Mendocino, Lake, Sonoma Tribal Resilience Initiative on Air Quality and Drought (MLS-TRIAD)

Tribal Perspectives on Drought in Mendocino, Lake, and Colusa Counties

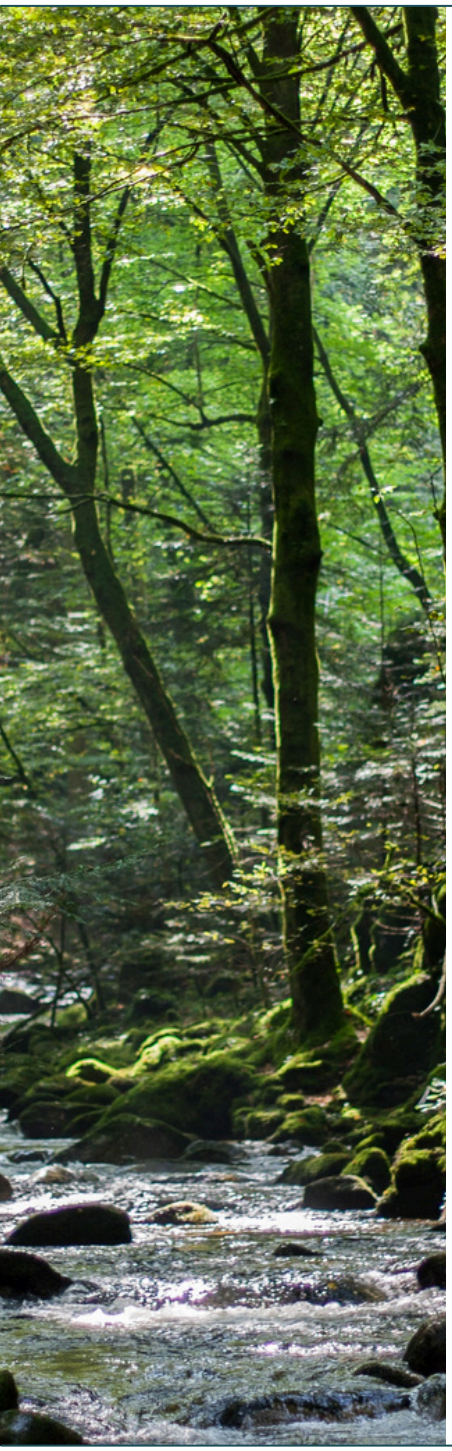
Prepared by Tracking California
In partnership with Big Valley Band of Pomo Indians, Middletown Rancheria of Pomo Indians, and Sherwood Valley Band of Pomo Indians

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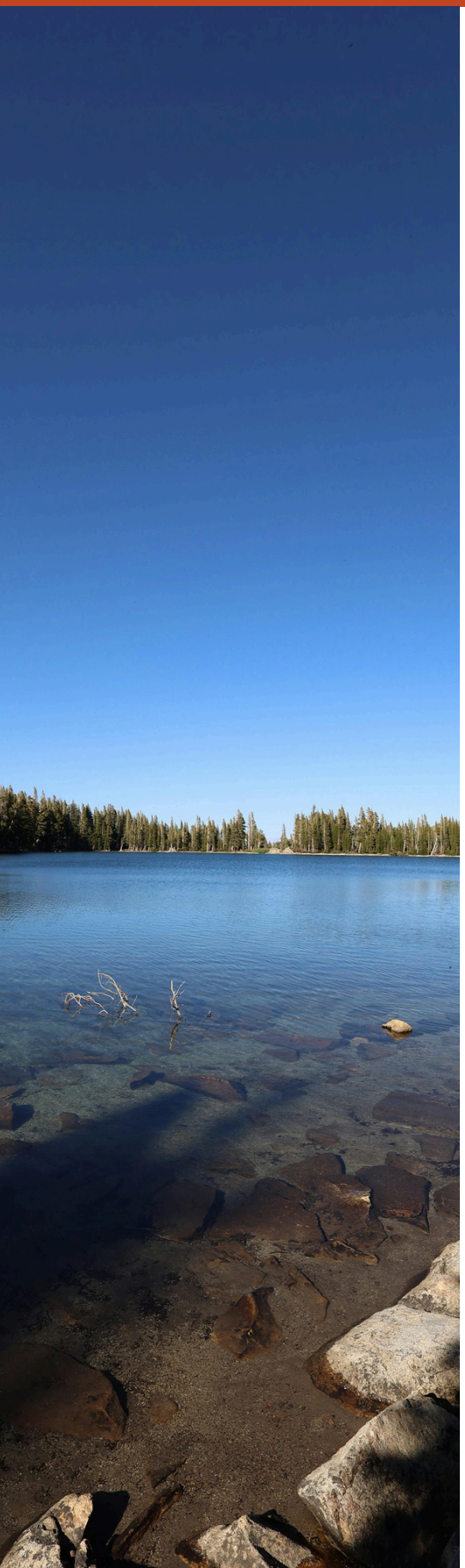
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Preface



Drought is not a distant threat to our Tribal communities. For many of us, it is already shaping daily decisions, from how we manage our water systems to how we care for the lands and species we are responsible for.

Water use in California is a managed system, and during drought, that management has real consequences for Tribal communities. For some, drought means losing access to drinking water entirely. For others, it means the loss of plants and animals that are central to cultural life and community identity. In all cases, what is at stake is not just water. It is the foundation of how our communities live.

While every Tribe's experience of drought is different, we share many of the same underlying challenges. MLS-TRIAD brought Tribes from across the region together to examine them collectively. This regional collaboration has been both significant and timely. Drought affects all our communities, and addressing it requires working together.

We hope this report, and the work behind it, help connect Tribal communities to the resources, partnerships, and support needed to withstand and recover from drought's impacts. By sharing our experiences and needs, we are better positioned to engage with local, regional, and state water planning processes and to pursue opportunities for funding, technical assistance, and coordination. At the same time, the relationships built across this network are themselves a resource, and we hope they continue to deepen beyond this project.

We are grateful to everyone who participated in this project. That participation has strengthened relationships among Tribes, our environmental departments, our communities, and the partners working alongside us. We believe that through this shared effort, we are better positioned to build the drought resilience our communities need and deserve.

The MLS-TRIAD Core Working Group
Big Valley Band of Pomo Indians, Middletown Rancheria of Pomo Indians, and Sherwood Valley Band of Pomo Indians

Executive Summary

Tribal communities across Northern California face drought as an ongoing, compounding challenge affecting water systems, ecosystems, cultural practices, public health, and overall wellbeing. To better understand these impacts and identify shared priorities, the Mendocino, Lake, Sonoma Tribal Resilience Initiative on Air Quality and Drought (MLS-TRIAD) conducted a brief survey and interviews with Tribal partners. This report is intended primarily for Tribes and Tribal environmental departments who participated in the project, and for partners working to support Tribal drought resilience.

This report was developed by Tracking California, a program of the Public Health Institute, in partnership with Big Valley Band of Pomo Indians, Middletown Rancheria of Pomo Indians, and Sherwood Valley Band of Pomo Indians. It summarizes findings from an online survey and interviews with Tribal environmental staff in Mendocino, Lake, and Colusa counties. Input from seven Tribes in Mendocino County, four in Lake County, and one from Colusa County was gathered from October 2025 to January 2026. Due to the brevity of the survey and limited participation, **findings are illustrative rather than representative** of all Tribes in the region. The report highlights perspectives on drought impacts, preparedness, barriers, and support needs, and aims to support shared learning, planning, and coordination.

Key themes from respondents



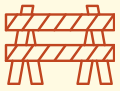
Drought as a Hazard

Drought is a recurring hazard likely to worsen due to climate change and is often linked to increasing wildfire risk, with each hazard intensifying the other.



Systems & Quality

Water systems and water quality are central concerns, including drinking water access, inadequate infrastructure, and the rising cost of procuring water.



Barriers are Common

Barriers are common across Tribes, including funding for risk mitigation, a limited local workforce, information needs for drought planning, and limited opportunities for knowledge sharing.



Ecosystem & Cultural Impacts

Ecosystem and cultural impacts are deeply felt, with degrading forest health and declining traditional resources contributing to loss of cultural knowledge and practices.



Public Health Concerns

Public health concerns are present but not always recognized as drought related, including both direct impacts (respiratory and waterborne illness) and indirect mental health effects such as stress and anxiety.

These findings highlight shared challenges faced by Tribal environmental departments as they navigate drought alongside wildfire risk, regulatory requirements, and climate change. Preparedness levels vary across participating Tribes, with some communities integrating drought into broader emergency or climate planning and others still in earlier stages. That variation points to the value of peer learning and regional coordination, as experiences and approaches from communities further along in planning can be a practical resource for those just getting started. By documenting these perspectives, this report aims to support collaboration, inform planning and funding efforts, and ensure that Tribal experiences and priorities inform drought resilience planning and investment decisions.

Introduction

Tribal communities in Mendocino, Lake, and Colusa counties are navigating drought alongside a broader set of ongoing environmental and climate-related challenges, including wildfire, extreme heat, and shifting ecosystem conditions. These changes affect not only water systems and infrastructure, but also cultural practices, traditional foods, and community health.

To better understand how drought is shaping Tribal priorities and day-to-day realities, the Mendocino, Lake, Sonoma Tribal Resilience Initiative on Air Quality and Drought (MLS-TRIAD) worked with Tribal environmental staff to gather information and perspectives through a brief survey and voluntary interviews. The information shared reflects the lived experiences of Tribal partners who are managing the effects of drought while balancing many other responsibilities.

This report summarizes those perspectives. It is intended for project-participating Tribes, Tribal environmental departments, and organizations that partner with Tribes on drought resilience, water systems, and climate adaptation. The goal is not to provide a comprehensive drought assessment, but to highlight common themes, elevate Tribal experiences, and identify opportunities for coordination, learning, and support. The findings reflect a snapshot of conditions and concerns at a particular moment in time, grounded in the practical realities of Tribal staff responding to drought amid multiple competing priorities, and are not intended to represent all Tribes or all drought-related conditions in the region.

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About MLS-TRIAD

The Mendocino, Lake, Sonoma Tribal Resilience Initiative on Air Quality and Drought (MLS-TRIAD) is a project led by Tracking California, in partnership with three co-applicant Tribes: Big Valley Band of Pomo Indians, Middletown Rancheria of Pomo Indians, and Sherwood Valley Band of Pomo Indians, who together form the Core Working Group. This project is funded by the California Governor's Office of Land Use and Climate Innovation through the Regional Resilience Grant Program and focuses on strengthening Tribal climate resilience across the region. The initiative builds on the long-standing relationships and shared work of the Mendocino Lake Sonoma Tribal Environmental Programs (MLSTEP), a consortium that supports Tribal environmental departments through coordination and peer learning.

