

**Response to 2017 Peer Review
Comments on
Draft Cannabis Cultivation Policy
Principles and Guidelines for Cannabis Cultivation**

**State Water Resources
Control Board
1001 I Street
Sacramento, CA 95814**

OCTOBER 2017

INTRODUCTION

This document provides response to peer review comments received on the State Water Resources Control Board's (State Water Board), July 2017 proposed policy for water quality control titled *Draft Cannabis Cultivation Policy - Principles and Guidelines for Cannabis Cultivation* (Policy). In accordance with the Health and Safety Code, the State Water Board submitted the Policy for independent external scientific peer review and the peer reviewers determined that the Policy is based on sound science. The Draft Cannabis Cultivation Policy Staff Report (Staff Report) was also provided to the reviewers as the supporting document for the Policy. As such, no significant changes were needed to the Policy. However, additional information to clarify and support the principles and guidelines (Requirements) in the Policy was added to the Cannabis Policy Staff Report as discussed in the responses to comments below. In addition to those responses, while not required, State Water Board staff has developed responses to minor comments and questions raised by the peer reviewers.

BACKGROUND

The Policy includes interim principles and guidelines (requirements) for cannabis cultivation. This is the State Water Board's interim Policy, which is necessary to establish timely water quality and instream flow requirements for cannabis cultivation activities throughout California. It is anticipated the Policy will be updated over time to modify or add requirements to address cannabis cultivation impacts and incorporate more regional information. California Health and Safety Code, section 57004 requires that all California Environmental Protection Agency organizations submit for external peer review the scientific basis and scientific portion of all proposed policies, plans, and regulations. The State Water Board currently maintains a contract with the University of California to provide for independent peer reviews by outside scientific experts to meet these requirements. The University of California selected four experts (Table 1) with substantial experience in water quality, aquatic ecology, fisheries biology, instream flow development, hydrology, hydrologic modeling, and geology to review the Policy. State Water Board staff appreciates the time and effort the reviewers dedicated to developing insightful comments.

Table 1. Independent scientific peer reviewer names and affiliations.

Name	Affiliation
Thomas Ballesterio, Ph.D.	Associate Professor & Director UNH Stormwater Center University of New Hampshire
James A. Gore, Ph.D.	Professor (Retired) and Dean Emeritus College of Natural and Health Sciences University of Tampa
Joe Magner, Ph.D.	Research Professor Department of Bioproducts and Biosystems Engineering College of Science and Engineering University of Minnesota
Diane McKnight, Ph.D.	Professor and Director Center for Water, Earth Science and Technology Environmental Engineering Program College of Engineering and Applied Science University of Colorado Boulder

The California Health and Safety Code requires that the peer reviewers evaluate whether the scientific portions of the proposed rule are based upon sound scientific knowledge, methods, and practices. If the peer reviewers find that any scientific portion of a proposed regulation is not

based upon sound science then the reviewers are required to state those findings and the reasons for their conclusions. In this circumstance, the agency promulgating the regulation may either revise the scientific portion of the proposed rule or, if it disagrees with the finding, explain why the proposed rule is indeed based on sound scientific knowledge, methods, and practices.

For the peer review, State Water Board staff submitted the Policy, Staff Report, associated references, and a statement of scientific assumptions, findings, and conclusions (Table 2) on which the Policy are based. In addition, State Water Board staff requested that the peer reviewers identify whether, when taken as a whole, the scientific portion of the proposed Policy is based upon sound scientific knowledge, methods, and practices and also requested input on whether any additional scientific issues should have been included in the assessment.

Table 2. Summary of conclusions submitted for peer review

	Conclusion
1	The State Water Board developed the interim requirements contained in the Draft Policy to expeditiously address water diversions and waste discharges impacts associated with cannabis cultivation activities. <u>The requirements in Draft Policy Attachment A, Sections 1-4 will reduce water quality and water diversion impacts associated with cannabis cultivation.</u>
2	To expeditiously develop numeric instream flow requirements statewide, State Water Board used natural flow statistics developed by the United States Geological Survey (USGS) in collaboration with The Nature Conservancy and Trout Unlimited (USGS natural flow modeling approach). The USGS natural flow modeling approach used a peer-reviewed methodology to develop the flow statistics. <u>The USGS natural flow modeling approach used appropriate modeling inputs and R scripts, and the modeling outputs stored in the database predict the unimpaired flow statistics as intended.</u>
3	The State Water Board developed interim wet season numeric instream flow requirements throughout California using the Tessmann method. <u>The Tessmann method is an appropriate method to use to develop interim instream flow requirements in California, was applied correctly, and the Tessmann method spreadsheet calculator correctly calculated the wet season instream flow requirements.</u>
4	The State Water Board developed interim dry season groundwater low flow thresholds throughout California to inform the need for additional actions to address impacts from cannabis groundwater diversions. The State Water Board used the New England Aquatic Base Flow Standard (ABF Standard) method to develop the dry season groundwater low flow thresholds. The ABF Standard was slightly modified to only look at low flows when temperatures are high in the late summer period. <u>The ABF Standard is an appropriate method to use to develop interim groundwater low flow thresholds in California, modification to the ABF Standard is appropriate for California's climate and aquatic resources, the ABF Standard was applied correctly, and the ABF Standard spreadsheet calculator correctly calculated the dry season instream flow requirements.</u>

The peer reviewers completed their assessment of the science supporting the Policy and determined that all four conclusions are based upon sound scientific knowledge, methods, and practices. One reviewer did not agree with Conclusion 1. However, none of the reviewers identified any major additional scientific issues meriting assessment or a general lack of support for the overall science upon which the Policy is based. Therefore, State Water Board staff concludes that no significant revisions to the Policy are required. However, additional information to clarify and support the Requirements in the Policy was added to the Staff Report as discussed in the responses to peer review comments below. The peer reviewers also included a number of minor suggestions and questions; and while not legally required, staff provides the following responses organized around the four conclusions submitted for peer review.

RESPONSE TO PEER REVIEW COMMENTS

Letters from the four peer reviewers were received by the State Water Board on October 2, 2017. Comments within the peer review letters were identified and numbered using the name of the reviewer and labeled by subject. The comments received along with responses from the State Water Board are listed below by the pertinent conclusion or big picture question. After the response to comments, the final section includes statements from the peer reviewers that were in support of the Policy or one of its elements. Additionally there is a section for comments on typographical or editing errors that are noted, but do not require a response.

CONCLUSION 1:

The request for peer review included Conclusion 1 which reads:

“The State Water Board developed the interim requirements contained in the Draft Policy to expeditiously address water diversions and waste discharges impacts associated with cannabis cultivation activities. **The requirements in Draft Policy Attachment A, Sections 1-4 will reduce water quality and water diversion impacts associated with cannabis cultivation.**”

Overall Policy Comments

Comment 1

Ballestero: “First paragraph under Problem Statement indicates practices and consequences but provides no references or data.”

Response: *This comment refers to information in the peer review request letter, not in the Policy being reviewed.*

Comment 2

Ballestero: “It is not clear why the enterprises under the section Exemption for Indoor Cultivation Activities are exempt. Do they not require water withdrawals that potentially affect instream flows?”

Response: *The documents have been revised to make indoor cultivation activities no longer exempt. Those activities are required to obtain coverage under the Waiver of Waste Discharge Requirements contained within the General Order. However, the regulatory status addresses authorizations of waste discharges. Any activity that requires a diversion of surface water is also required to obtain a valid water right.*

Comment 3

Ballestero: “While competitive advantage control is a laudable objective, one would think that the penalties and other consequences are more importantly enforced to promote receiving water ecosystem characteristics: water flow, water quality, aquatic habitat, riparian habitat, wetlands, and springs. Additionally, that water use is not unreasonable.”

Response: *The purpose of the Policy is to ensure that the diversion of water and discharge of waste associated with cannabis cultivation does not have a negative impact on water quality, aquatic habitat, riparian habitat, wetlands, and springs. Compliance with the Policy is mandatory and enforcement action may be taken against cultivators who continue to grow cannabis in violation of state law and against cultivators who enroll in regulatory programs but fail to fully comply with the Requirements.*

*The State Water Board's authority to prevent waste, unreasonable use, unreasonable methods of use, unreasonable methods of diversion, and harm to public trust resources supports including all waters of the state within the scope of the Policy's diversion requirements. Article X, section 2 of the California Constitution provides that there can be no right to the waste or unreasonable use of water. Water Code section 275 authorizes the State Water Board to conduct necessary proceedings to prevent waste and unreasonable use. That authorization is not limited to enforcement proceedings; it includes any State Water Board adjudicatory or regulatory functions otherwise authorized by law, including but not limited to water resources planning under the Porter-Cologne Water Quality Control Act. (See *Light v. State Water Resources Control Board* (2014) 226 Cal.App.4th 1463, 1482-83, 1484.) Further, the State Water Board "has an affirmative duty to take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible." (State Water Resources Control Bd. Cases (2006) 136 Cal.App.4th 674, 777 [quoting *National Audubon Society v. Superior Court* (1983) 33 Cal.3d 419, 446].) As stated in the Policy and the Staff Report, in light of limited available water supply and the need for water to protect public trust resources, the State Water Board has determined that it is a waste and unreasonable use of water under Article X, section 2 of the California Constitution to: 1) divert or use water for cannabis cultivation in a manner inconsistent with this Policy, regardless of water right seniority; 2) to divert or use water for cannabis cultivation, where prohibited by State law, this Policy, on public lands, or on tribal land without authorization; and 3) overwater cannabis plants and cause runoff.*

Comment 4

Ballestero: "Table 3. Water Quality Contaminants and Percent Impairment in the Nine Policy Priority Regions. Note that for first three listed regions in this Table, Temperature is a major impairment. This is relevant because a hydrologic issue overlooked in the Policy and the Staff Report is that when groundwater diversions do replace surface water diversions, although there may be a zero net effect on watershed flow, temperature will be a casualty in the cold water fisheries: by leaving warmer surface water and removing groundwater base flows, logically the result will be warmer overall surface waters. In addition, groundwater discharge zones would be expected to shrink, potentially adversely affecting hyporheic fluxes."

