

FEASIBILITY STUDY | DECEMBER 2025

STORMWATER RECHARGE RED BLUFF SUBBASIN

PREPARED FOR

TEHAMA COUNTY FCWCD

DWR Agreement, Component 3, Category (b), Task 2

PREPARED BY



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1. INTRODUCTION

The enactment of Water Code §1242.1 in 2023 provided an avenue to divert stormwater for recharge without obtaining appropriative water rights. Stormwater provides a cost-effective water source to be utilized for recharge. Stormwater diversions have the added benefit of reducing flooding from excess flows. This feasibility study discusses water availability for recharge within the Red Bluff Subbasin. This discussion is supported by a water availability analysis conducted for Thomes Creek and Elder Creek, both of which are located in the Red Bluff Subbasin. The analysis provides the number of days available for diversion given different year types (wet, dry, normal) and the average number of days available for diversion across all year types.

2. LOCATION

The Red Bluff Subbasin is located in Northern California within the Sacramento Valley. It lies entirely within Tehama County, where groundwater management is overseen by the Tehama County Flood Control and Water Conservation District (Tehama County FCWCD), acting as the exclusive Groundwater Sustainability Agency (GSA). The area encompasses and surrounds the City of Red Bluff and is adjacent to neighboring subbasins in Corning, Antelope, and Los Molinos. Its boundaries are defined in the Groundwater Sustainability Plan (GSP) as a high-priority subbasin under the Sustainable Groundwater Management Act (SGMA), emphasizing its importance for long-term groundwater sustainability and flood mitigation planning.

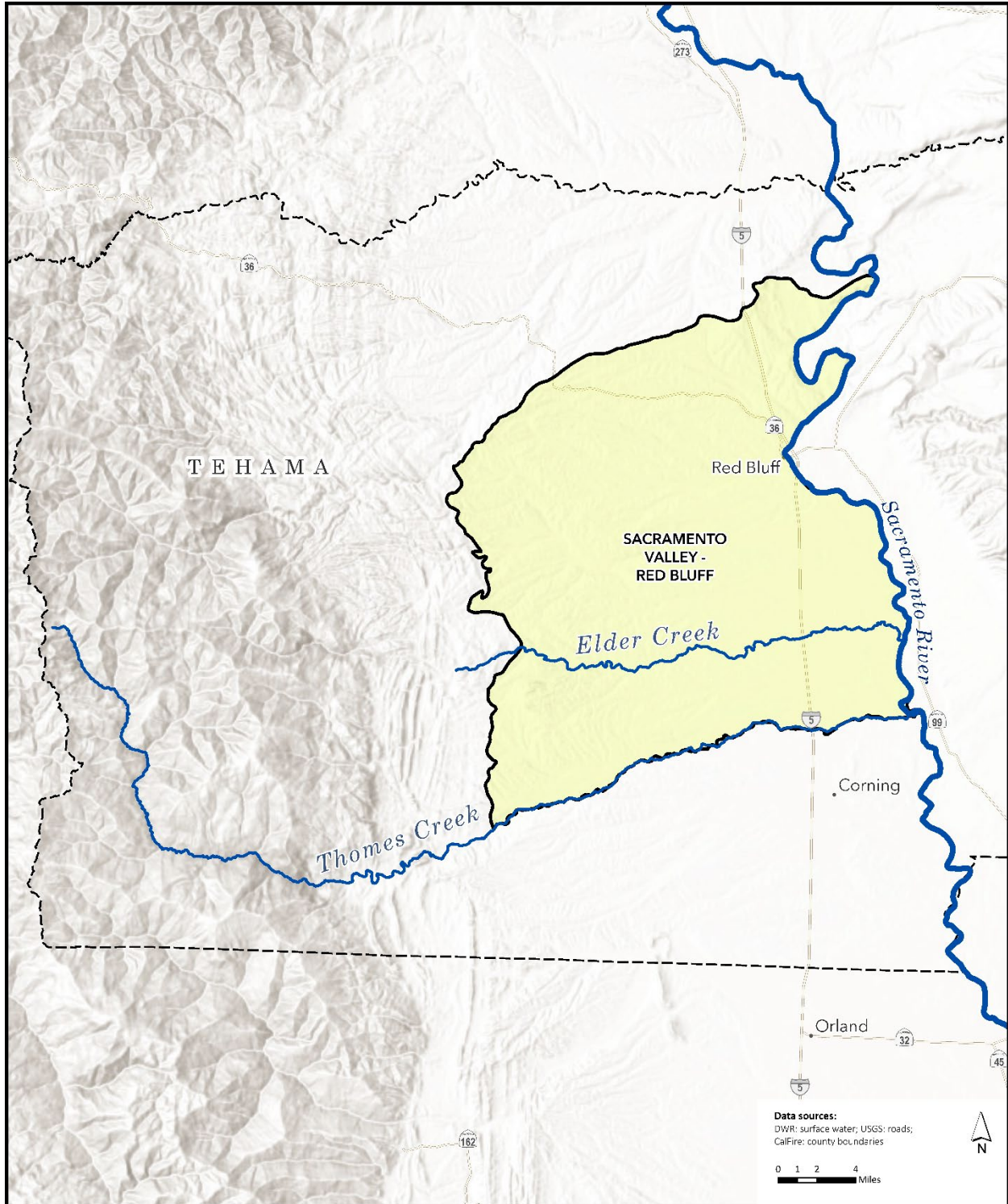


Figure 1 Location of Subbasin, Creeks, and Sacramento River

2.1. Elder Creek

Elder Creek runs across the southern half of the Red Bluff Subbasin before converging with the Sacramento River.