While MLSTEP addresses a wide range of environmental health priorities, MLS-TRIAD concentrates on two interconnected climate stressors – air quality and drought – that Tribal partners identified as persistent and increasingly urgent. The project aims to better understand how these hazards affect Tribal communities and to support planning, communication, and resource sharing across the region.

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Drought Impacts in Northern California and Regional Tribal Communities

The drought component of MLS-TRIAD originally focused on assessing existing Tribal drought plans and developing a white paper on drought resilience. An initial workshop survey revealed that many Tribes did not yet have formal plans, prompting the development of the Tribal Drought Resilience Checklist (Appendix A). Subsequent conversations with the Core Working Group identified the need for a deeper understanding of how Tribes were experiencing and addressing drought, which led to the interviews and survey that form the basis of this report.

Although Sonoma County is part of the broader MLS-TRIAD project, it is not included in this report because no Sonoma County-based Tribal partners were interested in participating in the project. Colusa County is included due to active Tribal participation in the survey and interview process. As a result, the findings presented here represent the perspectives of Tribal partners in Mendocino, Lake, and Colusa counties who contributed to this effort.

Drought Impacts in Northern California and Regional Tribal Communities

Drought conditions in Northern California have become more frequent, severe, and prolonged over the past two decades. Warmer temperatures, reduced snowpack, and higher evaporation rates are contributing to long-term declines in both surface water and groundwater recharge[1,2]. As a result, drought is increasingly understood as a recurring structural condition rather than a temporary event[3].

Across the region, diminished snowpack has reduced the reliability of surface water supplies, pushing many communities to rely more heavily on groundwater[4]. Long-term monitoring shows declining groundwater levels in several parts of the state, leading to dry or failing domestic wells, especially in rural areas served by independently operated water systems[5]. These systems often operate with limited staff, financial resources, and expertise, making them more vulnerable to drought-related disruptions[6].

The drinking water sources that Tribal communities rely on also shape their vulnerability to drought. Tribes in this region rely on a range of drinking water sources, including public water systems (including those operated by Tribes), private wells, and private intakes from lakes and other surface water sources. Communities relying on smaller or less resourced water sources often face limited backup capacity and higher per-household costs for maintenance and monitoring. These sources can be especially sensitive to prolonged dry periods or water quality issues.

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In a survey of Tribal organizations across Northern California in 2020, 19 Tribal respondents reported that small water systems had aging infrastructure, inadequate storage capacity, limited backup systems, and limited financial capacity to maintain or upgrade infrastructure. In contrast, larger public water systems typically have full-time certified operators, engineered infrastructure, continuous monitoring, and greater financial capacity to meet regulatory requirements and respond to disruptions.

Drought also interacts with other climate-driven hazards. Dry vegetation increases wildfire risk, and post-fire erosion can degrade water quality[7]. Extreme heat often coincides with drought, compounding stress on water systems, ecosystems, and public health[8]. Wildfires in turn can worsen drought conditions by destroying vegetation and root systems that help soil absorb rainfall, increasing surface runoff and reducing groundwater recharge.

Beyond water supply and infrastructure, Tribal communities experience drought through distinct cultural, ecological, and governance lenses. For many Tribes, water is deeply tied to cultural practices, traditional foods, and ceremonies rooted in specific places, species, and waterways. Changes in streamflow, groundwater levels, and ecosystem health therefore affect subsistence and cultural continuity as well as physical water availability.

How Tribes are governed and regulated also influences how drought is experienced and addressed. Tribes operate within overlapping federal, state, local, and Tribal jurisdictions, which can influence access to funding, data, and technical assistance. One respondent shared: "Many Tribes face compounding structural disadvantages. Federal trust land arrangements can leave communities geographically isolated, and even within their own ancestral territories, Tribes often lack access to land or water. Even when land is secured, water rights frequently are not." Many Tribes also carry stewardship responsibilities, or responsibility for caring for culturally important species and ecosystems, including salmon and steelhead, the Clear Lake hitch, and traditional plant resources, expanding the scope of drought resilience beyond water supply alone.

Together, these cultural, ecological, and governance factors underscore why drought resilience for Tribal communities cannot be understood solely through conventional measures of water availability or infrastructure. Instead, drought intersects with sovereignty, cultural preservation, environmental stewardship, and long-term community wellbeing, shaping a set of challenges and priorities that cannot be separated from the specific lands, waters, and ecosystems these communities steward.

Survey & Interview Process

The information summarized in this section was gathered through a combination of one-on-one interviews and a brief online survey conducted with Tribal partners participating in MLS-TRIAD. This approach was intended to capture both in-depth perspectives and broader themes related to drought impacts, preparedness, and support needs.

Between October and November 2025, we conducted one-on-one interviews with representatives from nine Tribes in Mendocino, Lake, and Colusa counties. These interviews were part of a broader MLS-TRIAD assessment. Copies of the interview guide and survey instrument are available upon request. Interview topics and questions related to drought included:

- Major drought impacts affecting the Tribe
- Leadership priorities related to drought preparedness
- Existing drought or hazard mitigation planning efforts
- Primary water sources (e.g. public systems, private wells, surface water, or combinations)
- Coordination and communication with state agencies
- Key needs for strengthening drought readiness and response
- Priority actions that Tribes identified for state or regional agencies to support drought resilience

Insights from these interviews helped inform the design of a subsequent online survey, which was distributed to environmental directors participating in the Mendocino Lake Sonoma Tribal Environmental Programs (MLSTEP) regional consortium from November 2025 to January 2026. The survey was developed with input from the Core Working Group. It included 17 questions and was designed to identify drought-related priorities, highlight common barriers, and explore areas where coordinated support or technical assistance could be most helpful. Many survey questions mirrored interview topics, with additional questions focusing on funding, infrastructure, staffing, coordination challenges, and preferred types of external support.

The survey received complete responses from 12 Tribes: one from Colusa County, four from Lake County, and seven from Mendocino County. Interview participation included nine Tribes: one from Colusa County, two from Lake County, and six from Mendocino County. County-specific survey figures for Lake County and Mendocino County are included as Appendices B and C respectively, for use in local and county-level planning and engagement.

Preliminary survey results were shared back with MLSTEP during the February 2026 monthly meeting, providing an opportunity for respondents to reflect on findings, offer additional input, and identify themes that resonated or required clarification.

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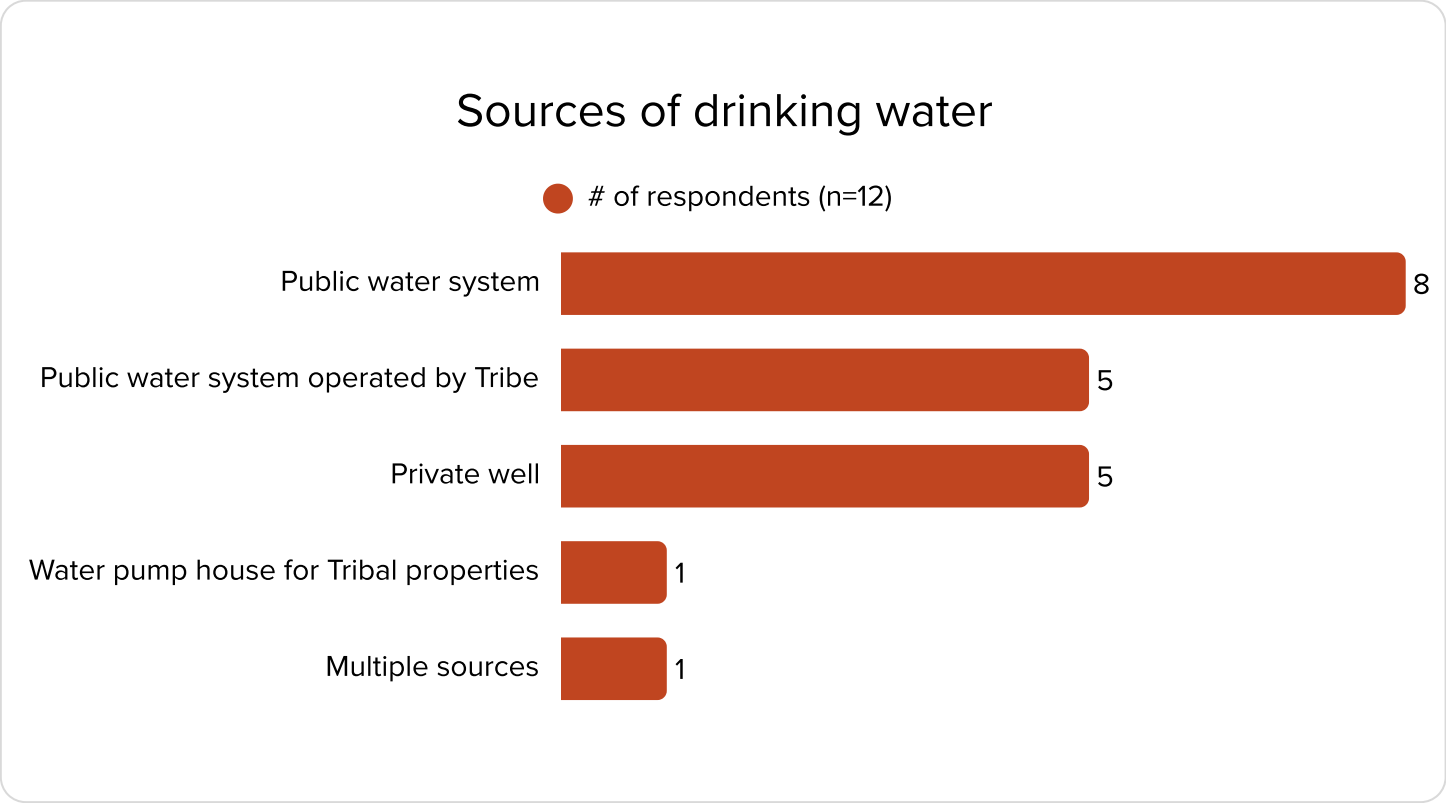
Results: Perspectives from Tribal Environmental Staff

TRIBAL WATER SOURCES AND SYSTEM VULNERABILITY

Respondents reported relying on a range of water sources to meet community needs, including public water systems, Tribal-operated systems, private wells, and combinations of multiple sources (Figure 1). Responses highlight variation in system management, infrastructure, and local control, reflecting differences in geography, resources, and governance across communities.

