

Recommendation 1: Drought Indicators and Metrics

Part 0. Recommendation Declaration

To be submitted to the DRIP support team prior to commencing work on Part I.

Recommendation Proposer

DRIP Member name, member type (state/non-state) and any partners (DRIP members or external) in development of proposed recommendation.

Alvar Escriva-Bou, non-state DRIP member (expert in water resource management). Other DRIP members who have previously expressed interest in this idea: Nancy Vogel, Katie Ruby, Katy Landau.

Potential contributing partners outside of DRIP Collaborative: CA Water Data Consortium (CWDC) and CA Data Collaborative (CaDC)

Recommendation Idea

Provide a brief (no more than 150 words) description of the idea for a recommendation.

There is a need to develop a practical drought early warning system to inform drought management actions—both proactive mitigation measures and effective emergency responses—to minimize drought impacts.

Our ability to link drought conditions and expected impacts is not sufficiently specific and actionable. Given the complexity of California’s water system, it is not straightforward to understand different sectors’ potential impacts and develop drought responses. We also lack useful summary statistics to characterize drought resilience at the highest level (the type of drought metrics that might appear in every DRIP report to show our collective effort in improving our resilience). To do this, we need an improved ability to monitor and integrate that data, working across all levels including local, state, federal and tribal.

This drought early warning system should be adopted as part of a larger narrative and communication plan. How these metrics should be visualized and communicated must be considered, likely as part of a potentially updated online dashboard.

Focus Area

Drought Relevant Data Drought Narrative Drought Preparedness for Domestic Wells

Intended Benefit to the Drought Risk Management Cycle (Please check all that apply)

Mitigation, Preparation and Capacity

Forecasting and Monitoring

Response

Recovery

Recommendation 1: Drought Indicators and Metrics

Part I: Recommendation Overview

Recommendation Title

Provide a concise title for your recommendation in fewer than ten words.

Indicators and metrics to improve drought decisions, actions, and resilience

Description

In one or two paragraphs, please provide a brief overview of the recommendation and how it addresses the Focus Area problem statement. Supporting documentation to include an overview of existing trends, the reasons for urgent action, and people currently impacted.

There is a need to develop a practical drought early warning system to inform drought management actions—both proactive mitigation measures and effective emergency responses—to minimize drought impacts and improve drought resilience.¹ This would take the form of an online web application or dashboard that would communicate in a simple manner, but accounting for the local nuances of California’s complex management, drought states and expected impacts for different California’s water-dependent sectors. This application would improve information for local and state actions, increasing drought resilience. This came out explicitly from past DRIP Collaborative conversations related to the “Drought Relevant Data” focus area, and arguably would be the first key action to address the overall data problem statement.

The identification of the most actionable (both at state and local level) drought metrics would serve as a focal point for data sharing/coordination, data collection and interoperability, and then more predictive capabilities such as incorporating climate change data and projections. It could help pilot an improved level of coordination, where state requested data is used directly and transparently for shared metrics that multiple stakeholders believe are critical for tracking resilience.

Today, given an uncoordinated approach to drought metrics and dashboards (such as US Drought Monitor, CA Water Watch, separate drought websites from DWR, State Water Board, etc.) it is believed there is inefficient action and results. We cannot measure or quantify drought resilience today, in a way that is easily communicated and understood by all critical stakeholders. Aligned upon metrics and indicators could be the foundation for improved drought communication and narratives.

Impacts

What are the expected outcomes or benefits of this recommendation, and how will it specifically enhance drought resiliency in California?

The practical output of this recommendation would be the development of an online dashboard or web application that tracks drought status and impacts through a state-university partnership. It would aim to empower state and local agencies to improve drought response and preparation, fostering greater communication, collaboration and coordination. These would be tracked and quantified, providing key agencies (such as the Department of Water Resources, the State Water Resource Control Board, the Department of Fish and Wildlife, and local urban and agricultural suppliers, among others) with the

¹ According to the [National Integrated Drought Information System \(NIDIS\)](#), drought early warning systems provide accurate, timely, and integrated information on drought conditions at the relevant spatial scale. This can help governments and communities make proactive decisions to minimize the economic, social, and ecosystem losses associated with drought.

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ability to quantify relative improvement in resilience over time. The desired outcome of this would be a measurable improvement in our overall drought resilience, achieved via better planning and management actions, and improved decision-making.

We believe this drought early warning system would include new elements that ensure drought information is more specific and actionable. This includes:

- **Water supply portfolio:** An integrated view of surface water and groundwater, inclusive of complex water supply portfolios (including storage, conveyance, and imports). This would include specific information about each element of the portfolio, such as expected surface deliveries.
- **Spatial:** Finer resolution, ideally at the sub hydrologic region
- **User/sectoral impacts:** Addressing distinct needs and impacts on cities, small communities, irrigated agriculture, and freshwater ecosystems

This could potentially help the state better identify areas in need of assistance and coordinate policy responses in a transparent manner, by providing more geographic-specific information and identify drought responses. This early warning system could help also identify long-term risks.

What are the anticipated impacts or consequences of not adopting this recommendation?

If this recommendation is not adopted, we believe the consequence would be continued lack of focus, misunderstanding of drought severity and impacts, lack of coordination on essential actions, and likely continued serious impacts on vulnerable communities. In short, the status quo would continue even though DRIP members believe this is a critical enabler for better decision making.

Implementing Parties and Partners

Who would be the implementing agency or entity (potentially multiple)?

Implementation would undoubtedly require a mix of state and local agencies (in collaboration with federal agencies, such as NOAA NIDIS and EPA, and university researchers). During the evaluation and execution of this recommendation, a key question will need to be addressed: is there a lead agency and/or single home for this work? This is complicated given an existing mix of responsibilities being shared across many agencies and at different levels. Ideally, open data (housed in each authoritative agency) will be maintained, and these new metrics and indicators would have a highly transparent link back to source data and calculations. Whether these news metrics and indicators should simply be displayed on multiple dashboards (versus a single location) would need to be discussed.

Which existing entities (e.g., departments or other agencies, private or nonprofit groups, community-based organizations) will the implementing agency or entity need to partner with for successful implementation of this recommendation?

Existing entities or stakeholders that would need to be involved cross five different groups: 1) groups reporting needed data, 2) data collecting agencies, 3) organizations performing metrics calculations, 4) open data portals/dashboards communicating the metrics, and 5) end users who utilize the metrics and indicators (such as urban agencies, groundwater agencies, irrigation districts, environmental organizations, corporations, and small suppliers or domestic well owners). These groups would cross all relevant state agencies, counties, Tribal, local water agencies, non-profit groups (including environmental conservation and justice organizations), community-based organizations, academics, and key sectors like agriculture and industrial. Any increase in effort needed to collect additional data, would need to be justified and communicated along with the desired metrics.

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Describe the coordination required by federal, state, local and tribal governments to successfully implement this recommendation.

To ensure successful implementation of this recommendation, it is believed the wide range of stakeholders need to be involved from the very beginning, most notably in defining the metrics and indicators. Each stakeholder representation should be given influence to inform and select the metrics, given careful consideration of the effort/cost required to gather the data and the resulting value of the metrics to decision making.

Alignment with Other Initiatives

How does the recommendation align with and/or leverage existing state efforts, concurrent public or private initiatives?

There are a number of ongoing initiatives already underway that would need to be considered in implementing this recommendation. These would serve as a starting point and foundation for creating the drought metrics and indicators. Lessons learned from these efforts should be addressed.

For example (not an exhaustive list):

- DWR work to assess vulnerability per SB 552 (Water Shortage Vulnerability Scoring and Tool)
- SWB SAFER Drinking Water Needs Assessment, Clearinghouse, other drought tools and methods
- UC Davis work with NIDIS to define drought hazard and indicators at section and sub-regional level
- CA Water Data Consortium work on urban water reporting and data streamlining
- Community Water Center Drinking Water Tool
- COEQWAL and other efforts aimed at communities
- US Drought Monitor and other federal, Tribal efforts

Implementation Time Frame

Approximately how quickly could the proposed recommendation be implemented? Factor time needed to develop, design, permit, construct (if applicable). Select one timeframe:

Short term (1-2 yrs.) **Medium term (2-4 yrs.)** Long term (4-5+ yrs.)

Part II: Implementation Considerations

Necessary Steps & Measuring Success

What are the key steps to adopt and implement action?

- Develop a partnership between state agencies and an academic research team to implement this recommendation
- Establish a steering work group (including agencies and researchers, potentially including DRIP members) to guide the initial development
 - Define specific goals of the early warning system to track, communicate and minimize drought impacts
 - Identify other strategies that are aligned to create synergies and avoid overlapping actions
- Launch an advisory committee of relevant stakeholders (potentially including DRIP members) that would identify specific needs and provide feedback on the research activities.
- The academic research team would conduct research activities to create a sector-specific drought early warning system for California, including the development of an online application (dashboard

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or webpage). This application would be simple to understand but would account for the complex nuances of drought representation in California, and would serve to inform local and state decision and policy making. It must also provide appropriate links and attribution to other related sites

- Set up a hosting and maintenance plan (including review options) to keep the tool working and improve it over time

To help monitor progress and success, what thresholds and reporting can be identified to reflect successful implementation?

- Set-up a stage-gate, agile design process to determine appropriate project milestones.
- Milestones, which should be tracked for progress, could include:
 - Establishment of the task force that is tasked to monitor the progress
 - Establishment of advisory committee
 - Definition of specific goals for the online tool/application; alignment on essential scope
 - Conducting research activities, including identifying the initial and refined drought metrics
 - Note: This should include symbology, visualization, etc. that was previously part of Rec 7 Communication Plan
 - Development of the online application (webpage or dashboard). Includes original mock-up, beta version and final version
- Ongoing usage, maintenance, and ownership of application
 - Usage of tool, impressions/views
 - Downloads of related datasets
 - Media mentions
 - Use by different users, especially local communities and vulnerable communities
- In the long-term, improvement of drought communication (for instance, media usage) and drought response (improved decisions and policies)

Potential Challenges

What issues or challenges might arise during implementation (e.g. authority or need for additional authority, funding or revenue streams, public awareness and perception, technical, interagency coordination)? List these hurdles and offer a brief description of how to address/mitigate them.