2.2. Thomes Creek

Thomes Creek runs along the southern boundary of the Red Bluff Subbasin before converging with the Sacramento River.

3. WATER AVAILABILITY ANALYSIS

Guidelines on developing a water availability analysis are provided by the State Water Resources Control Board (SWRCB) and provided as an Attachment to this document (**Attachment A**). Below is a summary of the two methodologies that can be utilized while conducting this analysis.

3.1. Method 1

This method establishes a predefined high-flow threshold and imposes a conservative cap on water diversions to protect aquatic ecosystems while allowing limited water use during periods of elevated streamflow. The approach is designed to be transparent, data-driven, and protective of senior water rights and environmental functions.

High-Flow Threshold Definition

High-flow conditions are defined as daily stream flows exceeding the 90th percentile of historical daily flows. This percentile is calculated using long-term streamflow records and is intended to preserve key ecosystem processes, including channel maintenance, sediment transport, and natural hydrograph variability.

Diversion Cap

Water diversions are limited to a maximum of 20 percent of the instantaneous daily streamflow. This conservative cap is intended to minimize adverse ecological effects such as excessive channel scour, degradation of fish habitat, and disruption of aquatic species.

Seasonal Applicability

The method applies exclusively during the designated diversion season, defined as December 1 through March 31, when higher stream flows are more likely to occur and ecological risks from limited diversions are reduced.

Data Source

The 90th percentile daily flow values are obtained from the U.S. Geological Survey (USGS) Daily Streamflow database. Use of this readily available data source simplifies implementation and ensures consistency and reproducibility in flow calculations.

Implementation Procedure

Applicants are required to monitor the relevant stream gage on a daily basis throughout the diversion

season to confirm that stream flows exceed the 90th percentile threshold. The allowable diversion rate for any given day is calculated as the lesser of the following two values:

1. The difference between the actual daily streamflow and the 90th percentile daily flow; or
2. Twenty percent of the actual daily streamflow.

Applicability and Benefits

This method is well suited for applicants seeking a straightforward and defensible approach to demonstrating water availability. By limiting diversions to periods of high flow and imposing conservative withdrawal limits, the method ensures protection of senior water rights and minimizes impacts to aquatic ecosystems.

3.2. Method 2

This method demonstrates water availability based on the occurrence, or imminent threat, of flood conditions and allows water diversions only when flood control actions are actively required. The approach is intended to align water diversions with flood risk management objectives while maintaining protections for senior water rights and environmental resources.

Flood Threshold Definition

Water availability is established when stream flows exceed thresholds that initiate flood control actions, as specified in written flood management protocols formally adopted by a recognized flood control agency. These thresholds are typically associated with conditions that pose risks to public safety, infrastructure, or property.

Coordination with Flood Control Agencies

Applicants are required to coordinate directly with the applicable flood control agency to confirm when flood control actions are necessary. Diversions may occur only during periods when such actions are actively underway and must be consistent with the agency's flood management objectives and operational constraints.

Seasonal Applicability

Diversions under this method are limited to the designated diversion season of December 1 through March 31, consistent with Method 1, when flood events are most likely to occur.

Applicability of Flood Conditions

Flood conditions must be present, or imminently anticipated, in the specific waterbody from which the diversion is proposed. Flooding or high-flow conditions occurring solely in adjacent tributaries, upstream reaches, or neighboring watersheds do not qualify as demonstrating water availability under this method.

Data and Documentation Requirements

Applicants must quantify the amount of water proposed for diversion during flood control activities. This includes estimates of diversion rates, duration of diversion, and the total volume of water to be diverted. Documentation must demonstrate that the proposed diversions are directly associated with active flood control conditions.

Applicability and Benefits

This method is appropriate for projects designed to divert water during flood events to reduce risks to human health and safety, such as preventing levee overtopping, infrastructure damage, or floodplain inundation. By linking diversions to formal flood control actions, the method ensures that water withdrawals occur only during periods of excess flow and elevated flood risk.

4. RESULTS

A water availability analysis based on Method 1 was conducted for both Elder and Thomes Creeks. The results of that analysis are provided below.

4.1. Elder Creek

The water availability analysis was conducted for Elder Creek using the Elder Creek nr Paskenta stream gage. This gage had 75 years of complete data available for the analysis. Based on this data and method 1, diversion thresholds were calculated for December through March on a daily basis. These thresholds are presented in **Table 1**.