Interview findings reinforced these patterns. Several respondents described reliance on small systems, either Tribal-operated or serving a limited number of households and facilities, while others drew water from self-supplied sources such as private wells or a lake. In some cases, communities depend on a single primary source, making them more sensitive to disruptions not only during prolonged drought, but also during water contamination events, wildfires, or damage to infrastructure from earthquakes or flooding. Where backup options are limited, alternative supply options may be difficult to implement quickly, regardless of the cause.

Figure 1. Respondents rely on a range of drinking water sources



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What this means for planning: Reliance on small, self-sufficient, or single-source water systems increases vulnerability to drought-related disruptions and exposure to potential contaminants if systems are not maintained, treated, or improved, particularly where infrastructure redundancy and technical staff capacity are limited. For Tribal communities, these vulnerabilities affect not only water reliability, but also emergency preparedness, public health protection, and the continuity of cultural, subsistence, and community activities during extended dry periods. Understanding which systems are most vulnerable is an important starting point for prioritizing infrastructure improvements, emergency preparedness planning, and funding requests.

DROUGHT AS A RECURRING AND INCREASING CONCERN

Survey responses reflect broader regional trends showing that drought is becoming more frequent and severe[1]. Most respondents reported that drought is an increasingly common occurrence affecting their communities (Figures 2 and 3). These perceptions align with state data showing drought has become more common across California over the past several decades[9].

Figure 2. Tribal communities have frequently been impacted by drought in recent years

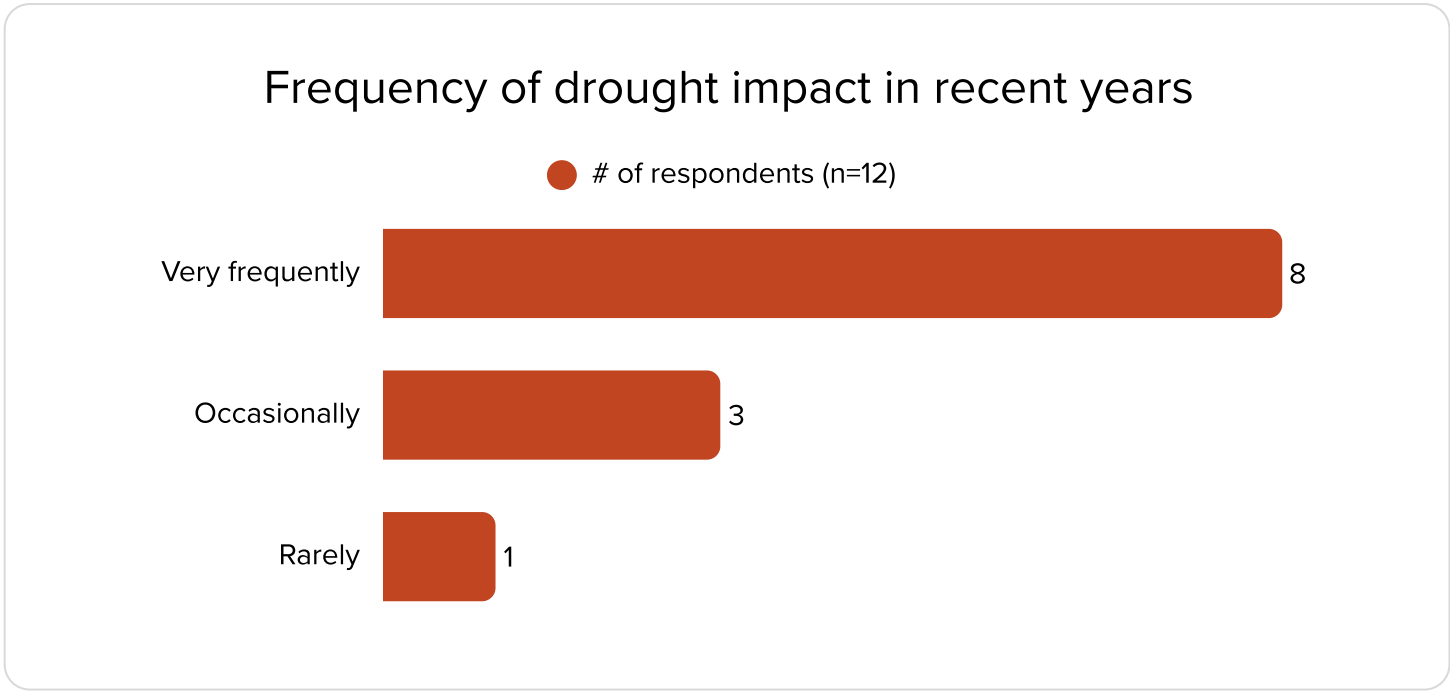
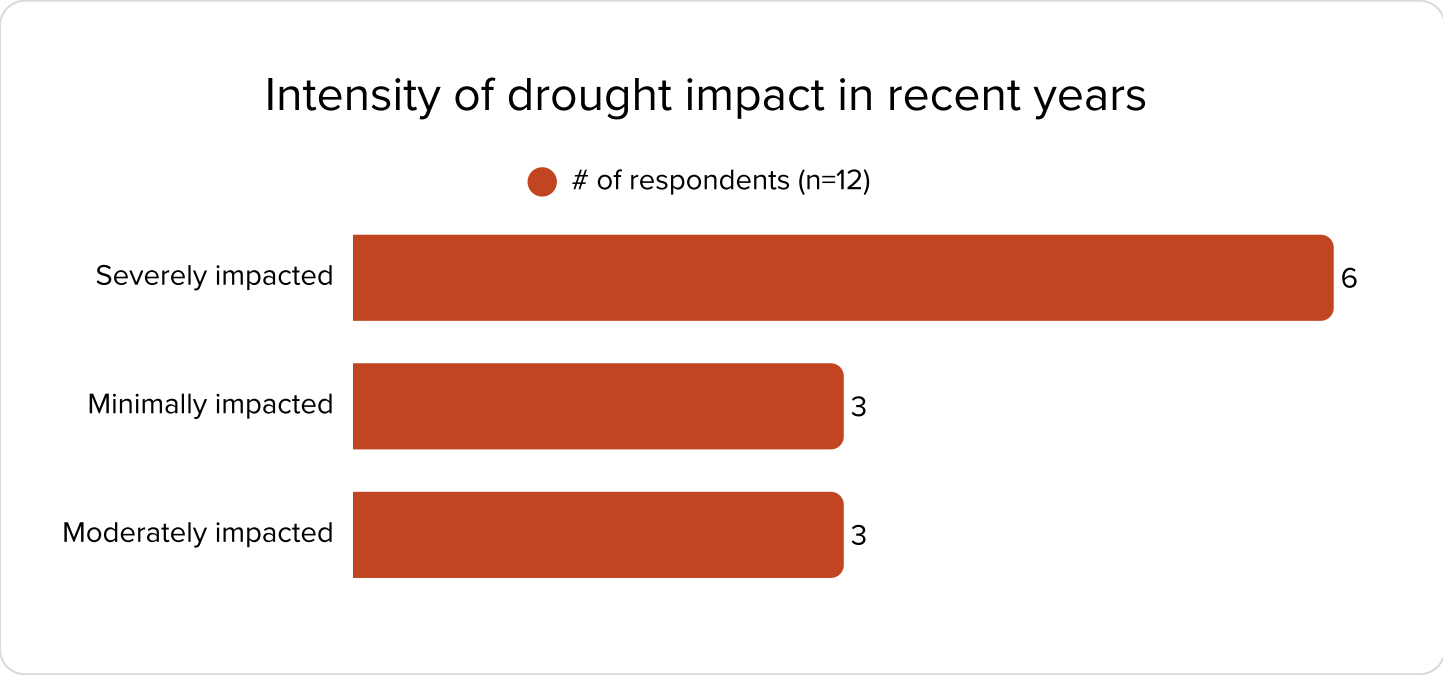


Figure 3. Impact of drought on Tribal communities has been severe in recent years

