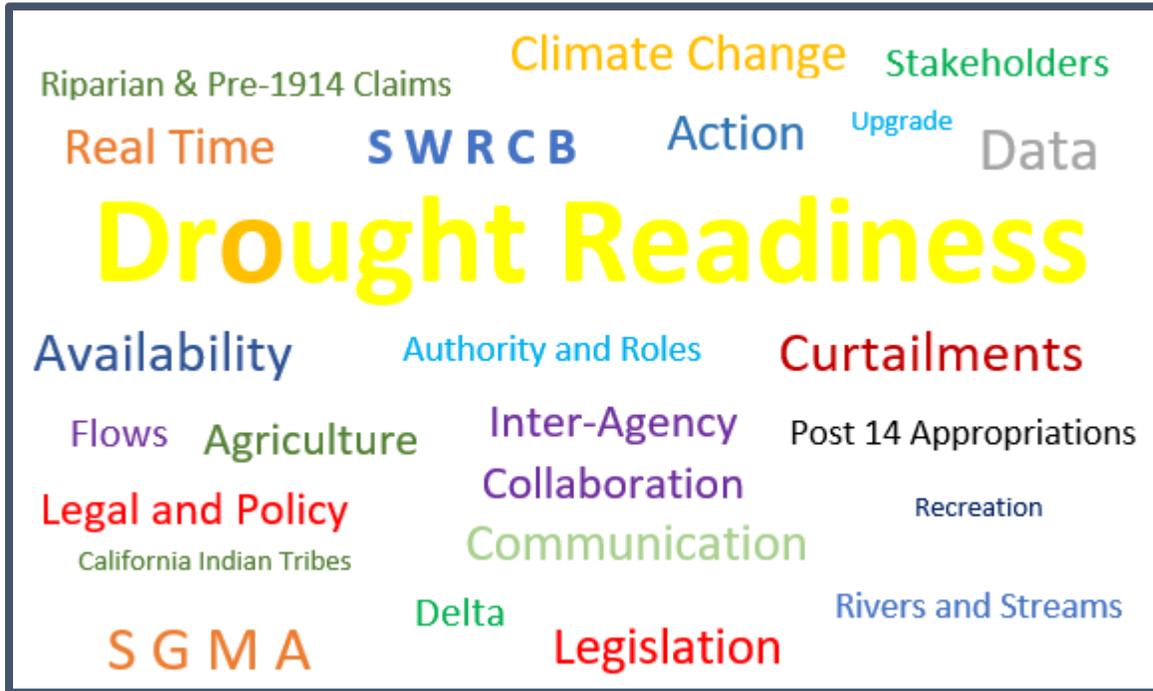


Water Rights Drought Effort Review

A Compilation of Stakeholder Comments on Previous Drought Efforts and
Recommendations for Future Improvements

Prepared for

the State Water Resources Control Board and Division of Water Rights



Prepared by

the State Water Resources Control Board's
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Executive Summary

California experienced a dry 2019-2020 water year across much of the state. As of June 1, 2020, the statewide average snowpack was about 39 percent of average¹ with the North Coast Region averaging only 15 percent and the Russian River Watershed reporting its third driest water year in 127 years of record. While many reservoirs in the state entered the dry season with near average storage, dry conditions raised concerns about the likelihood of a multi-year drought and the prospect of future water-saving responses.

The State Water Resources Control Board (State Water Board or Board) Division of Water Rights (Division), with direction from Board members, conducted a series of interviews with water users and managers to gather input on the Division's actions during the last drought, and to solicit recommendations for Division priorities during a future drought. The Water Rights Drought Effort Review, or WARDER, solicited input from over 20 participants, including individuals, urban water agencies, irrigation districts, advocacy groups, non-governmental organizations, tribal governments, and others. This report is a compilation of the comments and recommendations that were collected as part of the WARDER effort.

Executive Summary: Background

The mission of the State Water Board is to preserve, enhance, and restore the quality of California's water resources and drinking water for the protection of the environment, public health, and all beneficial uses, and to ensure proper water resource allocation and efficient use, for the benefit of present and future generations.

The Division is responsible for administering California's complex water rights system, which operates under a dual system that recognizes both riparian² and appropriative³

¹ Estimate based on data from:

<https://cdec.water.ca.gov/reportapp/javareports?name=COURSES.202005>

² Riparian water rights pertain to the use of natural flows on lands that touch a lake, river, stream, or creek. Riparian water rights are often referred to as "claims" because the State Water Board records but does not verify the validity of riparian rights.

³ Appropriative water rights are used for non-riparian lands, or for water that would not naturally be in a stream at a particular time. In contrast to riparian rights water storage is authorized under appropriative water rights.

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water rights.⁴ The Division's water rights database⁵ currently holds over 46,000 records⁶ of active or pending water rights. During times of water shortage, the water rights system faces significant challenges due to competing needs and the complexity of the system itself⁷.

During the 2012-2016 drought, the Division issued over 9,000 Notices of Water Unavailability, often referred to as curtailment notices,⁸ to water right holders primarily in the Bay-Delta Watershed and the Scott River in Siskiyou County. Curtailments were based on the needs of senior right holders, public trust resources, water quality, and the environment. Many Division staff were diverted from core work to address drought issues, including development of curtailment notices and associated data collection and analyses. Staff returned to core work once the drought emergency ended.

Executive Summary: Process

WARDER outreach was specifically focused on water rights activities and did not seek specific input on other key drought issues such as urban water conservation, drinking water supply, and funding for replacement water.

⁴ For the purposes of this document, the term "water right" or "right" generally includes riparian and pre-1914 appropriative claims of right, as well as post-1914 appropriative water rights. The term "claim" is used when specifically describing two specific bases of right riparian and pre-1914 appropriative that do not rely on the State Water Board's water rights permitting authority.

⁵ The Electronic Water Rights Information Management System, referred to as eWRIMS

⁶ A water right record is uniquely identified by an application identification code for each individual right, claim, registration, etc. For this report, a record refers to an individual water right and all underlying data that pertains to it (i.e., points of diversion, places of use, beneficial uses, seasons of use, etc.).

⁷ The different methods by which water is allocated in a riparian system (correlative or shared reductions by all users to bring supply and demand into balance) versus the appropriative system (curtailment of junior right holders so that limited availability is allocated to more senior right holders) have never been reconciled in California water rights law.

⁸ Curtailments are a component of California's water rights priority system, and require a reduction in or complete cessation of diversion pursuant to specific water rights/claims under certain circumstances. Diverters may still divert water if they have another water right/claim or contract that has not been curtailed. Diversion of previously stored water is generally not impacted so long as the water was collected in storage prior to a curtailment. An analysis of water availability is used to determine when and to whom curtailment notices should be issued.

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The Division individually interviewed 23 groups that were engaged during the 2012-2016 drought. Participants included knowledgeable people from academia, nongovernmental organizations (NGOs), former staff, water rights attorneys, water users, consultants, and water rights holders. While the number of participants is relatively low, the spectrum of participants and their feedback appears to adequately capture the general recommendations that would be received from a larger survey group. The list of participants can be found in Appendix B. Comments and recommendations are not attributed to specific participants.

At the time of this draft report, staff received limited input from representatives of Native American tribes. The COVID-19 pandemic and the 2020 wildfire season have been particularly difficult for Native American communities and made interviews during this time challenging. The State Water Board recognizes that federally recognized Indian Tribes with reservations created by federal executive order may have federally reserved water rights and jurisdictional authority to manage such rights. Some of these water rights are unquantified, yet senior to other water rights within these waterways, and may be harmed during times of drought. Tribal governments are valuable partners that can help work through difficult issues. The State Water Board is committed to consulting with tribes that have federally reserved water rights, as well as other tribes whose resources are affected by water use in California. Staff will revise this report based on comments and recommendations from tribal representatives as they become available. Input provided by individual tribal governments for this report does not necessarily reflect the views or consensus of all California Indian Tribes.

All told, participants provided over 500 unique comments as part of the WARDER interviews. Comments ranged in terms of consensus and applicability, as would be expected from a diverse set of interests and perspectives. Some recommendations were unanimous, coming from every participant, while others were unique to specific interest groups or perspectives. Some of the recommendations appear to run counter to existing State Water Board authority or legal precedent⁹. While the Division may not be able to implement such recommendations, this input is important for long-term planning as these types of comments highlight areas where the Water Code may not reflect the current needs of stakeholders, and where the Division may need to provide better context and messaging during a future drought. Appendix C includes reports, studies and websites referenced by participants during the interviews.

⁹ This document strives to present participant comments as they were provided, with some editing for clarity. “Staff Notes” are used in limited circumstances to provide additional context in cases where the comments and recommendations are not consistent with current law or State Water Board authorities, however these notes are not provided in all cases. Readers should bear this in mind especially in Section 2: Legal and Policy Considerations.

