	2/17/2009	2/17/2009	651	1*†
2009	2/24/2009	2/24/2009	827	1*†
2010	12/13/2009	12/13/2009	242	1*
2010	1/18/2010	1/18/2010	135	1*
2010	1/23/2010	1/27/2010	3,193	5*†
2010	2/7/2010	2/10/2010	3,114	4*†

Year	First Date of Supplemental Release	Last Date of Supplemental Release	Amount Released (AF)	Days of Supplemental Release
2010	3/1/2010	3/7/2010	5,492	7*†
2010	4/5/2010	4/5/2010	879	1
2010	4/12/2010	4/12/2010	171	1
2011	12/18/2010	12/18/2010	670	1*†
2011	12/25/2010	12/29/2010	1,999	5
2011	12/31/2010	1/10/2011	7,708	11
2011	2/19/2011	2/20/2011	1,109	2
2011	2/27/2011	3/1/2011	2,055	3
2011	3/3/2011	3/5/2011	2,412	3
2011	3/7/2011	3/7/2011	887	1
2011	4/1/2011	4/13/2011	7,738	13
2012	4/13/2012	4/14/2012	1,008	2*†
2014	3/2/2014	3/2/2014	785	1*†
2017	1/9/2017	1/9/2017	607	1*
2017	1/11/2017	1/11/2017	754	1*
2017	1/20/2017	1/22/2017	1,494	3*
2017	1/24/2017	1/25/2017	827	2*
2017	2/4/2017	2/4/2017	781	1
2017	2/6/2017	2/6/2017	75	1
2017	2/9/2017	2/16/2017	3,866	8
2017	2/23/2017	3/1/2017	4,522	7
2018	3/22/2018	3/23/2018	988	2*†
2019	1/18/2019	1/18/2019	643	1*
2019	2/2/2019	2/2/2019	161	1*
2019	2/7/2019	2/12/2019	4,264	6
2019	2/18/2019	3/1/2019	8,602	12
2019	3/4/2019	3/5/2019	712	2
2019	3/10/2019	3/22/2019	8,586	13
2020	3/17/2020	3/17/2020	760	1
2020	4/7/2020	4/13/2020	4,479	7
2023	1/1/2023	1/1/2023	534	1*
2023	1/7/2023	1/7/2023	809	1*†
2023	1/12/2023	1/12/2023	20	1
2023	1/18/2023	1/28/2023	5,818	11

Note: * Insufficient water supplies available in Twitchell Reservoir under the Proposed Action (less than 13,000 AF) to make Supplemental Releases.
† Supplemental Releases that would be triggered with *no water* stored in Twitchell Reservoir.

Table 5: Annual Comparison of Estimated Water Use for the Three Supplemental Release Scenarios 1962 - 2023

	Reclamation's Proposed Action			Stillwater Recommended Action[1]			NMFS Recommended Action[1]		
Year	***Days of Supplemental Release***	***Number of Supplemental Releases***	***Total Water Released[2, 3] (AF)***	***Days of Supplemental Release***	***Number of Supplemental Releases***	***Total Water Released (AF)***	***Days of Supplemental Release***	***Number of Supplemental Releases***	***Total Water Released[2, 3] (AF)***
1962	6	1	3,792	6	1	3,836	15	4	9,677
1963	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	2	1	1,101
1966	0	0	0	2	1	1,012	4	2	2,737
1967	15	3	8,000	15	3	8,539	56	9	32,938
1968	0	0	0	0	0	0	0	0	0
1969	3	1	1,765	2	2	934	56	8	28,988
1970	0	0	0	0	0	0	6	1	4,062
1971	0	0	0	0	0	0	2	1	1,279
1972	0	0	0	0	0	0	1	1	597
1973	3	1	1,833	3	1	1,847	33	10	23,506
1974	0	0		0	0	0	2	2	1,466
1975	0	0	0	0	0	0	4	2	2,460
1976	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0
1978	2	1	984	4	1	2,515	39	11	24,514
1979	10	2	6,085	12	2	6,286	17	4	9,777
1980	0	0	0	16	3	9,727	20	4	11,338
1981	0	0	0	0	0	0	7	4	5,101
1982	0	0	0	0	0	0	11	3	6,758
1983	15	4	6,902	17	4	8,577	77	11	35,012
1984	0	0	0	0	0	0	2	1	1,144
1985	0	0	0	0	0	0	0	0	0
1986	5	1	3,223	8	3	4,596	17	5	9,499