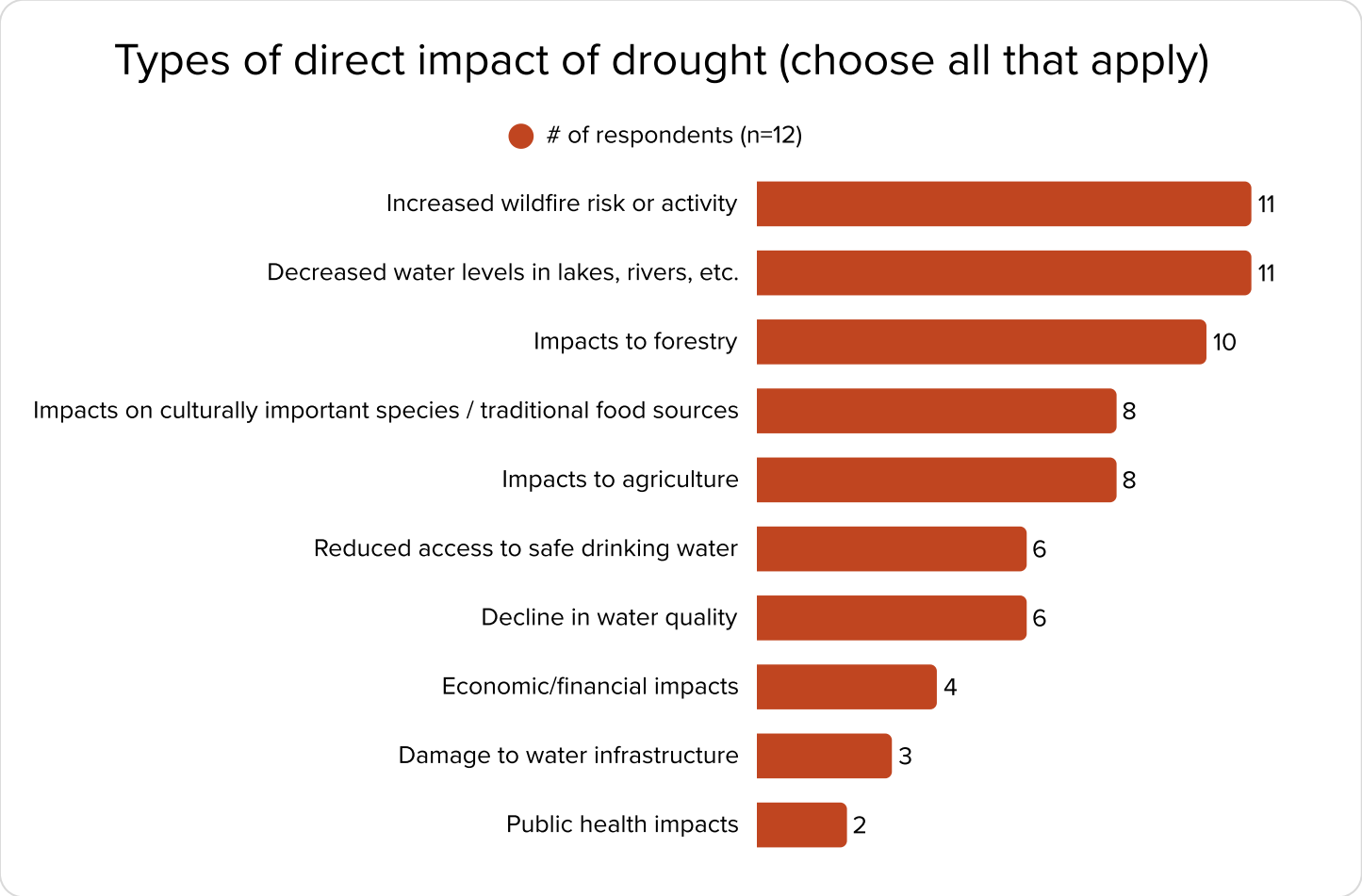


What this means for planning: As drought becomes more frequent and prolonged, the reliability of both surface water and groundwater is expected to decline[10]. For communities relying on small, single-source systems with limited backup capacity, that declining reliability leaves less margin for error and less time to respond than larger, more robust systems allow. The compounding effect of drought and wildfire, both of which are increasing in frequency—further underscores the need for planning approaches that move beyond emergency response toward sustained, long-term drought adaptation.

ENVIRONMENTAL, CULTURAL, AND COMMUNITY IMPACTS OF DROUGHT

Respondents described drought as closely connected to other environmental stressors, particularly wildfire risk, water availability, water quality, and ecosystem health. Some respondents noted that while drought is a priority concern, wildfire preparedness is often more immediate due to current risk levels and resource demands.

Figure 4. Drought affects environment, culture, and economy



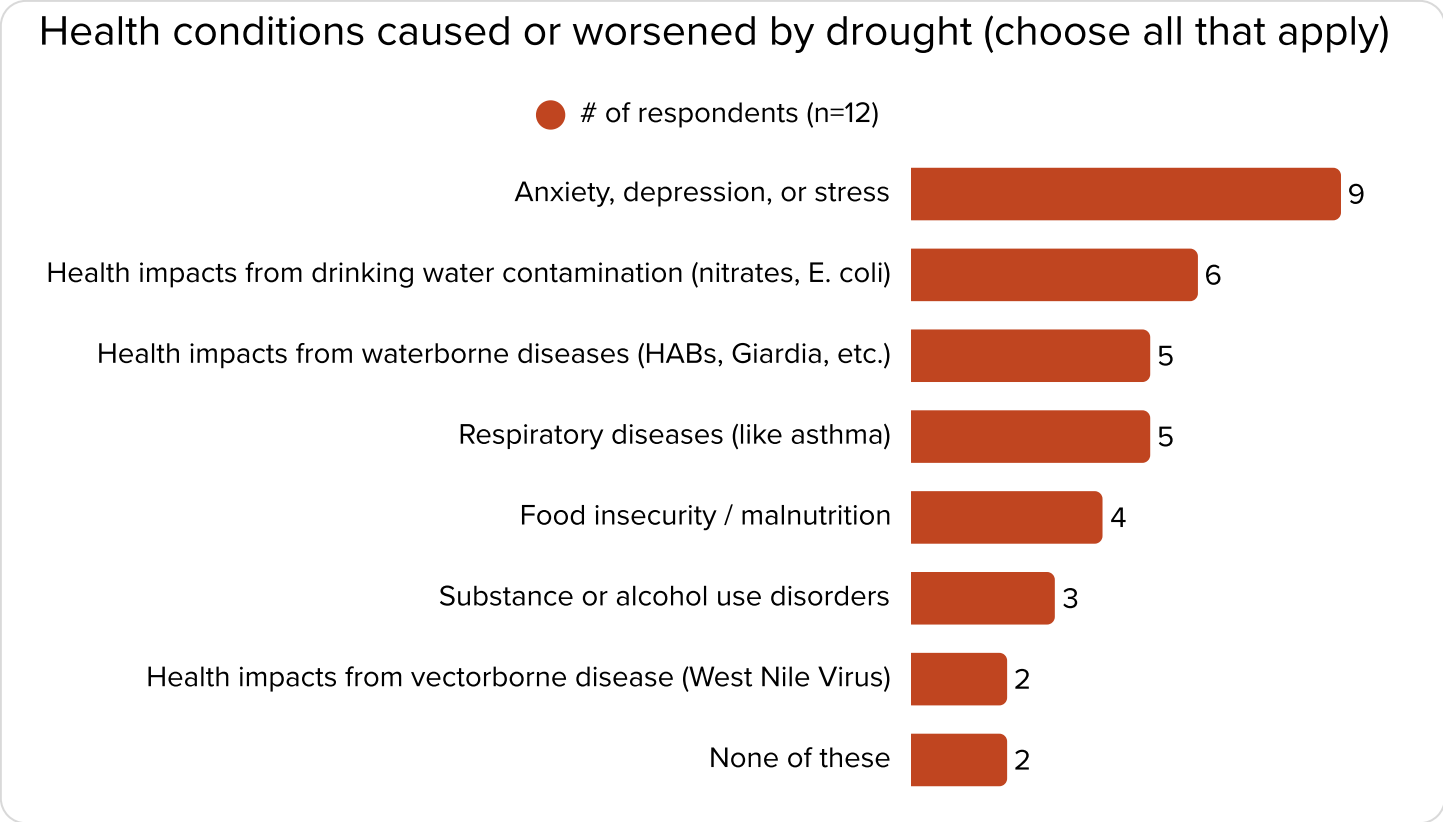
Drought was also described as disrupting cultural and traditional practices. Reduced water availability affects ceremonial uses, traditional gathering, fishing, hunting, and land stewardship practices through which knowledge and ways of life are passed from one generation to the next. One respondent highlighted the challenge of conducting prescribed burns in a mountainous region with limited water supply. Respondents also noted economic impacts, including reduced agricultural productivity, increased costs associated with securing water, and declines in tourism.

What this means for planning: Drought impacts extend beyond environmental conditions to affect cultural continuity, livelihoods, and community wellbeing. Disruptions to traditional practices and ecosystems can have long-lasting and intergenerational consequences, reinforcing the need for drought responses that account for cultural and ecological dimensions alongside economic and health impacts. For Tribal environmental departments, drought planning should go beyond water supply and infrastructure to explicitly incorporate cultural and ecosystem dimensions and can draw on traditional ecological knowledge as a planning resource.

HEALTH IMPACTS: RECOGNIZED AND EMERGING CONCERNS

Respondents were asked about health outcomes they associated with drought. While health impacts were not among the most identified drought impacts overall (Figure 4), respondents nonetheless reported a range of drought-related health concerns (Figure 5). The most frequently selected outcomes were mental health-related, including anxiety, depression, stress. Health impacts of harmful algal blooms, nitrates, and *E. coli* bacteria were also noted. Additional concerns included respiratory impacts, particularly in connection with increased wildfire risk.

Figure 5. Mental health is the most commonly recognized health impact of drought

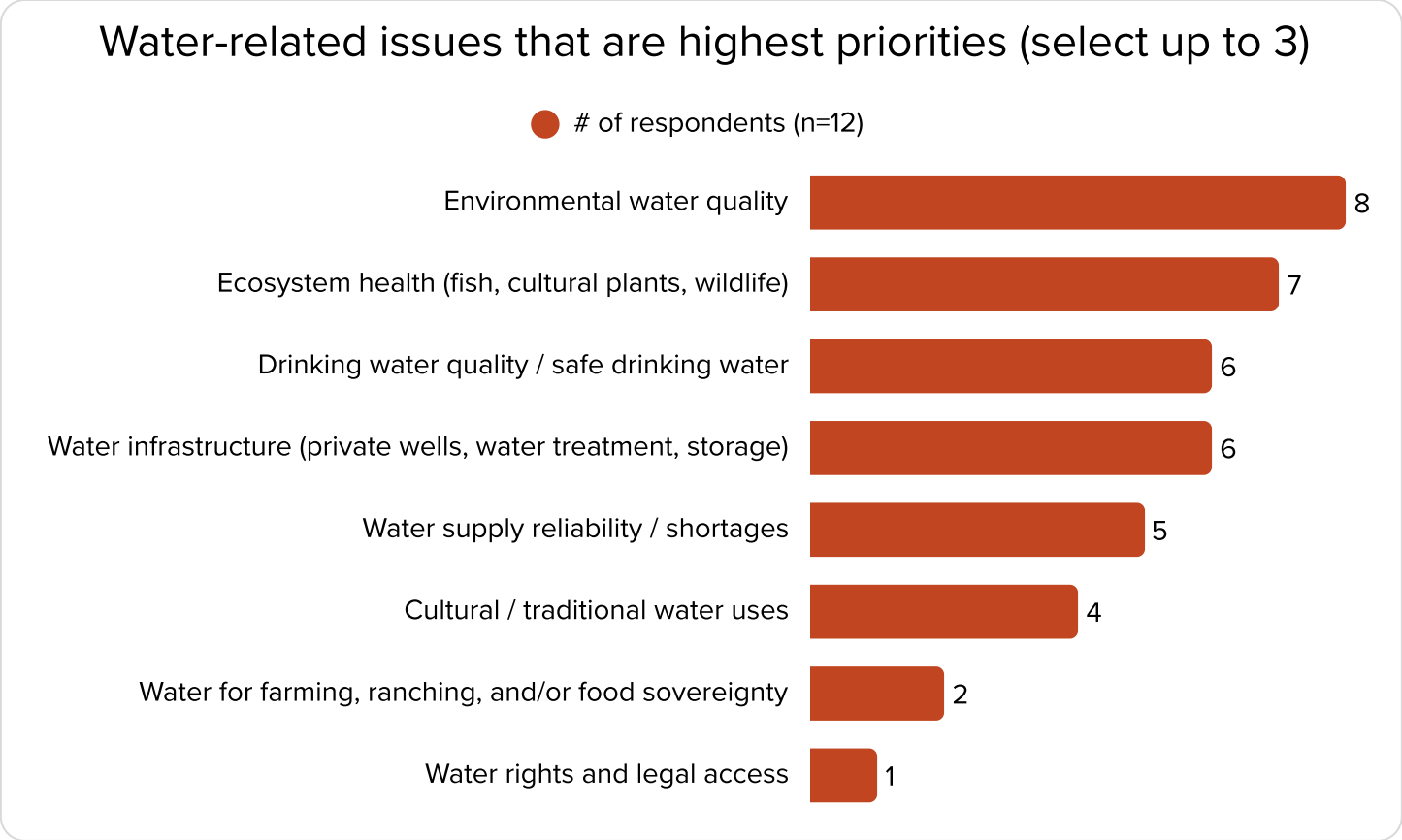


What this means for planning: Health impacts from drought are real but often go unrecognized, since symptoms like stress, anxiety, and respiratory illness overlap with those from other climate stressors and are rarely attributed to any single cause[11]. This gap has consequences. When these impacts are not connected to drought, they are less likely to appear in health planning, emergency preparedness, or funding applications. Tribal environmental departments tracking water quality and ecosystem conditions are well-positioned to bridge this gap by coordinating with Tribal health programs, documenting health concerns alongside environmental data, and framing drought as a health issue when engaging funders and partners. Routine water quality monitoring is an important planning priority, as risks from harmful algal blooms, nitrate contamination, and *E. coli* may go undetected in communities relying on private wells or small self-operated systems without routine testing[12].