Executive Summary: Common Themes and Frequently Received Comments

Participant comments and recommendations generally fell into four main categories: 1) communication, 2) legal and policy issues, 3) data, and 4) collaboration. There was significant variation in the recommendations received due to the diversity and interests of the 23 participating groups. However, several common themes were reflected in many (and in some cases, all) of the participant comments, which are detailed below:

- **Communication**
Participants unanimously stated the need for earlier and more frequent communication on water availability. Participants recommended that the Division provide opportunities for public input when protocols and water availability analyses are developed. Participants also recommend the Division use visual tools, graphics, and narratives to explain the complex analyses used to make water availability estimates and to support curtailment-related actions. Almost every interview noted that the Division should make relationship-building a priority to improve trust in Division actions.
- **Legal and Policy**
Many participants expressed the desire for more regulatory certainty in advance of drought. Participants recommend the Division establish clear drought protocols regarding voluntary or mandatory response actions far in advance of the implementation. Participants largely agreed on the need to resolve uncertainties regarding riparian and pre-1914 appropriative rights¹⁰, including federally reserved water rights of certain Indian tribes, and the need to streamline review and approval of water transfers. The State Water Board's increased collaboration with other agencies involved in transfers was highlighted as important, as was protecting public trust resources when approving transfers. Participants also agreed on the need to better integrate surface water and groundwater management and to treat surface water and groundwater as a single resource in water balance and other accounting practices. The need for the Division to take meaningful action during drought conditions was highlighted by several participants. However, some participants also expressed concern that

¹⁰ Appropriations of water which occurred prior to the establishment of the State Water Board predecessor agencies (i.e., December 19, 1914) do not fall under the permitting authority of the State Water Board. Prior Division involvement in riparian and pre-1914 appropriations often has resulted in litigation, though some aspects of the Division's authority with respect to water rights that have not been issued by the State Water Board or its predecessors (i.e., riparian and pre-1914 appropriative claims) are generally accepted. Different views about the extent of Division authority over these rights is a source of uncertainty, especially during times of shortage.

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the Division's regulatory actions during the last drought (curtailment notices, emergency regulations) conflicted with right holders' due process protections.

- Data
Participants consistently indicated the need to improve the data systems used to collect, manage, and share water right and reporting data. Technology should be leveraged to simplify, clarify, and improve the quality of electronic data submissions. Participants unanimously recommend the Division collaborate with stakeholders to develop transparent statewide methods to estimate and display water supply conditions, define environmental flow needs, and estimate water availability in near real-time.
- Collaboration
Participants highlighted how the Division can bridge data, resource, and experience gaps through partnerships with other tribal, state and federal agencies, NGOs, academia, and the regulated community. Participants also recommend the Division work with its sister agencies, like the Department of Water Resources and Department of Fish and Wildlife, to begin planning an interagency drought protocol so that all agencies are better prepared for future droughts.

Participants did not agree on the scope of the Division's drought actions or the most appropriate regulatory approaches (e.g., regulations versus policies) the Division should use. Similarly, participants did not agree on how the water rights priority system¹¹ should be implemented during water shortages (i.e., enforcing priority strictly or considering other factors).

Specific stakeholder comments are described in the remainder of this report. Comments are organized by the "Common Themes" described above. Within each common theme section, the high-level general or frequently received comments are summarized in paragraphs, and specific comments (or comments that shed light on general themes) are bulleted to provide additional detail. In a few instances, staff provide context or clarity in the bulleted comments. Staff notes are clearly marked.

¹¹ The water rights priority system operates on two general principles: 1) Riparian claims are generally the highest priority and must correlatively share the burden of any shortages that affect their collective priority relative to other water rights holders. Once riparian demands are met, 2) the demands of appropriative rights are met on a "first in time first in right" basis, with the earlier appropriations being entirely fulfilled before the next later appropriation is entitled to divert water. The most recent appropriations are last to be fulfilled and are the first to be curtailed during shortage. As noted above, the two methods for allocating water during shortage have never been reconciled, complicating water rights administration in watersheds where both types of claims exist in proximity.

Participant Comments and Recommendations

Staff received approximately 500 unique comments that are paraphrased and consolidated within this report. Staff provide narrative context to participant recommendations where appropriate. Specific participant recommendations are found in bulleted lists to provide additional details. Staff notes are clearly marked.

1.0 Communication

Overview: The magnitude and duration of the 2012-2016 drought required management actions that had not been implemented since the 1976-1977 drought, including curtailment notices being sent to all post-1914 appropriative right holders in the Bay-Delta watershed. Staff, resource, and timing constraints limited advanced outreach and impacted communication related to curtailment and other drought-related actions.

All participants commented that the Division and State Water Board need to communicate better leading up to and during drought. Nearly every participant noted that the lack of early communication limited many right-holders' abilities to plan for the potential loss of water or develop local solutions and led to confusion over the purpose of curtailment notices. Stakeholder recommendations related to improving communication during drought were expansive, but generally focused on two areas, improving communication and relationships and communicating watershed conditions, each described below:

1.1 Improving Communication & Relationships

Background: The Division and Board needed to communicate complicated concepts and messages to diverters during the 2012-2016 drought in close to real-time. The Division took actions that had not been seen in a generation, and many water users were not familiar with those actions. The Division also took actions that had not been used previously (e.g., emergency regulations to protect minimum instream flows), often at a faster pace than stakeholders may have been accustomed to. The Division made numerous efforts to communicate the goals, timing, and reasoning behind its drought actions, but additional communication could have been beneficial. This section gives a high-level summary of how participants believe the Division should communicate watershed conditions and provide more regulatory certainty to stakeholders, tribes, and members of the public.

Recommendations: There was unanimous input from participants stating the need for more frequent, comprehensive, and varied communication during droughts or dry conditions. Comments frequently reflected the need to understand the types of diverters in a watershed prior to developing outreach efforts.

- Prioritize drought communications based on an understanding of who uses water, and when, by watershed. Communication should increase as water

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shortages or curtailment notices appear more likely. This would help the Division communicate more effectively with its limited staff resources.

- Use plain language and different communication approaches (e.g., public meetings, websites, social media, and visual/graphic tools) for different audiences-email subscription lists are not enough to reach the Division's broad audience. Use stakeholder and tribal organizations to share messages within their networks. Plan for the cost of messaging.
- Encourage people to use and contribute to the tools the Division is developing by holding workshops that explain the need for and benefit of the tools and that invite stakeholder input and refinement.

Participants recommended the following partnership activities, suggesting that water system operators often have the best local knowledge of how a system or watershed functions, and that such expertise is critical to understanding and conveying water availability in real-time:

- Collaborate with local partners (e.g., urban water districts, NGOs, water managers, irrigation districts, tribes, etc.) to assist with data gathering and analysis and to develop or refine visual tools that identify water availability indicators, convey water availability data, and detail potential water supply management actions that may be required (i.e., curtailments or other actions).
- Collaborate with local groups (e.g., resource conservation districts, Farm Bureaus, groundwater sustainability agencies, etc.) to spread messages to smaller operators and harder-to-reach stakeholders.
- Designate Division liaisons by geographic region to develop local relationships and understand local expertise prior to drought. Liaisons could host small group listening sessions to build trust; encourage drought planning and voluntary local solutions, including diversifying sources in water portfolios. Track, assess, and publicize drought conditions and work with stakeholders to implement voluntary water management actions before the Division triggers curtailment actions.

Participants provided numerous comments related to how the Division could better explain its regulatory authority and purpose during drought. Many participants noted that basic information on water rights is lacking, and that many diverters do not have a good understanding of the legal and regulatory underpinnings associated with water rights. Better explanations and background information for water rights, the state's dual riparian and appropriative systems, managing water quality in the Delta, and public trust flows would greatly benefit both the Division and diverters during a future drought. The need to establish clear messaging during drought was a recurring comment throughout WARDER interviews.

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- Clarify the Division's role in managing the water rights system (specifying authorities), protecting the environment, and preventing unlawful diversion/injury.
- Improve basic information on how the water rights system works (e.g., what priority means, how a License is not a guarantee of water, what a curtailment notice is, what drought scenarios are).
- Clarify misconceptions regarding water rights, like what a water right is and means and ways to conserve water without impacting a water right (conservation, recycling, [Water Code section 1707](#), efficiency, transfers etc.).
- Define key terms and concepts. Include what they do and do not mean.
- Update the Division's stakeholder and contact lists frequently, so that they are up to date when drought comes.
- Develop a communication strategy that includes the State Water Board's goals, highlights the work the Board and Division do on a regular basis, and gives credit to local conservation or stewardship projects or efforts.
- Show what permittees pay for (i.e., Division fees) and what they get for the payment.

1.2 Communicating Watershed Conditions

Background: The Division provided information on supply and demand conditions when it issued curtailment notices in 2014 and 2015. In some cases, diverters received a curtailment notice only a few days or weeks before the notice took effect.

Recommendations: Many participants expressed the need for more timely communication on forecasted and real-time water availability within watersheds. Diverters who received notices of lack of water availability for diversion under their priority of right were curious as to the underlying assumptions and inputs that led to the notices, and recommended that the legal basis for notices be incorporated into any communication or messaging effort. Diverters noted that better information regarding watershed conditions, and early communication regarding the potential for dry conditions or lack of water availability, would have allowed them to better prepare for dry conditions through transfers, changes in crops or irrigation practices, or increased conservation efforts. Participants noted that the short notice that was provided to diverters in 2014-2015 was costly for users and, in some cases, unworkable.