Day	Dec	Jan	Feb	Mar	Day	Dec	Jan	Feb	Mar
1	216	404	560	569	16	245	1278	904	537
2	266	256	711	473	17	270	927	641	479
3	356	290	473	390	18	232	866	642	385
4	200	601	644	427	19	296	766	863	371
5	223	397	588	625	20	439	661	1004	476
6	275	329	682	517	21	502	563	858	569
7	253	509	1046	414	22	536	764	638	469
8	220	429	757	478	23	452	558	595	456
9	210	417	786	690	24	304	456	526	705
10	337	377	711	645	25	268	623	529	512
11	214	484	673	551	26	301	1040	598	515
12	165	953	745	483	27	465	727	537	546
13	185	836	722	394	28	399	761	595	505
14	201	1088	723	350	29	501	680		427
15	295	759	649	548	30	534	555		358
					31	446	482		411

Table 1 Daily Diversion Thresholds December-March for Elder Creek

These diversion thresholds were used to evaluate historical data to determine the availability of water for diversions. Historical flows were compared to these diversion thresholds to ascertain the number of days diversions would have been possible if a temporary diversion permit had been in place and how much volume could have been diverted each year. This evaluation was conducted for stream gage data from 2000 through 2023. The results of this analysis are presented in **Figure 2**. This figure shows that generally wet years tend to have more days (December – March) where diversions could occur and more total volume available to divert.

4.2. Thomes Creek

The water availability analysis was conducted for Elder Creek using the Elder Creek nr Paskenta stream gage. This gage had 28 years of complete data available for the analysis. Based on this data and method 1, diversion thresholds were calculated for December through March on a daily basis. These thresholds are presented in **Table 4**.

Day	Dec	Jan	Feb	Mar	Day	Dec	Jan	Feb	Mar
1	829	2802	1201	988	16	795	2058	1190	1420
2	718	544	1509	1007	17	855	2132	1468	1256
3	726	628	1280	1085	18	493	1892	1306	981
4	459	1642	1383	1156	19	957	1361	1296	1062
5	620	1397	1446	1139	20	969	1340	1649	1253
6	636	1059	2233	1345	21	1040	994	1744	1333
7	432	1219	2678	1034	22	1009	856	1143	1441
8	667	2011	1617	863	23	651	1141	1163	1170
9	559	1979	1555	911	24	417	844	908	1180
10	1119	1456	1410	1435	25	316	1097	667	1052
11	1154	1896	1141	1039	26	738	1377	869	878
12	619	2101	951	1069	27	2697	1223	1138	1014
13	722	1507	1035	1565	28	2132	1301	1325	985
14	1007	1737	1448	1610	29	1563	1546		1056
15	840	1987	987	1747	30	2613	1188		937
					31	5497	942		1022

Table 4 Daily Diversion Thresholds December-March for Thomes Creek

These diversion thresholds were used to evaluate historical data to determine the availability of water for diversions. Historical flows were compared to these diversion thresholds to ascertain the number of days diversions would have been possible if a temporary diversion permit had been in place and how much volume could have been diverted each year. This evaluation was conducted for stream gage data from 2000 through 2023. The results of this analysis are presented in **Figure 3**. This figure shows that generally wet years tend to have more days (December – March) where diversions could occur and more total volume available to divert.