	Reclamation's Proposed Action			Stillwater Recommended Action[1]			NMFS Recommended Action[1]		
Year	***Days of Supplemental Release***	***Number of Supplemental Releases***	***Total Water Released[2, 3] (AF)***	***Days of Supplemental Release***	***Number of Supplemental Releases***	***Total Water Released (AF)***	***Days of Supplemental Release***	***Number of Supplemental Releases***	***Total Water Released[2, 3] (AF)***
1987	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0
1991	5	1	2,341	7	1	3,999	14	4	7,882
1992	7	1	3,907	9	1	5,474	24	5	16,015
1993	3	1	1,732	6	2	2,132	46	7	24,655
1994	0	0	0	0	0	0	2	2	1,380
1995	3	1	1,012	7	2	3,560	52	9	30,625
1996	6	1	3,130	8	1	4,506	25	2	15,705
1997	10	2	6,212	10	2	6,323	26	8	16,147
1998	0	0	0	0	0	0	74	8	36,534
1999	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	15	6	9,705
2001	4	1	1,793	6	1	3,180	20	5	14,394
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	5	2	2,890
2004	0	0	0	0	0	0	0	0	0
2005	4	1	2,019	9	3	5,044	47	11	28,895
2006	3	1	1,166	5	1	2,339	21	5	13,611
2007	0	0	0	0	0	0	0	0	0
2008	9	1	6,482	7	2	3,792	23	5	15,406
2009	0	0	0	0	0	0	2	2	1,478
2010	0	0	0	0	0	0	20	7	13,226
2011	3	1	1,734	5	1	2,436	39	8	24,577
2012	0	0	0	0	0	0	2	1	1,008

	Reclamation's Proposed Action			Stillwater Recommended Action[1]			NMFS Recommended Action[1]		
Year	***Days of Supplemental Release***	***Number of Supplemental Releases***	***Total Water Released[2, 3] (AF)***	***Days of Supplemental Release***	***Number of Supplemental Releases***	***Total Water Released (AF)***	***Days of Supplemental Release***	***Number of Supplemental Releases***	***Total Water Released[2, 3] (AF)***
2013	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	1	1	785
2015	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0
2017	8	1	3,808	8	1	3,841	24	8	12,926
2018	0	0	0	0	0	0	2	1	988
2019	6	1	3,438	18	4	10,297	35	6	22,969
2020	0	0	0	0	0	0	8	2	5,238
2021	0	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0	0
2023	10	1	5,629	10	1	5,802	14	4	7,180
TOTAL	140	29	76,987	200	44	110,593	912	203	536,173

[1] Stillwater and NMFS recommended actions do not include any minimum inflow or storage criteria for releases; therefore, some releases would not be possible.

[2] The Total Released water includes only releases for Supplementation and does not include water needed to conduct ramp down.

[3] The modeling of Supplemental Releases does not consider operational limitations on releases from Twitchell Dam. Actual releases would likely be higher, as releases would need to be rounded up to nearest possible release rate.