- Lack of clarity of the specific goals (conflicting views of the objectives): the initial task force will be crucial to define the objectives, and the advisory committee should help increasing the usability of this tool
- Data availability: identify data gaps and determine how critical gaps can be filled
- Interpretation: Ability to keep metrics/indicators focused but yet be helpful for decision making by a diverse group of water stakeholders
- Funding: identify funding sources for the development and maintenance
- Maintenance: create a maintenance plan accounting for its costs of ongoing use and hosting

Are there foreseeable potential negative consequences or unintended impacts associated with implementing this recommendation?

- NA

Funding

What are the potential (estimated) costs to implement the recommendation? Is there both an implementation cost and ongoing costs? Briefly describe any assumptions behind the estimate.

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- ~\$1.5 million: 3 years, 2 full time researchers, 1 lead PI working 1 month per year, a team of webpage developers, and some funds for travel and workshops. Note: Depending on future scope and functionality, additional funding (beyond the initial \$1.5M) and time may be needed
- In-kind contributions expected (e.g. technical support/products from state agencies)

What potential existing and/or future funding sources or mechanisms are available (e.g., grants, general fund, bond funds, rate payers, philanthropic foundations, etc.)? Does the recommendation require funding from the state and potentially matching funds?

- NIDIS has committed to fund \$300,000 in fiscal year 2024-25, and it's likely to fund other \$300,000 for fiscal year 2025-26.
- Other sources of funding could be USDA, CDFA, DWR, USBR, or SWRCB.

Equity and Outreach

How does this recommendation align with established agency equity policies and how might the recommendation address any specific equity or justice concerns, as defined by the DWR Racial Equity Vision, during its implementation?

- Usually there is less data about water supplies and other drought metrics for small communities, domestic well owners, and tribal nations, who are often the most vulnerable to droughts. They also have less physical and financial capacity to adapt to water scarcity. That could be a concern for equity.

What sort of outreach is necessary for the successful implementation of the recommendation? Describe the target audience and the methods of outreach needed (e.g., communication, technical or financial assistance, partnering assistance).

- Target audience: local and state decision-makers on drought actions, and the general public.
- Workshops and meetings will be needed to gather feedback and disseminate the results.
- Maintenance of the established partnership, as well as access the data and refinement of methods, will be key for long-term success.

Recommendation 2: Rapid Inventory of Drought-Related Tools & Resources

Part 0. Recommendation Declaration

To be submitted to the DRIP support team prior to commencing work on Part I.

Recommendation Proposer

DRIP Member name, member type (state/non-state) and any partners (DRIP members or external) in development of proposed recommendation.

Ben McMahan and Elea Becker Lowe, Governor's Office of Land Use and Climate Innovation (LCI).

Recommendation Idea

Provide a brief (no more than 150 words) description of the idea for a recommendation.

Conduct an evaluation of programs and initiatives relevant to California drought issues, to ensure strategic alignment with existing federal, state or regional efforts, and rapid action to address outstanding questions. This should include an evaluation of information gaps in drought related tools (e.g., National Integrated Drought Information System), and may include a summary of relevant monitoring or research already underway to address drought related research questions (e.g., California's Fifth Climate Change Assessment research and data products). Filling these knowledge gaps should be done strategically to uplift and complement existing efforts while leveraging federal efforts such as the NIDIS CA-NV Drought Early Warning System or other experimental drought monitoring tools (e.g. EDDI), and exploring partnerships with drought technical experts already grappling with drought challenges (State/non-State).

Partners should include technical experts (State/non-State).

Focus Area

- Drought Relevant Data** Drought Narrative Drought Preparedness for Domestic Wells

Intended Benefit to the Drought Risk Management Cycle (Please check all that apply)

- Mitigation, Preparation and Capacity
 Forecasting and Monitoring
 Response
 Recovery

Recommendation 2: Rapid Inventory of Drought-Related Tools & Resources

Part I: Recommendation Overview

Recommendation Title

Provide a concise title for your recommendation in fewer than ten words.

Rapid Inventory of Drought Related Tools & Resources Relevant to California

Description

In one or two paragraphs, please provide a brief overview of the recommendation and how it addresses the Focus Area problem statement. Supporting documentation to include an overview of existing trends, the reasons for urgent action, and people currently impacted.

This is a revision of the initial recommendation to focus less on a formal or in-depth evaluation of drought data and resources. The updated recommendation is in support of a rapid inventory of drought related resources relevant to California. The purpose of this effort would be to ensure that DRIP is broadly aware of existing drought tools and resources. This would help promote existing tools and provide initial guidance on use cases and highlight opportunities for new decision support tools or resources that address gaps or priorities. The process would include identifying the key attributes to track for each of the resources (geography, timescale, relevant sector(s), etc.), sorting known tools and resources into this schema (items to be included in any inventory), and some limited desk research to document previously unknown tools and resources. The outcome of this effort would be a summary of the resources that are relevant to drought related decision making in California, with a simple schema that describes their area(s) of focus (re: sector, geography, etc.), in a format that could support ongoing evaluation and assessment of how they do or don't address drought related issues in CA, limited guidance on use of these tools, and any gaps in data, tools, or indicators that could help address CA related drought. The schema could be a discussion item for future DRIP meetings, and we could use a simple referral process (email, a form, etc.) to elevate or highlight resources to ensure their inclusion in this process.

Impacts

What are the expected outcomes or benefits of this recommendation, and how will it specifically enhance drought resiliency in California?

This process would 1) ensure we are broadly aware of drought resources that already exist to avoid any redundancy, 2) elevate existing tools and resources that are relevant or useful in California, including links to guidance where available, and 3) identify gaps in the data/resources landscape based on known or emergent need, specific to the California drought context. The outcome or benefit of this overall process would be to serve as a baseline to support subsequent recommendations and effort and could be developed into a standalone resource that summarizes drought relevant tools and resources.

What are the anticipated impacts or consequences of not adopting this recommendation?

No major consequences for this 'homework' which will support other DRIP Collaborative recommendations/efforts and will help ensure more efficient use of existing resources. Any gaps we identify would help prioritize future efforts framed around these gaps/needs.

Implementing Parties and Partners

Who would be the implementing agency or entity (potentially multiple)?

Recommendation 2: Rapid Inventory of Drought-Related Tools & Resources

LCI could help coordinate this effort, as it mirrors a similar process conducted in response to the Integrated Climate Adaptation and Resilience Program (ICARP) Technical Advisory Council’s (TAC’s) development of a definition of climate vulnerability (which included a cross walk of existing tools, and some assessment of gaps/needs that resulted from that process), and the Vulnerable Communities Platform (VCP) team has been assembling similar information as part of interagency coordination (VCP Interagency Technical Working Group). Would welcome any additional support from DRIP members and drought focused agencies (SWB, DWR, DSC, etc.) and this has strong alignment potential with the drought indicators recommendation, as well as the drought definition/narrative recommendations.

Included is a sample from the existing inventory the VCP team has already been developing, to better understand the landscape of drought relevant resources in California. This is just a sample but illustrates the information the team is already gathering for a similar purpose (awareness of the landscape of tools and resources around Drought/Vulnerability in CA).

	A	B	C	D	E	F	G	H
1	Name	Tool or Info Resource?	Area of Focus	Indicators	Short Description	Utility	Gaps/Limitations	Access Link
2	Tools							
3	Local Climate Change Snapshot	Tool	Local (county, zipcode or address, census tract, HUC10, city)	Temperature, precipitation	This tool allows users to select a geography (e.g., zip code) and access projections for temperature and precipitation for that geography over time.	Understand projected changes in climate for a given area. For example, for Sacramento zip, understand change in inches of precipitation from baseline under different RCPs by mid-century.	Focuses on temperature and precipitation, which are related to drought risk, but are not precise indicators of presence or absence of drought.	https://cal-adapt.org/tools/local-climate-change-snapshot/
4	Maps of Projected Change	Tool	State-wide	Temperature, precipitation	This tool allows users to view statewide maps of projected temperature and precipitation change.	Understand projected change in climate across the state for temperature and precipitation. Helps visualize large-scale trends for different regions of the state. Allows for comparison between different RCPs.	More of a visualization tool; data is not easily downloaded or summarized for users.	https://cal-adapt.org/tools/maps-of-projected-change/
5	Extended Drought Scenarios	Tool	Local (LOCA grid cell)	Temperature, precipitation, evapotranspiration, snow water equivalent, baseflow, runoff	This tool allows users to understand projected changes in climate variables under two drought scenarios: early century drought and late century drought.	Understand projected changes in climate under drought scenarios. Helps to answer the question, what would average precipitation look like in my geography under an extended drought scenario?	Does not project where or when drought is likely to occur. Rather, helps to determine what conditions would be like under extended drought scenarios if they were to occur.	https://cal-adapt.org/tools/extended-drought/

Which existing entities (e.g., departments or other agencies, private or nonprofit groups, community-based organizations) will the implementing agency or entity need to partner with for successful implementation of this recommendation?

No mandatory participation to implement, but there are 2 important touchpoints in this process: comments/input on the schema for the inventory and reviewing the list to identify any missing tools/resources. The schema input could take place as a discussion item for the DRIP Collaborative and doesn’t need to be over-complicated. The goal would be to identify the baseline attributes required to have this be a worthwhile effort, while still feasible in a shorter turnaround. In the Drought-Relevant Data Workgroup Meeting held on June 17th, 2024, sector, geography, timescale, and links to vulnerable populations/communities were all mentioned as possible attributes to include. There may be other attributes to consider. It would also be helpful for Subject Matter Experts (SMEs) and users outside of the DRIP to review the list/inventory for completeness and to suggest additional tools/resources.