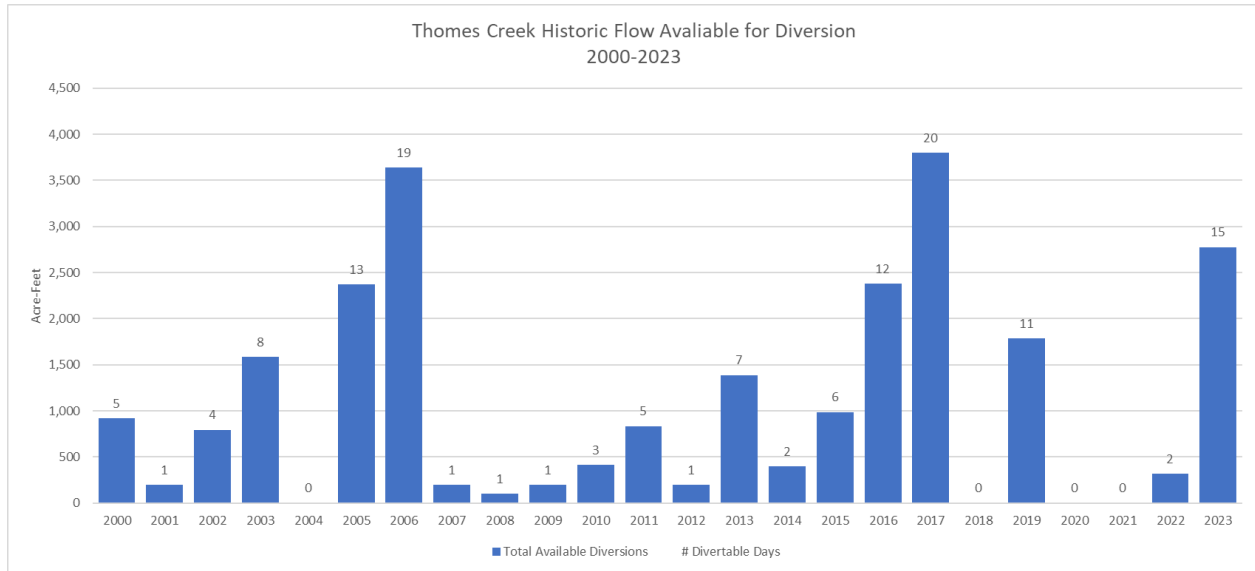


Figure 3 Historical Diversion Availability - Thomes Creek

This analysis of historical data is further summarized based all years and corresponding water year types. The water years are classified as one of five water year types: wet (W), above normal (AN), below normal (BN), dry (D), and critically dry (C). As observed in **Figure 3**, wet years tend to have more days where diversions can occur and larger volumes available to divert. Across all year types from December through March, diversion thresholds are met during eight days on average. The average amount of water available to divert across all water year types is 1,548 acre-feet. This information is presented in **Tables 5 and 6**.

Potential Diversion under Streamlined Permit (days)													
WY Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
W	0	0	4	5	5	4	0	0	0	0	0	0	18
AN	0	0	0	3	3	3	0	0	0	0	0	0	9
BN	0	0	0	1	0	2	0	0	0	0	0	0	3
D	0	0	1	1	0	0	0	0	0	0	0	0	2
C	0	0	1	0	0	0	0	0	0	0	0	0	2
All Years	0	0	2	2	2	2	0	0	0	0	0	0	8
Potential Diversion under Streamlined Permit (acre-feet)													
WY Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
W	0	0	891	736	1,026	861	0	0	0	0	0	0	3,513
AN	0	0	66	529	496	536	0	0	0	0	0	0	1,627
BN	0	0	0	250	40	309	0	0	0	0	0	0	598
D	0	0	264	132	0	66	0	0	0	0	0	0	463
C	0	0	197	0	74	99	0	0	0	0	0	0	370
All Years	0	0	373	366	392	417	0	0	0	0	0	0	1,548

Table 5 (Top) Potential Number Diversion Days – Thomes Creek
Table 6 (Bottom) Potential Volume Available for Diversion – Thomes Creek

5. CONCLUSION AND NEXT STEPS

This analysis evaluated historical stream gage records for Elder Creek and Thomes Creek to determine diversion thresholds using Method 1 of the water availability framework. The assessment quantified the number of days and the volume of water that could have been diverted under a temporary permit based on historical conditions.

In addition, average diversion days and volumes were calculated across the full period of record to estimate future potential. Results indicate that Elder Creek could provide approximately 1,800 acre-feet of water over 11 days on average, while Thomes Creek could yield about 1,500 acre-feet over eight days. These volumes represent a meaningful contribution to groundwater recharge within the Red Bluff Subbasin during years when water is available. However, implementation under Method 1 would require securing a temporary diversion permit or appropriative water rights.

Method 2 offers an alternative approach by establishing flood diversion guidelines for each creek based on historical flow data. It is recommended that a comprehensive watershed and flow analysis be conducted to define flood thresholds and develop diversion protocols, thereby creating an additional mechanism for stormwater recharge.

ATTACHMENT A

State Water Resources Control Board

Water Availability Analysis for Streamlined Recharge Permitting

Introduction

This document contains guidelines for potential water rights applicants interested in pursuing a streamlined application to appropriate high flows for diversion to underground storage and subsequent beneficial use. Diverting to underground storage is also referred to as “groundwater recharge.” The purpose of this guidance is to describe how potential water right applicants can simplify the process used to determine whether water is available for appropriation. The simplified approach applies only to certain times of the year and hydrologic conditions and identifies what will help the State Water Resources Control Board’s (Board’s) Division of Water Rights (Division) determine that a new diversion during high flow conditions will not injure senior users or instream beneficial uses. This guidance also identifies the types of information that will be needed for Division staff to conduct its review and the sources for this information.

Early outreach and consultation with Division staff is critical for WAA development as prospective applicants will likely be completing the WAA to support the pre-requisite CEQA document prior to filing an application. Prospective applicants are encouraged to discuss their projects with Division staff in advance and provide a draft copy of the WAA for review and comment. Each application will be considered on a case-by-case basis. An application that fits some but not all of the eligibility criteria for streamlined permitting may still be processed more quickly than a standard water right application. In either case, additional review or permit requirements may be necessary to support required findings or to resolve protests by interested parties. For example, parties covered by the [North Coast Instream Flow Policy](#) (i.e., Marin, Sonoma, and portions of Napa, Mendocino, and Humboldt counties) must meet specific

requirements related to water availability analyses and should contact Division staff to discuss their project.