Response: *The State Water Board agrees with the commenter that groundwater diversions can impact surface water temperature even when there is a near zero net effect on watershed flow. The Policy and Staff Report does not discuss localized surface water temperature impacts that may occur due to groundwater diversions. However, to address potential impacts of groundwater diversions on surface flow, the Policy includes a provision that allows the State Water Board to require a forbearance period or other measures for cannabis groundwater diversions in areas where such restrictions are necessary to protect instream flows. The State Water Board will*

monitor instream flows during the dry season and evaluate the number and location of cannabis groundwater diversions to determine whether imposition of a groundwater forbearance period or other measures are necessary. To address potential localized effects of groundwater diversions on surface water flow, the State Water Board will also monitor where significant numbers of surface water diverters are switching to groundwater diversions to evaluate whether imposition of a groundwater forbearance period or other measures are necessary.

Comment 5

Magner: “I respectfully disagree with [Conclusion 1] based on detailed comments presented for the Policy and Principles document (Attachment 5), and the Staff Report (Attachment 6).”

Response: *This is not a substantive comment. Specific responses to Dr. Magner’s comment can be found in other sections of this document where he provided more specific comments and concerns. In addition, peer reviewer Dr. McKnight agreed with the Conclusion 1 and Dr. McKnight’s comments can be viewed in the Supportive Comments section below.*

Comment 6

Magner: “Page 6 – “Water Code section 13149 authorizes the State Water Board to develop both interim and long-term requirements **and update them as necessary**. It is anticipated that the State Water Board will update this Policy **over time** to modify or add requirements to address cannabis cultivation impacts, as needed.”

What is the anticipated timeline for additional review? 2 years, 5 years? Might be important to set up an expectation for this to occur, to ensure that it does occur and pre-develop a means to track decisions and the concordant response.”

Response: *As noted in the draft Resolution for Item 6 (adoption of Policy) on the Board’s October 17, 2017 meeting agenda, State Water Board staff plan to continue to work with the California Department of Fish and Wildlife, California Department of Food and Agriculture, Regional Water Quality Control Boards, California Native American tribes, the regulated community, and other interested parties to evaluate and implement updates to the Policy’s Requirements, and will report back to the State Water Board in no less than two years regarding the Policy’s implementation and any updates thereto.*

Comment 7

Magner: “Are spring and wetland locations already known and recorded in ArcGIS? Given the ephemeral nature of these waterbodies, would there need to be better identification of these water body features to know where riparian setbacks are required and where cultivation cannot occur? Would this be part of the application review process?”

Response: *A limited number of spring and wetland locations are already known and recorded in ArcGIS. Cannabis cultivators are required to identify their water source when they apply for a cultivation license under California Department of Food and Agriculture’s (CDFA) CalCannabis Licensing Program. If they have a surface water diversion, including springs, they need to provide evidence to CDFA that for the spring*

they have either: 1) filed a Statement of Diversion and Use; 2) filed for a Cannabis Small Irrigation and Use Registration; 3) applied for an appropriative water right permit; or 4) submitted documentation to the State Water Board that they are claiming, pursuant to Business and Professions Code section 26060.1(a)(2)(A)(iv) or section 26060.1(a)(2)(B)(iii), that a spring or artesian well does not flow off their property by surface or subterranean (subsurface) means in the absence of diversion. If the cannabis cultivator is unsure of the appropriate setback they should consult with a qualified professional.

Comment 8

Magner: “It is this last point that I would like to highlight; every cannabis operation should have an annual review by a recognized expert to determine if a critical threshold of change has occurred that will adversely influence water quality and aquatic life.”

Response: : *Attachment A Section 5 of the Policy discusses the types of plans that cannabis cultivators are required to submit based on their Tier and risk categories. Additionally the Monitoring and Reporting Program for the General Order requires Annual Reports to be submitted annually to the Regional Water Quality Control Board the review. The Annual Report shall include the facility status (nitrogen application, winterization, etc.), site maintenance status (surface water runoff observations, sediment capture, stabilization of disturbed areas, etc.), and storm water runoff monitoring (pH and turbidity). In addition, State Water Board staff will conduct annual inspections of a subset of cannabis cultivation sites.*

Monitoring and Reporting Comments

Comment 9

Magner: “Page 27. 45 - Cannabis cultivators shall only divert water such that water does not scour the channel bed or banks at the downstream end. Cannabis cultivator shall divert flow in a manner that prevents turbidity, siltation, and pollution and provides flows to downstream reaches. Cannabis cultivators shall provide flows to downstream reaches during all times that the natural flow would have supported aquatic life. Flows shall be of sufficient quality and quantity, and of appropriate temperature to support fish and other aquatic life both above and below the diversion. Block netting and intake screens shall be sized to protect and prevent impacts to fish and wildlife.

This is a critical piece of the policy to ensure that aquatic life is protected from pollution, has sufficient flow, as well as securing a stable channel. Will cultivators know how to interpret this information? Would a training session be sufficient, or would this require a watershed consultant that is familiar with fluvial geomorphology, hydrology, and habitat quality? How will cultivators know if temperatures in waterbodies are appropriate above and below diversions? Will they or someone else be monitoring this? If not done already, these items should have more detail on how this is to be interpreted and who will be responsible for training, monitoring, and management.”

Response: *The referenced Requirement falls under the section regarding Temporary Watercourse Diversion and Dewatering: All Live Watercourses and is intended to apply to such activities. These activities would also require consultation with the California Department of Fish and Wildlife and, most likely, a Lake and Streambed*

Alteration Agreement. It is anticipated that such instream work would require the cannabis cultivator to hire a Qualified Professional. This condition was included as guidance as to what must be taken into consideration and what standards must be met during such work.

Comment 10

Magner: “How will cultivators know how to identify these aquatic features? Road crossings will likely occur in shallow areas that may be riffles and spawning areas for federally listed and endangered fish and other species. Will or should a professional be consulted when placing road crossings on streams?”

Magner: “Page 31 - 72. Cannabis cultivators shall ensure that all water diversion facilities are designed, constructed, and maintained so they do not prevent, impede, or tend to prevent the passing of fish, as defined by Fish and Game Code section 45, upstream or downstream, as required by Fish and Game Code section 5901. **This includes but is not limited to the supply of water at an appropriate depth, temperature, and velocity to facilitate upstream and downstream aquatic life movement and migration.** Cannabis cultivators shall allow sufficient water at all times to pass past the point of diversion to keep in good condition any fish that may be planted or exist below the point of diversion as defined by Fish and Game Code section 5937. Cannabis cultivators shall not divert water in a manner contrary to or inconsistent with these Requirements.

Again, similar question. How will cultivators know what is an appropriate depth, temperature, and velocity? A watershed consultant familiar with aquatic species requirements will likely be needed to ensure compliance.”

Response: *Attachment A of the Policy contains specific Requirements for Stream Crossing Installation and Maintenance, which includes requirements that require cannabis cultivators to obtain all applicable permits and approval prior to doing work in or around waterbodies or within riparian setbacks. Additionally, Requirement 48 (Requirement 49 in the draft Policy) requires cannabis cultivators to ensure that watercourse crossings are designed by a qualified professional.*

The condition referenced (depth, temperature, velocity) is consistent with existing code and general requirement necessary to support aquatic life. Cultivators may need to consult with qualified professionals in the development of their water diversion facilities depending on a variety of factors, including the location, watercourse type, species present, and diversion rate. Under its Lake and Streambed Alteration Agreement authority, or as part of its conditions of Small Irrigation and Use Registrations, the California Department of Fish and Wildlife may require additional conditions in streams with important aquatic resources, including threatened or endangered fish species.

Comment 11

Magner: “Page 39, 127. Cannabis cultivators shall implement all applicable Erosion Control and Soil Disposal and Spoils Management Requirements in addition to the Winterization Requirements below by November 15 of each year...how much attention will cultivators pay to this and implement winterization measures, especially on large tracts when it costs staff time and money in materials? Perhaps add a requirement that the cultivator will email when

winterization is completed along with photos of erosion control measures in place... Additionally, I would recommend staff visit all or a percentage of cultivation plots to see that winterization measures have indeed been completed as planned.”