Describe the coordination required by federal, state, local and tribal governments to successfully implement this recommendation.

Recommendation 2: Rapid Inventory of Drought-Related Tools & Resources

n/a other than if any state/local/Tribal governments would like to submit a resource for inclusion.

Alignment with Other Initiatives

How does the recommendation align with and/or leverage existing state efforts, concurrent public or private initiatives?

This aligns with the Drought Indicators & Metrics recommendation, serving as a precursor to identify the baseline or landscape of existing resources. It would also align with the Drought Definition and Narrative Focus Area recommendations, as many of these tools and resources are either used in defining different flavors of drought, or as examples of data that help illustrate drought narrative case studies. The 'strategic' literature review discussed at the June 17th meeting could also be a shared resource across the DRIP Collaborative recommendations and working group or made available publicly (strategic = the short list of academic resources or technical white papers that are essential resources in the drought impacts space and show we have reviewed crucial prior work in defining/ characterizing/ mapping drought to inform our recommendations).

This aligns with the Interagency Technical Working Group (ITWG) for the ICARP VCP at LCI, which has been coordinating with agencies on drought related vulnerability. Any public facing summaries or inventories of drought relevant information could be hosted on the Adaptation Clearinghouse and tagged with relevant sector/hazard information in the database.

Implementation Time Frame

Approximately how quickly could the proposed recommendation be implemented? Factor time needed to develop, design, permit, construct (if applicable). Select one timeframe:

Short term (1-2 yrs.) Medium term (2-4 yrs.) Long term (4-5+ yrs.)

Part II: Implementation Considerations

Necessary Steps & Measuring Success

What are the key steps to adopt and implement action?

To help monitor progress and success, what thresholds and reporting can be identified to reflect successful implementation?

- (DRIP Leads) Coordinate with LCI VCP team on any existing work to inventory drought/vulnerability related resources. To support VCP development, the VCP team has conducted literature reviews and reviewed available data sources to identify, evaluate, and select data relevant to drought social vulnerability and climate vulnerability. DRIP leads could coordinate with the LCI VCP team to identify the resources the team has investigated for contribution in the rapid inventory.
- (DRIP/Interagency/ITWG) Expand search/review based on agency and external input (other literature or tools on drought characterization)
- (DRIP) Review any information produced as part of this effort
- (DRIP) Suggest other information or provide feedback on the inventory and any inventory documents produced
- (DRIP Leads in collaboration with VCP team) Explore how to document this information in an easy to review/update format. For example, there could be two outputs with different formats: 1) a rapid

Recommendation 2: Rapid Inventory of Drought-Related Tools & Resources

inventory for internal processes developed in Excel, and 2) a public-facing summary table of the rapid inventory that highlights the most applicable and accessible resources.

Potential Challenges

What issues or challenges might arise during implementation (e.g. authority or need for additional authority, funding or revenue streams, public awareness and perception, technical, interagency coordination)? List these hurdles and offer a brief description of how to address/mitigate them.

- VCP team’s effort is already underway, and while aligned with DRIP Collaborative input, has internal mandates and deliverables for platform development (i.e. where we can leverage that effort, it’s a great opportunity for alignment, but there is limited space to alter their workstream).
- The breadth of tools and resources that exist, may require some filtering – either for overall inclusion, or based on limitations of a given resource
 - For example, some may not be statewide in coverage (e.g. an San Joaquin Valley drought assessment), while others may not be updated recently or regularly. This challenge will become more apparent as the inventory proceeds.

Are there foreseeable potential negative consequences or unintended impacts associated with implementing this recommendation?

- No obvious negative consequences, but given the complexity of drought – it will be crucial that this is presented as an overview/inventory of drought/vulnerability tools, and not a definitive answer (not fully comprehensive) to that question (given the complexity of different sectors, geographies, timescales, and drivers of drought)

Funding

What are the potential (estimated) costs to implement the recommendation? Is there both an implementation cost and ongoing costs? Briefly describe any assumptions behind the estimate.

What potential existing and/or future funding sources or mechanisms are available (e.g., grants, general fund, bond funds, rate payers, philanthropic foundations, etc.)? Does the recommendation require funding from the state and potentially matching funds?

- VCP team leverage is cost neutral, but we are subject to what that team can do given their internal mandates (i.e. how can this leverage their existing work), and what we can gather via DRIP member submissions or recommendations. This seems feasible to complete within that constraint, but important to note that we are tapping into existing effort/work, not scoping a new project.
- If there were ambition to scope this beyond leveraging existing efforts and coordination, we could revisit potential cost estimates, but this exceeds the initial intent of this recommendation (e.g. a quick inventory to organize the most relevant information and resources, to make sure we’re up to speed on the ‘landscape’ or resources/info on drought – thereby informing subsequent effort/recommendations).

Equity and Outreach

How does this recommendation align with established agency equity policies and how might the recommendation address any specific equity or justice concerns, as defined by the DWR Racial Equity Vision, during its implementation?

Recommendation 2: Rapid Inventory of Drought-Related Tools & Resources

- VCP works is framed around equity considerations, and these efforts could broaden our understanding/definition of drought related vulnerability (i.e. social and community factors that exacerbate drought and water supply vulnerabilities)

What sort of outreach is necessary for the successful implementation of the recommendation? Describe the target audience and the methods of outreach needed (e.g., communication, technical or financial assistance, partnering assistance).

- Direct coordination with VCP team – should be relatively easy to coordinate, as DWR staff sit on the VCP ITWG, so some of this coordination is already underway.

Appendix

Professor Michael Crimmins, an Extension Specialist in Climate Science and a co-PI on the NOAA-CAP Climate Assessment for the Southwest (CLIMAS) program at the University of Arizona – with over 20 years of experience in applied research and application of different drought monitoring strategies for Arizona and the broader southwest U.S. region – provided the following feedback after reviewing this recommendation:

The proposed project is ambitious, but also necessary prior to scoping and implementing new drought related projects, especially in the western U.S. Numerous existing studies, projects, tools, and resources have been developed over the past three decades focusing on drought and climate change across the western U.S., including and often focused on California.

Specific comments and ideas to consider in implementing this project include:

- Consider sector, geography and drought timescale carefully when thinking about how drought related resources may be developed and applied. Different sectors are often sensitive to different timescales of drought (short-term on the order of months can impacts rangelands and fire danger, while longer-term will impact the water resources sector). Sometimes drought can be present at one timescale (e.g. longer-term drought over years) and not at another (short-term with recent winter precipitation alleviating drought, for example). Systems, tools, resources need to be sensitive to these sectoral differences (and geographic). One-size-fits-all maps most likely won't be responsive enough to changing conditions and can often introduce confusion when describing drought conditions.
- Differentiating between increasing aridity through increasing temperatures and evapotranspiration and drought impacts is challenging and needs to be considered in terms of how monitoring is implemented and how drought is often defined. Droughts are definite as temporary hydroclimatic anomalies that end when conditions return to some type of normal conditions. Increasing temperatures are shifting this norm and communicating and educating on this fact is an important part of implementing and updating drought related resources.
- Numerous synthetic studies and handbooks have been developed to aid in the implementation of drought related efforts, like this handbook... <https://www.drought.gov/documents/handbook-drought-indicators-and-indices>. The proposed review could quickly leverage these resources to find specific strategies that fit the unique needs of different sectors and regions across California.

Recommendation 3: County Drought Resilience Planning

Part 0. Recommendation Declaration

To be submitted to the DRIP support team prior to commencing work on Part I.

Recommendation Proposer

DRIP Member name, member type (state/non-state) and any partners (DRIP members or external) in development of proposed recommendation.

Kyle Jones, Community Water Center, and Sierra Ryan, Santa Cruz County

Recommendation Idea

Provide a brief (no more than 150 words) description of the idea for a recommendation.

[Senate Bill \(SB\) 552](#), passed in 2021, introduced requirements for small water suppliers, county governments, the Department of Water Resources (DWR), and the State Water Board to engage in proactive drought planning to enhance preparedness for future water shortages or dry years. Several key challenges have been identified through the DRIP Collaborative’s discussions, particularly in regard to county-level drought planning for domestic wells and smaller water systems.

A central issue is the lack of structured guidance or deadlines for county drought plans, which makes it difficult for counties to stay aligned and learn from one another. This has led to inconsistent levels of preparedness across counties, and without a mechanism to share plans, counties are unable to benefit from the experiences of their neighbors. Additionally, counties have expressed the need for more support in terms of staffing and resources to maintain their newly developed or to-be developed standing drought and water shortage task forces, which are essential for effective local planning. This recommendation will identify these key problems and explore possible solutions.

Focus Area

Drought Relevant Data Drought Narrative **Drought Preparedness for Domestic Wells**

Intended Benefit to the Drought Risk Management Cycle (Please check all that apply)

- Mitigation, Preparation and Capacity**
- Forecasting and Monitoring**
- Response**
- Recovery**

Recommendation 3: County Drought Resilience Planning

Part I: Recommendation Overview

Recommendation Title

Provide a concise title for your recommendation in fewer than ten words.

Empowering County Drought Resilience Planning for Domestic Wells and State Smalls

Description

In one or two paragraphs, please provide a brief overview of the recommendation and how it addresses the Focus Area problem statement. Supporting documentation to include an overview of existing trends, the reasons for urgent action, and people currently impacted.

[Senate Bill \(SB\) 552](#), passed in 2021, introduced requirements for small water suppliers, county governments, the Department of Water Resources (DWR), and the State Water Board to engage in proactive drought planning to enhance preparedness for future water shortages or dry years. Several key challenges have been identified through the DRIP Collaborative’s discussions, particularly in regard to county-level drought planning for domestic wells and smaller water systems.