Table 6. Comparison of Smolt and Steelhead Passage Events under the Three Supplemental Release Scenarios and Baseline Conditions without Supplemental Releases 1962 – 2023

Month[1]	Year[1]	Smolt Passage[2] Baseline Conditions (without Supplement)	Proposed Action	Stillwater Recommended Action[3]	NMFS Recommended Action[3]	Steelhead Passage[2] Baseline Conditions (without Supplement)	Proposed Action	Stillwater Recommended Action[3]	NMFS Recommended Action[3]
February	1962	5	5	5	19	5	5	5	19
February	1962	2	8	8	-	2	8	8	-
March	1962	0	0	0	3	0	0	0	3
April	1965	0	0	0	2	0	0	0	2
December	1965	2	2	4	4	2	2	4	4
February	1966	0	0	0	2	0	0	0	2
December	1966	0	0	0	1	0	0	0	1
December	1966	3	5	5	6	2	5	5	6
January	1967	0	0	0	1	0	0	0	1
January	1967	2	9	9	9	1	1	1	9
January	1967	0	-	-	-	0	7	7	-
March	1967	1	1	1	8	0	0	0	8
April	1967	3	19	19	46	1	1	1	46
April	1967	12	-	-	-	11	16	16	-
January	1969	3	3	12	92	3	3	12	92
January	1969	7	10	-	-	7	10	-	-
February	1969	11	11	11	-	8	8	8	-
February	1969	-	-	-	-	1	1	1	-
February	1969	26	26	26	-	23	23	23	-
April	1969	2	2	2	-	1	1	1	-
May	1969	0	0	0	1	0	0	0	1
March	1970	1	1	1	7	1	1	1	7
December	1970	0	0	0	2	0	0	0	2
December	1971	0	0	0	1	0	0	0	1
January	1973	2	2	2	6	1	1	1	6
February	1973	1	1	1	4	1	1	1	4
February	1973	3	6	6	7	3	6	6	7
February	1973	1	1	1	5	0	0	0	5

March	1973	0	0	0	3	0	0	0	3
March	1973	0	0	0	2	0	0	0	2
March	1973	0	0	0	11	0	0	0	11
January	1974	1	1	1	2	1	1	1	2
April	1974	0	0	0	1	0	0	0	1
March	1975	2	2	2	5	1	1	1	5
December	1977	0	0	0	1	0	0	0	1
January	1978	0	0	0	1	0	0	0	1
January	1978	1	1	1	6	1	1	1	6
January	1978	1	1	1	-	1	1	1	-
February	1978	8	10	12	16	8	10	12	16
March	1978	12	12	12	26	7	7	7	26
March	1978	0	0	0	1	0	0	0	1
April	1978	0	0	0	1	0	0	0	1
April	1978	0	0	0	4	0	0	0	4
February	1979	1	1	1	2	0	0	0	2
February	1979	0	4	4	6	0	3	4	6
March	1979	5	10	12	13	4	10	12	13
January	1980	1	1	1	4	0	0	0	4
January	1980	0	0	2	-	0	0	2	0
February	1980	11	11	14	14	10	10	10	10
February	1980	-	-	-	-	0	0	3	3
February	1980	9	9	20	21	7	7	7	21
March	1980	0	0	-	-	0	0	11	-
March	1981	0	0	0	2	0	0	0	2
March	1981	0	0	0	2	0	0	0	2
March	1981	0	0	0	1	0	0	0	1
March	1981	0	0	0	2	0	0	0	2
March	1982	0	0	0	3	0	0	0	3
April	1982	2	2	2	5	2	2	2	5
April	1982	2	2	2	6	2	2	2	6
December	1982	0	0	0	1	0	0	0	1
December	1982	1	1	1	3	1	1	1	3
January	1983	3	30	32	121	3	9	9	121
January	1983	6	-	-	-	5	-	-	-