Response: *The State Water Board and Regional Water Boards are tasked with performing investigations and performing enforcement when needed to compel compliance. The inspections will be both announced and unannounced. All sites, including personal use exempt sites are subject to inspection. However, it is anticipated that larger sites (Tier 1 and Tier 2) are more likely to be the sources of significant water quality degradation. Those sites are required to submit annual self-monitoring reports. Those reports, as well as all other technical reports, are submitted under penalty of perjury. If a cultivator is determined to have not submitted the report, submitted an incomplete or inaccurate report, or has falsified a report, they are subject to imposition of administrative civil liabilities (monetary fines) of \$1,000 per day. Additional enforcement requirements can also be imposed as appropriate.*

State Water Board and Regional Water Board staff will perform inspections of cannabis cultivation sites. But the inspections will not be limited to ensure winterization procedures are performed. They will also be used as means to review site layout, effectiveness of best practicable treatment or control measures, and to educate the regulated community. In addition, staff maintain contacts with local permitting agencies, regulatory agencies, and law enforcement that can provide additional information regarding site compliance status.

Dr. Magner’s suggestion regarding staff visits to verify winterization measures are complete is consistent with the requirements of the Policy. Cannabis cultivators that are enrolled under the General Order as Tier 1 and Tier 2 enrollees (Tier 2 for disturbed area larger than 1 acre) are required to submit a Site Management Plan, which describes how the enrollee is implementing the requirements of Attachment A. In addition, Tier 1 and Tier 2 enrollees are required to report winterization procedures implemented, including any outstanding measures with a schedule for completion in their annual report. Photographs are not required but can be provided by a cultivator. Regional Water Board Executive Officers have the authority to revise a monitoring and reporting program if they determine that photographs would be useful.

Comment 12

Magner: “Who will measure if redds are being adversely impacted?”

Response: *While redd management is not an explicit part of the Policy, the water quality conditions of the Policy are protective of aquatic organism health. The Fisheries Branch of the California Department of Fish and Wildlife compiles annual population counts of salmonids, which includes ground and aerial redd counts.*

Flow Requirements Comments

Comment 13

Ballestero: “Visual estimation of streamflow in order to comply with policy is not an accurate or reliable method to manage surface waters. In addition, no limiting size to stream or watershed is given for this metric. This 50% flow bypass metric seems entirely subjective.”

Response: *The State Water Board selected the 50% visual bypass requirement because half of the flow in a stream (as opposed to 20 percent, 40 percent, or some other percent of flow) is something that can be reasonably observed*

Comment 14

Ballestero: “Page 44, BACKGROUND AND RATIONALE FOR INSTREAM FLOW AND GAGING REQUIREMENTS, Diversion Rate Section. The maximum 10 gpm diversion at this juncture seems arbitrary and unsupported, especially since it seems to apply to all streams of any watershed size and climatic zone.”

Response: *The State Water Board is developed the Policy to establish interim requirements prior to January 1, 2018 that address the diversion of water and discharge of waste associated with cannabis cultivation. Due to the short timeframe, statewide scale, and interim nature of the Policy, State Water Board staff thinks a universal maximum diversion rate is appropriate.*

As noted in the Staff Report, the 10 gallons per minute (gpm) maximum diversion rate was developed in consultation with CDFW because it is not anticipated this rate will adversely affect the natural flows needed for forming and maintaining adequate channel structure and habitat for fish. Lower volume diversion rates can also reduce cumulative impacts that may occur when multiple water users are diverting at the same time. The maximum diversion rate set forth in the Policy will reduce the potential cumulative impacts of diversions and protect aquatic habitat and designated beneficial uses.

Comment 15

Magner: “Page 31 - 74. Water diversion facilities shall include satisfactory means for bypassing water to satisfy downstream prior rights and any requirements of policies for water quality control, water quality control plans, water quality certifications, waste discharge requirements, or other local, state or federal instream flow requirements. Cannabis cultivators shall not divert in a manner that results in injury to holders of legal downstream senior rights. Cannabis cultivators may be required to curtail diversions should diversion result in injury to holders of legal downstream senior water rights or interfere with maintenance of downstream instream flow requirements.

This seems to be a large responsibility to know and respond appropriately by individual cultivators. Will the State Water Board staff be responsible for oversight and ensure that the cultivators are collectively abiding by all federal, state, and local water use policies and restrictions? To me, this sounds like it will require some watershed wide oversight, such as a watershed wide water usage monitoring manager or a more comprehensive water management plan or agency.”

Response: *As noted in the Policy, the State Water Board holds dual mandates of allocating surface water rights and protecting water quality. Through its water rights mandate the State Water Board allocates water through an administrative system that is intended to maximize the beneficial uses of water while protecting the public trust, serving public interest, and preventing the waste and unreasonable use or method of diversion. If appropriate, the State Water Board may curtail diversions or take*

enforcement action to prevent injury to legal downstream senior water rights holders or to ensure instream flow requirements are met.

Comment 16

Magner: “Page 42- 4. Cannabis cultivators that divert water from a waterbody with an assigned compliance gage in Section 4 of this Policy **are required to ensure that the real-time daily average flow**, as published on a designated compliance gage website identified by the Deputy Director for Water Rights, **exceeds the minimum monthly instream flow Requirement at the cannabis cultivator’s assigned compliance gage. Cannabis cultivators shall verify and document compliance with the applicable Numeric Flow Requirement on a daily basis for each day of surface water diversion.**”

Will individual cultivators or consultants make daily observations and know how to interpret the gage information to make these decisions? Will there be training provided to cultivators on how to interpret and implement this part of the policy - as well as the many other areas of the policy? It may serve in their best interest to hire a watershed wide hydrologist to monitor, and keep records to ensure daily flow requirements and documentation. Training provided to individual cultivators before they receive permits. Perhaps suggest that collectively, the cultivators hire a consultant to assist in interpretation and implementation of all policy requirements, as well as advice on diversion times and other instream flow requirements.”

Response: *The State Water Board is developing a GIS based website that will allow a user to input an address or GPS coordinate to determine which gage they are assigned and what the instream flow requirement is for that gage. Included in the information will be a link to the previous day’s average measured flow to determine whether diversions are authorized or not. The State Water Board intends to have a website developed in the near future that will automatically calculate real-time flows and display using a green light/red light color schema or some other visual aid to assist the diverter’s with this requirement and associated compliance.*

Comment 17

Magner: “Page 42 - 5. In addition to Narrative Flow Requirement 4, at all times the cannabis cultivators shall bypass a minimum of 50 percent of the surface water flow past their point of diversion, as estimated based on visually observing surface water flow at least daily.”

How will this be managed and monitored? How will cultivators be able to interpret this 50% visual observance? Will one time a day be sufficient when multiple cultivators begin diversions on the same day? How will this be documented? Again, training for cultivators and their watershed consultants on how to implement and record observations. Photographs of the instream water conditions just at or downstream of their point of diversion.”

Response: *The minimum 50 percent of surface flow bypass requirement is in addition to meeting the assigned gage instream flow requirement. The intent of the 50% bypass requirement is to protect smaller, ungaged tributaries from substantial diversions of natural flow in the case that the assigned gage indicates that diversion is authorized on a given day. The Policy calls out a requirement that the Water Boards’ have the right to access properties for inspections. State Water Board staff will conduct periodic inspections of a subset of cannabis cultivation sites and water diversions.*

Comment 18

Magner: *“Page 43 - 7. The State Water Board has developed Numeric instream flow Requirements (minimum instream flow requirements) for each compliance gage in Section 4, Table 1 through Table 14, to ensure that individual and cumulative effects of water diversion and discharge associated with cannabis cultivation do not affect the instream flows needed for fish spawning, migration, and rearing, and the flows needed to maintain natural flow variability. If the individual and cumulative effects of diversions result in unanticipated impacts, however, the State Water Board may revise the narrative and/or numeric instream flow Requirements to better protect instream resources, habitat, and natural flow variability.*

Who will be reviewing the instream flow requirements? Adverse impacts of instream habitat and flow variability will likely occur – this looks like a research project for a graduate student?”

Magner: *“The Instream Flow Policy research also concluded that traditional agricultural diversions permitted to divert during the dry season would be reduced or ceased by October 1 of each year, which would further diminish the impacts from cannabis cultivation diversions occurring after this period. No sooner than November 1 was selected as the beginning of the diversion period for the Policy to allow time for:*

After reading several times, this paragraph is confusing. Are these two dates supposed to be the same (November 1) or what does October 1 mean and how is it different from “No sooner than November 1”? More clarification is needed here. Or, rather should October 1 be October 31 instead?”