A central issue is the lack of structured guidance or deadlines for county drought plans, which makes it difficult for counties to stay aligned and learn from one another. This has led to inconsistent levels of preparedness across counties, and without a mechanism to share plans, counties are unable to benefit from the experiences of their neighbors. Additionally, counties have expressed the need for more support in terms of staffing and resources to maintain their newly developed or to-be developed standing drought and water shortage task forces, which are essential for effective local planning.

Key Challenges and Considerations

1. **Unclear Plan Structures and Expectations**

County drought resilience plans currently lack standardized expectations, deadlines, and regular review or update periods. This creates uncertainty and inhibits long-term planning. Completion of these plans (and the domestic wells and state smalls they aim to assist) would benefit from clear, recurring timelines and structured guidance for integrating drought plans with other local plans.

2. **Lack of Collaboration and Learning Opportunities**

There is no centralized repository for county drought resilience plans, which prevents counties from learning from each other’s strategies and experiences and prevents the State from understanding the progress or local needs. A system for sharing best practices would allow counties to build on existing efforts and improve overall drought preparedness across the state.

3. **Resource Constraints for County Implementation**

Many counties face significant resource limitations, including staffing and financial support, which hampers the development and implementation of robust drought resilience plans. Identifying sustainable ways to provide ongoing technical and financial assistance is crucial for counties to maintain preparedness, especially in rural and underserved areas.

4. **Task Force Implementation**

Counties have articulated that establishing and maintaining effective drought and water shortage task forces is challenging, particularly without clear guidance on how frequently these groups should meet and what their scope should be. Furthermore, some counties have found alternative processes, such as integrating drought planning with existing water commissions, to be more effective than creating new task forces. Tailoring solutions to local contexts is key to successful implementation.

Recommendation 3: County Drought Resilience Planning

Potential Solutions

- **Development of Best Practices**
To address the lack of structured expectations for county drought plans, the State could review and update the **DWR's County Drought Resilience Plan Guidebook**, emphasizing lessons learned and integration with other local plans and establishing clear timelines for recurring updates. This would help counties continuously refine their plans based on the latest data and insights.
- **Establishing a Knowledge-Sharing Platform**
Creating a platform or repository where counties can share their drought resilience plans and best practices would promote collaboration and learning. Such a platform could be supported by the DWR or another state entity to ensure accessibility and consistent updates.
- **Providing Technical and Financial Support for Counties**
Exploring opportunities to provide counties with ongoing technical and financial assistance is essential. This could include the creation of a grant program to fund pre-disaster drought planning and mitigation for domestic wells, as well as contracts with counties or GSAs that streamline emergency funding when needed.
- **Tailoring Task Force Structures to Local Needs**
Rather than mandating new task forces, counties should have the flexibility to adapt existing structures, such as water commissions or advisory groups, to meet the goals of SB 552. Establishing more realistic expectations for task forces and ensuring there is a clear point of contact at the state level to facilitate communication between counties and the state would improve overall coordination and effectiveness.

Impacts

What are the expected outcomes or benefits of this recommendation, and how will it specifically enhance drought resiliency in California?

1. **Improved County-Level Drought Preparedness**
Counties would have clearer, more actionable drought resilience plans that align with statewide goals, leading to more consistent levels of preparedness across California.
2. **Enhanced Collaboration and Knowledge Sharing**
The establishment of a shared platform for county plans will foster collaboration, allowing counties to benefit from one another's experiences and insights, ultimately strengthening local and regional drought resilience.
3. **Increased Equity in Drought Response**
With more standardized drought preparedness plans, counties with fewer resources will be better positioned to apply for grants and other funding opportunities, ensuring that vulnerable communities, including those reliant on domestic wells, receive the support they need.

What are the anticipated impacts or consequences of not adopting this recommendation?

- Vastly different levels of drought preparedness per county
- Drought resilience plans will not be robust enough to serve as a tool to guide counties' drought preparedness and response

Implementing Parties and Partners

Who would be the implementing agency or entity (potentially multiple)?

Recommendation 3: County Drought Resilience Planning

Implementing the potential solutions would likely need to involve efforts from the counties, State, and technical assistance providers.

Which existing entities (e.g., departments or other agencies, private or nonprofit groups, community-based organizations) will the implementing agency or entity need to partner with for successful implementation of this recommendation?

(See above)

Describe the coordination required by federal, state, local and tribal governments to successfully implement this recommendation.

DWR would remain the agency tasked with facilitating successful implementation of the law, and counties would create and implement their drought resilience plans.

Alignment with Other Initiatives

How does the recommendation align with and/or leverage existing state efforts, concurrent public or private initiatives?

This recommendation aligns with the potential state actions needed to promote drought preparedness and response for communities which are identified within the Water Commission’s “Potential State Strategies for Protecting Communities and Fish and Wildlife in the Event of Drought” (p. 19. Available at: https://cwc.ca.gov/-/media/CWC-Website/Files/Documents/2024/01_January/Drought-Strategies-White-Paper_Final.pdf).

Implementation Time Frame

Approximately how quickly could the proposed recommendation be implemented? Factor time needed to develop, design, permit, construct (if applicable). Select one timeframe:

- Short term (1-2 yrs.)** Medium term (2-4 yrs.) Long term (4-5+ yrs.)

Part II: Implementation Considerations

Necessary Steps & Measuring Success

What are the key steps to adopt and implement action?

This section presents practical strategies to help counties address the challenges of drought planning and implementation, with a focus on flexibility, collaboration, and support.

1. **Structured Plan Development and Review Cycles**

Establish a voluntary framework for counties to follow in developing, updating, and reviewing their drought plans. This could include:

- Regular review cycles, such as every 3-5 years, to ensure plans remain current.
- A formal feedback loop with DWR to provide counties with constructive input on their plans and encourage alignment with statewide drought resilience goals.

2. **Creation of a Centralized Knowledge Hub**

Develop a centralized online repository managed by DWR or a designated State entity where counties can upload, access, and review other county drought plans. This platform could:

- Include best practices and success stories from different counties to foster learning.

Recommendation 3: County Drought Resilience Planning

- Feature interactive tools to help counties compare drought resilience measures and identify areas for improvement.
- Identify funding opportunities to support drought resilience measures implementation.
- Some baseline funding would be needed to maintain this type of system, but it could be in partnership with other programs so as to make use of existing resources for information sharing.

3. Long-Term Financial and Technical Assistance

Implement a targeted assistance program to help counties with limited resources meet SB 552 requirements. Key components could include:

- Technical support from DWR, such as workshops or dedicated staff to assist counties in plan development similar to the one-time start-up assistance provided by DWR.
- A future drought preparedness grant program could help fund planning, mitigation efforts, and maintenance of task forces.
- Pre-approved emergency contracts with counties to allow for rapid distribution of funds when drought conditions worsen.

4. Flexibility in Task Force Formation

Encourage counties to adopt a flexible approach to drought task forces, allowing them to leverage existing groups like water commissions or advisory boards. This could include:

- Clear guidance on when alternative processes can be used.
- Setting realistic goals for task force activities, such as focusing on broader water management issues beyond just drought response.
- Establishing a state liaison to support counties in forming and maintaining these groups. This would require State staff time that could potentially require some resources, with more time needed during a dry period.

To help monitor progress and success, what thresholds and reporting can be identified to reflect successful implementation?

- A relative comparison of the completion of SB 552 requirements for counties participating in the voluntary framework versus counties not participating.
- Tracked engagement with the developed interactive tools designed to help counties compare drought resilience measures and identify areas for improvement.
- Number of pre-approved emergency contracts put in place.
- Tracked task force engagement opportunities and community participation.

Potential Challenges

What issues or challenges might arise during implementation (e.g. authority or need for additional authority, funding or revenue streams, public awareness and perception, technical, interagency coordination)? List these hurdles and offer a brief description of how to address/mitigate them. Are there foreseeable potential negative consequences or unintended impacts associated with implementing this recommendation?

Additional guidance may be needed from interested parties (DWR, counties, EJ community), as well as additional state funding for future implementation of the best practices. However, this recommendation will just be an acknowledgment of key problems (such as lack of standardized planning, resource constraints, and inconsistent task force implementation) and exploring possible solutions.

Funding

Recommendation 3: County Drought Resilience Planning

What are the potential (estimated) costs to implement the recommendation? Is there both an implementation cost and ongoing costs? Briefly describe any assumptions behind the estimate.

Best practices can be developed through the existing DRIP Collaborative process without additional costs. The State has already provided one-time funding to the majority of Counties to establish some of the law. There are ongoing costs to counties for plan updates that need to be considered as part of the discussion, as aspects of the current SB 552 and this recommendation amount to unfunded mandates. There would also be anticipated annual costs for the State to appoint a staff member as point of contact for County Drought Task Forces (approximately \$100,000) and for DWR to review the Drought Resilience Plans and provide guidance on their development (approximately \$125,000).

What potential existing and/or future funding sources or mechanisms are available (e.g., grants, general fund, bond funds, rate payers, philanthropic foundations, etc.)? Does the recommendation require funding from the state and potentially matching funds?

Adding State requirements to assist counties and reviews plans would likely require annual General Funds. Funding to support counties could come from different funding sources, including the State or philanthropic foundations and may necessitate creativity to meet the various needs of counties.

Equity and Outreach

How does this recommendation align with established agency equity policies and how might the recommendation address any specific equity or justice concerns, as defined by the DWR Racial Equity Vision, during its implementation?

Drought can impact low-income communities of color reliant on domestic wells. More support to implement SB 552 could empower DWR to better serve those residents.

What sort of outreach is necessary for the successful implementation of the recommendation? Describe the target audience and the methods of outreach needed (e.g., communication, technical or financial assistance, partnering assistance).

