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.

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[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 diversions[2]; 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.