Magner: *“Under future climate change scenarios and additional SW and GW usage during the winter, will the spring flushing flow still be adequate to maintain redds in these watersheds?”*

Response: *The Policy, including the narrative and numeric instream flow requirements, may be updated over time as reasonably necessary. Water Code section 13149 directs the State Water Board to develop interim principles and guidelines (requirements) pending the development of long-term requirements. The State Water Board will continuously monitor implementation of the Policy. It is anticipated that staff will formally report back to the State Water Board regarding implementation of the Policy and lessons learned, no later than two years after adoption of the Policy. It is further anticipated that the Policy requirements will be updated periodically as more information becomes available on the impacts of commercial cannabis cultivation, location of cannabis cultivation sites, and the source and amount of water used for cannabis cultivation. This structure allows the State Water Board to adaptively manage the Policy and address these issues as more information becomes available.*

The confusion between the October 1 and November 1 dates may relate to the differences between two separate policies discussed in the Staff Report. The Policy for Maintaining Stream Flows in Northern California Coast Streams is referenced in the Staff Report and includes a discussion noting that most flows that support channel and riparian maintenance flows occur after the first few fall storms, usually after October 1 and before March 31. The Cannabis Policy uses this information as support for a requirement that diversions may not commence from November 1 – December 14 until instream flows at the compliance gage are greater than the

November instream flow requirement for seven consecutive days.

Numeric Flows Comments

Comment 19

Magner: “Also, given that it will take time for a water usage restriction to be implemented, is there an alert system that can be developed to inform water users that a restriction has a high probability of occurring? For example, within 5-to-10% of the minimum flow threshold? This would allow cultivators time to plan and prepare for water use restrictions, as well as alert staff to be prepared to enter watersheds to ensure that the flow restrictions are being followed. How will these water use restrictions for junior users be enforced? Will senior users also yield to restrictions on their usage when other junior users are not complying with the restrictions?”

Response: *A diverter subject to the Policy is required to monitor their assigned compliance gage daily, when diverting, to ensure that average flows for the previous day are greater than the minimum instream bypass flows for that compliance gage. Typically flows are updated on each agency’s website in real time, minus a several hour lag. It is therefore possible that a diverter could monitor the flows throughout a given day to determine whether average daily flows for that day will be sufficient to allow for authorized diversion during the subsequent day. All surface water diversions for cannabis cultivation are subject to the requirements in the Policy unless expressly exempted by the Policy, regardless of water right seniority.*

Comment 20

Magner: “Page 45 - . . . ***The State Water Board is developing an online mapping tool to assist cannabis cultivators with determining which compliance gage applies to them and whether they may divert water.*** It is anticipated that the online mapping tool will allow cannabis cultivators to enter their address or otherwise locate their point of diversion to identify their assigned watershed compliance gage. ***The compliance gage assignments may change as more information becomes available. To ensure cannabis cultivators are reporting in accordance with the appropriate gage, the cannabis cultivator is required to check the website for their compliance gage assignment at least daily and prior to diverting water to ensure water is available to divert at that gage (i.e., the real-time daily average flow is greater than the Numeric Flow Requirement at the assigned compliance gage).***”

Will this online mapping tool be available before permits are being received and granted? It might be important for cultivators to view the current flow conditions in some of these watersheds. The tool would also allow permit reviewers to see if cultivators are in gaged watersheds, or alert the Deputy Director that there are cultivators that are interested in currently ungaged watersheds. The Deputy Director should be involved in the permitting process to determine if gage implementation is a conditional requirement that needs to be met prior to granting the permit. See comments referencing [Page 43-44](#) above.”

Response: *It is anticipated that the online mapping tool will be available prior to the issuance of Cannabis Small Irrigation Use Registrations. The Policy allows for the State Water Board to adaptively manage and implement the interim instream flow requirements by requiring cannabis cultivators to install a local instream flow gage and*

establish an interim instream flow requirement for those cannabis cultivators at that gage. Over time, this approach will help to ensure the monthly interim instream flow requirements are achieved in localized areas and also provide information to inform whether additional requirements are needed to protect instream flows (e.g., requirements to protect high flow events). The Policy also allows that cannabis cultivators may request approval from the State Water Board to install a local instream flow gage and an updated interim instream flow requirement for the local gage if the cultivators believe the assigned gage does not accurately represent the local conditions.

Groundwater Flows Comments

Comment 21

Magner: “Identifying watersheds upfront that are already experiencing unsustainable GW and or SW levels, either by climate change or by current usage, and limit or restrict permitting of additional users in those areas. Where additional users may be permitted, I would advise considering a phase-in approach using a lottery or other method to allow a certain number of permits or acreage to be in production per watershed in a given year. Monitor groundwater stage, stream flow, usage, and compliance with water use restrictions before additional cultivators or increase in cultivated acreage is allowed.”

Response: *All cannabis cultivators are required to divert water under the claim of a valid water right or a valid water right, whether it is an appropriative water right, Small Irrigation Use Registration, or pre-1914 water right. Water availability is reviewed during the water right application process regardless of the water right type. A water right will not be issued if it is determined that water is unavailable for diversion. Additionally, water rights are not issued to streams that have been adjudicated or are considered fully appropriated.*

The Sustainable Groundwater Management Act is currently being implemented statewide and is addressing groundwater levels and impacts from overdraft. The Policy was developed to prevent further impacts to surface water associated with groundwater diversions for cannabis cultivation.

The State Water Board will continuously monitor implementation of the Policy. It is anticipated that staff will formally report back to the State Water Board regarding implementation of the Policy and lessons learned, no later than two years after adoption of the Policy. It is further anticipated that the Policy requirements will be updated periodically as more information becomes available on the impacts of commercial cannabis cultivation, location of cannabis cultivation sites, and the source and amount of water used for cannabis cultivation.

Gaging Comments

Comment 22

Ballestero: “Attachment A Section 3. Gage Installation, Maintenance, and Operation Requirements, page 44. It may seem trivial, but “inspection” is not mentioned in this paragraph which covers operation and maintenance. Inspection must be clearly spelled-out and discussed in any O&M plan.”

Magner: “Pages 43 - 44 *The Deputy Director for Water Rights (Deputy Director) may require cannabis cultivators to install and operate a local telemetry gage in ungaged watersheds or localized watershed areas if the Deputy Director determines that use of the assigned compliance gage does not adequately protect instream flows or does not adequately represent the localized water demand. The Deputy Director may also require the installation and operation of a local telemetry gage in watersheds with no gage assignment if the Deputy Director determines that a gage is necessary to adequately protect instream flows.*

This is a good requirement. However, the policy as written does not specify when the gage should be installed. While there are many gages at the outflow of larger rivers, there appears to be many headwater sub-watersheds where there are no flow gages currently in place. The policy outlines the requirement for the producers to install gages within these headwater watersheds, when it is determined that one is needed. However, what is the required timeline for this to take place? Should this be a requirement to have gages installed and operating *before* clearcutting and other cultivation activities begin? I would suggest the Board make it a condition that *before* a permit is granted, that the gage is installed and operational. Require at least one year of monitoring to establish understanding for what allowance there maybe for additional SW and GW usage. The Deputy Director, as well the cultivators could use this time to understand how much water might be available for irrigation, and insure that they will not invest in a large undertaking before they estimate the probable water availability in an ungaged watershed.”

Response: *Water availability is reviewed during the water right application process regardless of the water right type. A water right will not be issued if it is determined that water is unavailable for diversion. Additionally, water rights are not issued to streams that have been adjudicated or are considered fully appropriated. The Policy limits the amount of water that can be diverted from a watershed for cannabis cultivation through a combination of instream flow and related requirements, including: visual bypass requirements at the point of diversion, numeric flow requirements during the wet (diversion) season, a forbearance period, and maximum diversion rate. Additionally, per the Policy, cannabis cultivators in ungaged watersheds (such as smaller tributaries) may be required to install a gage if information indicates that use of the assigned compliance gage does not adequately protect instream flows. The need to install additional gages will be evaluated as more information becomes available on the location and density of cannabis cultivation sites and the source and amount of water used for cannabis cultivation. Inspection of gages will primarily be done by licensed professionals under the operation and maintenance gage requirements, additionally the Policy allows the State Water Board to inspect a gage that is authorized under the Policy at any time.*

Water Quality Comments

Comment 23

Ballestero: “Page 31. BACKGROUND AND RATIONALE FOR POLICY REQUIREMENTS FOR WATER DIVERSION AND WASTE DISCHARGES ASSOCIATED WITH CANNABIS CULTIVATION. Section on Turbidity. Only sediment is discussed. Excess nutrient loads have the potential to increase algae and other plant species, also thereby affecting turbidity.”

Response: *Staff agrees with Dr. Ballestero's comments that the excess nutrient loading can affect turbidity through biostimulation. This section has been revised to incorporate Dr. Ballestero's suggestion.*

Comment 24

Magner: "The Staff Report (page 31) includes suggested application rates of fertilizer that is approximately 1.4 times plant uptake. This will mean that it is expected that at least 1/3 of the applied nitrogen will be more than plant uptake and be lost; mostly likely by leaching beyond the root zone where it may percolate to deep GW. That may amount to a large addition of nitrate-nitrogen to SW and GW which could lead to concerning levels for drinking water and human health and be detrimental to sensitive aquatic organisms, either indirectly by increasing aquatic plant production and lowering levels of dissolved oxygen or being directly toxic to sensitive species. What are the current standards for nitrate-nitrogen in SW and GW and does California have nutrient standards in development for protection of aquatic life in both warm and coldwater streams? What would an aquatic life nitrogen standard mean for future cannabis cultivation?"