Successful development of a recommendation will require outreach to other interested parties, primarily counties.

Recommendation 4: Voluntary Community Well Monitoring Program

Part 0. Recommendation Declaration

To be submitted to the DRIP support team prior to commencing work on Part I.

Recommendation Proposer

DRIP Member name, member type (state/non-state) and any partners (DRIP members or external) in development of proposed recommendation.

Suzanne Pecci, public member with a domestic well as the sole source of drinking water; member of a Domestic Well Advisory Groups formed under SGMA.

Recommendation Idea

Provide a brief (no more than 150 words) description of the idea for a recommendation.

The goal of this recommendation is to encourage the organization of voluntary community-based well monitoring programs to (1) monitor domestic wells with potential data submission to statewide databases and (2) support domestic well community engagement. The monitoring would be accomplished by providing monitoring equipment, technical training, and funding, as appropriate. The community engagement would be an educational opportunity to develop an awareness and encourage personal responsibility for wise water use by individual domestic well owners. The education of domestic well owners would be geared towards establishing a broad community understanding of the significance of groundwater levels, water quality, value of well maintenance and repairs, and how to access existing data and websites as a resource of information and funding sources.

This local effort would be led and coordinated by the community of domestic well owners but could be a partnering opportunity with the Department of Water Resource's Sustainable Groundwater Management Office (DWR's SGMO), County-level well-permitting authorities, Groundwater Sustainability Agencies (GSAs), the State Water Resources Control Board (SWB), non-government organizations (NGOs), land use agencies, and other beneficial users. The program may also help develop and implement water policies and actions protective of local domestic well communities water levels and water quality, so that it provides proactive, funded support to domestic well communities throughout the drought lifecycle.

Focus Area

- Drought Relevant Data Drought Narrative **Drought Preparedness for Domestic Wells**

Intended Benefit to the Drought Risk Management Cycle (Please check all that apply)

- Mitigation, Preparation and Capacity**
 Forecasting and Monitoring
 Response
 Recovery

Recommendation 4: Voluntary Community Well Monitoring Program

Part I: Recommendation Overview

Recommendation Title

Provide a concise title for your recommendation in fewer than ten words.

Voluntary Community Well Monitoring Program

Description

In one or two paragraphs, please provide a brief overview of the recommendation and how it addresses the Focus Area problem statement. Supporting documentation to include an overview of existing trends, the reasons for urgent action, and people currently impacted.

A Voluntary Community Well Monitoring Program is an overarching effort to support and potentially host individual Voluntary Community Well Monitoring Networks (Voluntary Community Network). A Voluntary Community Network is described as a group of private well owners, usually pumping from the same aquifer, that voluntarily join or create a network to monitor water levels and/or water quality. This is driven by a variety of reasons which often include: perception of, or quantified threat to, water quantity and/or water quality; an interest to gain a better understanding of the hydrogeology; or an interest in sustainable management of their water resource.

Contributing factors for the need of a Voluntary Community Network are the often-decreased staffing and ability of regulatory and science-based agencies to meet monitoring needs of a community. Establishing a Voluntary Community Network is a recognition of the value domestic well owners bring to water resource management and supports the community understanding of the competing demands of a local shared resource.

This recommendation specifically suggests the development of a pilot Voluntary Community Network as means to demonstrate the benefits of the concept and evaluate implementation options.

Impacts

What are the expected outcomes or benefits of this recommendation, and how will it specifically enhance drought resiliency in California?

A Voluntary Community Network is a proactive program that relies on the engagement of a domestic well community members to promote individual responsibilities to service and maintain their private wells. It further provides an opportunity to encourage private well owners to take a personal interest in water levels and quality in their wells and to fosters community collaboration and data sharing to support drought resiliency and recovery. This effort acknowledges competing demands on a shared water resource and is a proactive effort to complement SB 552.

What are the anticipated impacts or consequences of not adopting this recommendation?

Today there is a significant and acknowledged lack of data on groundwater levels related to domestic wells. If this recommendation is not adopted, there will be a missed opportunity to address the continued well dewatering issues spanning multiple areas in California. This was chronicled in the most recent drought article ([Wells still drying up despite California groundwater law – CalMatters](#)) which described how thousands of well shortages occurred in areas of California that had not previously had these issues.

Recommendation 4: Voluntary Community Well Monitoring Program

There are examples of sustainable water management efforts, led by GSAs and community members, in rural areas in the South American Subbasin (SASb) and the Cosumnes Subbasin. This large, diverse community of private wells is comprised of agricultural and agricultural-residential along the Cosumnes River/Deer Creek and has approximately 3,000 to 5,000 private wells. This area is not considered to be a “disadvantaged community” and has a regional goal to develop new homes on thousands of acres of agriculture land.

These new developments and hydrologic conditions may contribute to wells going dry and residents relying on bottled water and tank trucks delivery for a large rural population while at the same time newly constructed homes are connected to a permanent water source. This highlights the tension of land use planning and the need for housing development, which is often at odds with sustainable use of water resources. The potential consequence of not adopting proactive community monitoring include the missed opportunity to educate rural communities about the competing water demands and their cause and effect.

Implementing Parties and Partners

Who would be the implementing agency or entity (potentially multiple)?

A useful first step for developing a Voluntary Community Network is to engage in a pilot to demonstrate the benefits of the concept and evaluate implementation options. The rollout of a Voluntary Community Network, its scope and impacts, will largely depend on the implementing parties. Some volunteer programs which already exist may be connected to this new Voluntary Community Network effort. If the State were involved in some capacity, the data gathered could be made available as part of the groundwater level monitoring for public access. Potential partners to support a Voluntary Community Network could include: DWR’s SGMO, SWB, GSAs, and community neighborhood organizations (i.e., homeowners associations). Regardless of funders and implementers, the Voluntary Community Network must be led and coordinated by the community of domestic well owners.

Which existing entities (e.g., departments or other agencies, private or nonprofit groups, community-based organizations) will the implementing agency or entity need to partner with for successful implementation of this recommendation?

The parties and partners with unique expertise to complement the establishment of the pilot include domestic well owners, DWR’s SGMO, SWB, County-level well-permitting authorities, GSAs, NGOs, and community neighborhood organizations (i.e., homeowners associations).

*Describe the **coordination** required by federal, state, local and tribal governments to successfully implement this recommendation.*

To be most impactful, special considerations should be given to how monitoring data will be collected and shared with the State, Counties, and the public through open data platforms. Data should be used to support the engagement and educational goals of this recommendation.

Regardless of the funding source, implementers are advised to coordinate with the County agency responsible for implementing SB 552 to ensure that the program is tailored to the specific local structure and needs of each community.

Recommendation 4: Voluntary Community Well Monitoring Program

Alignment with Other Initiatives

How does the recommendation align with and/or leverage existing state efforts, concurrent public or private initiatives?

- The Voluntary Community Network is aligned with multiple ongoing State groundwater monitoring and health initiatives. At DWR, the Voluntary Community Network could tie into the California Statewide Groundwater Elevation Monitoring (CASGEM), the Sustainable Groundwater Management Office (SGMO), and County Drought Resilience Planning Assistance Program. At SWB, the Community Network could tie into the Groundwater Ambient Monitoring and Assessment (GAMA) and the Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) programs.
- In addition to these state programs, the Voluntary Community Network should connect to any LAFCOs in the pilot area, where applicable; particularly where expansion and development abut domestic well communities, where water supply is not identified, and where water and sewer infrastructure extensions are not part of the approval requirements. With time, a Voluntary Community Network may inform General Plan and Municipal Code amendments to inform on development decisions that may be impactful to domestic well communities.

Implementation Time Frame

Approximately how quickly could the proposed recommendation be implemented? Factor time needed to develop, design, permit, construct (if applicable). Select one timeframe:

- Short term (1-2 yrs.)** Medium term (2-4 yrs.) Long term (4-5+ yrs.)

Part II: Implementation Considerations

Necessary Steps & Measuring Success

What are the key steps to adopt and implement action?

- The proposed pilot Voluntary Community Network is proposed as an approach to promoting a Voluntary Community Well Monitoring Program throughout the state. An example of a pilot development and implementation workplan outline is provided as an example at the end ([Appendix](#)). Key steps to implementing a pilot may include research of existing related programs, develop a pilot area selection process, review existing conditions, develop an engagement plan and pilot guidelines, implement and evaluate the pilot program to inform other opportunities for community monitoring programs.

To help monitor progress and success, what thresholds and reporting can be identified to reflect successful implementation?

- Evaluation of pilot progress and success should include opportunities to understand the level of participation and interest, what information is gained through the program to address local/regional water related issues, and how to scale this pilot to other regions in the state.
- Engagement and partnerships. Examples include:
 - Meeting and event attendance

Meetings may have a “social element” to attract and maintain participant interest.

Meeting agenda could include demonstrations and discussions by well experts in the

Recommendation 4: Voluntary Community Well Monitoring Program

area on well maintenance, repair, regulations, and other topics of interest to domestic well owners.

- Number of domestic well owners expressing interest in learning more on participation
- Extent of monitoring program
 - Number of new monitoring wells added to the Network
 - % of land covered
 - % of domestic wells being monitored
 - Number of well measurements submitted to local and state officials
 - Data collection/submittal timing
 - Evaluate quality of data collected
- Evaluating for added value
 - What additional information is gained?
 - How is data being used?

Some potential data uses include additional measure to evaluate the sufficiency of Minimum Thresholds and Measurable Objectives in the GSP, local land use and development policies, County Environmental Management Department policies and regulations
 - Should this be expanded beyond the pilot?

Potential Challenges

What issues or challenges might arise during implementation (e.g. authority or need for additional authority, funding or revenue streams, public awareness and perception, technical, interagency coordination)? List these hurdles and offer a brief description of how to address/mitigate them.