WATER-SPECIFIC CONCERNS: DRINKING WATER, INFRASTRUCTURE, AND ECOSYSTEMS

Survey responses identified water quality, infrastructure reliability, and ecosystem health as key concerns (Figure 6). Respondents reported challenges related to contamination of surface and groundwater sources, drinking water quality, and aging or insufficient infrastructure.

Figure 6. Environmental water quality and ecosystem health are top concerns



Interview responses provided additional context. One respondent described long-term concerns about water diversions affecting aquifer levels and local water storage. Another noted that water demand from nearby agricultural uses contributes to local scarcity. The compounding nature of these pressures was described clearly by one respondent: “As the water table drops, water quality declines, requiring higher amounts of chlorine to meet state treatment standards. With chlorine suppliers located out of state, higher fuel prices drive up costs on both ends: purchasing and transportation.”

For smaller, rural Tribes operating with limited funding or without dedicated budget allocations for water infrastructure, these compounding costs can be particularly burdensome. Looking ahead to projected drought years, significant uncertainty remains about whether Tribes will be able to sustain water treatment operations, and what that means for community health.

Respondents also emphasized ecosystem impacts, including:

- Declines in hitch, a culturally important food species
- Drying creeks limiting fish migration
- Vegetation stress on fir trees and increased wildfire risk
- Soil erosion, dust exposure, and contamination from surrounding land

What this means for planning: Water concerns in Tribal communities are closely tied to both infrastructure and ecosystem health. As water quality declines, treatment costs rise, and for smaller rural Tribes operating with limited budgets, those costs can be hard to absorb. Drought planning should account for these projected cost increases. Declines in culturally important species, drying creeks, and impacts to forest health also affect cultural programming, food systems, and intergenerational knowledge transfer, not just environmental health. Regular communication between Tribal environmental departments and cultural program staff can help ensure drought planning reflects the full range of community impacts.

PREPAREDNESS AND PLANNING FOR DROUGHT

Preparedness levels varied across participating Tribes (Figure 7). Some respondents reported having drought response strategies integrated into broader emergency responses or climate action plans (Figure 8), while others indicated earlier stages of planning.

Figure 7. Drought preparedness varies widely across Tribal communities

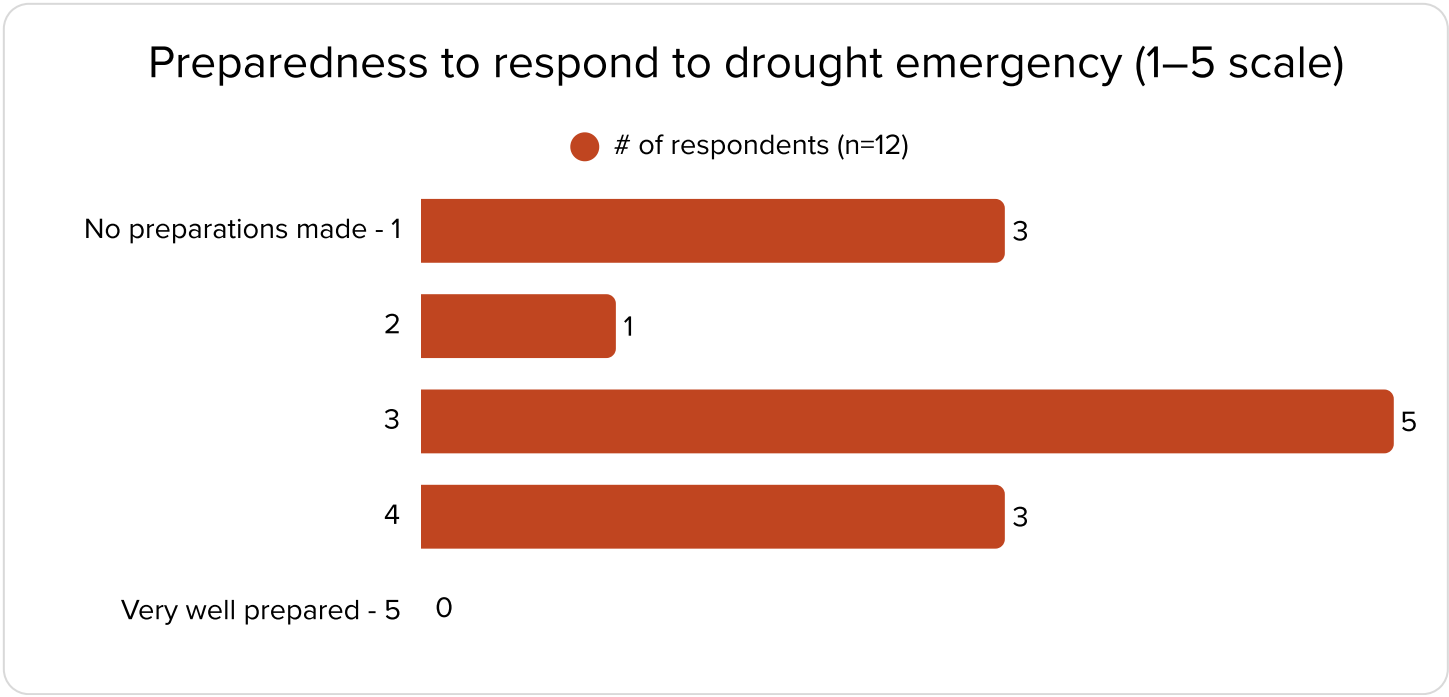
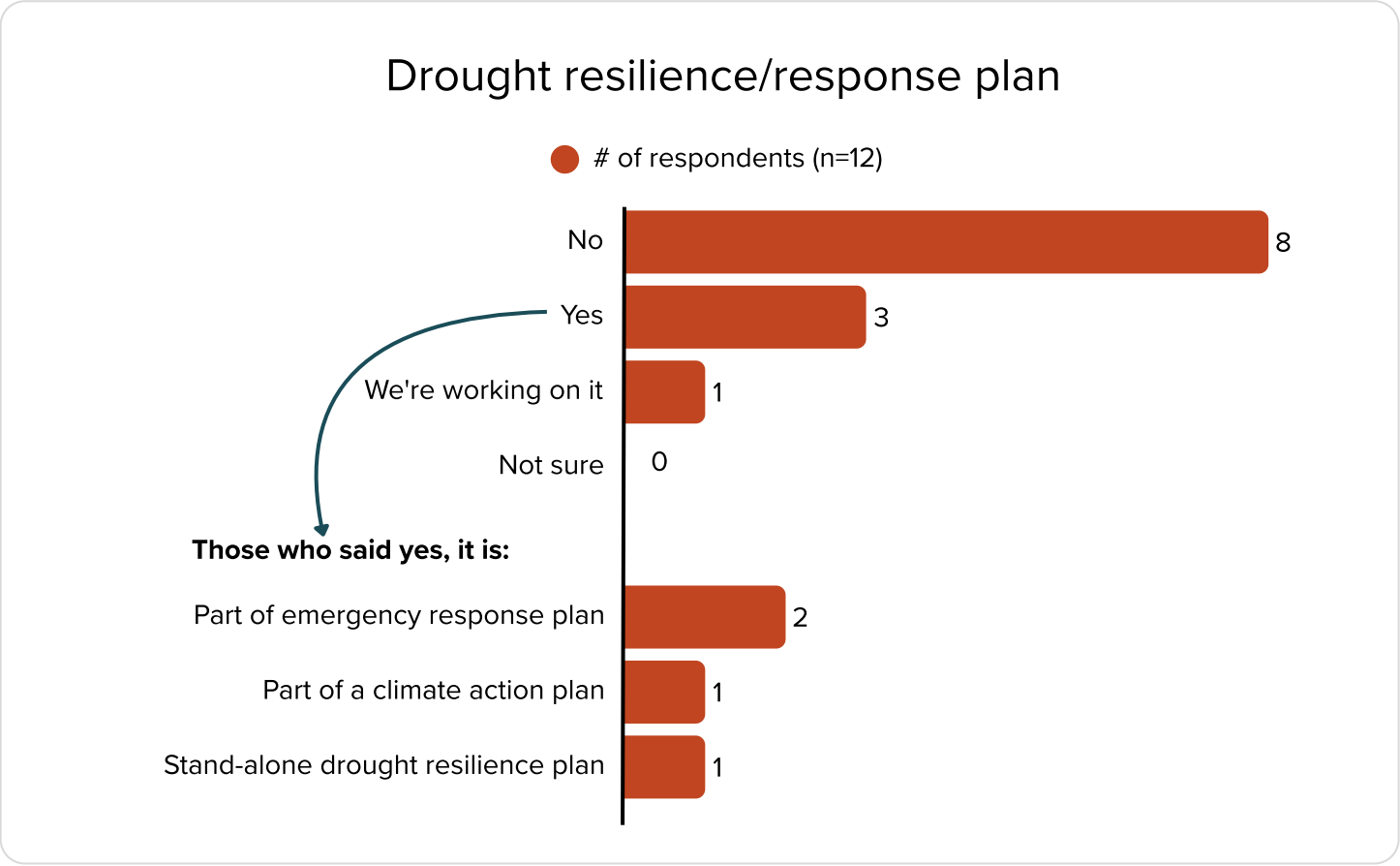


Figure 8. Many respondents do not yet have a formal drought resilience plan



What this means for planning: Preparedness levels vary across respondents, reflecting differences in capacity, resources, and planning priorities. For communities still in earlier stages of drought planning, accessible tools and peer learning opportunities, including the checklist in Appendix A, can help build momentum. The variation across Tribes also highlights the potential value of regional coordination: shared frameworks and lessons learned can reduce duplication of effort and strengthen drought readiness across the region.