This document is divided into three sections and a technical appendix:

1. The streamlined options for demonstrating that water is available;
2. How to implement your project;
3. How to implement an umbrella permitting approach; and
4. An appendix describing technical details and available information related to the 90th percentile method.

Section 1 Demonstrating Water is Available

1.1 Options for streamlining the Water Availability Analysis

The Division must find that unappropriated water is available prior to issuing a water right permit. Senior water rights and environmental needs must be considered when determining whether water is available for appropriation. This determination is often based on a Water Availability Analysis (WAA). Division staff have identified two possible methods for a simplified demonstration of water availability.

1.1.1 Method 1 – The “90th Percentile / 20 Percent Method”

The 90th Percentile/20 Percent method relies on a predetermined threshold to show the presence/absence of high flow conditions and protects critical ecosystem functions associated with high flows by applying a conservative cap on the amount of water that can be diverted. The 90th Percentile/20 Percent method explicitly assumes that flows above the 90th percentile daily flow, between December 1 and March 31, are protective of aquatic ecosystem functionality if the total amount of water diverted is capped at 20 percent of the daily flow. The assumption relies on published ecological studies (specifically, Richter et al. 2011) showing minimal channel formation, channel cleaning, and channel scour effects when diversions are limited to 10-20 percent of the available flow.

The 90th percentile metric also has the advantage of being readily available through the U.S. Geological Survey (USGS) Daily Streamflow webpage. Unreasonable impacts to fish and wildlife are likely to be avoided when high flows are paired with a limit on diversion rates of 20 percent of total daily streamflow to protect hydrograph variability and channel maintenance flows.¹ To take advantage of this streamlined pathway, an applicant must be applying for high flow diversions between December 1 and March 31. The applicant must also ensure sufficient water remains in-stream to satisfy senior water right holders. Instructions on how to calculate these metrics are provided in the Appendix.

1.1.2 Method 2 – Threat of Flood Conditions

The second method relies on the presence or imminent threat of flood conditions to demonstrate water availability. An applicant may demonstrate water availability by proposing to divert when flows exceed thresholds that trigger flood control actions necessary to avoid threats to human health and safety. These thresholds and actions need to be established in written flood management protocols adopted by a flood control agency. Diversions will be limited to times, still within the December 1 to March 31 timeframe, when a flood control agency determines that flood control actions are necessary.

Flood conditions must be present in the waterbody that is the source of the diversion. Flooding in an adjacent tributary or watershed is not enough to demonstrate water availability.

¹ Richter et al., *A Presumptive Standard for Environmental Flow Protection*, River Res. Applic. (2011).

Applicants will need to coordinate closely with the flood control agency and will only be able to divert during active flood control activities; an example would be where water diversions help avoid levee overtopping or failure. If diverting from a bypass where flows in the bypass do not pose a threat to health and human safety, additional analysis may be necessary to demonstrate water availability.

As described below in Section 1.3, the applicant will need to estimate the amount of water that will be available for diversion during these flood control activities, including diversion rates, duration, and total amounts of water the proposed project is planning to be able to divert within a water year. This information may be acquired by evaluating prior flood conditions or communicating with flood control agencies prior to application submittal.

1.2 Fully Appropriated Streams

Neither of the above options for demonstrating water availability applies to stream systems that the Board has declared fully appropriated. Fully Appropriated Streams (FAS) can be designated as fully appropriated either year-round or during specified months of the year. Generally, the Board does not accept water right applications for diversion from a FAS. In stream systems that are declared “fully appropriated” for only a portion of the year, water may be appropriated during the non-FAS months of the year. A water right applicant can ask the Board to revise its FAS determination by submitting a petition to the Board to open the FAS designation for a water body, however this requires a hearing. The hearing will determine whether FAS can be opened; an application cannot be accepted until the FAS hearing is completed. For more information on the FAS process, please [visit FAS website](#).

Please note much of the Tulare Lake Basin has been designated as FAS. The Kings River has been designated as fully appropriated year-round and is currently involved in the FAS petition process. The Kern River completed the FAS petition process. In response, multiple parties have filed applications and are in the application acceptance stage of processing. For more information on the Kings River FAS petition, [visit this website](#). For more information on the FAS proceeding for the Kern River, [visit this website](#).

1.3 Water Availability and Your Water Right Application

A water right application must include certain elements, regardless of whether the applicant is pursuing a streamlined WAA. Those elements include: 1) the total annual amount proposed to be diverted, 2) the proposed diversion rate, and 3) the total amount proposed to be placed into storage (in this case underground storage). A WAA will aid in identifying a maximum feasible diversion rate to propose, as well as a viable maximum diversion volume. The proposed diversion volume will function as the “face value” of the permit until the project can be implemented and the actual diversion rates and volumes verified through the water rights licensing process. Please note that these values cannot be increased once an application has been filed, because filing the application secures the priority date for the appropriation. For

more information on what needs to be included in a water rights application, see our Frequently Asked Questions (FAQ) or our [Water Rights Application website](#).