There were numerous comments focused on the concept of "certainty." Stakeholders noted that water users can prepare for hydrologic uncertainty, but only if they have regulatory certainty. Two separate types of regulatory certainty were discussed: 1) data and hydrologic information that could affect planning and other decisions related to water supply, and 2) a clear understanding of how the Division will respond to drought

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with its policies, regulations, or actions. If the Division can provide earlier data and regulatory certainty, users can better adjust demands, develop contracts or transfer agreements, or otherwise prepare for water shortages. [Staff note: there is significant additional discussion related to data, and how the Board evaluates and uses that data in implementing drought actions, in the “Data” section below.]

Many participants recommended the Division create a publicly accessible tool that evaluates supply and demand data to show real-time watershed conditions and emphasized the need for public input when developing such tools. Stakeholders noted that the opportunity for public input was particularly important for any method or tool the Division would later use for regulatory purposes. If the Division is unable to show real-time conditions, participants recommended publicizing conditions throughout the winter and spring or, at minimum, when dry conditions become more prevalent.

- Publicize, describe, and link to sources of data relied on during droughts and explain how data were collected or developed.
- Clearly explain the data and methods used for water availability analyses and curtailment notices. Experts will disagree on specifics but can work towards better results if they can see the math. Explaining everything prior to acting is ideal, but when that is not an option provide as much information as possible at the time and explain why full public participation is not possible due to time constraints. [Staff note: additional recommendations related to data and curtailments are provided in the “Data” section.]
- Provide graphics or visualizations showing flow conditions against demands. One participant recommended the graphs be at the HUC-12¹² level. These visualizations could also include relative priority of demands to help show the potential effects of any notice of water unavailability.
- Use a combination of data, visual aids, and narrative explanations, also known as data stories, to communicate the complex analyses that go into understanding water availability, water demand, and environmental flows. People understand and relate to stories more than data alone.
- Build trust in the regulated community and make curtailment notices easier to understand and accept by simplifying the process.

¹² HUCs (Hydrologic Unit Codes) were developed by the United States Geological Survey as a hierarchical system of hydrological units throughout the United States. The HUC-12 designation references a 12-digit code which uniquely identifies “sub-watershed” scale hydrological units ranging from about 10,000 to 40,000 acres, and is the smallest hydrologic unit designated throughout California. For more information, see <https://nas.er.usgs.gov/hucs.aspx>

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- Develop approaches to explain seemingly conflicting information. For example, message the importance of conservation or curtailment when drought conditions are present, even when reservoirs are full because reservoirs can mitigate impacts during the first year of drought, but at the hazard of more disruptive shortage as a drought persists.
- Better communicate that surface water and groundwater depend on each other and are not separate systems. Find opportunities to frame this discussion and communicate the need for collaboration between parties who only have access to one portion of this single resource.

Several participants drew connections between the availability of data, regulatory certainty, and the ability to develop local solutions or voluntary approaches that could achieve the goals of curtailments. Participants also noted that voluntary agreements could be more successfully implemented if clear hydrologic thresholds (triggers) were identified or developed – in essence suggesting that clear messaging and identification of thresholds or triggers will help develop voluntary approaches, and help identify when state action is likely.

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2.0 Legal and Policy Considerations

Overview: The State Water Board's regulatory authority is provided in and limited by the California Constitution, Water Code, and other legislation. Court decisions have also played a significant role in defining the extent of State Water Board authority. The Board has discretion in setting priorities and guiding policy implemented by the Division. How those authorities, policies, and direction should be interpreted is often disputed by the regulated community and others and is subject to legal challenge.

The State Water Board and Division must weigh the legal and policy ramifications of actions taken during a drought against the intended outcomes. The following section highlights comments that identify 1) areas of perceived or actual legal uncertainty, or 2) where the Board should reevaluate previous policies.

2.1 Legal and Policy Considerations: State Water Board Authority and Role During Drought

Recommendations: Many comments reflected opinions on whether or how the State Water Board should exercise its existing authority, including comments on the scope of the State Water Board's authority. Fewer participants offered input on direction for future legislation or new policies. Numerous comments focused on the state's water rights system in general, and comments were extremely varied in terms of content. [Staff note: some recommendations may not accurately reflect current water right law.]

Several comments suggested that the State Water Board maintain a narrow focus on core water right elements:

- Implement the water rights priority system [Staff note: see Section 2.2 for additional details].
- Manage the water rights system relative to the availability of natural flows. Many contracts and agreements for use of stored water are outside the purview of the Board, and those users should be left to manage stored water or use their portfolios as needed.
- Do not use emergency regulations because they limit due process and stakeholder input.
- Legal water users often exercise drought contingency plans and take other drought action without State Board involvement and those actions should be understood and evaluated by the State Board as a foundation prior to considering any state curtailment action.
- Consider unquantified federal rights, such as federal reserved water rights of some tribes in time of drought.

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In contrast, other comments suggested a more expansive role for the Board:

- Water in California is a public resource that is being used for private gain to the detriment of the public good. Greater use of the public trust doctrine is needed to protect shared resources.
- The Board should promote actions, develop best management practices, and infrastructure investments (e.g., off stream storage, rainwater harvesting, water use efficiency) that increase local resilience in the face of changing hydrology (less snow, and more rain). This includes changes in the Delta which reduce impacts to fish while increasing certainty of deliveries moved through the Delta. Consider actions that can be implemented following major disasters such as wildfire.

Participants also provided recommendations regarding the use of regulations or policies to address drought conditions:

- The State Water Board should not skip the policy development step and go straight to regulation, which is expeditious but only creates short-term solutions. Adjudications or policies should be used before the Board pursues regulatory actions that allow for broader enforcement such as Water Quality Control Plans (WQCPs) or orders.
- Regulations that are clear and detailed are more useful than policies.
- Regulatory processes should not be driven by Division staff alone, Division staff lack the expertise held by water managers and environmental groups. Stakeholders must be involved to achieve workable and accurate solutions.

2.2 Legal and Policy Considerations: The Water Rights System

Background: The Division generally does not verify the validity of riparian and pre-1914 appropriative water right claims (or accuracy of claimed quantities, among other details). As a result, the volume of water that may be diverted pursuant to these most senior claims can be highly uncertain. This uncertainty can make estimating water availability and implementing the priority system challenging, particularly in watersheds where diversions made pursuant to riparian and pre-1914 claims represent a large portion of demand. Additionally, the role of the State Water Board in managing groundwater-surface water interactions is an emergent topic that will likely become more important as Sustainable Groundwater Management Act (SGMA) implementation proceeds.

Recommendations: Participants did not agree on solutions but noted that focusing on these challenges will be an important part of gaining certainty and predictability in water resource management. However, some participants recommended that the Division validate claims of right:

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- The Board should have a uniform approach for validating pre-1914 and riparian claims within the Delta and statewide. Priority and season of use should be validated in the process.
- The Board should pursue enforceable voluntary agreements to reduce the uncertainty surrounding senior water demands, instead of legal actions.
- The Board should set a goal to manage watersheds like adjudicated systems, but without going through the adjudication process. The Board should consider using approaches similar to [Water Code section 2501](#), which authorizes comprehensive adjudication of all the water rights to a stream system. Riparian and pre-1914 rights are difficult to manage, and legislative changes to how they are regulated would be necessary to achieve many Board goals.
- The Board should acknowledge federal reserved rights, such as those created by federal executive order for some Indian reservations, and work to validate them in the process.

Some stakeholders observed that the priority system can lead to inefficient distribution of water during shortages and can leave junior right-holders with limited water portfolios and no water or very expensive water during drought. Participants had mixed opinions about how priority should be considered during times of drought:

- The priority system is the law and must be the basis of management action.
- While the priority system is important, consideration should be given to the size of impact from some users (e.g. users having the biggest impact be asked to reduce first).
- The priority system is not an ideal way to allocate water during shortage. The needs of local areas (tributaries and sub-watersheds) should be evaluated along with downstream needs (receiving water from many sub-watersheds), and if downstream shortages exist, the State Water Board should consider spreading the shortage across upstream junior diverters.
- The human right to water, health and safety uses, and the needs of disadvantaged communities need to be considered when implementing the priority system.
- [Article X, Section 2 of the California Constitution](#) authorizes the Board to alter water rights priorities in specific circumstances based on findings that strict adherence to priorities under the circumstances would result in the unreasonable use of water. This constitutional authority also augments and enforces statutory priorities, including but not limited to the domestic use preference in [Water Code section 106](#), the human right to water in [Water Code section 106.3](#), and the protection of fish populations below dams in [Fish and Game Code section 5937](#).

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In addition, Article X, Section 2 augments the Board's authority to protect water quality, fisheries, recreation, and other public uses under the public trust doctrine.

There were several comments related to the interconnection of surface water and groundwater, and the role that SGMA could play in the Division's future drought work. Commenters noted that improvements in conjunctive management can lead to better outcomes for both supply as well as environmental and instream uses, and that a combined accounting system including surface and groundwater storage and use, along with standardized methods, could reduce burdens on regulated entities:

- Transparent and open source water accounting and trading platforms (including surface water and groundwater) would greatly improve conjunctive water management and increase locally driven solutions to water shortages.
- The State needs a centralized water accounting system that could be used for water rights, SGMA, environmental flows, etc. and unified databases and procedures across agencies and efforts.