- Funding
 - Funding the acquisition and maintenance of monitoring equipment, technical training, database development and maintenance, and community outreach and engagement are some of the key challenges in implementing this recommendation. Depending on the source of funding, coordination amongst federal, state, or local agencies and Tribal governments would be required to disperse funds and provide technical assistance.
- Data Security, Transparency, and Confidentiality
 - All existing, required groundwater well reporting, including DWR's Well Completion Reports, must comply with the Information Practices Act of 1977 (CA Civil Code Sections 1798-1798.78), which limits the collection of personal information (street address, contact information, name), its future disclosure, and ongoing safeguarding. It's recommended that any data collection and disclosure done in the Voluntary Community Network also follow the Information Practices Act of 1977.
 - Issues related to data use may be addressed through explanation and demonstration of data anonymization
 - Participation in this program is entirely voluntary and users may request removal of electronically collected personal information from government records (CA Government Code Section 11015.5).
- Technical Know-How: Limited technical ability to interpret groundwater level data and implication to domestic well owners.
 - May be addressed through "citizen scientist" training and collaborations with nearby universities

Recommendation 4: Voluntary Community Well Monitoring Program

- Potential data visualization and how that is integrated with existing efforts that may be related (GAMA, SGMA data viewer, California Groundwater Live, CNRA Open Data Portal)
- Public Buy-In
 - May be addressed through outreach and communications regarding the value of participating in the program
- Coordination between involved parties; division or share of responsibilities

Are there foreseeable potential negative consequences or unintended impacts associated with implementing this recommendation?

- Data privacy
 - Connection to property value and family dynamics related to impacts from known water supply issues. This issue can be addressed through data anonymization.
- Potential local tension arriving from concerns of monitoring groundwater levels
 - This can be addressed by sharing examples from successful community monitoring programs and providing opportunities for the community to engage with experts.
- Disengagement and lack of continuity of program participants
 - This can be addressed through creative and varied approaches to public engagement and incentives including free water quality testing or rebates on water saving devices or water wise landscaping. Loaning out equipment to participants is another incentive.

Funding

What are the potential (estimated) costs to implement the recommendation? Is there both an implementation cost and ongoing costs? Briefly describe any assumptions behind the estimate.

- The major costs for the Voluntary Community Network development and implementation include purchase and maintenance of monitoring equipment, technical assistance, data management, and community engagement. Depending on the wants and needs of the community, the required funding for these cost categories will vary significantly.
- **Monitoring Equipment:** There is a wide range of monitoring equipment options that can be used based on community needs to monitor water levels and specific water quality indicators. For monitoring equipment, implementation could range from creating a lending library (purchase 1-3 sounders, \$1,000-\$1,500/each, for domestic well owners to rent) to the installation of transducers and water quality sensors for continuous monitoring (including equipment and installation costs, a basic setup ranges from \$2,000 to \$6,500), both options will require ongoing maintenance costs (sounders can break quite easily and may require \$1,000/year for repairs). The different equipment options will require different levels of technical assistance both for equipment training and data interpretation.
- **Data Sharing:** Depending on the desired data sharing capabilities by the Voluntary Community Network members, a member portal or dashboard (estimated \$12,000) and central database (estimated \$50,000 for start-up and ongoing maintenance) may be created. If this recommendation were funded by a public entity, the collected monitoring data would be submitted to the CASGEM Online System and shared through the California Open Data Portal, circumventing some central database costs.
- **Community Engagement:** Community engagement designed to incentivize long-term community commitment is central to this recommendation and will require ongoing project development and

Recommendation 4: Voluntary Community Well Monitoring Program

assessment (estimated \$250,000) and periodic Voluntary Community Network meetings (estimated cost of \$12,000 for 6 meetings).

What potential existing and/or future funding sources or mechanisms are available (e.g., grants, general fund, bond funds, rate payers, philanthropic foundations, etc.)? Does the recommendation require funding from the state and potentially matching funds?

- SWB GAMA program
- SWB SAFER program
- DWR Sustainable Groundwater Management Grant Program
- Rural Community Assistance Corporation Household Water Well Loan/Grant Program
- UC Davis Environmental Health Sciences Center Pilot Projects Program
- City or County grant programs
- Seed funding from the state or another source to support the implementation of pilot would improve the chances of creating an effective/successful pilot but is not necessary if there is local funding otherwise available for community members. Such funding could ensure the state's continued involvement and assistance with making data publicly available as part of a larger service of monitoring groundwater levels in California.

Equity and Outreach

How does this recommendation align with established agency equity policies and how might the recommendation address any specific equity or justice concerns, as defined by the DWR Racial Equity Vision, during its implementation?

- Connecting with members of the public; ensuring Human Right to Water
- Providing monitoring and reporting equipment to members of the public who it would be challenging to afford to participate in the program through a lending program

What sort of outreach is necessary for the successful implementation of the recommendation? Describe the target audience and the methods of outreach needed (e.g., communication, technical or financial assistance, partnering assistance).

- Program notice and announcement to community
 - The target audience is the domestic well community. Potential advertisement resources include community and neighborhood associations and groups, local newspaper articles and public notices, City and County newsletters and websites, inserts included with agency billing statements and property tax notices, local online news organizations and podcasts, community gatherings and organizations, local fairs and events, and public agency meetings.
- Network communications
 - Potential communication venues include community and neighborhood associations and group, GSA public board meetings, public executive committee meetings, dashboard and websites devoted to domestic well owners.
- Public meetings
 - Initial Program efforts for public outreach needed to provide reasons to participate, including benefits to sharing data and monitoring one's well

Recommendation 4: Voluntary Community Well Monitoring Program

Appendix

The following is a general list of key steps and considerations to support the implementation of a pilot program.

1. **Research related pilot programs** and other community-based groundwater monitoring programs to inform pilot approach (including pilot size, data sharing and transparency issues, engagement, and funding)
 - Engagement of the broader community should include an education of domestic wells owners on their responsibility to repair and maintain their wells.
 - Data would ideally be shared via an open platform accessible to all domestic well owners populated with the community water level open data, general information and resources for domestic well owners, and options to opt-in the Voluntary Community Well Monitoring Network
 - Data would also ideally be shared with applicable GSA agencies to inform, appropriately incorporate into their groundwater modeling, and monitor local effects of groundwater aquifer management
 - Related pilot programs include:
 - i. [Yolo Subbasin GSA Groundwater Monitoring Program](#)
 - ii. [Sonoma County's Level Up! Voluntary Well Monitoring Program](#)
 - iii. [Napa County's Voluntary Well Monitoring Program](#)
2. **Develop criteria and process** for selecting a pilot study area (partnership opportunities, existing monitoring efforts)
3. **Identify and define the pilot community** where the Voluntary Community Network will be centered
 - Identify the regional issues driving monitoring
 - Develop Community Outreach and Participation Plan
 - Identify partners (Determine point of contacts, existing relevant task forces/committee/agencies working in the area)

Define roles and responsibilities for those involved in the project (including GSAs, NGOs, state and local agencies, and community members)
4. Review existing groundwater level monitoring
 - Extent of current monitoring (What wells are already being monitored? What types of equipment is used? Who owns that equipment and how much does it cost?)
 - i. Identify what, if any, ongoing monitoring contracts are active in the pilot community.
 - Data collection and use (What type of data is being collected? Who is using the data and how? Who can access the data? Where is the data being maintained and stored? Is there a Property Access Agreement and Well Monitoring Consent Form in place? Are there existing guidelines for a data collection protocol in place?)
 - Data gaps: Identify spatial data gaps → use to determine where to target outreach
 - Establish baseline groundwater levels
5. **Prepare Pilot Guidelines** that explain monitoring and data reporting activities (how to use the monitoring equipment, the monitoring frequency, data reporting options, etc.). These Guidelines should be developed in a way that allows application in other regions/monitoring programs. It's suggested that a sample landlord-tenant agreement be drafted and included with the guidelines to enable renters to participate in the program despite not owning the well on their property.

Recommendation 4: Voluntary Community Well Monitoring Program

6. **Convene a Planning Committee** of network partners to develop a Communication and Engagement Plan that include goals, objectives, and operation of the program tailored to local needs.
7. Launch the monitoring program
 - Outreach, monitoring kickoff event, first major training event, community data collection event
 - Network check-ins - Frequency could be quarterly as the Monitoring Network is establishing and greater community participation in the network is achieved to a predetermined “ideal” size. Frequency of community outreach once established could correspond to the semiannual collection corresponding to GSA monitoring in Spring and Fall depending on the continuing level of public participation. Network check-ins could also be held at planned community events, including bar-be-ques or social events at local wineries, water wise programs relevant to domestic well owners, and educational events of interest to domestic well owners.
8. One-year-in evaluation and update
 - Evaluation period to assess the need to adaptively manage components of the Program (evaluate level of participation, added value of additional data collected)

Recommendation 5: Roles and Responsibilities

Part 0. Recommendation Declaration

To be submitted to the DRIP support team prior to commencing work on Part I.

Recommendation Proposer

DRIP Member name, member type (state/non-state) and any partners (DRIP members or external) in development of proposed recommendation.

Kyle Jones & Justine Massey, Community Water Center, and Sierra Ryan, Santa Cruz County

Recommendation Idea

Provide a brief (no more than 150 words) description of the idea for a recommendation.