February	1983	8	-	-	-	4	9	9	-
February	1983	-	-	-	-	1	10	12	-
February	1983	42	42	42	-	16	16	16	-
February	1983	-	-	-	-	13	13	13	-
April	1983	6	6	6	-	5	5	5	-
April	1983	1	1	1	-	0	0	0	-
December	1983	1	1	1	3	1	1	1	3
February	1986	3	3	7	9	3	3	7	9
February	1986	2	2	-	-	2	2	-	-
March	1986	1	1	1	13	0	0	0	13
March	1986	2	7	7	-	1	1	1	-
March	1986	0	-	-	-	0	4	5	-
March	1991	0	0	0	2	0	0	0	2
March	1991	0	0	0	1	0	0	0	1
March	1991	13	17	19	21	5	5	5	21
March	1991	-	-	-	-	5	9	12	-
January	1992	0	0	0	2	0	0	0	2
February	1992	3	3	3	16	3	3	3	16
February	1992	3	10	12	-	3	10	12	-
March	1992	0	0	0	2	0	0	0	2
March	1992	0	0	0	10	0	0	0	10
January	1993	2	2	2	3	1	1	1	3
January	1993	7	10	10	10	7	9	10	10
February	1993	29	29	29	42	2	2	2	42
February	1993	-	-	-	-	23	23	26	-
March	1993	7	7	7	30	6	6	6	30
February	1994	0	0	0	1	0	0	0	1
February	1994	0	0	0	1	0	0	0	1
January	1995	0	0	0	1	0	0	0	1
January	1995	4	4	8	11	3	3	6	11
January	1995	2	2	-	-	1	1	-	-
January	1995	8	10	12	32	7	10	12	32
February	1995	4	4	4	-	3	3	3	-
March	1995	31	31	31	48	4	4	4	48
March	1995	-	-	-	-	23	23	23	-

May	1995	0	0	0	1	0	0	0	1
February	1996	4	10	12	30	4	10	12	30
March	1996	2	2	2	-	1	1	1	-
December	1996	2	2	2	3	1	1	1	3
December	1996	0	0	0	2	0	0	0	2
January	1997	3	7	7	7	3	5	7	7
January	1997	0	0	0	1	0	0	0	1
January	1997	1	15	15	25	1	14	14	25
January	1997	9	-	-	-	7	-	-	-
December	1997	0	0	0	1	0	0	0	1
January	1998	0	0	0	2	0	0	0	2
January	1998	0	0	0	2	0	0	0	2
January	1998	0	0	0	2	0	0	0	2
February	1998	38	38	38	129	35	35	35	129
March	1998	26	26	26	-	23	23	23	-
May	1998	2	2	2	-	1	1	1	-
May	1998	5	5	5	-	3	3	3	-
February	2000	2	2	2	5	2	2	2	5
February	2000	0	0	0	3	0	0	0	3
March	2000	0	0	0	7	0	0	0	7
April	2000	1	1	1	3	1	1	1	3
February	2001	0	0	0	2	0	0	0	2
February	2001	0	0	0	2	0	0	0	2
March	2001	7	10	12	21	6	10	12	21
April	2001	0	0	0	1	0	0	0	1
March	2003	0	0	0	2	0	0	0	2
May	2003	0	0	0	3	0	0	0	3
December	2004	0	0	0	1	0	0	0	1
December	2004	1	1	1	6	1	1	1	6
January	2005	1	1	4	-	1	1	4	-
January	2005	7	11	13	18	6	10	12	18
February	2005	10	10	10	25	7	7	7	25
March	2005	0	0	0	2	0	0	0	2
March	2005	1	1	1	10	1	1	1	10
May	2005	0	0	0	1	0	0	0	1