2.3 Legal and Policy Considerations: Curtailments

Background: The process for determining a water shortage and alerting right-holders of the need to curtail is complex. When the Board issued curtailment notices in 2014 and 2015, those notices covered thousands of square miles and thousands of diverters.¹³ Historically, curtailment notices have often been issued with relatively short notice provided to water users.

Recommendations: Comments largely focused on the need for greater transparency and advance notification regarding curtailment notices and recommended easy-to-understand messaging and tools [Staff note: communication and messaging is described in the "Communication" section]. Several comments also observed that curtailment notices in 2014-15 were issued with very little warning (days), which limited

¹³ The Division issued two different kinds of curtailment notices. Where a previously issued order or regulation such as Term 91 requires curtailment after receipt of notice, the curtailment notice amounted to an enforceable order to cease diversion. Where the diverter was not subject to any previously issued order or regulation requiring curtailment, the notice had a different effect. The notice informed the diverter that by the Division's calculation there was insufficient water available to divert under the diverter's priority of right and warned the diverter that if it did not curtail its diversions it could be subject to enforcement for unauthorized diversion, but the notice did not have the effect of an enforceable order.

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opportunities for right holders to protest or provide alternative data that could change the Board's findings:

- Refine notices based on area (e.g., stream segment, tributary, watershed) and time. In 2015, curtailment notices extended to some pre-1914 diversions and across major watersheds (i.e., Sacramento and San Joaquin). The Division should be able to ratchet-up curtailments as available flows diminish, target where shortages exist, and avoid areas where shortages are less critical. Large-scale water supply indices are fine for many purposes, but do not provide enough detail to dictate operations in non-Project¹⁴ tributaries.
- Consider approaches like Term 91¹⁵ to alert users that conditions are approaching water availability thresholds. Term 91 gives affected water rights holders information about water availability and relies on users to only take water they have a right to.
- Properly account for the geographic location of a point of diversion as well as seniority, and only count demands relevant to diverters within a contiguous connected system. For example, demand from a senior right-holder in sub-watershed A should not be counted against right-holders in a geographically isolated sub-watershed B. Previous methods appear to have improperly rolled excess demands into other tributaries/watersheds. A junior diverter should not be curtailed for a senior who could never physically access the water at the junior water right holder's point of diversion.
- Consider the stream network location of diversions when conducting curtailment actions, using geospatial allocation tools, or approaches similar to the Drought Water Rights Allocation Tool (DWRAT).
- Make time to hear petitions for reconsideration and allow diverters to interact with the Division to correct mistakes in the analysis before curtailment notices are issued and enforcement actions are taken. Due process is important and must be respected and preserved in the Division's drought actions.
- Curtailment notices should incorporate area-of-origin rights, human right to water, and the needs of disadvantaged communities. The use of health and safety

¹⁴ Project in this case refers to the State Water Project (SWP), and Central Valley Project (CVP) operated by the California Department of Water Resources and U.S. Bureau of Reclamation, respectively. The SWP and CVP coordinate operations that could impact the Delta, in order to meet state and federal requirements.

¹⁵ for additional information, visit:

https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/term_91/

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exemptions during the 2014-15 curtailments was fine, but the Division focused on urban areas and ignored rural areas that should receive special consideration.

- Clearly define the role of the Administrative Hearings Office (AHO) during drought and curtailment actions and empower the AHO to prioritize (or triage) response to drought-related cases where ongoing harm (either to environment or water users) is alleged.
- Encourage and promote voluntary agreements as an alternative to curtailments. The goals, outcomes, and timelines of voluntary agreements must be clearly defined in advance with stakeholder input. Mechanisms must be developed to bring in outliers who do not participate in the agreements. The State Water Board should allow non-flow measures as part of voluntary agreements. The Board must also strictly follow a schedule (“enforce the clock”) both internally and externally to ensure solutions are implemented when they can be most effective.
- Make field inspections effective and efficient by increasing field inspections and State Water Board staff presence leading up to a drought and using tools and technology as efficiently as possible. For example, inspections of dry channels in August are a waste of resources, since those diverters clearly had not been using water for some time. Field inspectors should focus on collecting or verifying data that cannot be conducted remotely. For example, staff sometimes arrived to conduct inspections on ditches or conveyances that had been dry for months. Staff should also collaborate with local entities (e.g., RCDs, watermasters, districts etc.) to make field presence worthwhile.
- Consider the cumulative effects of State Water Board actions, even those that are being managed in other programs within the Board. For example, implementing curtailments as well as conservation requirements can be a double hit to municipalities, even those with senior rights.
- Establish thresholds (or triggers) for various response actions. The thresholds should be based on watershed-specific hydrologic conditions and designed so that predefined conditions trigger predefined actions such as voluntary or regulatory responses: for example, if X flow is in the system, then Y voluntary actions should occur, or Z regulatory actions will be imposed. Some participants recommended identifying the costs of ‘no action’ when developing the triggers; costs could include impacts to rural areas, environmental costs, and costs to downstream (or senior) water diverters.
- Water quality requirements and public trust considerations are components that require long-term planning and procedural safeguards. Dry year planning must be considered during the process of setting water quality requirements and weighing public trust beneficial uses and should not be evaluated as part of a drought or curtailment process.

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2.4 Legal and Policy Considerations: Water Transfers, Exchanges, and State Water Project (SWP)/Central Valley Project (CVP)

Background: Voluntary transfers are an integral part of the State's water rights priority system, promoting more efficient and economically productive beneficial use of the waters of the state while avoiding injury to water rights holders. Many water users rely on water transfers¹⁶ to address temporary supply reductions or shortages. The State Water Board and Division have approval authority over transfers involving a change in point of diversion, place of use or purpose of use of post-1914 appropriative rights, but some types of transfers and exchanges¹⁷ do not require Board or Division approval to occur (i.e., transfers of water under pre-1914 claims). Transfers which use SWP or CVP facilities require approval by the Department of Water Resources (DWR) or the United States Bureau of Reclamation respectively. [Water Code sections 1810 to 1815](#) require that state, regional and local public agencies allow transfers of water using their facilities so long as the transfers meet certain conditions.

Recommendations: Participant comments generally focused on the need to simplify transfer petitions, streamline the Division's review processes, and increase interagency collaboration on approving transfers. However, most commenters also noted that the Division's transfer process was generally fast and effective, and that there were fewer stakeholder concerns with the Division's transfer processes relative to other state agencies.

- Work collaboratively with sister agencies to streamline transfers. DWR can block some transfers, but DWR has conflicting interests (i.e., protecting public trust resources and operating the SWP) and is not transparent with its accounting. DWR also sees transfers that the Division does not, and some pre-1914 transfers are not seen by any agency. The state should act as one regarding transfers.

¹⁶ Water transfers occur when a party with access to available surface water chooses to sell the right to use that water to a party in need. The water is generally physically moved from the point of diversion (POD) of the selling party, to a point of access for the buying party. In some cases, surface water is sold and the seller then pumps groundwater to meet its needs. Such groundwater substitution transfers require increased scrutiny as a result of the legal recognition of the interconnectedness of surface water and groundwater in SGMA.

¹⁷ Exchanges can take several forms and may include a sale/purchase or may include other accounting mechanisms to increase efficiency, reduce cost, or optimize water movement or storage. Exchanges generally do not physically move water, but could involve a party diverting water in one location but using another party's conveyance facilities.

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- Encourage pre-planning with the SWP and CVP and allow flexibility in meeting flow obligations. Releasing water from storage then pumping it back out of the Delta is expensive and wasteful. Similarly pumping water over the Tehachapi Mountains is expensive; can the state bear some of the opportunity costs of implementing transfers or water wheeling to serve areas offset from major infrastructure?
- Develop a single-page transfer application.
- Change attitude towards California Environmental Quality Act (CEQA) exemptions. An umbrella permit approach should be pursued to streamline approvals. Export interests want to transfer until May 1st, but that is too late for agricultural planning.
- Develop criteria to evaluate and streamline multi-year water transfers which can demonstrate environmental benefits or are protective of public trust resources.
- Increase use of "delegated authority" (empowerment of staff), and internal/external coordination to use discretion to move projects forward when the public benefit outweighs potential harms (i.e. permitting of winter diversion to storage to get users off summer diversions, [Water Code section 1707](#) instream flow dedications).
- The State Water Board must consider the cascading impacts of curtailment actions, transfers, and Temporary Urgency Change Petitions (TUCPs) (e.g., how does management of Shasta affect Oroville or Folsom?).

However, other participants noted that there is a perceived conflict of interest in better managing transfers and accounting for water moved through the State's conveyance system. Some comments also noted that certain types of transfers could be difficult to approve or accurately account for.

- Transfers through the Delta are challenging because there's no incentive for the SWP and CVP to agree. They make enough water available for everyone using their storage as a backstop, then ask for a TUCP when supplies run low which comes at the expense of the environment. The SWP and CVP appear to have excessive influence with the State Water Board, which negatively impacts smaller, senior diverters. The SWP and CVP should not dictate State Water Board policy.
- Urban water transfers are problematic especially north of the Delta. The State Water Board should revise the methods used for accounting and should seek collaboration with sister agencies in implementing any such transfers.
- Water markets and transfers are good, but the state needs to implement guardrails to better protect public trust resources, as well as use types. Transfers between agricultural users are fine as are transfers between urban

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users, however agricultural-to-urban transfers should be prevented or greatly restricted.