When domestic wells fail to provide safe drinking water, due to impaired water supply or quality, it impacts Californians' Human Right to Water. California currently lacks a comprehensive approach to address the urgent drinking water needs of households served by failing domestic wells and lacks a comprehensive policy for reducing the growth of dry domestic wells in the future. The DRIP Collaborative agrees that clarifying the roles and responsibilities related to domestic wells and drought, with a focus on understanding where inefficiencies, gaps, or overlaps in authority or funding for long-term solutions exist, is an important foundation to develop a comprehensive policy. We recommend an outside, non-DRIP Collaborative entity, such as the Legislative Analyst Office or academic researcher, provide clarity on the existing roles and responsibilities of the state and local governments and any other responsible parties on how domestic wells are managed, maintained, and responded to when an outage or other problem occurs. The purpose of this is to manage expectations, support coordination, and document the existing gaps in law or implementation for domestic wells related to preparedness and response for water shortage. Included in this analysis should be areas of drought management for domestic wells that remain unclear or absent entirely. Potential or real implications of these gaps and a prioritization of gaps to fill should be included in the roles and responsibilities analysis.

Step 2 of this phased recommendation is that the DRIP Collaborative relies on the roles and responsibilities and gaps analysis to build new recommendations for how to fill the gaps agreed upon as high priorities. The DRIP Collaborative's recommendations could then be vetted by the broader water community for input and ultimately finalized as a set of best practices to be shared with the responsible parties.

Focus Area

- Drought Relevant Data Drought Narrative **Drought Preparedness for Domestic Wells**

Intended Benefit to the Drought Risk Management Cycle (Please check all that apply)

- Mitigation, Preparation and Capacity**
 Forecasting and Monitoring
 Response
 Recovery

Recommendation 5: Roles and Responsibilities

Part I: Recommendation Overview

Recommendation Title

Provide a concise title for your recommendation in fewer than ten words.

Roles and Responsibilities

Description

In one or two paragraphs, please provide a brief overview of the recommendation and how it addresses the Focus Area problem statement. Supporting documentation to include an overview of existing trends, the reasons for urgent action, and people currently impacted.

When domestic wells fail to provide safe drinking water, due to impaired water supply or quality, it impacts Californians' Human Right to Water. Various government and private entities have responsibilities to address this risk, however these responsibilities can overlap, and coordination must be worked out in advance of emergencies to minimize response time when residents' Human Right to Water is impacted. California currently lacks a comprehensive approach to address the urgent drinking water needs of households served by failing domestic wells and lacks a comprehensive policy for reducing the growth of dry domestic wells in the future. The DRIP Collaborative agrees that clarifying the roles and responsibilities related to domestic wells and drought is an important foundation to develop a comprehensive policy.

We recommend an outside, non-DRIP Collaborative entity, such as the Legislative Analyst Office or academic researcher, provide clarity on the existing roles and responsibilities of the state and local governments and other responsible parties on how domestic wells are managed, maintained, and responded to when an outage or other problem occurs. The purpose of this is to manage expectations, support coordination, and document the existing gaps in law or implementation for domestic wells related to preparedness and response for water shortage.

This analysis should include the following components regarding who has the responsibility, what the role is, and through what mechanism they can provide short-term and long-term drinking water solutions for existing domestic wells, and comprehensive planning to limit new development in areas with failing domestic wells until solutions are reached:

- Existing roles and responsibilities for domestic wells related to the drought risk management cycle
- Areas of drought management for domestic wells that remain unclear or absent entirely
- Potential or real implications of these gaps and a prioritization of gaps to fill
- Prioritized list of gaps that if addressed would most effectively contribute to improving drought management related to domestic wells
- Available funding resources, and opportunities to streamline distribution

Impacts

What are the expected outcomes or benefits of this recommendation, and how will it specifically enhance drought resiliency in California?

Improved coordination for domestic well drought response and long-term solutions will result in fewer delays and more coherent implementation of California's laws and policies to preserve drinking water access.

What are the anticipated impacts or consequences of not adopting this recommendation?

Recommendation 5: Roles and Responsibilities

Without this coordination, efforts to resolve dry domestic wells can be hampered by unresolved questions of jurisdiction and responsibility. Delays while residents are awaiting solutions for their drinking water needs are distressing and at odds with California's Human Right to Water law. Further, emergency response and interim supplies can cost the state millions. By clarifying these roles now, relevant agencies and responsible parties can get prepared, execute any necessary Memoranda of Understanding, and arrange for reliable funding mechanisms to go into effect when the need arises.

Implementing Parties and Partners

Who would be the implementing agency or entity (potentially multiple)?

It is the recommendation of the DRIP Collaborative that the implementing agency be an outside, non-DRIP Collaborative entity, such as the Legislative Analyst Office or academic researcher.

Which existing entities (e.g., departments or other agencies, private or nonprofit groups, community-based organizations) will the implementing agency or entity need to partner with for successful implementation of this recommendation?

DWR, SWB, LAFCOs, local CBOs, regional NGOs

Describe the coordination required by federal, state, local and tribal governments to successfully implement this recommendation.

The outcome of the analysis should include not only an evaluation of current roles and responsibilities, and gaps, but ideally identified solutions for filling gaps. These can be considered by the DRIP Collaborative for evaluation under Step II. Examples of this are shown in the [Appendix](#).

Alignment with Other Initiatives

How does the recommendation align with and/or leverage existing state efforts, concurrent public or private initiatives?

This recommendation links existing responsibilities and clarifies how entities should coordinate to avoid delays in responding to domestic well drought emergencies.

Implementation Time Frame

Approximately how quickly could the proposed recommendation be implemented? Factor time needed to develop, design, permit, construct (if applicable). Select one timeframe:

Short term (1-2 yrs.) Medium term (2-4 yrs.) Long term (4-5+ yrs.)

Part II: Implementation Considerations

Necessary Steps & Measuring Success

What are the key steps to adopt and implement action?

Identify possible implementing groups to do the required analysis, and budget for that work if available.

To help monitor progress and success, what thresholds and reporting can be identified to reflect successful implementation?

Implementation success will be gauged by the quality of the deliverable provided and the work that informed its development. Brief, written updates from the implementing organization to the DRIP

Recommendation 5: Roles and Responsibilities

Collaborative would be a minimum. Ideally a representative would be available at DRIP meetings to answer questions.

Potential Challenges

What issues or challenges might arise during implementation (e.g. authority or need for additional authority, funding or revenue streams, public awareness and perception, technical, interagency coordination)? List these hurdles and offer a brief description of how to address/mitigate them. Are there foreseeable potential negative consequences or unintended impacts associated with implementing this recommendation?

As the recommendation is currently focused simply on data collection, reporting, and recommendation, there are not significant hurdles or unintended impacts anticipated. More challenges will be likely as the DRIP makes recommendations regarding Roles and Responsibilities for drought mitigation to address identified gaps.

Funding

What are the potential (estimated) costs to implement the recommendation? Is there both an implementation cost and ongoing costs? Briefly describe any assumptions behind the estimate.

The cost to do this analysis will likely range from \$100,000 to \$300,000 based on the implementing organization and the number of interviews they do.

What potential existing and/or future funding sources or mechanisms are available (e.g., grants, general fund, bond funds, rate payers, philanthropic foundations, etc.)? Does the recommendation require funding from the state and potentially matching funds?

The funding to pay for this work should be found within the existing State budget, as it is a relatively small amount of money with a large impact to vital State initiatives.

Equity and Outreach

How does this recommendation align with established agency equity policies and how might the recommendation address any specific equity or justice concerns, as defined by the DWR Racial Equity Vision, during its implementation?

There is known overlap between areas of domestic well water quality and water supply challenges, and areas with low incomes and/or high rates of non-native English speakers.

What sort of outreach is necessary for the successful implementation of the recommendation? Describe the target audience and the methods of outreach needed (e.g., communication, technical or financial assistance, partnering assistance).

Successful implementation of the review of authorities and gaps analysis, as well as recommendations for next steps, will require interviews with policy makers, local and state government staff, environmental justice groups, and members of communities that have suffered from domestic well water shortages.

Recommendation 6/8: Defining Drought

Part 0. Recommendation Declaration

To be submitted to the DRIP support team prior to commencing work on Part I.

Recommendation Proposer

DRIP Member name, member type (state/non-state) and any partners (DRIP members or external) in development of proposed recommendation.

Ben McMahan & Elea Becker Lowe, Governor's Office of Land Use and Climate Innovation (LCI), and Katie Ruby, California Urban Water Agencies (CUWA)

Recommendation Idea

Provide a brief (no more than 150 words) description of the idea for a recommendation.

Compile a suite of drought related case studies across sectors and geographies of California to highlight the complicated drought realities that diverse communities across the state are facing. Case studies may focus on drought-specific impacts to natural, built or social systems, including compounding or cascading impacts, or highlight existing approaches to addressing those vulnerabilities. This will help inform DRIP areas of focus and priority actions while capturing nuanced and diverse experiences across sectors and geographies of the state. This compilation will help guide drought narrative definitions development by showcasing the range of unique and context-dependent complexities of drought related issues in California, with focus on projections for more frequent and extreme weather events and impacts.

Partners should include DRIP Collaborative members and collaborators representing community perspectives.

Focus Area

- Drought Relevant Data **Drought Narrative** Drought Preparedness for Domestic Wells

Intended Benefit to the Drought Risk Management Cycle (Please check all that apply)

- Mitigation, Preparation and Capacity
 Forecasting and Monitoring
 Response
 Recovery

Recommendation 6/8: Defining Drought

Part I: Recommendation Overview

Recommendation Title

Provide a concise title for your recommendation in fewer than ten words.

Defining Drought: A Summary of Challenges and Solutions to Achieving Resilience to Water Scarcity in California

Description

In one or two paragraphs, please provide a brief overview of the recommendation and how it addresses the Focus Area problem statement. Supporting documentation to include an overview of existing trends, the reasons for urgent action, and people currently impacted.

Many efforts are underway to understand, communicate, and address drought in California. However, the terminology around drought can be confusing and may not fully capture or articulate the ways water shortage is experienced by different types of communities and the environment. Considering the variability of California's diverse climate and geographies, plus recognizing that different communities will experience the impacts of drought in unique ways, this recommendation aims to create a broader understanding of the challenges and successes of achieving drought resilience by compiling relevant literature resources and examples. This resource would discuss different aspects of resilience (e.g., water access, quality, and availability) and present them in context of case study narratives. Ultimately, the goal of this recommendation is to provide a more complete picture of how drought is experienced by different groups and identify paths to resilience.