Section 2. Implementing Your Project

2.1 What to Expect in your Permit.

Applicants that apply for streamlined permitting will be required to accept permit terms and conditions that prevent injury to downstream right holders and the environment. The results of the WAA and the information contained in the water right application will be used to define the parameters of the water right permit, as well as the terms and conditions that will be included in the permit. Terms related to the WAA will incorporate the following concepts into the permit:

1. Minimum bypass flow requirements that align with either a) limiting diversions to flows above the 90th percentile at a rate not to exceed 20% of the streamflow or b) limiting diversions to flows that exceed a threshold established by a written and adopted flood management protocol;
2. Monitoring requirements, including installation and maintenance of a telemetered gage immediately upstream or downstream of the point of diversion; and
3. Accounting requirements to demonstrate how much water has been diverted, how much water has been beneficially used, and how much water remains stored underground.

Projects may also receive special terms depending on specific circumstances. For example, projects located within the Sacramento-San Joaquin River watershed will be required to include Term 91 and Term 93, conditions based on Net Delta Outflow Index to account for delta water right demands, and applicable components of the Board's Bay-Delta Water Quality Control Plan. Projects within this watershed will also only be authorized to divert at times when there are no limitations on export rates from the Sacramento-San Joaquin Delta Estuary.

2.2 Ongoing Stream Gaging

2.2.1 Determining How Much to Divert and When

In order to implement the 90th percentile flow threshold, the project proponent will rely on a stream gage installed near the project's diversion point. This gage will be used to determine when the 90th percentile diversion threshold is satisfied and the rate of flow that may be diverted. Each day during the diversion season, a right holder will:

1. Check the gage to determine if flows are above the 90th percentile at the point of diversion (POD).
2. If flows are above the 90th percentile, calculate their diversion rate as the lesser of:
 - a. [Diversion rate] = [Actual flows] minus [the 90th percentile flow for that day] or
 - b. [Diversion rate] = 0.2 multiply [Actual flows]
3. Proceed with diverting at the rate calculated in step 2.
4. Record the rate and amounts of diversion to comply with the Board's monitoring and reporting requirements (California Code of Regulations, title 23, chapters 2.7 and 2.8).
5. Continue steps 1 through 4 for each day of the diversion season.

A right holder may also reduce the frequency of the above steps by choosing to operate more conservatively than what is required by the permit. For example, diversions could be limited to 15% of total flow to facilitate using a moving average, or a threshold above the 90th percentile may be chosen to allow a weekly or monthly value to be used instead of a daily value. Rationale must be provided for how a moving average or a reduced frequency of the above steps will still adhere to the conditions included in the permit.

2.2.2 Additional Gaging Provides More Flexibility

There may be cases where the downstream flow path can include cumulative demands much higher than the 90th percentile flow calculated at the location of the diversion, for example when an applicant is proposing to divert from a smaller tributary stream located upstream of a major stream confluence. Water availability may still be demonstrated by either 1) choosing a flow threshold at the POD that is high enough to ensure downstream senior demands are satisfied, or 2) relying on an additional downstream compliance gage to demonstrate that senior demands are being satisfied. Downstream compliance gage data could be developed from multiple sources, including existing USGS gages, a suitable gage from another 3rd party, or an additional gage installed by the applicant.

Downstream compliance gage data will be incorporated into the permit if that gage is relied upon to demonstrate water availability. Additional information on how to select and incorporate additional downstream compliance gages is included in the Appendix.

Section 3. The “Umbrella Permitting” Approach

A project does not need to be limited to a single point of diversion and place of use. A project may include multiple points of diversion and a place of use that spans the jurisdictional boundaries of the applicant. An “umbrella permit” of this type can authorize many points of diversion and locations of use that are coordinated as part of one recharge program.

If the applicant is a public agency, a place of use that includes the entire service area of the agency will allow changes in places of use within the service area from year to year, based on the operation of the project, without any additional approval by the Board. Likewise, a project with multiple authorized PODs will allow changes in diversions from one approved POD to another from year to year, or event to event, without any additional approval by the Board.

Applicants interested in pursuing an umbrella permit approach are encouraged to apply for a broad project that considers all existing, proposed, and potential future PODs and places of use. It is important to keep in mind that the permit will be limited, in part, based on the outcome of the WAA evaluation. Therefore, part of the initial project scoping should include considerations of possible diversion rates and volumes at each POD, the total maximum instantaneous diversion rate from all PODs, and the total volume from all PODs. This data may be based on existing pump capacities but could also be more forward looking and based on expected demand needs and infiltration capabilities.