- Prioritize satisfaction of water rights, including federal rights and those reserved by the federal government for Indian Tribes, prior to approving transfers.

2.5 Legal and Policy Considerations: Permitting

Background: The Division permits new water rights and approves changes to existing rights. These actions are collectively referred to as “permitting activities.” Some permits and changes could help create greater water availability during the summer and fall low-flow periods, which are often the most critical for environmental needs during droughts.

Recommendations: Numerous participants recommended the Division streamline its permitting processes, particularly for projects with net environmental benefits. Participants recommended that the Division should increase efforts to streamline the preparation, review, and approval of a broad range of permitting activities, as well as increase staffing to process the permits:

- Incentivize projects which reduce reliance on summer diversions. Elements of the [Policy for Maintaining Instream Flows in Northern California Coastal Streams \(AB 2121\)](#) could be used as a model, including section 3.3.2.5 which allows Division staff the discretion to approve projects with net beneficial impacts. Water Code sections [1700.4](#) and [1700.6](#) which provide for streamlined approval of minor water right changes, may also be useful for certain minor projects.
- Collaborate with external entities to develop technical tools and clearly established processes to prepare uniform water availability analysis and other standard application elements.
- There is a perception that time does not matter, the Division is slow to act, and the status-quo is beneficial to some diverters; faster processing of permits could help change this.
- Streamlining of permits (i.e. diversion of flood flows, managed aquifer recharge, switching from summer to winter diversions) is encouraged but does not appear to have been well implemented. Consider triggers which allow for diversion of flood flows in the short term (i.e. if a flood agency shows stream stage at “monitor” level then everyone nearby can divert).
- Temporary permits with low anticipated impacts should be processed in batches or have “master” permits developed for specific classes of activity.

In contrast, there was a recommendation that the Division should not permit new water diversions prior to the quantification of, or at minimum, accounting of existing water rights.

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3.0 Data

Overview: Data are critical to the Division's drought management actions. The Division's drought actions are reliant on estimating initial water supplies in a watershed (a function of hydrology), calculating user and environmental demands, and then evaluating supply and demand against each other to determine whether water is available at any given point of diversion and priority.

Data limitations contributed to the Division's communication and curtailment challenges during the last drought. At the start of the 2015 water year, the Division lacked the regulatory authority to collect yearly use data. Data on available water supplies at local scales were difficult to obtain and synthesize, particularly where conditions were changing on an almost daily basis. The Division made decisions based on best available information but noted that in some cases information was out of date and/or of questionable reliability.

Stakeholders provided numerous recommendations related to the Division's reporting requirements, data management, data systems, and how the Division interprets its available data. Many comments drew connections between better data and the ability to take more targeted, timely, and effective communication and implementation actions during drought. Recommendations related to data are categorized into five broad categories, each of which is described in detail below: 1) annual reporting, data systems, and needs; 2) estimating a watershed's initial supply; 3) determining water demand; 4) determining water availability for users; and 5) determining water availability for the environment.

3.1 Data: Annual Reporting, Data Systems, and Needs

Background: Diverters must submit separate annual diversion reports for each of their water rights each year. The Division relies on an electronic data system (the Report Management System, or RMS) to collect, store, and manage water rights data. The data collected in this process are important for establishing estimates of water demand, which are a critical component of establishing water availability and forecasting whether demand may exceed supply in a given year. The RMS feeds into a larger data system, known as the [electronic Water Rights Information Management System](#) (eWRIMS), that includes additional information regarding water rights, including ownership and contact information; authorized beneficial uses, diversion seasons, and volumes, and other water right-related information.

There are significant challenges with the Division's data management. Most of the state's water right records still only exist in paper format and can only be accessed by retrieving the file from storage at the State Water Board's headquarters in Sacramento, and as a result staff and the public cannot easily access water right files or information. In addition, RMS and eWRIMS do not have features found in many modern data

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management tools that would prevent submittal of clearly erroneous or poor-quality data. There is little information related to place of use, and the quality of the place of use information that is available is poor (particularly for older rights). There is little geospatial information available in eWRIMS.

Recommendations: Participants uniformly expressed the need for simpler forms (especially for smaller diverters) with clearer instructions, better quality control, and data entry assistance. Most participants recommended updating the Division's data management capabilities. Simplifying reporting requirements and increasing the use of technology to obtain more accurate data will help better determine water demand. Numerous comments suggested that the Division incorporate the inherent differences in hydrology, history, water demands (e.g., agriculture, urban, environmental), and types of water rights in evaluating drought conditions in any given watershed. Participants emphasized that the Division needs to build an understanding of local watershed conditions and operations outside of data collected by the Division through annual use reporting.

- The Division must update its data systems (i.e., convert to all digital records, incorporate geospatial elements) and requirements regarding the submission of electronic data. The state's economy revolves around water rights, and California should be leading the way in water rights management. The State Water Board should be able to collect all data necessary to understand the basis of riparian and pre-1914 claims. That information is critical for enforcing against alleged unlawful diversions and maintaining the state's priority water right system.
- Work with local stakeholders or groups to determine what data are necessary, and how best to ask for that data, then build the data infrastructure to efficiently and clearly collect it.
- Integrating other water data into the data-system (e.g. water quality, drinking water) would provide simpler reporting with less redundancy, and provide a better picture of hydrologic conditions. The data system must also have a public-facing element to transparently share the data in a useful manner.
- Ensure reports can be completed on a smartphone, include options like "map my location" and "upload a photo" in the reporting system, and notify users immediately when potentially incorrect data (e.g., gallons instead of acre-feet) have been entered with tips on how to correct the issue.
- Increase measurement and reporting assistance: smaller operators, non-English speakers, and those with complex systems may need more help understanding what the Division expects in reports. Consultants can help with this but are not feasible for many diverters. Partnering with local agencies or providing direct technical assistance would lead to better data collection.

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Several participants raised technical questions regarding the utility of certain reported data and recommended that the Division reassess its reporting requirements. Some participants suggested that the Division reduce reporting requirements for certain diverters, whereas other participants recommended the Division expand its reporting requirements:

- Frequent reporting often requires data manipulation and conversion skills in addition to technical device installation and measurement skills. These same participants suggested that the Division collect daily diversion information and convert that into monthly or other time-steps it requires (rather than forcing a diverter to submit both). A single measurement during the day could also be used to represent relatively constant diversions rather than reporting numerous nearly identical readings.
- Assess how other programs, such as the California Department of Food and Agriculture [State Water Efficiency and Enhancement Program](#) (SWEET), conduct reporting for ways to improve reporting compliance.
- The Division should require reporters to specify the basis of right for a diversion, which is needed to properly characterize diversions and demand during a water availability analysis. Reporting should be separated by right, contract, transfer, re-diversion of stored water, diversion of natural flow, etc.
- Separate reported diversions by beneficial use. Since domestic use is the highest priority, understanding what portion of reported demand is related to domestic use will help lead to more effective demand reduction actions.

3.2 Data: Estimating A Watershed's Initial Supply (Water Supply)

Background: Year-to-year variability in weather (including temperature, precipitation, etc.) is the single largest influence on natural streamflow, and, in turn, is a critical determinant of whether a region or watershed is in a drought. Estimating water supply begins with an estimate of the total quantity of water that is naturally in a system at a particular time and place, and it stems directly from the hydrologic and climatological conditions in the watershed. In general, wet water years mean greater streamflow while drier years mean less streamflow; however, the relationship is not linear, and stream conditions (and resulting water supply) depend on the dryness of the soil, vegetation, recent fires/landscape changes, geology, and other factors. Additional inputs – imported water, wastewater return flows, agricultural return flows, for example – must also be accounted for.

For the purposes of this discussion, water supply is differentiated from water demand and water availability, both of which are described in greater detail below. Water demand can generally be described as the need of water users and the environment. Water availability is the integration of supply, demands, and the water rights priority

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system that ultimately describes whether water is available for diverters to use at a particular time. Division curtailment efforts generally start by evaluating water supply, and balancing supply with demand to estimate availability for diverters and other uses.

Recommendations: Participants generally highlighted the need for stream gages, which are critical components of estimating water supply conditions, and highlighted the role that telemetry¹⁸ could play. Participants also noted that while there are not enough real-time streamflow gages in California, some stakeholders may be willing to share their own data to supplement state or federal gage information.

- Additional stream gages are needed. There will never be enough stream gages to know everything, but Senate Bill (SB) 88 and SB 19 [Staff note: see Appendix A for definitions for SB 88 and SB 19] will help, and models can help fill in the gaps. Placing gages upstream of reservoirs will help with modeling.
- Use a combination of telemetry, more robust gage networks, better reporting, satellite monitoring, compliance with existing regulations, and information sharing to manage systems. The Division should develop better real-time understanding of flows, beyond modeled assumptions regarding natural flow. Existing data can be used to understand trends and most-likely scenarios for water supply during different water year types. Specific recommendations to improve estimates included the following:
 - Full natural flow estimates, paired with real-time gages and remote evapotranspiration (ET) monitoring, can estimate additional flows (e.g. return flows, wastewater treatment plant releases, instream flow releases) available for diversion. Water supply estimates must include all sources above the location of interest.
 - Real-time (telemetered) data and the systems to analyze the data are required to make real-time management decisions. Stakeholder groups have streamflow gages they are willing to share but need the State Water Board (or State) to provide a uniform data platform. Some gages are hard to maintain, and additional partners could help make operations more manageable.
- The Division should not focus on developing water supply forecasts on its own, and instead should rely on flood agencies, Department of Water Resources (e.g. snow surveys), or the California Nevada River Forecast Center.