BARRIERS, NEEDS, AND PRIORITIES FOR SUPPORT

Respondents identified key barriers to addressing drought challenges, including limited funding, staffing constraints, and inadequate water infrastructure (Figure 9). Interviews provided examples such as a lack of public or private water infrastructure that then requires water deliveries, high costs of water testing, and reliance on single water sources.

Commonly identified needs included funding support and technical expertise in areas such as engineering, hydrology, and planning (Figure 10). Respondents also emphasized the importance of access to data, mapping tools, and learning opportunities.

Figure 9. Inadequate financial resources and lack of technical expertise are the most significant barriers to addressing drought

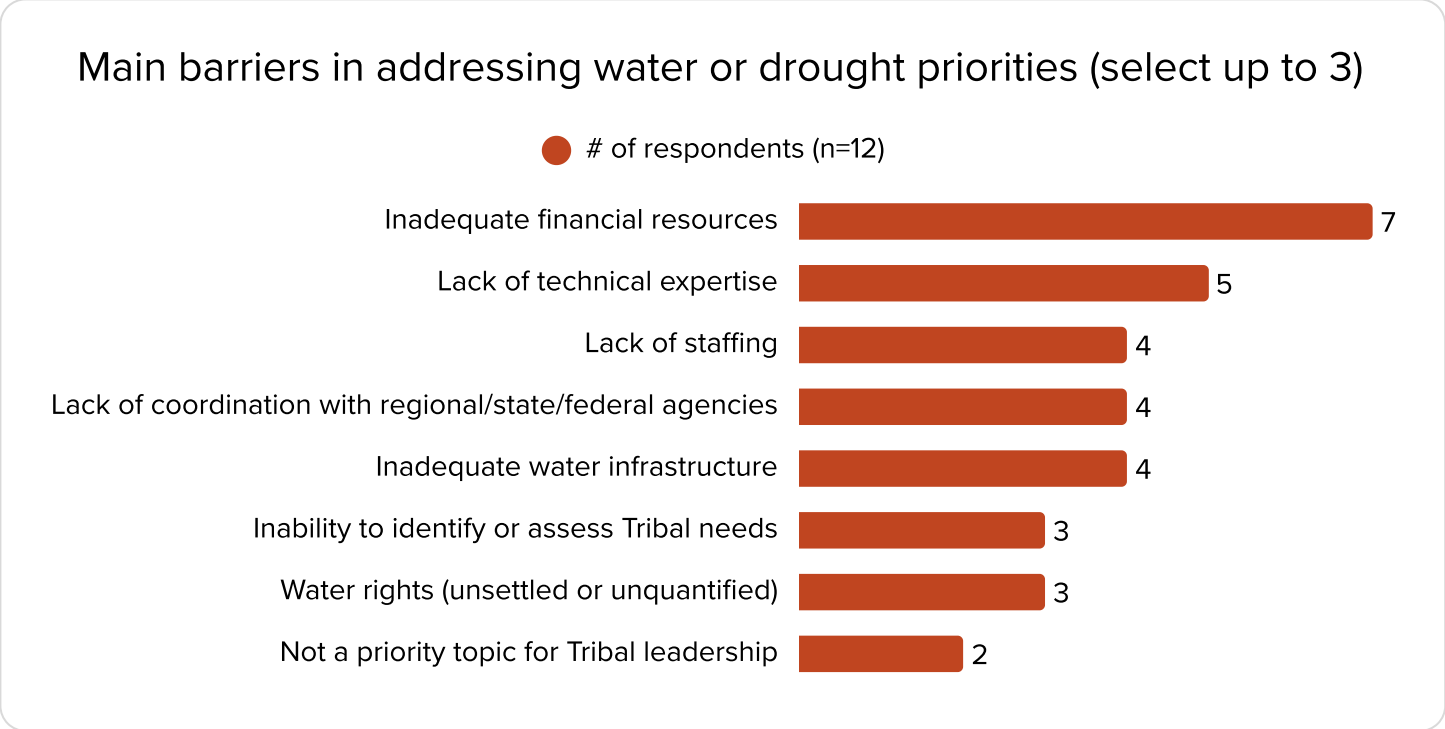
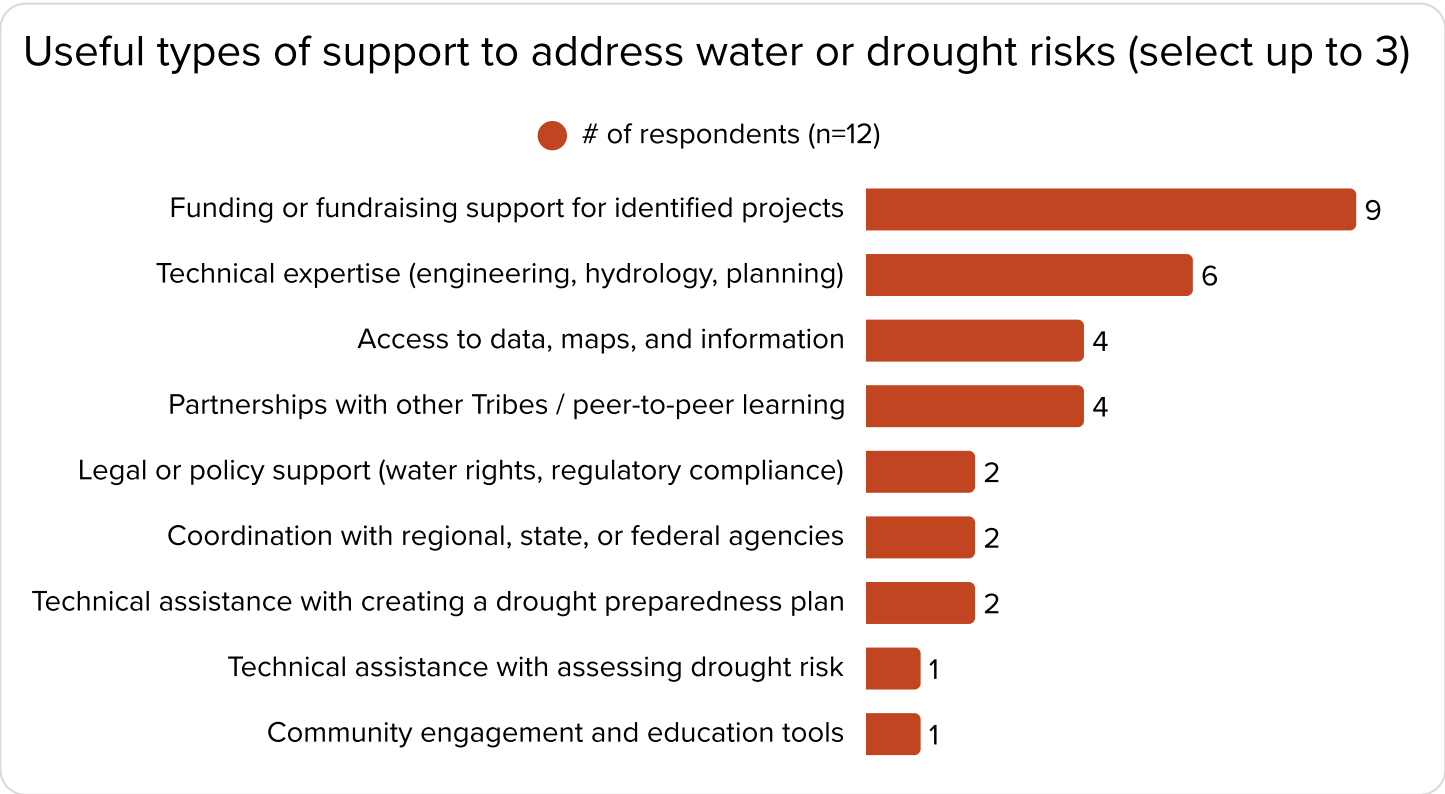


Figure 10. Funding support and technical expertise are the most needed forms of assistance



What this means for planning: Addressing drought-related challenges requires resources that are often limited in small or rural Tribal communities. Financial, technical, and staffing constraints can delay infrastructure improvements and reduce flexibility in responding to drought conditions. Strengthening access to funding, expertise, and data can support more effective, locally driven drought resilience efforts and help reduce long-term vulnerability. Documenting these barriers and needs in concrete terms (as this report does) also provides evidence that can support funding applications and conversations with state and regional partners.

Reflections: Moving Forward on Drought Resilience

Across participating communities, a set of consistent themes emerged that deepen our understanding of how drought is experienced, planned for, and managed. Drought does not affect water supply alone. Its impacts extend across ecosystems, cultural practices, subsistence activities such as traditional food gathering and hunting, public health, and community wellbeing in ways that are deeply interconnected and not always recognized as related to drought. Across all these areas, limited funding, staffing, and capacity shape what actions are feasible for Tribal environmental departments managing drought alongside many other priorities.

Key takeaways from responses:

- **Drought requires long-term planning, not just emergency response.** Respondents described drought as an ongoing reality that intersects with wildfire risk and other environmental pressures. That framing has practical consequences: communities that plan only for acute drought events will be underprepared for conditions that are becoming the norm.

- **Water systems and water quality are central concerns.** Reliance on independently operated water systems increases vulnerability to drought-related disruptions. Few alternative water sources or backup systems, combined with limited technical capacity, raise the risk of service disruptions and contamination, and rising costs of procuring and treating water add further pressure on constrained budgets.

- **Ecosystem and cultural impacts are deeply felt.** Changes to water availability, ecosystem health, and the abundance of culturally important plants and animals disrupt traditional practices, subsistence activities, and ceremonial life, threatening the continuity of cultural knowledge across generations.

- **Unrecognized health impacts are a planning blind spot.** Mental health effects, respiratory illness, and waterborne contamination risks were identified but rarely connected to drought. When these impacts go unnamed, they are less likely to appear in health planning, preparedness, or funding decisions, making coordination between environmental and health programs a priority near-term action for Tribal environmental departments.