Response: *Cannabis Policy and General Order limits the amount of nitrogen that can be applied to land, requires best practicable treatment or control measures to prevent leaching of nitrogen compounds to groundwater, prohibits discharge of irrigation water off-site, and requires a nitrogen management report for large cultivation sites.*

The comment implies that nitrogen is a conservative analyte; the Cannabis Policy, Staff Report, and General Order contain significant discussion of the various chemical forms of nitrogen and identify how all applied nitrogen is not either taken up by a crop or leached to groundwater. The fate and transport of nitrogen can be complex and influenced by several factors. The Cannabis Policy and General Order provide reasonable limits on the application of nitrogen so that it may be performed in a manner that allows cannabis cultivation and provides adequate water quality protections.

The Cannabis Policy and General Order prohibit surface water discharges and over application of nitrogen fertilizers that would result in leaching beyond the root zone and percolation to groundwater. The allowance of nitrogen application rate at 1.4 times crop uptake rate is the maximum allowed to compensate for the nitrogen that is not plant available, or lost through denitrification or ammonia volatilization. No increase beyond the limit stated is allowed unless the discharger submits a site-specific laboratory analysis of plant tissue demonstrating that the crop is nitrogen deficient.

Other requirements in the Policy provide additional protection of water quality that justifies the 1.4 application rate factor:

- a) *Tier 2 cannabis cultivators (with a cultivation area greater than one acre) are required to submit a Nitrogen Management Plan, which describes how nitrogen fertilizers and/or soil amendments are stored and applied to crops in a way that is protective of water quality.*
- b) *Tier 2 cultivators are required to monitor monthly and annual total nitrogen use from all sources (bulk, solid, and liquid forms). This reported amount will be*

compared to the allowances of 228 lbs/canopy acre/year. The requirement to apply by canopy acre is more conservative than lbs/acre/year because one canopy acre typically occupies more than one acre of land.

- c) In addition to the application rate limit, the following requirements related to fertilizer use are included in the Attachment A of the Cannabis Policy:
- To minimize infiltration and water quality degradation, Cannabis cultivators shall only irrigate and apply fertilizers to cannabis cultivation areas consistent with crop need (i.e. agronomic rate). Agronomic rate is defined in the Cannabis Policy as: “The rate of application of irrigation water and nutrients to plants necessary to satisfy the plants’ evapotranspiration requirements and growth needs and minimize the movement of nutrients below the plants root zone. The agronomic rate considers allowances for supplemental water (e.g., effective precipitation), irrigation distribution uniformity, nutrients present in irrigation water, leaching requirement, and plant available nitrogen.
 - Cannabis cultivators shall ensure that potting soil or soil amendments, when not in use, are placed and stored with covers, when needed, to protect from rainfall and erosion, to prevent discharge to waters of the state, and to minimize leaching of waste constituents into groundwater.

Comment 25

Magner: “Nitrogen also contributes to plant growth in aquatic species. When plants die, decomposition uses up dissolved oxygen in streams which may create low-diel dissolved oxygen levels that are stressful to aquatic organisms. From the Staff Report, there appears to be several streams already impaired for dissolved oxygen. Given reduced flows at certain times of the year, there will likely be problems. The USEPA encourages states to develop numeric nutrient criteria to be protective for aquatic life. What is California’s timeline for development of these criteria for phosphorus and nitrate-nitrogen for warm and coldwater streams and rivers? What are the current background levels for SW and GW for areas that already have land application of nitrogen sources? (e.g., manure, fertilizers, etc.)”

Response: *Each Regional Water Board has the authority to develop a water body specific criteria for phosphorous and nitrate-nitrogen for warm and coldwater streams and rivers. Only some waters have been assigned nitrogen or phosphorous criteria. The list can be searched and sorted. <https://www.epa.gov/nutrient-policy-data/state-progress-toward-developing-numeric-nutrient-water-quality-criteria>.*

Regardless of nutrient standards adopted, the Cannabis Policy and General Order prohibit surface water discharge via overland flow, and limits the potential discharge of nitrogen to groundwater. Any baseflow component (groundwater discharged to surface water) in surface water that originated below a small cannabis cultivation site would be a minor contributor to the surface water flow (even in those surface waters that are entirely dependent on baseflow), and therefore is unlikely to significantly impact ambient surface water quality. The Cannabis Policy and General Order have sufficient requirements to protect water quality; therefore, an aquatic life nitrogen standard is unlikely to have a significant effect on future cannabis cultivation (for cultivators that comply with the requirements).

Comment 26

Magner: “With increased corn production in Minnesota, nitrogen applied fertilizer increased to meet crop demand. Minnesota has communities with GW and SW nitrate levels far exceeding safe drinking water standards (10 mg/l nitrate-nitrogen)... Additional research on more productive timing and amount of nitrogen fertilizers should be performed using research plots. Maintaining deep rooted perennials will help to utilize excess applied nitrogen during the non-cannabis growing season.”

Response: *California has similar experience with irrigated agriculture, over application of nitrogen containing fertilizers has degraded ground water quality. The degradation resulted from significant over application of nitrogen. The Cannabis Policy and General Order limits the application to prevent significant groundwater degradation.*

Because cannabis cultivation remains illegal under federal law, there is limited information on the nitrogen crop uptake rate. The normal sources of information such as universities, federal agencies, etc., have avoided funding research concerned such research might put federal grants in jeopardy. As a result, only one reliable source of information regarding nitrogen crop uptake rate was located and it was used to establish the current limits. It is anticipated that after the year 2023, when the one acre cultivation area limit expires, industry is likely to sponsor agronomic studies as a means to maximize production and protect water quality.

Water Rights Comments

Comment 27

Magner: “Given the already sensitive status of California stream and GW availability, how will additional permitting reviews and permit issuance be managed? Are there areas where GW and SW sensitivity will mean there will be no opportunities for additional GW and SW extraction for cannabis irrigation? Will there be enough staff to handle both application review and overseeing usage? It appears to me that the private sector will be needed to help this effort run smoothly.”

Response: *All cannabis cultivators are required to divert water under the claim of a valid water right or a valid water right, whether it is an appropriative water right, Small Irrigation Use Registration, or pre-1914 water right. Water availability is reviewed during the water right application process regardless of the water right type.*

The Policy limits the amount of water that can be diverted from a watershed for cannabis cultivation through a combination of instream flow and related requirements, including: visual bypass requirements at the point of diversion, numeric flow requirements during the wet (diversion) season, a forbearance period, and maximum diversion rate. Additionally, per the Policy, cannabis cultivators in ungaged watersheds (such as smaller tributaries) may be required to install a gage if information indicates that use of the assigned compliance gage does not adequately protect instream flows.

The State Water Board has been provided additional staffing to address the implementation of the Cannabis Policy and the Cannabis Small Irrigation and Use

Registration Program (Cannabis SIUR Program). Staff resources are limited, but the Cannabis SIUR Program is structured to streamline the application process and focus resources on compliance inspections. It is anticipated a subset of cannabis cultivators will be inspected annually, as resources allow.

The State Water Board will continuously monitor implementation of the Policy. It is anticipated that staff will formally report back to the State Water Board regarding implementation of the Policy and lessons learned, no later than two years after adoption of the Policy. It is further anticipated that the Cannabis Policy Requirements will be updated periodically as more information becomes available on the impacts of commercial cannabis cultivation, location of cannabis cultivation sites, and the source and amount of water used for cannabis cultivation.

CONCLUSION 2

The request for peer review included Conclusion 2 which reads:

“To expeditiously develop numeric instream flow requirements statewide, State Water Board used natural flow statistics developed by the United States Geological Survey (USGS) in collaboration with The Nature Conservancy and Trout Unlimited (USGS natural flow modeling approach). The USGS natural flow modeling approach used a peer-reviewed methodology to develop the flow statistics. **The USGS natural flow modeling approach used appropriate modeling inputs and R scripts, and the modeling outputs stored in the database predict the unimpaired flow statistics as intended.**”

Comment 28

Gore: “Assuming that the USGS model to estimate natural flows is sufficient for the state of California, then the State Water Board report indicates an adequate application of the Tessman method has been achieved and I believe that the minimum flows predicted by the method adequate, on an *interim* basis. The operative word in this rule is “*interim*” and should not be considered to be adequate for a final minimum flow allocation as it does not link biological requirements of target species to the flows as they exist, even when a wetted perimeter is maintained.”

Gore: “I suggest that the State Water Board consider a building-block approach (Postel and Richter 2003), that attempts to partition the water year into identifiable habitat blocks (for example, wetted perimeter, targeted spawning requirements, floodplain inundation, etc.) (Gore et al. 2016). This method creates an integrated approach to maximizing water availability yet retaining a natural hydrograph and ecological integrity.”