¹⁸ Telemetry is an automated system which sends data from the measurement location to centralized location for processing, or directly to the internet

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- Any method the Division develops to estimate water supply should be made available to the public; the Division should solicit comments and feedback, and allow for updates, prior to implementing as part of a formal regulatory process.
- Water supply conditions vary greatly across the state in any given year, with some areas experiencing severe drought while other areas receive normal precipitation; in these instances, state-wide drought declarations are not warranted. Estimates of water supply by watershed or region, could support more targeted proclamations or declarations by the Governor in order to focus application of resources to the areas where they are needed most.

3.3 Data: Determining Water Demand

Background: The Division relies on annual diversion and use data reported by water right holders to develop estimates of water demand. These reports include the volume and rate of water diverted each month, and additional information may be required based on the type of right, permit conditions, or beneficial use of water. Reporting and interpreting these data can be challenging because 1) right-holders may divert water from a single location (i.e., point of diversion (POD)) for multiple types of rights or sources (e.g., riparian, appropriative, contract) and 2) a single water right may use multiple points of diversion. Some diverters report the same water diversion under both riparian and pre-1914 claims (referred to as ‘overlapping claims of right’), which has been questioned as to its legal authority. Poor-quality data from these reports can lead to uncertainties in Division demand estimates.

Recommendations: Many participant comments highlighted the need to better understand demand, particularly for riparian and pre-1914 diverters, and where diverters may be submitting overlapping claims.¹⁹ Participants also requested that the

¹⁹ Many diverters, particularly in the Sacramento- San Joaquin River Delta, report their diversion and use under both riparian and pre-1914 claims based on the argument that, until their claims are adjudicated, they may assert “overlapping” claims in both categories. In 2014 and 2015 when licenses and some pre-1914 water rights were curtailed to protect more senior demand, some diverters purported to comply with the curtailment by ceasing appropriation under the pre-1914 claim but continued to divert under an asserted overlapping riparian right. Following up after the drought, the Office of the Delta Watermaster commissioned and then published a memorandum of law to evaluate the overlap claim; the so-called [Overlap Memo](#) explains the limited factual circumstances in which such overlap can actually occur. Because the principles laid out in the Overlap Memo are not universally accepted by the Delta water bar, it is likely that the validity of overlapping claims will be contested in an enforcement action during some future shortage.

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Board provide adequate opportunity for public comment and input into any proposed method developed to evaluate demand. Stakeholders also provided comments related to regulations implementing the statutory demand for diversion measurement (SB 88) enacted as a trailer bill in 2015. Participants' comments on the reporting process and requirements are included in the Annual Reporting section above.

General recommendations related to water demand include the following:

- Refine estimates of demand for riparian claimants including developing individual water budgets. Often what is currently reported bears no resemblance to the initial statement.²⁰ Water budgets could be used to verify the reasonableness of reported demands and forecast future demands.
- Informational Orders can be useful in collecting additional information that isn't typically submitted as part of a right holder's annual reporting requirements. However, the use of Informational Orders must be carefully considered. Specifically, make sure that the forms are clear and easy to understand, and that the data-intake method makes sense and is reasonable. People get confused if the process is too detailed or lengthy, which could prevent water users from responding or inadvertently introduce bad data. Utilize and support local resources (e.g. RCDs, reclamation districts, watermasters and regional water agencies) to provide technical assistance.
- Collect data on water needs (e.g., number of people, number of livestock, acreage, type of crops, instream flows) to help validate demand data. Better information on water needs will help the Division consider the scope, scale, and necessity of any drought actions such as curtailment notices.
- Obtaining timely and accurate data from reservoir or project operators (or dominant players in a watershed) is a prerequisite for implementing a range of drought management actions. Specifically, issues related to contracts and deliveries need to be understood and adequately captured in the State Water

²⁰ When a diverter exercises a riparian claim for the first time, they are required to submit an "Initial Statement of Diversion and Use" (Initial Statement). In some cases diverters are directed to submit an Initial Statement while a formal appropriative water right is pursued. For the purposes of calculating demand, the Initial Statement is entered into eWRIMS at face value and the validity and extent of the claim are not reviewed, nor is a permit issued for the reported water use. The Division does, however, assign a unique Statement number to the claim. Thereafter, the claimant is required to file an annual Supplemental Statement of Water Diversion and Use. Riparian rights are only limited by what can be put to reasonable and beneficial use on the riparian lands, and the rights cannot be lost through non-use. These factors make estimating or forecasting riparian demands very challenging.

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Boards data system to eliminate "double counting" of diverted water during a water availability analysis.

- Base supply and demand estimates on patterns of use (demand) from the largest diverters and incorporate the most likely water supply forecast estimates. Participants noted that in many watersheds, just a few large diverters account for most of the water use by volume; measurement, metering, and reporting requirements could focus on these large diverters and still provide most of the information the Division would need to enforce the priority system, while smaller diverters could be exempted from costly measurement and reporting requirements.
- Display visually how the reporter's points of diversion and demand data are being interpreted and used, so the reporter can help convert raw data into meaningful information. Spreadsheets with raw data do not always tell the story the Division is looking for.
- Develop automated quality assurance and quality control procedures for developing demand datasets. Machine learning could be used to improve the effectiveness of an automated approach.
- Give ample opportunity for public input and review of any method for calculating demand, particularly when the method may be used in a regulatory process.
- Require large irrigators to measure, identify (geospatially), and report return flows (including any direct return at the diversion location). Smaller irrigators should estimate return flows.
- Consult with Tribes regarding unmet tribal water demands.

Numerous stakeholders provided comments and input on SB 88 reporting requirements. *As background*, SB 88 (2015) requires water right holders that divert more than 10 acre-feet per year to measure their diversions and provide sub-monthly records of those diversions with their annual reports. Additionally, right holders who divert or store more than 10,000 acre-feet per year, or divert more than 30 cubic feet per second, must publish their data on a public website using telemetry. Nearly 14,000 water right records are subject to SB 88 requirements.

The data collected under SB 88 are critical for the Division's efforts to develop finer-resolution water demand analyses. The data reported under SB 88 requirements will help the Division calculate demand on a shorter time step, possibly even at daily resolution. Unfortunately, in the first two years of the SB 88 requirements, less than 20 percent of right holders have submitted SB 88 data, and only three percent of submissions include useable information (e.g., proper format, required data categories).

Participant comments largely focused on clarifying and reevaluating SB 88 requirements and integrating modern data protocols to reject poor-quality submittals. In

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addition, numerous participants suggested that the Division better describe the purpose of the SB 88 reporting requirements and why the data are important for watershed and drought management:

- Hold workshops that discuss current compliance with SB 88, evaluate methods to improve compliance, and demonstrate how better demand data would be used to improve water availability analysis.
- Communicate with reporters about reporting requirements more often (e.g., when reports are due, when they have missed the deadline, and what the ramifications are if they do not report).
- Enforce against the largest non-compliant groups because if the largest players aren't reporting properly, the Division will never get curtailments right.
- Focus on the patterns of water diversion and water use contained in the SB 88 reports and use forecasts from the largest diverters in a system and use those observed patterns to extrapolate use by smaller diversions. Such an approach could investigate different methods for projecting the demand from smaller users and could be justification for exempting some smaller diversions from the SB 88 reporting requirements.
- Provide incentives for using telemetry, like streamlining permitting or fast-tracking approval, based on the level of a diversion's impact in a watershed.
- Phase the use of Supervisory Control and Data Acquisition (SCADA) systems,²¹ for large and complex operations to replace reporting requirements and lead to more targeted management actions.
- Requiring SCADA or telemetry as a condition of transfers and change petitions could increase participation.

3.4 Determining Water Availability Part 1: Water Users

Background: California's water right priority system is based on the principle of "First in time, first in right." This means those with the oldest (i.e., senior²²) rights have the first

²¹ SCADA is a system that allows industrial organizations to control processes locally or at remote locations; monitor, gather, and process real-time data; directly interact with devices such as sensors; and record events into a log file.

²² Senior diverters are not uniformly defined, but the term "senior" is often used to generally refer to riparian and pre-1914 appropriative rights. Riparian rights generally

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opportunity to divert available water, and those with more recent (junior) rights have the lower priorities. The needs of the environment must also be considered, but do not have a specific “priority” within the water rights seniority system. When information available to the State Water Board indicates demand exceeds supply, the Board has endeavored to alert affected water rights holders (i.e., curtailment notices) and take enforcement action against those who without or outside of valid rights. The system allows for more senior rights to be met in their entirety before more junior diverters can take any water, which often leaves the lowest priority right-holders without a right to divert water during dry periods.