January	2006	2	2	2	2	2	2	2	2
February	2006	0	0	0	1	0	0	0	1
March	2006	0	0	0	1	0	0	0	1
March	2006	0	0	0	1	0	0	0	1
March	2006	1	1	1	25	0	0	0	25
April	2006	8	10	12	-	7	10	12	-
January	2008	1	1	1	3	1	1	1	3
January	2008	1	1	1	23	1	1	1	23
January	2008	5	5	12	-	5	5	12	-
February	2008	2	11	-	-	1	4	-	-
February	2008	0	0	0	5	0	0	0	5
February	2009	0	0	0	1	0	0	0	1
February	2009	0	0	0	1	0	0	0	1
December	2009	0	0	0	1	0	0	0	1
January	2010	6	6	6	10	4	4	4	10
February	2010	1	1	1	5	1	1	1	5
February	2010	2	2	2	9	2	2	2	9
April	2010	0	0	0	1	0	0	0	1
April	2010	1	1	1	1	0	0	0	1
December	2010	6	12	12	24	6	10	12	24
December	2010	1	-	-	-	0	-	-	-
December	2010	2	-	-	-	1	1	-	-
February	2011	0	0	0	2	0	0	0	2
February	2011	1	1	1	4	1	1	1	4
March	2011	0	0	0	3	0	0	0	3
March	2011	0	0	0	1	0	0	0	1
March	2011	13	13	13	25	12	12	12	25
April	2012	0	0	0	2	0	0	0	2
March	2014	0	0	0	1	0	0	0	1
January	2017	0	0	0	1	0	0	0	1
January	2017	0	0	0	1	0	0	0	1
January	2017	1	1	1	6	0	0	0	6
January	2017	2	2	2	-	1	1	1	-
February	2017	0	0	0	1	0	0	0	1
February	2017	3	17	17	24	2	9	16	24

February	2017	1	-	-	-	0	-	-	-
February	2017	6	-	-	-	6	6	-	-
March	2018	0	0	0	2	0	0	0	2
January	2019	1	1	1	2	1	1	1	2
February	2019	5	5	11	11	4	4	10	11
February	2019	4	10	12	37	4	10	12	37
March	2019	2	2	2	-	2	2	2	-
March	2019	5	5	5	-	4	4	4	-
March	2020	0	0	0	1	0	0	0	1
April	2020	1	1	1	8	1	1	1	8
January	2023	0	0	0	1	0	0	0	1
January	2023	2	2	2	3	2	2	2	3
January	2023	11	20	20	20	3	3	3	20
January	2023	-	-	-	-	5	5	5	-
January	2023	-	-	-	-	0	7	10	-
February	2023	45	45	45	45	41	41	41	41

[1] This table excludes the following years in which no Supplemental Releases would have been made under any of the three supplementation scenarios (i.e., too dry, flows < 150 cfs December- June): 1963, 1964, 1968, 1976, 1977, 1985, 1987, 1988, 1989, 1990, 1999, 2002, 2004, 2007, 2013, 2015, 2016, 2021, and 2022. Periods with no natural passable flow in the Sisquoc, and no supplementations under all three supplementation scenarios (i.e., all columns are the same) are also excluded from the table.

[2] A successful passage period is defined for smolt as one or more days of 500 cfs flow at the confluence (at Sisquoc Garey Gage or Sisquoc Garey Gage flows+ Twitchell Releases) preceded by at least two consecutive days of Sisquoc River flows ≥ 350 cfs. A successful passage period for steelhead is defined as three or more consecutive days of 600 cfs at the confluence (at the Sisquoc Garey Gage or Sisquoc Garey Gage flows plus Twitchell releases).

[3] Passage periods under the Stillwater and the NMFS Recommended Actions include Supplemental Releases that may not have been implementable due to insufficient inflow or storage in Twitchell Reservoir.

Gray highlighted cells represent failed passage periods. Failed passage periods are defined as periods with at least one day of passable flow which does not meet the criteria described above (i.e., duration and magnitude) for a successful smolt or steelhead passage period.

Blue cells represent passage periods where Supplemental Releases would have been initiated before at least 2 consecutive days of flow ≥350 cfs has occurred in the Sisquoc River. While these releases eventually met the criteria for a smolt passage event, the start of these releases likely would not benefit smolt migration, as flows in the Sisquoc would not yet be sufficient to trigger or facilitate downstream smolt migration from the tributaries along the upper Sisquoc down to the confluence.

Dashes represent a continuation of a passage period with a total that has already been listed above in the same column