Response: *Water Code section 13149 directs the State Water Board to develop interim Principles and Guidelines (requirements) pending the development of long-term requirements. For the development of long-term instream flow requirements, the State Water Board, in consultation with CDFW, will have the time and resources to further evaluate other scientifically robust methods that may be more reflective of regional variability and the needs of target species. The State Water Board is aware of the building-block approach and will evaluate the approach during the development of long-term instream flow requirements.*

Comment 29

Gore: “As an additional analysis to the existing *interim* methodology and recommendation, State Water Board may want to consider a *stop-gap* analysis to address at least some biological criteria; that is, by assuring that connectivity is maintained to ensure the ability of likely target species to move upstream or downstream over the course of a year. The State Water Board report acknowledges that this is a concern, even on an interim basis. I suggest that State Water Board may want to consider analyzing flow records to maintain fish passage depth criteria, generally considered to be 0.6 ft, for salmonid species (Thompson 1972; Hupalo *et al.* 1994).”

Response: *To meet the timeline, scale, and purpose of this Policy, the State Water Board, in consultation with CDFW, has determined that the Tessmann Method is the best methodology to develop interim instream flow requirements. For the development of long-term instream flow requirements, the State Water Board, in consultation with CDFW, will evaluate other scientifically robust methods that are more reflective of regional variability and the needs of target species. Correlating flow records to stream water depths is beyond the scope of a desktop interim method of setting minimum instream flows for such large hydrographic regions and would likely require site specific field studies to achieve. The State Water Board may consider such methods as suggested in the development of the long-term instream flow requirements.*

Comment 30

Gore: “Regardless of the choice of habitat model, the State Water Board should also consider carefully, the appropriate benchmark time period. In my opinion, it is no longer appropriate to choose the previous 20-years as the period of record for analysis (even to include the “natural flow statistic” already described by the State Water Board in item 2 (above). Analysis of longer periods of record, encompassing multi-decadal shifts in weather pattern will provide the most effective representation of natural flows. These analyses will have significant affect upon time-series analysis of habitat availability and significant ecological harm.”

Response: *The instream flow requirements produced by the State Water Board were calculated from 65 years of historical predicted natural flows. The minimum period of record for gages used in developing the United States Geological Survey and The Nature Conservancy (USGS/TNC) predicted natural flow model was at least 20 years with an average historic record for reference gages of approximately 40 years based on calculations of data obtained by the State Water Board from USGS/TNC. Based on suggestions from public comments received, the State Water Board performed an error analysis using a subset of up to 4 reference gages per each cannabis policy region to inform whether long term mean monthly and mean annual flow calculations based on the monthly natural flow predictions made by the model were accurate. Observed over expected values were calculated for each of the five months during the diversion season and for the mean annual flow value. Please refer to the State Water Board’s response to public comments for details on this error analysis.*

Comment 31

Gore: “I suggest that the creation of the natural flow statistic described in the report make assurances that long-term precipitation cycles also be incorporated.”

McKnight: “There may be changes over time that are related to shifts in vegetation or other watershed characteristics due to steady changes in climate. It may be worthwhile in the future to evaluate the USGS natural flow modeling approach for any issues of non-stationarity. Given the flexibility of approach, these issues could be addressed potentially by modifying the temporal span of flow records considered to put less weight on earlier records for example.”

Magner: “**The USGS natural flow modeling approach used appropriate modeling inputs and R Scripts and the modeling outputs stored in the database predict the unimpaired flow statistics as intended.** True, but this method does not account for climate change.”

Response: *The State Water Board’s use of USGS/TNC predicted natural flow data will be used for the interim instream flow requirements. In the development of long-term instream flow requirements, the State Water Board, in consultation with CDFW, will have the time and resources to further evaluate other scientifically robust methods that may be more reflective of regional variability and the needs of target species. The Policy, including the narrative and numeric Instream Flow Requirements, may be updated over time as reasonably necessary. Water Code section 13149 directs the State Water Board to develop interim principles and guidelines (Requirements) pending the development of long-term requirements. The State Water Board will continuously monitor implementation of the Policy. It is anticipated that the Cannabis Policy Requirements will be updated periodically as more information becomes available on the impacts of commercial cannabis cultivation, location of cannabis cultivation sites, and the source and amount of water used for cannabis cultivation. This structure allows the State Water Board to adaptively manage the Policy and its Requirements and allows stakeholders to participate and propose changes to the Requirements. This structure also allows the State Water Board to address changes to climate change.*

CONCLUSION 3

The request for peer review included Conclusion 3 which reads:

“The State Water Board developed interim wet season numeric instream flow requirements throughout California using the Tessmann method. **The Tessmann method is an appropriate method to use to develop interim instream flow requirements in California, was applied correctly, and the Tessmann method spreadsheet calculator correctly calculated the wet season instream flow requirements.**”

Comment 32

Ballestero: “Attachment A Section 3.7, page 43. “*The State Water Board has developed Numeric instream flow Requirements (minimum instream flow requirements) for each compliance gage in Section 4, Table 1 through Table 14, to ensure that individual and cumulative effects of water diversion and discharge associated with cannabis cultivation do not affect the instream flows needed for fish spawning, migration, and rearing, and the flows*

needed to maintain natural flow variability...”

Where is the technical support for this paragraph? There are no references, citations, etc. to direct the reader to the technical basis for Requirements or the developed values.”

Response: *The technical support for all of the Policy Requirements were provided to the reviewers in the Staff Report. The technical support in the Staff Report for Attachment A Section 3.7, page 43 is summarized here.*

The numeric instream flow Requirements developed by the State Water Board are based on the Tessmann methodology of determining minimum instream flow or bypass requirements. The Tessmann Method is a common modification of the Tennant Method to adjust for watersheds with more varying seasonality or flashy stream systems than those tested in developing the Tennant Method. The Tennant Method was tested through detailed field studies conducted on 11 stream systems in three states between 1964 and 1974. The work involved “physical, chemical, and biological analyses of 38 different flows at 50 cross sections on 196 stream miles, affecting both coldwater and warmwater fisheries.” Based upon his studies, Tennant came to the conclusion that for the months of April through September a flow standard that was calculated at 60% of the mean annual flow would provide for excellent to outstanding habitat for most aquatic life forms during primary periods of growth, additionally supporting the majority of recreational uses while a flow standard that was calculated at 40% of the mean annual flow for the months of October through March would result in similar excellent to outstanding habitat conditions. In California, during the wet season of October through March, the Tessmann method generally sets the minimum instream flow requirements to 40% of mean annual flow or greater. The monthly variability that the Tessmann Method produces maintains the flows needed for intra-annual natural flow variability on a monthly timestep. The Tessmann Method and the USGS flow modeling data allow for instream flow requirements to be calculated at additional compliance points throughout the state. This Policy allows the State Water Board to use the Tessmann Method and the USGS flow modeling data to calculate or adjust a flow requirement, as needed, throughout the State.

In addition, the Policy, including the narrative and numeric Instream Flow Requirements, may be updated over time as reasonably necessary. Water Code section 13149 directs the State Water Board to develop interim principles and guidelines (Requirements) pending the development of long-term requirements. The State Water Board will continuously monitor implementation of the Policy. The State Water Board, in consultation with CDFW, will evaluate other scientifically robust methods that are more reflective of regional variability and the needs of target species for the development of long-term instream flow requirements.

Comment 33

Magner: “Yes – but epistemic uncertainty about future climate, may negate the usefulness of the tool. “The Tessmann Method develops instream flow requirements by using percentages of historical mean annual and mean monthly natural streamflow”. The fundamental problem is “natural” for the future does not exist! For future management of watersheds and specifically cannabis cultivation, anthropogenic and paleoclimatic cycles make historic “natural” irrelevant in California and many other locations across the globe e.g., India. The tool should still be applied, but must have professional judgement and interpretation that acknowledges climate

extremes into management decisions.”