Calculating water availability is not as simple as comparing supply against the sum of water users’ demand; return flows from agricultural irrigation, wastewater discharges, reservoir operations, riparian demands, unaccounted or illegal diversions, and stream depletion/gains may also need to be considered. Environmental demand and availability are discussed in a separate section below.

Recommendations: Participant comments generally focused on the need for the Division to refine its methods for determining water availability, allow opportunities for public input, and provide time for right-holders to understand the approach. Participants emphasized the need to develop these approaches during wet periods to provide enough time for review and feedback well in advance of any curtailment situation. Participants also emphasized the need for an adaptive approach that incorporates feedback, new data, and data corrections. [Staff note: not every recommendation may reflect current water right law or policy.]

- Before the next drought, develop methods that allow for calculation of water availability in closer to real-time, ideally on a tributary/watershed basis. The methods should include triggers for management actions, including curtailments, with specific implementation plans that list the order of actions by priority. The methods could be developed in a less complex watershed where technical issues related to data and priority could be more easily worked out before moving to more complex watersheds.
- The Division may need a hearing (or an “adversarial process”) to implement a curtailment method that provides due process to right-holders. At a minimum, local communities must have the opportunity to provide input and review models and methods developed by the Division
- Division staff do not have the experience or number of staff needed to develop models throughout the state. The Division needs hydrologists and

have the highest priority, however, in rare circumstances pre-1914 rights can have a more senior priority than riparian right. This can pose issues because all riparian right holders are entitled to a correlative share of natural river flow while pre-1914 appropriative rights operate under the “first in time, first in right” principle.

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hydrogeologists who understand how watersheds work, and how to develop water accounting and water balances. This is especially critical when dealing with salinity issues, the hydrodynamics of the Delta, and trying to understand "real-time" water availability.

- Be prepared to implement curtailments more frequently and with a narrower focus as climate changes. Most curtailments occur within a similar annual timeframe (e.g., summer and fall), and seasonal water availability should be the initial focus of an improved water availability analysis.
- Incorporate methods to adjust demands (in water availability analyses). When considering water availability during droughts, the Division should plan on using real time telemetered diversion data, diversion forecasts, or more appropriate base year demand estimates so that demands can be adjusted to more closely reflect on-the-ground conditions (as opposed to modeled or calculated availability based on previous years' water use reporting). Simply averaging all demand values is inadequate as demand volumes change between wet and dry years. Data from large diverters could be used to represent demand patterns for smaller diverters.
- Use emerging data sources such as [Open ET](#) to assist in estimating and validating water used for irrigated lands and verifying conservation efforts or other changes in water use. While remote sensing methods like Open ET do not identify the source of irrigation water, they can be used to approximate where lands are irrigated, which can improve water budgeting and conjunctive management.
- Expand how groundwater pumping is considered in the context of water rights. For some growers, groundwater is a backup supply that can be used during drought. Others use groundwater all the time. In both cases, wells located near a stream can contribute to stream depletion (more distant wells can also contribute, but often with a lag time). The Division should consider the total net effect of stream depletions caused by groundwater pumping, which can be particularly important during drought or other dry conditions. Curtailment actions should consider including groundwater pumpers in some circumstances.
- Expand the Board understanding of Indian water rights, consult with Indian tribes regarding the status of such rights, and work with Tribes to enforce such rights.

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3.5 Determining Water Availability Part II: Environmental Flow needs

Background: As California's water rights system developed, riparian uses and appropriations²³ were made with little consideration for the needs of the environment and other public general uses, often described as public trust uses.²⁴ While many diverters today recognize the need to provide water for public trust purposes, it can be difficult to know how much water is needed and when. During dry periods, human uses of water are often prioritized over environmental needs, especially where environmental needs are poorly defined, or where the perception is that if one diverter forgoes a diversion, a downstream diverter will take that water.

The State Water Board relies on agencies such as the California Department of Fish and Wildlife, US Fish and Wildlife Service, National Marine Fisheries Service, and others to provide the specific recommendations or requirements for inclusion in regulations, policies, permits, and licenses. During the last drought, the Division implemented public trust actions in some watersheds, but not others – and as a result participant comments raised the seemingly ad-hoc nature of the approach.

Recommendations: The following participant recommendations generally focused on providing consistency, earlier information and messaging, and clear metrics and data upon which the Division's recommendations or actions were based:

- The Division should clearly describe what “protecting public trust resources” means, especially in light of changing climate. State Water Board leadership and perseverance is needed to achieve public trust goals in the face of resisting forces.
- Consider multiple methods to manage water for the environment, including environmental water budgets, watermasters, environmental reserves in reservoirs (gainshare), trustees/managers, water blocks, and/or dedicated water rights. Keeping in mind that solutions may differ by watershed, and stakeholder engagement is crucial to success.
- Encourage the Department of Fish and Wildlife to submit its flow recommendations to the State Water Board (under [Public Resources Code](#))

²³ An appropriation of water is made for the use of water on non-riparian lands, for storage of water, or for the use of water on riparian land when the water would not be available under natural conditions. Since 1914, all appropriators of surface water must file an application with the Division, which issues a permit if water is available for appropriation, other applicable requirements are satisfied, and the application is approved.. A license is issued once all conditions of the permit have been met.

²⁴ Public trust uses include navigation, commerce, fishing, recreation, and the preservation of fish and wildlife habitat, which are protected by the State for the benefit of the public.

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[section 10002](#)) as soon as the recommendations are completed, rather than waiting for lengthy management review or approval. The Board is not a fisheries agency and will have a hard time defending its own flow recommendations while also defending its balancing of beneficial uses role without an official recommendation from the fishery agency.

- Develop a process to rapidly implement statewide instream or environmental flows at levels/times/temperatures that are reasonably protective of public trust resources and are considered valid until superseded by Department of Fish and Wildlife flow recommendations.
 - The [California Environmental Flows Framework \(CEFF\)](#) could be a place to start, and while it could be slow to fully implement, it is better than no approach. Legislative support would be beneficial, but CEFF and establishing public trust needs can be implemented under existing authorities.
- The Division should develop a process to adjust flows during droughts to better balance environmental and human needs. Temporary Urgency Change Petitions (TUCP) should not be part of the process as they undercut the idea that the State Water Board will meaningfully enforce its decisions. Currently, many stakeholders have incentives in maintaining the status quo and delaying environmental flow requirements.
- Physical solutions must be part of the environmental flow conversation and should be considered as part of voluntary agreements. Streamflow enhancement, fish passage improvements, channel modifications, managed aquifer recharge, off-stream storage and other solutions are worth considering, and diverters would consider implementing them if they had the right incentives (e.g. funding, time, planning assistance) or motivation (e.g. curtailment, specific impacts to individuals clearly shown).
- Recognize that there could be trade-offs in management actions, and some actions favor one species over another. For example, during the last drought the State Water Board prioritized protection of winter run salmon, but those actions may have been detrimental for Delta Smelt. To help with this determination, datasets such as [UC Davis PISCES](#) should be used to better understand species presence and distribution when developing or evaluating management actions.
- Partner with the federal government to collect information about federal rights for the Endangered Species Act and tribal water rights.

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4.0 Collaboration

Overview: The State Water Board relies in part on other tribal, state and federal agencies, NGOs, regional water managers, and academics to help develop the information, analyses, and thresholds needed to manage the water rights system. While many routine activities are generally well coordinated, additional consideration is needed for coordination during drought. Timely collaboration at appropriate managerial levels is necessary to develop and implement fact-based, time-sensitive responses to evolving hydrologic conditions.

Many participants emphasized the value of partnerships to help the Division collect data and build models, and they recommended that the Division identify partners that can help bridge data, resource, and experience gaps. These types of partnerships will also assist the Division with the relationship and trust-building recommendations discussed in the “Communication” and “Data” sections.

4.1 Interagency Coordination

Background: State agencies try to collaborate on almost every aspect of state resource management and in development of related regulatory oversight measures. However, the most recent drought highlighted areas where additional collaboration and coordination was critical in protecting water resources, and where additional coordination was still needed.

Recommendations: Participants noted that California has experienced many droughts and will experience many more (particularly when considering climate change). Comments emphasized that the Division and other state agencies need to plan how they will respond cohesively during the next drought.

- Before the next drought, improve coordination between tribal, state and federal agencies (e.g., Department of Fish and Wildlife and Department of Water Resources, Bureau of Reclamation, and tribal natural resource or water management departments). This includes establishing lines of communication, defining roles and responsibilities, coordinating messaging, establishing goals and priorities, setting timelines, and improve data sharing. By developing this communication framework now, agencies would be able to identify equipment and contract needs and determine who is gathering data and how to distribute it (e.g., identifying monitoring data needed for winter run chinook salmon, or general ecosystem health).
 - Submit a Budget Change Proposal (BCP) that would assign two to five staff from different agencies to focus on interagency collaboration, drought preparation, and overall resilience.

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- Conduct a dry-run drought exercise with the Department of Water Resources to evaluate actions to protect Delta water quality before dry conditions become concerning. The outcome would include documentation of challenges and areas of improvement.
- Prepare hiring protocols, agreements, or response plans (e.g., exemptions, proclamations, drought declarations, water balance accounting methods, water rights accounting methods, etc.) to quickly respond to the need for increased staff and funding during drought emergencies.
- During drought emergencies, maintain strategic communication with state agencies with overlapping or related authorities and responsibilities so that agencies can better share data and work collaboratively to maximize the effectiveness of drought efforts.