3.1 Umbrella Permits and the 90th Percentile Threshold

Projects with multiple PODs may still rely upon a streamlined approach for demonstrating water availability. As described in the preceding section, stream gages will be relied upon to demonstrate that flows above the 90th percentile are occurring. The steps described above for calculating the 90th percentile should be calculated at the most upstream POD on every unique flow path. For example, if a project has three PODs downstream of each other, all on the same stream, a gage at the most upstream POD should demonstrate that the 90th percentile flows exceed the total downstream demand (including the total diversions proposed by the project). If a project has three PODs on three parallel distinct and separate tributaries, each POD would need a stream gage to demonstrate flows above the 90th percentile flows are occurring in that tributary. The purpose of gaging each unique flow path is to ensure that senior demands along each flow path are satisfied.

3.2 Umbrella Permits and the 20% Cumulative Diversion Limit

Total diversions can be capped across the project to 20% of available flow by gaging flows at the most upstream POD on a flow path and applying the 20% limit as a cumulative limit across all downstream points of diversion on that flow path. As with the evaluation of the 90th percentile threshold, calculations of the amount available for diversion will rely on a gage at the

most upstream POD of every unique flow path. Below are examples of how this would be implemented under different circumstances.

3.2.1 Right holder has multiple PODs along a single flow path

1. Check the gage at the most upstream POD to determine if flows are above the 90th percentile at the POD.
2. If flows are above the 90th percentile, calculate the cumulative diversion rate as the lesser of:
 - a. [Diversion rate] = [Actual flows] minus [the 90th percentile flow for that day]
 - b. [Diversion rate] = 0.2 multiply [Actual flows]
3. Allocate the diversion rate amongst the project's PODs.
4. Proceed with diverting at the rates calculated in step 3.
5. Record the rate and amounts of diversion at each POD to verify that the cumulative diversion rate did not exceed 20 percent of the daily available flow.
6. Continue steps 1 through 5 for each day of the diversion season

The above steps would be repeated for each unique flow path included within the umbrella permit. If there is a confluence and two flow paths join, PODs downstream of the confluence could be allocated a portion of the diversion rate from either upstream gage.

3.2.2 Right holder relies on more than one gage on the downstream flow path

As described above in Section 2.2.2, a right holder may rely on an additional compliance gage downstream to demonstrate water availability. Additional gages can also be used to determine the allowable diversion rate when there are multiple PODs. For a gage not located at the most upstream POD, the following approach would be used to calculate the allowable diversion rate that could be allocated to PODs downstream of that additional compliance point gage. The six steps outlined above in Section 3.2.1 would still apply, except that the allowable diversion rate in Step 2 would be calculated as the lesser of:

- a) [Actual flows] minus [flow threshold that satisfies downstream demands] minus [Cumulative diversion rate allocated to PODs upstream of the compliance point] or
- b) ([Actual flow] minus [Cumulative diversion rate allocated to PODs upstream of the compliance point]) multiply by 0.2.

More information

More information on the application process is available from the [Division's Streamlined Recharge Permitting](#) website. Additional information on the WAA, including data and resources for completing the steps described above, is available on the website. Applicants may also contact staff listed on the Division's [Permitting Program website](#) for more information.

Appendix A. The 90th percentile / 20 percent method

A streamlined Water Availability Analysis (WAA) that relies on the 90th percentile as a threshold for high flows will have the following components:

1. Gage selection;
2. 90th percentile diversion threshold;
3. Downstream demand;
4. Diversion threshold and downstream demand comparison

The streamlined WAA estimates existing downstream flow demand (i.e. senior water rights demand and instream flow requirements) and evaluates whether the 90th percentile flow is sufficient to avoid injury to those demands.

A.1 Gage selection

The first step is to select a gage for estimating high flows at the project's point of diversion. Ideally, the applicant will select a USGS gage with pre-calculated flow statistics located on the stream in the vicinity of the project. However, most applicants will likely need to select a gage on another stream or at a different location on the same stream and prorate flow measured at the gage to flow at their diversion; this process is referred to as "gage pairing" and the gage chosen is referred to as the paired gage.

There are several options for selecting a gage to pair; the following are suggestions, but other techniques may also be applicable:

1. Applicants can search for a nearby USGS gage with at least 30 years of record. USGS Streamflow data are available from the [National Water Information System](#). Gages with at least 30 years of record have pre-calculated flow statistics available.
2. If a nearby USGS gage is not available, applicants may use the Board's [Online Cannabis Compliance Gage Mapping Tool](#) to find a paired gage. Not all of the gages shown will have at least 30 years of record, so applicants will need to review the gage's period of record to determine if it is appropriate.
3. If either option 1 or 2 does not work, the applicant may select another gage with at least 30 years of record. This gage may be listed on the [California Data Exchange Center \(CDEC\)](#), or could be a local gage not listed on CDEC. The applicant will need to calculate flow statistics and prorate them to the project.
4. If there is no appropriate gage with 30 years of record available for pairing, applicants may synthesize 30 years of data by using data from multiple gages. For example, a nearby gage can be selected to represent the most recent 15 years of data, and another

gage that was operating until 15 years ago may be used to represent the prior 15 years of data when flows are prorated using further steps below.