- **Common barriers and needs exist.** Funding for risk mitigation, a limited local workforce, access to drought planning information, and limited opportunities for peer learning were consistently identified across participating Tribes, highlighting areas where regional coordination and shared resources could provide support.

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For Tribal Environmental Departments

These findings reinforce the importance of considering drought alongside other interconnected risks in emergency preparedness, water and natural resource management, hazard mitigation, and climate adaptation efforts, whether through dedicated drought planning or as part of broader resilience strategies.

The public and mental health dimensions of drought warrant particular attention. Because health impacts were not always recognized as drought related, they may be underrepresented in existing planning and funding efforts. Coordinated engagement among environmental, emergency management, and Tribal health programs could help ensure drought-related health risks are recognized and incorporated into planning, preparedness, and funding decisions.

The shared barriers documented here demonstrate that many challenges are experienced across participating Tribes, highlighting areas of common need that Tribal environmental departments can use to inform planning and engagement with regional, state, and federal partners. The findings also underscore the importance of continued support from agencies, funders, technical assistance providers, and partner organizations in helping Tribes identify, access, and effectively leverage available technical assistance and funding programs.

The Tribal Drought Resilience Checklist in Appendix A offers a structured framework for departments ready to begin or deepen their drought planning, with actions that can be selected and scaled to fit available capacity and resources.

For Tribal Governance and Leadership

Drought poses an ongoing threat to water security, community wellbeing, and the long-term stability of Tribal communities. Proactive investments in water infrastructure, organizational capacity, and planning can reduce vulnerability to drought impacts, lower the need for costly emergency responses, and strengthen Tribal capacity to address future risks in ways that reflect Tribal priorities and values.

The effects of drought on traditional practices, culturally significant species, and ecosystems underscore the importance of ensuring that resilience and adaptation efforts are guided by Tribal knowledge and priorities, not only by conventional planning and resource management frameworks.

Shared challenges across Tribes also point to opportunities for collective advocacy and coordinated engagement with regional, state, and federal partners. This report can support those efforts by documenting common needs and concerns expressed by participating Tribes.

Resources

Drought conditions

- **United States Drought Monitor:** https://droughtmonitor.unl.edu/About/WhatistheUSDM.aspx
- **California Water Watch:** https://cww.water.ca.gov/cww_info#about

Vulnerability assessment

- **Communities Vulnerability Platform:** https://experience.arcgis.com/experience/652c6def7040429bafe23c38966f8f73/page/Welcome-%26-Regions?views=Extreme-Heat----------#data_s=id%3AdataSource_14-196357c0a98-layer-18%3A616
- **Water Shortage Vulnerability Explorer Tool:** https://experience.arcgis.com/experience/ae1b4e3e41004f07b4901a7a3fa50637/page/Overview?org=DWR

Drought resilience planning

- **County Drought Resilience Plan Handbook**, March 2023: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/SB-552/DWR_Final_Guidebook_20230313_ADA_508_v5.pdf
- **California Water Plan:** https://water.ca.gov/programs/california-water-plan

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References

1. Diffenbaugh, N. S. et al. (2015). Anthropogenic warming has increased drought risk in California. Proceedings of the National Academy of Sciences
2. Williams, A. P. et al. (2020). Large contribution from anthropogenic warming to California drought. Science Advances
3. Hanak, E. et al. (2017). Water Stress and a Changing San Joaquin Valley. Public Policy Institute of California.
4. Knowles, N., Michael D. Dettinger, & Daniel R. Cayan (2006). Trends in snowfall versus rainfall in the western United States. Climatology, Journal of Climate, 19(18), 4545–4559
5. United States Geological Survey (2023). California drought and groundwater conditions.
6. Ekstrom, J. A. et al. (University of California, Davis). 2018. Drought Management and Climate Adaptation among Small, Self-Sufficient Water Systems in California. California's Fourth Climate Change Assessment, California Natural Resources Agency. Publication number: CCCA4-CNRA-2018-004.
7. North Coast Resource Partnership, 2020. Disadvantaged Community & Tribal Water & Wastewater Service Providers Needs Assessment Summary https://northcoastresourcepartnership.org/site/assets/uploads/2020/10/NCRP_DACTI-Needs_Sept20_v4.pdf
8. Reid, C.E., Brauer, M., Johnston, F.H., Jerrett, M., Balmes, J.R., & Elliott, C.T. (2016). Critical review of health impacts of wildfire smoke exposure. *Environmental Health Perspectives*, 124(9), 1334–1343. doi: 10.1289/ehp.1409277. PMID: 27082891; PMCID: PMC5010409.
9. California, Office of Environmental Health Hazards Assessment. 2022 Report; Indicators of Climate Change in California.
10. Summary of Projected Climate Change Impacts on California. California Climate Adaptation Strategies. https://climateresilience.ca.gov/overview/impacts.html
11. Vins H, Bell J, Saha S, Hess JJ. The Mental Health Outcomes of Drought: A Systematic Review and Causal Process Diagram. Int J Environ Res Public Health. 2015 Oct 22;12(10):13251-75. doi: 10.3390/ijerph121013251. PMID: 26506367; PMCID: PMC4627029.
12. Solomon GM, Stanton B, Ryan S, Little A, Carpenter C, Paulukonis S. Notes from the Field: Harmful Algal Bloom Affecting Private Drinking Water Intakes — Clear Lake, California, June–November 2021. MMWR Morb Mortal Wkly Rep 2022;71:1306–1307. DOI: http://dx.doi.org/10.15585/mmwr.mm7141a3

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Appendix A: MLS-TRIAD: Tribal Drought Resilience Plan Checklist

Background and purpose

This checklist was developed in response to a drought survey completed by MLS-TRIAD Workshop participants indicating that a checklist for developing a drought mitigation plan would be a useful resource to support their Tribe's drought resilience.

This checklist draws from the California Department of Water Resources' "County Drought Resilience Plan Guidebook", [Guidebook], which helps counties support small water suppliers and rural communities in reducing water shortage risks.

Tribes may use or adapt this checklist to mitigate the impacts of drought, including impacts on drinking water, local food sources, ecosystems, and cultural water uses.

How to use this checklist

This checklist outlines actions that can help users in developing a Drought Mitigation Plan or be included in a plan. The checklist is intended to be simple to understand and adaptable, so that Tribes can select and scale activities that best suit their needs, resources, and time. The checklist references the Guidebook for further details or examples.

Checklist overview

The checklist is divided into the following sections:



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1. Develop a Tribal Drought Task Force

Purpose: Lead the preparedness planning for Tribal water systems, domestic wells, ecological health, and cultural resources against water shortages caused by droughts, wildfires, or water quality issues.

Recommended actions:

- [ ] Establish the purpose and goals of the Task Force (include water security, food sovereignty, ecological resilience, and cultural protection).
- [ ] Plan and initiate membership (include Tribal leaders, water system managers, cultural practitioners, fisheries/wildlife experts, and community members). As needed, identify external technical support (e.g., engineers, hydrologists, ecologists).
- [ ] Determine group and individual roles and responsibilities.
- [ ] Schedule meeting plan for development and implementation of Drought Resilience/Management Plan.
- [ ] Initiate process and establish methods of communication with the community.

2. Perform Risk Assessment

Purpose: Establish where and who is most at risk from drought. Use this assessment as a roadmap for what risks should be addressed in the Drought Resilience/Management Plan.

Recommended actions:

- [ ] Map water system(s), domestic wells, springs, streams, wetlands, and culturally important water sources.
- [ ] Map and review water supplies for all critical facilities (clinics, schools, emergency shelters, cultural centers).
- [ ] Identify drought risks and local vulnerabilities. Use local knowledge, traditional ecological knowledge, and data tools (p. 3–5 of Guidebook).
- [ ] Determine which risks to include in the Plan.

Consider 3 categories of risk management:

1. Develop a strategy to mitigate risks that are well-understood and need action
2. Gather information on risks that need more evaluation or data before deciding an action.
3. Continue monitoring risks that are lower priority or that are already managed, but should be tracked in case they become more serious.

How to Identify Drought Risks and Local Vulnerabilities

Describe Hazards

- Such as groundwater levels; water use; water quality; cyanobacteria/harmful algal blooms; climate projections/hazards
- Potential data sources:
  - US Drought Monitor
  - California WATER WATCH
  - California Groundwater Live
  - Cal Adapt

Define Scope of Community Hazards

- Potential data sources:
  - DWR Water Shortage Vulnerability Explorer
  - DWR Well Completion Report Website
  - DWR Water Shortage Vulnerability Tool
  - Water Board state small water system and domestic well data

Assess Vulnerabilities

- **Physical**: domestic wells, water infrastructure, spring flows (see Guidebook checklist, p. 3-11)
- **Social:** health impacts, low-income households, elders, and those with limited transportation (see Guidebook checklist, p. 3-14)
- **Ecological:** reduced streamflow, drying wetlands, fish die-offs, habitat loss, invasive species
- **Food system:** loss of access to fish, game, native plants, acorns, basket-weaving plants, and other subsistence resources
- **Cultural:** impacts on sacred springs, ceremonial water uses, and land-based practices

Analyze Risks

Possible method:

- Matrix of likelihood vs magnitude of consequence/event (see Guidebook, p. 3-19)

3. Develop Short-Term Response Actions

Purpose: Reduce community risks (as identified in step 2) during water shortages by planning for both drinking water and non-drinking water impacts.

Recommended actions:

- **General actions**

  ☐ Define triggers/thresholds for the activation of short-term response actions:
  - State or local drought emergency declarations.
  - Critical shortages in domestic wells or community water systems.
  - Ecological/cultural emergencies (e.g., fish kills, drying of culturally important springs, loss of wetland habitat).

  ☐ Establish method to collect reports from residents on drinking water and ecological/cultural impacts.

  ☐ Develop a communications plan to alert and direct residents during water shortages.

- **Drinking water response** (see Guidebook p. 4–14).
  If your water comes from a public water system, collaborate with them to understand their plans for providing drinking water during drought or emergencies.

  If your water comes from private wells or other sources (or if you operate your own public water system), you will need to do more planning, such as:

  ☐ Coordinate with large water systems for water filling stations.

  ☐ Explore feasibility of treating non-typical water supplies.

  ☐ Establish vendor agreements for packaged/bottled water.

  ☐ Engage with water hauling services for bulk water delivery (hospitals, clinics).

  ☐ Explore emergency mutual aid agreements with neighboring water systems.

  ☐ Explore physical “interties” (connections between water systems) that can be activated to provide backup during drought emergencies.