Response: *The Policy, including the narrative and numeric Instream Flow Requirements, may be updated over time as reasonably necessary. Water Code section 13149 directs the State Water Board to develop interim principles and guidelines (Requirements) pending the development of long-term requirements. The State Water Board will continuously monitor implementation of the Policy. It is anticipated that staff will formally report back to the State Water Board regarding implementation of the Policy and lessons learned, no later than two years after adoption of the Policy. It is further anticipated that the Cannabis Policy Requirements will be updated periodically as more information becomes available on the impacts of commercial cannabis cultivation, location of cannabis cultivation sites, and the source and amount of water used for cannabis cultivation. This structure allows the State Water Board to adaptively manage the Policy and its Requirements and allows stakeholders to participate and propose changes to the Requirements. It also allows the State Water Board to address future anthropogenic and paleoclimatic cycles.*

CONCLUSION 4

“The State Water Board developed interim dry season groundwater low flow thresholds throughout California to inform the need for additional actions to address impacts from cannabis groundwater diversions. The State Water Board used the New England Aquatic Base Flow Standard (ABF Standard) method to develop the dry season groundwater low flow thresholds. The ABF Standard was slightly modified to only look at low flows when temperatures are high in the late summer period. **The ABF Standard is an appropriate method to use to develop interim groundwater low flow thresholds in California, modification to the ABF Standard is appropriate for California's climate and aquatic resources, the ABF Standard was applied correctly, and the ABF Standard spreadsheet calculator correctly calculated the dry season instream flow requirements.**”

Comment 34

Ballestero: “What is not clear is how the Groundwater Instream Flow Requirements in the same Table 1 were developed. No mention of groundwater appears in the Policy for Maintaining Stream Flows in Northern California Coastal Streams (Instream Flow Policy) (State Water Board 2014). In the North Coast Instream Flow Policy (R2 Resource Consultants, Inc. and Stetson Engineers, Inc., 2007), the study specifically ignored groundwater pumping: “...does not consider the indirect effects of shifting water extraction from surface water diversion to alternate sources, such as groundwater pumping...” The Carlisle paper (Carlisle, D.M., Wolock, D.M., Howard, J.K., Grantham, T.E., Fesenmyer, Kurt, and Wiczorek, Michael, 2016) was the methodology employed to develop mean monthly flows from which the CA ABF flows were derived, but this document also does not address groundwater diversions and how they affect stream flows. Existing groundwater diversions are most likely built into the Carlisle model; however the model does not predict surface water reductions as a result of future groundwater diversions or switching from surface water to groundwater diversion.”

Ballestero: “Given the original vagueness on the technical aspects of how groundwater diversion thresholds were developed, the adaptive strategy is also thin on details. For

example, What type of data infers the need to modify the proposed Rule? No documentation was supplied to support the logic behind future adaptations.”

Ballestero: “In addition, up until this point of the Rule, there is no clear rational demonstrated for the Groundwater Low Flow Threshold.”

Ballestero: “The details of the Groundwater Low Flow Threshold need to be presented and supported.”

Response: *The Cannabis Policy includes requirements for groundwater diversions including a surface water aquatic base flow to help inform whether additional requirements are needed in certain areas to help ensure the individual and cumulative impacts of groundwater diversions do not have a negative impact on the surface water flows needed to support aquatic habitat. The Aquatic Base Flow standard setting method uses the limiting factors concept with the assumption that the median of the historical mean monthly flow of the lowest flowing month roughly represents the natural limiting period because of high stream temperatures and diminished living space, dissolved oxygen and food supply. If streamflow falls below the Aquatic Base Flow as calculated, it could be an indicator that excessive diversions are taking place in the watershed and groundwater diversions may be contributing to the low stream flows.*

The State Water Board has reasonably concluded, based on studies and other evidence in the record, that groundwater extractions that cause surface water flows to fall below the aquatic base flow requirements described in the Policy constitute an unreasonable use and unreasonable method of diversion. On that basis, the Policy includes authority for the State Water Board to: (1) examine whether groundwater diversions within a watershed are causing surface water flows to fall below the aquatic base flow requirements; and (2) impose forbearance or other requirements on those groundwater users. The Cannabis Policy is structured to allow for the State Water Board to evaluate whether, in certain locations, there are a significant number of groundwater diversions or locations where significant numbers of surface water diverters are switching to groundwater diversions and those groundwater diversions have the potential to have negative localized impact on surface flows. The Cannabis Policy discusses this structure along with monitoring whether the aquatic base flow is being met, the State Water Board will evaluate whether localized impacts are occurring from the density and demand of cannabis groundwater diversions and/or whether a significant number of surface water diverters are switching to groundwater diversions.

Comment 35

Ballestero: “No documentation was presented to clearly follow how the groundwater diversion thresholds were established and why they vary compared to the surface water diversion values. Additionally, no evidence was provided to support the general lag between groundwater diversion and the effect in nearby streams.”

Ballestero: “In other words, the groundwater pumping period, for use as a water management strategy, is variable to each groundwater withdrawal and its site specific hydrologic relation to each compliance gage. There is no supporting analysis to reveal how the groundwater threshold flows were determined other than to say the NE ABF method was

used, which is curious because the NE ABF describes surface water flow: diversions are then regulated in order to meet the ABF. Exactly what was performed to yield the ultimate threshold flows is unknown.”

Ballestero: “Attachment A Section 3.8, page 43. *“This Policy establishes a low flow threshold, calculated by applying the New England Aquatic Base Flow Standard, as one mechanism to help monitor whether groundwater diverters are having a cumulative negative impact on surface flows.”*

As with the previous comment, it is not evident upon which reports, documents, etc. the groundwater diversion flows are developed.”

Ballestero: “Page 50 Low Flow Thresholds. There simply is not sufficient detail to understand how the NE ABF method was used to ultimately develop the specified groundwater low flow thresholds in Policy Attachment A, Section 4: “Watershed Compliance Gage Assignments.”

Magner: “Yes – but epistemic uncertainty about future climate, may negate the usefulness of the tool. Further, the SW-GW exchange relationship understanding in most headwater watersheds is poorly understood at best. I have spent over two decades exploring SW-GW exchange in different hydrogeologic settings; the more sites I have examined the more I’m convinced that simple models are helpful but always wrong. Heterogeneity most often drives the unique interplay of water exchange both temporally and spatially. The bottom line: a professional trained in SW-GW exchange will need to guide acceptable land use actions above and beyond the use of ABF.”

Response: *The technical support for all of the Policy Requirements were provided to the reviewers in the Staff Report Methodology for Development of Dry Season Aquatic Base Flow Values section and is summarized here.*

The groundwater diversion threshold, referred to as aquatic base flow in the Policy, is based on a modification to the New England Aquatic Base Flow standard setting methodology (ABF method). Individual flow requirements are calculated from the median of the historical mean monthly predicted natural flow of the lowest flowing month with a predicted mean monthly natural flow greater than 1.0 cubic feet per second (cfs) during the forbearance period, as described in detail in the Staff Report. The ABF method does not evaluate the general lag time between groundwater diversions and their effect on surface flows. The Aquatic Base Flow values calculated using the ABF method are being used to evaluate instream conditions during the dry season to evaluate whether groundwater diversions may be a contributing factor in affecting instream flows needed for aquatic resources.

Comment 36

Ballestero: “Attachment A Section 4. Tables 1, 2. The ABF method was developed using USGS streamgages with drainage areas of 50 mi² or greater. Gage drainage areas should appear in these tables.”

Response: *The Cannabis Policy Attachment A has been modified to include drainage areas in the tables as suggested.*

Comment 37

Ballestero: “What is missing is the fundamental data for each Compliance gage (monthly flow probability distributions, monthly flow statistics, etc.) from which the ISF and groundwater thresholds are developed. The methodology that is described is technically sound for the ISF and surface water diversion Policy. The groundwater low flow thresholds of Policy Attachment A, Section 4: “Watershed Compliance Gage Assignments remain a mystery in the Staff Report.”

Response: *Monthly flow statistics can be found in the data produced by the USGS/TNC model for predicting natural stream flows. Monthly flow probability distributions were not utilized by the State Water Board in the development of the flow requirements. See also **Responses to Comments 34 and 35.***

BIG PICTURE

“Reviewers are not limited to addressing only the specific conclusions presented above, and are asked to contemplate the following “Big Picture” questions:

- **In reading the Policy and Staff Report, are there any additional scientific conclusions that should be a part of the scientific portion of the proposed Policy that are not described above?**
- **Taken as a whole, is the scientific portion of the Policy based upon sound scientific knowledge, methods, and practices?”**

COMMENTS

Comment 38

Magner: “Should there be one Comprehensive California water policy that considers cumulative effects?”

Magner: “Should cannabis cultivation be allowed in watersheds with currently impaired waterbodies, streams with federally listed species, and dewatered streams? Could clean up of these waters be incentivized by requiring a certain amount of rehabilitation/restoration to take place prior to permitting?”

Response: *Impaired water bodies are subject to Clean Water Act section 303d listing and total maximum daily load (TMDL) implementation plans. If an implementation plan identifies cannabis cultivation as a significant load, the Cannabis Policy and General Order can be revised to address the implementation plan. To date, a TMDL addressing cannabis cultivation has not been adopted. However, some Regional Water Boards have adopted TMDLs addressing activities that are consistent with cannabis cultivation. Those TMDLs are described in the General Order. As a result, property owners in the North Coast Regional Water Board jurisdictional area are required to investigate and remediate legacy issues that may not be related to the cannabis cultivation activities. By imposing the list of best practicable treatment or controls the activity’s risk to water quality is limited and water quality is protected.*

Comment 39

Magner: “Will there be enough Water Board staff to handle permit applications, training, and enforcement of these policies? Will inspectors have the level of expertise and training required to know how to identify each area of non-compliance and know who to contact when non-compliance issues come up, the multiple agencies involved in the management of soil, water usage, endangered species habitat, etc? Will cultivators diligently monitor all parcels to ensure that measures installed to be protective of water quality are still operating or will replace if needed? (e.g., erosion control measures, proper waste disposal, pesticide and fertilizer storage, winterization measures are sufficiently working after large rain events). Should the private sector have a key role – such as Watershed Service Providers – similar to Technical Service Provider for conservation practices?”