A.2 90th Percentile Diversion threshold

Applicants who have selected a USGS gage with 30 years of record can download the daily flow statistics, including 90th percentile flows from USGS. If a gage without available flow statistics is chosen, flow statistics will need to be calculated for each calendar day by first calculating the average flow for each calendar day and then using those values to calculate the 90th percentile flow for each calendar day during the proposed season of diversion. If applicants must use multiple gages to synthesize 30 years of data, flows from each gage must be prorated separately using the information below.

Applicants using a paired gage will need to prorate the 90th percentile flow to the project's proposed point of diversion (POD). The prorated estimate at the POD can be calculated using the watershed area and average precipitation at both the paired gage and proposed POD. The [USGS Streamstats](#) tool can be used to calculate watershed area and the University of Oregon's [PRISM data explorer](#) tool can be used to calculate average precipitation, but applicants may use other tools or techniques.

The prorated flow thresholds for each calendar day in the diversion period can be calculated using the following equation, adapted from the Board's 2014 Policy for Maintaining Instream Flows in Northern California Coastal Streams:

$$Q_{POD} = Q_{gage} \text{ multiply } (DA_{POD} / DA_{gage}) \text{ multiply } (P_{POD} / P_{gage})$$

where:

- Q_{POD} = 90th percentile flow at the POD;
- Q_{gage} = 90th percentile flow calculated for the gage;
- DA_{POD} = drainage area at the POD;
- DA_{gage} = drainage area at gage;
- P_{POD} = average annual precipitation at the POD; and
- P_{gage} = average annual precipitation at the gage.

A.3 Downstream demand

Senior demands and environmental flows along the source water body's downstream flow path need to be compiled and compared against the 90th percentile flow at the POD to verify that the 90th percentile is a high enough flow rate to ensure downstream demands are satisfied.

Online resources developed by Division staff are available to facilitate compiling senior demands and existing environmental minimum flows downstream of the project:

1. Tool for identifying downstream trace and existing water rights along the downstream trace is available online through the [eWRIMS GIS Tool](#);
2. [Existing instream flow requirements](#) identified by the Board's Cannabis Policy, available online;
3. Water rights demand available from the Division of Water Rights' [eWRIMS Database](#).

Senior water right demands should include direct diversion rates of active and pending senior diversions²; and rates of diversion to offstream storage or underground storage for all senior diversions downstream of the proposed project. The diversion rates should be based on the legal diversion limit or historical rate of diversions of downstream users with a valid claim of right. Minimum environmental flows should be treated as a direct diversion demand and included in the cumulative downstream demand.

The applicant should exclude diversions with a season of diversion outside that of the proposed project. If the proposed project proposes to divert from a source waterbody that has significant onstream reservoirs downstream, the project may be subject to additional conditions to ensure injury to the downstream senior diverters is avoided. Projects located within the Sacramento-San Joaquin Watershed may calculate demands along a flow path that ends at the Legal Delta and accept terms related to the Delta, including a term based on the Net Delta Outflow Index to ensure demands on the Delta are satisfied.

[A.4 Diversion threshold and downstream demand comparison](#)

Once calculated, applicants will compare downstream demand to the 90th percentile flow at the point or points of diversion. If the needs of downstream diverters and the environment exceed the chosen diversion thresholds, then further analysis or a higher threshold will be needed to demonstrate that instream beneficial uses and senior water rights are protected.

For example, projects located in upstream reaches of watersheds may have a downstream flow path that includes demands much higher than the 90th percentile flows calculated for the upstream reach. Water availability may still be demonstrated by either 1) choosing a flow threshold at the POD that is high enough to ensure downstream senior demands are satisfied, or 2) relying on an additional downstream gage to demonstrate that downstream flows are sufficient to satisfy senior demands.

The project proponent may install and rely upon any number of gages downstream of the project and use the methodology described below to demonstrate that water is available for appropriation. Gaging downstream of a confluence will likely be beneficial in nearly all

² Water right status is identified in eWRIMS. Active water right statuses include: "Licensed", "Permitted", "Pending" including water right type Appropriative (State Filing), "Certified", "Registered", "Claimed", "Adjudicated", and "Active"

circumstances to demonstrate that sufficient water is available downstream of the confluence to meet senior demands and that water in a tributary is available for diversion.

A.4.1 Selection and incorporation of additional downstream compliance gages

The location of the downstream compliance point gage will likely be an iterative process and will depend on if there is a USGS gage already present or if the applicant can secure access to install a gage. The gage will need to be located upstream of the senior demands that cannot be satisfied by the 90th percentile flow calculated at the project's POD. The applicant will need to identify a flow threshold at the gage that satisfies downstream senior demands. The steps described in Section 2.2.1 can still be used, but in Step 1 the diverter will check both whether flows at the POD are above the 90th percentile and whether flows at the downstream compliance point are above the threshold flow that satisfies downstream demands.