Drought narrative case studies will be designed to demonstrate elements of drought resilience through specific examples and experiences across California user groups (environmental, industrial, residential, etc.) and geographies. Case studies may uplift nuanced perspectives, including tribal expertise, community-lived experience, water resource management practices, and impacts to habitat and species, presenting a diverse array of experiences and actions from those closest to the impacts of drought that can improve our collective understanding and inspire more resilient outcomes. Case studies should uplift written examples of the existing drought definitions discussed in the introductory pages of the summary and their associated use cases (e.g., triggers for response actions) in context to highlight potential shortcomings and opportunities to improve resilience. Beyond the written summary, case studies may also be uplifted individually on various alternative and/or multi-media platforms to communicate the diverse impacts of drought and action-oriented solutions.

The definitions and case studies will leverage information collected through the proposed Rapid Inventory of Drought Relevant Tools and Resources. The intent is to build upon and highlight existing references and resources, rather than duplicate a work product that already exists. Alternative platforms and formats may be supportive to featuring completed work, and used to inform decision-making, improve general understanding, and connect with diverse audiences. This may include creating videos or hosting case study summaries on websites such as the [ICARP Climate Adaptation Clearinghouse](#). Additional efforts through a communications campaign can further uplift these examples in locally relevant contexts and venues. Case studies should be written for a general audience and include examples from diverse audiences (e.g., practitioners, planners, decision-makers, scientists, tribal communities, private well-owners, and other residents).

Impacts

Recommendation 6/8: Defining Drought

What are the expected outcomes or benefits of this recommendation, and how will it specifically enhance drought resiliency in California?

Developing a suite of case studies will help demonstrate the range of factors that influence water supply conditions (including quality and quantity), demands, and environmental needs, while highlighting diverse impacts of drought and water scarcity. These examples will improve general understanding and inform decision-making, promoting more proactive preparation and response. Case studies that illuminate the significance and urgency of drought impacts across different user groups (e.g., industrial, agricultural, residential, environmental, etc.), geographies (e.g., rural & urban), and various communities will help engage Californians in taking action. Additionally, case studies may highlight the role of State actions and programs, including successes, gaps, and opportunities. Examples of successful drought mitigation practices can be included to highlight model pathways for future resilience-building. Examples of drought-related challenges and specific extreme events will help prioritize potential issues areas of focus.

What are the anticipated impacts or consequences of not adopting this recommendation?

Lack of clear examples will contribute to further confusion or misunderstanding about the challenges and solutions available to addressing drought issues in California. Without documenting and sharing these stories, we would miss an opportunity to learn from the past as we prepare for future droughts and seek more equitable solutions.

Implementing Parties and Partners

Who would be the implementing agency or entity (potentially multiple)?

An academic or other research institution could take the lead on preparing the written work product; however, members of the DRIP Collaborative should be consulted on the scope of this work and may collectively contribute to the compilation of these case studies through their respective networks. The Governor's Office of Land Use and Climate Innovation (formerly OPR) may support by providing case study templates, develop processes for collection and review, and provide a space on the ICARP Adaptation Clearinghouse to host completed products. Other partnerships with State and local agencies and non-government contributors will be critical to uplifting diverse examples across sectors, geographies and communities of the state.

Which existing entities (e.g., departments or other agencies, private or nonprofit groups, community-based organizations) will the implementing agency or entity need to partner with for successful implementation of this recommendation?

This recommendation will be successful with broad input and support from State agencies, non-government partners, and community representatives.

Describe the coordination required by federal, state, local and tribal governments to successfully implement this recommendation.

Federal, state, local and tribal government perspectives should be included to demonstrate the breadth of water management stewardship relevant to drought issues across the state.

Alignment with Other Initiatives

How does the recommendation align with and/or leverage existing state efforts, concurrent public or private initiatives?

Recommendation 6/8: Defining Drought

This recommendation should follow and build upon the Rapid Inventory of Drought Tools and Resources and could potentially feed into a future Communication Program. Beyond DRIP, case studies can further elevate existing campaigns, such as, “Save Our Water”, or other statewide and locally relevant initiatives, delivering clear examples to inform diverse and broad audiences.

Implementation Time Frame

Approximately how quickly could the proposed recommendation be implemented? Factor time needed to develop, design, permit, construct (if applicable). Select one timeframe:

- Short term (1-2 yrs.)** Medium term (2-4 yrs.) Long term (4-5+ yrs.)

The recommended implementation timeline is short term but should follow the Rapid Inventory of Drought Tools and Resources. It is assumed that much of the work to develop the data inventory will help inform the scope and breadth of these examples. Implementation may continue on an ongoing basis to support longer-term communications campaigns and compile new examples over time.

Part II: Implementation Considerations

Necessary Steps & Measuring Success

What are the key steps to adopt and implement action?

- Confirm implementing parties and respective roles and responsibilities (see matrix below)
- Review outcomes from the completion of a Rapid Inventory (DRIP Collaborative Recommendation) to inform scope and criteria for case studies
- Based on available information, identify 2-3 case studies per category.
 - Suggested user categories (also consider diversity of geographic representation):
 - Agriculture
 - Urban water use
 - Individual water users
 - Water suppliers
 - Rural
 - Domestic wells / small communities
 - Tribal and cultural water needs
 - Commercial / Industrial
 - Environment / habitat benefit
 - Other relevant users / impacts from drought
- Recruit academic or research partner to lead the development of the Summary
- Develop and broadcast “call for content” for case study idea – leverage partnerships to cast a wide net
- Compile, review, and select case studies to include in written work product
 - DRIP Collaborative, in collaboration with academic or research partner, to review and screen submitted case studies
- Prepare written compilation and identify alternative methods/media to broadcast case studies
 - Expected deliverable includes introductory pages to reflect findings from rapid review of literature and resources, identifies various definitions of drought across CA, showcases diverse examples in case study format.

Recommendation 6/8: Defining Drought

- Case studies may be separately hosted on information platforms such as ICARP Adaptation Clearinghouse and used to highlight unique experiences of drought through social media campaigns and other forms of outreach.
 - Example: social media outreach featuring a particular region or community’s experience of drought per sector.
- Future alternative media formats may be explored in communications campaigns (Save Our Water, etc.), e.g. video interviews.

Partner	Role
DRIP Collaborative	Oversight & Contributions
State Agencies	Resource Host / Potential Funder / Outreach partner
Academic or Other Research Institution	Implementation Team / Potential Funder
Contributors	Case Study Submissions

To help monitor progress and success, what thresholds and reporting can be identified to reflect successful implementation?

- Establish criteria for case studies and report how submittals align with these criteria (e.g., representative of diverse geographics, sectors, types of impacted water sources, types of impacts, and existing examples of successful resilience actions)
- Track “impressions” of case studies presented through different channels (e.g., number of views/downloads)
- Identify gaps/opportunities/recommendations identified through these examples for further discussion with DRIP Collaborative

Potential Challenges

What issues or challenges might arise during implementation (e.g. authority or need for additional authority, funding or revenue streams, public awareness and perception, technical, interagency coordination)? List these hurdles and offer a brief description of how to address/mitigate them.

- Capacity and funding resource constraints at State agencies could make implementation a challenge; however, this could be partially mitigated through partnership with a third party (e.g., other academic or other research institution)
- Reaching diverse audiences for input and outreach communications about the final product could be a challenge, however DRIP members should collaborate on an outreach plan and be encouraged to leverage existing networks/outreach channels to ensure broad audiences are reached.

Are there foreseeable potential negative consequences or unintended impacts associated with implementing this recommendation?

- Depending on funding source, this recommendation could inadvertently divert resources away from other critical efforts. Reducing the scope of the summary to be CA specific and leveraging existing resources/outreach networks may help to reduce this cost.

Recommendation 6/8: Defining Drought

- Editing processes may unintentionally alter the meaning or intent of original submissions – it will be critical to provide submitters the opportunity to participate in the editing process and at a minimum, review and approve final content prior to publication.
- Potential for the scope of this effort to develop narrative case studies to unintentionally not be comprehensive enough to represent all stories of conditions and impacts across the state.

Funding

What are the potential (estimated) costs to implement the recommendation? Is there both an implementation cost and ongoing costs? Briefly describe any assumptions behind the estimate.

Anticipated cost: ~ \$50,000 (estimate: graduate research assistant – 2 quarters, including fringe, tuition and administrative costs), with potential for costs to be offset by in-kind contributions.

What potential existing and/or future funding sources or mechanisms are available (e.g., grants, general fund, bond funds, rate payers, philanthropic foundations, etc.)? Does the recommendation require funding from the state and potentially matching funds?

Potential sources – one time funding: grant funds, general funds, philanthropic donations, academic or other research institution funding, in-kind partnerships.

Equity and Outreach

How does this recommendation align with established agency equity policies and how might the recommendation address any specific equity or justice concerns, as defined by the DWR Racial Equity Vision, during its implementation?

These case studies are intended to highlight diverse experiences and perspectives to promote more equitable drought preparation and response.

What sort of outreach is necessary for the successful implementation of the recommendation? Describe the target audience and the methods of outreach needed (e.g., communication, technical or financial assistance, partnering assistance).

State Agency communications and information sharing platforms may be leveraged to elevate opportunities for input and final products relevant to this recommendation. For example, the Governor's Office of Land Use and Climate Innovation (formerly OPR) ICARP Adaptation Clearinghouse is a resource that includes a series of case studies and may be leveraged to store completed drought narrative case studies for general access and use. ICARP also maintains regular outreach and communications through email lists, social media, and other public communications efforts. These, and other State communication channels may be leveraged to reach diverse audiences across California.