Response: *The State and Regional Water Boards have been provided additional staffing to address the implementation of the Cannabis Policy. However, resources are limited. The State and Regional Water Boards will prioritize their activities and employ various technologies (geographic information systems; aerial photography interpretation; data collected in other programs such as non-point source, irrigated lands, storm water, or forestry; and coordinated regulation with state and local officials and law enforcement to leverage the resources to maximize the effectiveness of inspections, enforcement, and protection of water quality.*

Although cannabis cultivation has only recently become a regulated industry in California, the cultivation activities and its associated discharges (e.g. agricultural activities, land development, road building and maintenance, forest land conversion) are waste discharge types that are familiar topics for regulatory programs and personnel. The State and Regional Water Boards hold regular meetings to ensure consistency and exchange ideas/experiences. Staff training is discussed and planned in those meetings. The California Water Code provides the authority needed by the State and Regional Water Boards to enforce the water quality protections.

Currently, approximately 1,400 cannabis cultivations operate under the existing Central Valley and North Coast Regional Water Board regulatory orders. The staff have also engaged in extensive outreach efforts to the regulated community. The Cannabis Policy and General Order allow cultivators to identify a representative for matters before the State or Regional Water Board. Third party programs are not included in the Cannabis Policy and General Order, similar to what was allowed under the Regional Water Board orders. Those third party programs were designed to assist the cultivators and the Regional Water Boards to enroll a large number of cultivators, relatively quickly. The Cannabis Policy and General Order approach negates the need for third party programs by providing an on-line application procedure. Delays in obtaining authorization are not expected

Comment 40

Magner: “What will happen if legal production of cannabis supply outpaces demand? Any market research to date on the anticipated demand and projected costs of legally grown cannabis? Would a phase in approach minimize effects of boom/bust economics and prevent large scale legacy issues with forest clearing and provide better protection of SW and GW water quality and quantity?”

Response: *California Department of Food and Agriculture administer and control the number of cannabis cultivation licenses issued. The State Water Board has limited authority over levels of cannabis production. However, if the State Water Board or CDFW finds, based on substantial evidence, that cannabis cultivation is causing significant adverse impacts on the environment in a watershed or other geographic area, CDFA shall not issue new licenses or increase the total number of plant identifiers within that watershed or area (Business and Professions Code section 26069 (c)(1)).*

EDITING

Editing comments are those that apply to grammatical, punctuation, or other issues with the proposed Policy that are not related to a substantive issue. There is no response for these comments, but it can be assumed that the errors have been corrected in the final Policy.

COMMENTS

Ballestero: “Page 10 , Surface Water Diversion Forbearance Period paragraph, third line from the bottom of the paragraph. “breeding ques”? Not clear what this is.

Page 10 after the text, “streamflow7” there is an extra period.

Page 15, fourth line, word missing, suggested text in italics, “... activity, and also present a lower *risk* to water quality...”

“Attachment A, page 6, Soil Materials. There seems to be an errant underscore prior to the first word in the definition.”

SUPPORTING COMMENTS

Ballestero

Conclusion 4

“The ABF Standard is an appropriate method to use to develop interim groundwater low flow thresholds in California, modification to the ABF Standard is appropriate for California's climate and aquatic resources, the ABF Standard was applied correctly, and the ABF Standard spreadsheet calculator correctly calculated the dry season instream flow requirements.”

Big Picture Questions

“Overall, very good scientific basis was employed to develop the instream flows identified in the Policy.”

Magner

Conclusion 1

*“Page 44 - Prior to October 31, during each water year of gage operation, an annual maintenance and operation summary report **prepared by a qualified professional**, as defined above in this Requirement, shall be submitted to the Division of Water Rights that includes, at a minimum: qualifications and names of entities responsible for maintenance and operation; maintenance activities or operational issues for the prior water year of operation; quality assured gage stage and flow data collected and analyzed for prior water year; **rating curves for prior and upcoming water year of operation**; data collected to establish rating curves for prior and upcoming water year of operation; and any anticipated maintenance plans or operational issues for the upcoming water year.*

Hiring a qualified professional to handle this area of the policy is a good requirement. This level of detail in reporting and creation of rating curves will require a high level of expertise.”

Big Picture Questions

“Overall impressions of the policy - The report does a good job of identifying potential issues foreseen with cannabis cultivation in California. The draft policy provides an expectation for cultivators to follow and suggested measures to prevent pollution and instream flow maintenance for protection of water quality and quantity. I appreciate the acknowledgement that California has a varied topography, climate, precipitation regime, and stream types, wherein different management needs and restrictions may be required. Further, I understand that the timeline for review and implementation of this policy is a short window for consideration of outside review comments and big picture concerns.”

McKnight

Conclusion 1

“Overall, the draft Policy takes a comprehensive, balanced and scientifically robust approach towards achieving the objectives of the Policy for reducing water quality and water diversion impacts due to cannabis cultivation in the State of California. At the same time, the draft Policy presents a sufficient and tractable level of detail in the draft measures and guidelines for practical implementation. The draft Policy addresses in an integrated manner the different ways in which cannabis cultivation can cause deleterious impacts on water quality and aquatic biota. Specifically, the draft Policy presents measures for mitigation of disturbance of stream ecosystems through excess sedimentation, restriction and mitigation of contaminant inputs, protection of riparian zones and maintenance of instream flows required for sustaining suitable aquatic habitats throughout the year. In addition, the draft Policy includes several specific measures to protect fish populations, such as the prohibition of instream impoundments for water storage. This integrated and holistic aspect of the Policy is an important overarching strength. My review supports Conclusion 1 as elaborated below.

The draft Policy is strongly based on the scientific understanding of the sustained impact of disturbance in structuring aquatic ecosystems. For stream ecosystems, the long-lasting effects of episodic inputs of large quantities of sediments are well-established. Throughout Sections 1 and 2 of Attachment A of the draft Policy, strategic measures are presented that

can be expected to limit or mitigate input of excess sediment and resulting turbid conditions in the adjacent and downstream habitats of vulnerable aquatic biota. These measures are to be applied for the construction phase of a cannabis cultivation projects and for their operation as well. For example, under General Requirements and Prohibitions, item no. 5 (pg. 9) land disturbance activities are prohibited during the period when most of the rainfall occurs in California, and these activities are restricted to the period from April 1 to November 15. Further, item no. 7 (pg. 10) requires the cannabis cultivator to monitor the weather forecast during land disturbance activities and cease such activities and implement erosion control measures if the forecast indicates a 50% or greater chance of rain. There are numerous other protective measures to limit sedimentation and streambed disturbance related to watercourse crossings, e.g. items no. 38-57 (pgs. 26-29), that are precise and practical to implement. Similarly, item no. 60 (pg.29) protects stream habitats by requiring storage of erodible soils and soil amendments in a secure manner. Finally, the measures related to winterization, items no. 127-135 (pgs. 39-40) are also likely mitigate excess erosion and sedimentation. Taken as a whole, these requirements can be expected to avoid large episodic inputs of sediments and contribute in a major way to achieving the objectives of the draft Policy.

In addition to problems associated with turbidity and sedimentation, the draft Policy identifies excess nutrients, fertilizers, pesticides, and petroleum products as contaminants of concern. This selection of contaminants of concern are based on a well-established findings in stream ecology...

In addition to the strong scientific justification for focusing on the draft set of water quality contaminants (pgs. 28-33 of the Staff Report), the section on water quality impairment in the Overview of Policy Regions of the Staff Report presents definitive information on the current status of the percent of area impaired with respect to a given water quality contaminant. The potential for expanding cannabis cultivation to impact water quality in the Priority Regions without regulatory measures is evident by the existence of impaired conditions in 10-27% of the area for both nutrients and pesticides for more than half of the Priority Regions. Clearly, a balanced approach that mitigates both sediment impacts and water quality impacts is warranted. The requirements of the draft Policy include several specific measures that can be expected to limit contaminant inputs, e.g. items no. 106-108 (pg. 36).

The consistency of the requirements in the draft Policy to limit and mitigate sediment inputs are also reflected in the protections for riparian zones in the Sections 1 and 2 of Attachment A of the draft Policy. In addition to mitigating sediment inputs, riparian zone vegetation can contribute to stream health by regulating temperature through shading and by providing a source of allochthonous coarse particulate organic matter (e.g. leaf litter) that serve as a food resource for benthic invertebrates and other prey for fish populations. The “goods and services” provided by riparian zones are protected in the draft Policy by establishing clear riparian setbacks, for example...

Appendix 2 of the Staff Report clearly describes the life histories of the salmonids to be protected by the Policy. The strong scientific basis for these concerns associated with the summer low flows and dewatering that have been caused by cannabis cultivation and the thorough documentation of salmonid life histories work together to establish a robust scientific basis for the restriction of water diversions for cannabis cultivation during the low-flow period.”

Big Picture Questions

“In my opinion, the scientific portion of the draft Policy is based on well-established scientific

understanding of stream ecology and on relationships climate, landscape characteristics and hydrology.”