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Appendix A: Referenced Terms

The following are key terms and reference statues, regulations, or policies found in this document. The definitions provided in this document are solely intended to clarify the contents of this document and are not legal definitions unless noted.

Appropriative water rights are rights to use water outside of the constraints of riparian rights, including use on non-riparian lands, or storage for use when water would not naturally be available.

Curtailments implement the State's water rights priority system, and generally require complete cessation in diversion for the specific water right, usually identified by the priority date of the right. Diverters may still divert water if they have another valid water right/claim or contract that has not been curtailed. Previously stored water is generally not impacted so long as the water was collected to storage prior to a curtailment.

Diverter generally means a person or entity that diverts water from a surface water body under a right or claim.

Division means the State Water Board's Division of Water Rights and is used when referencing implementation of water rights policies and responsibilities of the State Water Board, normal actions which have been delegated to management within the Division, or with regard to individual staff within the Division.

eWRIMS means Electronic Water Rights Information Management System.

Hydrologic Unit Code(s) were developed by the United States Geological Survey as a hierarchical system of hydrological units throughout the United States. The HUC-12 designation references a 12-digit code which uniquely identifies "sub-watershed" scale hydrological units ranging in size from approximately 10,000 to 40,000 acres, and is the smallest hydrologic unit designated throughout California.

Policy for Maintaining Instream Flows in Northern California Coastal Streams (Assembly Bill 2121 (State. 2004, ch.943)): More information can be found in the [policy](#) and on the State Water Board Instream Flow Policy [website](#).

Open ET: More information on Open ET can be found on the [Open ET data website](#).

Pre-1914 means appropriations of water which occurred prior to the establishment of the water rights permitting system administered by the State Water Board or its predecessors (beginning in 1914).

Priority System operates on two general principles: 1) riparian claims are generally the highest priority, and must share the burden of any shortages when there is insufficient water for the needs of all riparians, and 2) once riparian demands are met, the demands of appropriative claims and rights are met on a "first in time, first in right" basis, with the earliest appropriations entitled to be fully fulfilled before the next later appropriation is

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entitled to divert water. The most recent appropriations are last to be fulfilled and are the first to be curtailed during shortage.

Public Trust Uses include navigation, commerce, fishing, recreation and the protection of fish and wildlife habitat, which are protected by the State for the benefit of the public.

Records: A water right record is uniquely identified by an Application Identification code for each individual right, claim, registration etc. Records are also kept for statements of claim, which are assigned a statement number. For the purposes of this report, a record refers to an individual water right or claim of right, and all underlying data that pertains to it (i.e. points of diversion, beneficial uses, seasons of use, etc.).

Riparian refers to water rights for the use of natural flows on lands that currently (or historically, if the right was preserved) touch a lake, river, stream, or creek.

Senate Bill 19 (SB 19): Senate Bill 19 ([Wat. Code, § 144 \(Stats. 2019\)](#)) directs state agencies in California to collaboratively develop a plan to identify and address information gaps in the stream gage network to meet a variety of management needs. More information can be found on the State Water Board's [SB19 Stream Gaging Plan website](#).

Senate Bill 88 (SB 88): Senate Bill 88 ([Wat. Code, § 116680 et seq. \(Stats. 2015\)](#)) requires parties authorized to divert more than 10 acre-feet of water per-year to measure and record diversions at frequencies shorter than the standard monthly time step. More Information can be found on the State Water Board's [Water Measurement Website](#).

Senior Diverters generally refers to riparian and pre-1914 claimants, though seniority is relative (i.e., appropriative water rights priority dates after January 1, 1915 and January 1, 2020 are both senior to a right with a priority date of January 2, 2020). Riparian claims are generally the highest priority. As between a riparian right holder and an appropriator, the priority of the riparian is based on when the land was patented, and; in rare circumstances pre-1914 claims can have a more senior priority than riparian claims (i.e., an appropriative right that was initiated prior to the land patent date for a riparian right). All riparian claimants are entitled to put to beneficial use a correlative share of natural river flow; riparian rights are not for a fixed quantity and generally cannot be lost for non-use. Pre-1914 appropriative claims operate under the “first in time, first in right” principle.

State Water Board means the State Water Resources Control Board. The State Water Board, among other things, develops policies and sets Division priorities, and this document generally refers to the State Water Board, as opposed to the Division, when discussing general authorities, elements outside the purview of the Division, and other issues where ultimate responsibility lies with the State Water Board members.

Telemetry means an automated system which sends data from the measurement location to centralized location for processing, or directly to the internet.

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Water exchange can take several forms and may include a sale/purchase or may include other accounting mechanisms to increase efficiency, reduce cost, or optimize water movement or storage. Exchanges generally do not physically move water but could involve a party diverting water in one location but using another party's water.

Water Transfers occur when a party with access to available surface water chooses to convey that water to a party in need. The transferred water typically is diverted at a point of diversion for the transferee instead of the transferor's point of diversion. In "groundwater substitution transfers" the transferor conveys the right to divert surface water and then pumps groundwater to meet its own needs.

Water User refers to a person or entity who puts water to any beneficial use, regardless of whether they hold the legal right to take the water from a water body or receive water from another entity which holds the right.

Section 1707 Dedications refer to dedications of water to instream use pursuant to Water Code section 1707. More information can be found on the State Water Board's [Instream Flow Dedication website](#).

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Appendix B: Participants

Organization	Participant Type
Yurok Tribe	Tribal Government
Spaletta Law	Water Rights Attorney
Former State Water Board Member/Chair	Former Staff
MBK Engineers	Consultant
University of California, Davis	Academia
O’Laughlin & Paris LLP	Water Rights Attorney
Moulton Niguel Water District	Water Agency
Downey Brand LLP	Water Rights Attorney
Water and Power Law Group	Water Rights Attorney
Public Policy Institute of California (PPIC)	NGO
Trout Unlimited	Environmental NGO
Water Foundation	Environmental NGO
Wagner and Bonsignore Consulting Civil Engineers	Consultant
California Farm Bureau Federation	Agriculture NGO
UC Agriculture and Natural Resources (UC ANR)	Academia
California Department of Fish and Wildlife	State Agency
Byron-Bethany Irrigation District and Placer County Water Agency	Water Agency
The Nature Conservancy	Environmental NGO
East Bay Municipal Utility District	Water Agency
Association of California Water Agencies	Water Agency
Environmental Defense Fund	Environmental NGO
Sonoma County Water Agency	Water Agency
Author: <i>The Dreamt Land: Chasing Water and Dust Across California</i>	Author

Appendix C: Referenced Materials

The following are materials (e.g., documents, programs, reports) referenced by participants during their interviews.

1. Analysis of Supply in the State Water Resources Board Division of Water Rights', 2015 Methodology for Water Availability Analyses for the Sacramento, San Joaquin, Delta Watershed" by West Side Irrigation District and Byron-Bethany Irrigation District. January 18, 2016.
waterboards.ca.gov/waterrights/water_issues/programs/hearings/byron_bethany/docs/exhibits/wsid_cdwa_sdwa/wsid0122.pdf
2. Three-set Venn diagram of Proactive Drought Preparations, In-Drought Action, Post Drought Action www.law.berkeley.edu/wp-content/uploads/2018/08/Fig_01_Pre-In-Post_cycle.jpg
3. California Department of Food and Agriculture, State Water Efficiency & Enhancement Program. www.cdfa.ca.gov/oefi/sweep/
4. Managing California's Freshwater Ecosystems: Lessons from the 2012-16 Drought; Public Policy Institute of California, November 2017
<https://www.ppic.org/publication/managing-californias-freshwater-ecosystems-lessons-from-the-2012-16-drought/>
5. Enforcement Action ENFO1949 Draft Cease and Desist Order Regarding Unauthorized Diversions or Threatened Unauthorized Diversions of Water from Old River in San Joaquin River; Written Testimony of Greg Young, P.E. January 18, 2016 (Exhibit BBID392)
https://www.waterboards.ca.gov/waterrights/water_issues/programs/hearings/byron_bethany/docs/exhibits/bbid/bbid392.pdf
6. Enforcement Action ENFO1949 Draft Cease and Desist Order Regarding Unauthorized Diversions or Threatened Unauthorized Diversions of Water from Old River in San Joaquin River; Rebuttal Testimony of Greg Young, P.E. February 22, 2016 (Exhibit BBID395)
https://www.waterboards.ca.gov/waterrights/water_issues/programs/hearings/byron_bethany/docs/exhibits/bbid/bbid395.pdf
7. California Institute for Water Resources, Climate Smart Agriculture:
<http://ciwr.ucanr.edu/Programs/ClimateSmartAg/>
8. California Nevada River Forecast Center (CNRFC) <https://www.cnrfc.noaa.gov/>
 - Ensemble Forecasts (short-term; example):
<https://www.cnrfc.noaa.gov/ensembleProduct.php?id=UKAC1&prodID=4>
 - Ensemble Forecasts (long-term):
<https://www.cnrfc.noaa.gov/ensembleProductCSV.php>