- **Non-drinking water response**
  - ☐ Identify food distribution support if traditional or subsistence food sources are disrupted.
  - ☐ Develop monitoring and reporting protocols for ecosystem distress (fish runs, drying creeks, reduced habiat).
  - ☐ Support cultural continuity by ensuring emergency access to springs or ceremonial water supplies.

4. Develop Long-Term Mitigation Strategies

Purpose: Create solutions that increase resilience of drinking water, ecosystems, food systems, and cultural practices.

Recommended actions:
Select the actions most relevant to your community's situation.

- **Domestic wells.** If you source any drinking water from private wells:
  - ☐ Create an inventory of wells.
  - ☐ Plan for testing and monitoring water levels and quality.
  - ☐ Develop mitigation strategies (e.g., deepen wells, filtration, pump replacement, consolidation).
  - ☐ Identify funding resources for well owners.
- **Drinking water system consolidation.** If your drinking water comes from one or more public water systems, work with the water system(s) to confirm that they are prepared for drought. Actions **they** should take include:
  - Assess physical, economic, legal, and socio-cultural barriers.
  - Gather input from the community.
  - Explore service agreements with potential suppliers.
  - Contact the Division of Drinking Water SAFER (Safe and Affordable Funding for Equity and Resilience) Engagement Unit and the State Water Board to discuss opportunities for consolidation and available funding.

- **Non-drinking water response**
  - ☐ Identify food distribution support if traditional or subsistence food sources are disrupted.
  - ☐ Develop monitoring and reporting protocols for ecosystem distress (fish runs, drying creeks, reduced habiat).
  - ☐ Support cultural continuity by ensuring emergency access to springs or ceremonial water supplies.

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  - ☐ Plan for testing and monitoring water levels and quality.
  - ☐ Develop mitigation strategies (e.g., deepen wells, filtration, pump replacement, consolidation).
  - ☐ Identify funding resources for well owners.
- **Drinking water system consolidation.** If your drinking water comes from one or more public water systems, work with the water system(s) to confirm that they are prepared for drought. Actions **they** should take include:
  - Assess physical, economic, legal, and socio-cultural barriers.
  - Gather input from the community.
  - Explore service agreements with potential suppliers.
  - Contact the Division of Drinking Water SAFER (Safe and Affordable Funding for Equity and Resilience) Engagement Unit and the State Water Board to discuss opportunities for consolidation and available funding.

- **Ecological and food sovereignty strategies**
  - ☐ Protect and restore wetlands, riparian areas, and groundwater-dependent ecosystems.
  - ☐ Support traditional food systems by planting drought-resilient native species, restoring fish populations, and protecting gathering grounds.
  - ☐ Incorporate traditional ecological knowledge in drought planning and land management.
- **Cultural resilience strategies**
  - ☐ Identify and protect sacred springs, ceremonial water sources, and other cultural resources vulnerable to drought.
  - ☐ Collaborate with Tribal elders and cultural leaders to ensure that resilience strategies protect ceremonial practices, traditional food systems, and culturally significant species and places.
  - ☐ Coordinate with neighboring Tribes and land managers on watershed-scale solutions.
- **Data needs**
  - ☐ Identify missing datasets (e.g., fish counts, habitat extent, ecological health indicators).
  - ☐ Identify county, local, state, and federal agencies for data assistance.
  - ☐ Secure funding for ecological monitoring alongside water supply data.

5. Implement Plan

Purpose: Ensure the Drought Mitigation Plan is actionable, funded, and regularly updated.

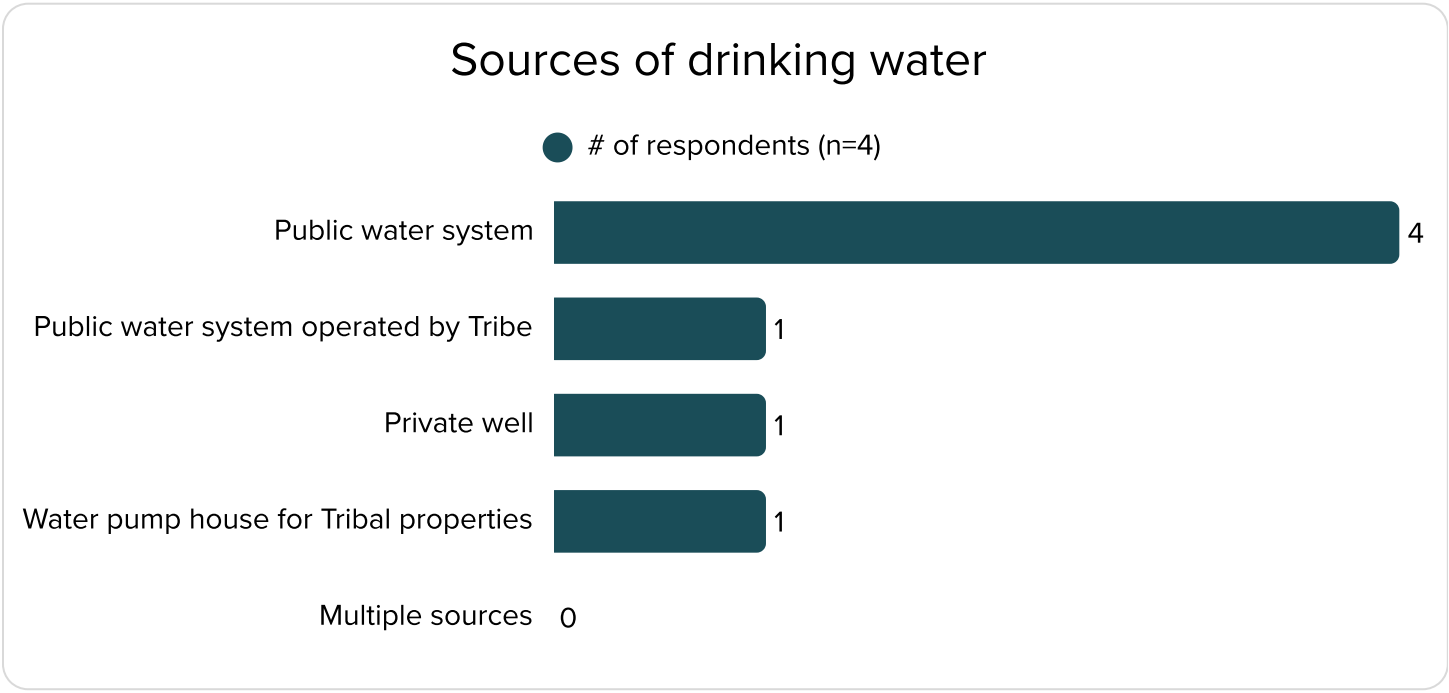
Recommended actions:

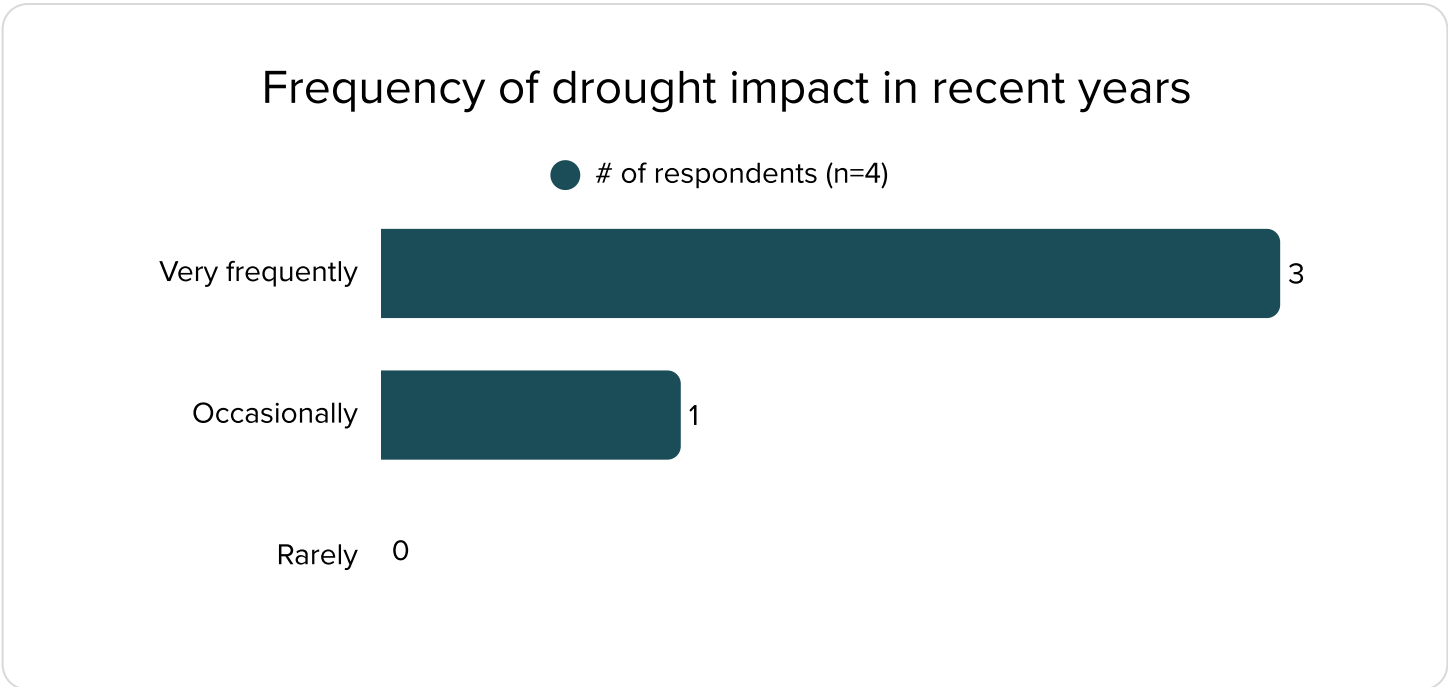
- Assess opportunities to integrate drought planning with existing Tribal emergency management or climate adaptation plans.
- Assign responsibilities and deadlines for each step.
- Gauge resources needed and research funding options (water infrastructure, ecosystem restoration, food sovereignty, cultural heritage).

- [ ] Set intervals for regular evaluation and updating of the Plan.
- [ ] Continue Tribal Drought Task Force meetings to oversee implementation.
- [ ] Monitor progress across three domains:
    - Drinking water security.
    - Ecological health indicators (streamflow, wetland condition, fish/wildlife).
    - Cultural/food system health (access to subsistence foods, ceremonial water).

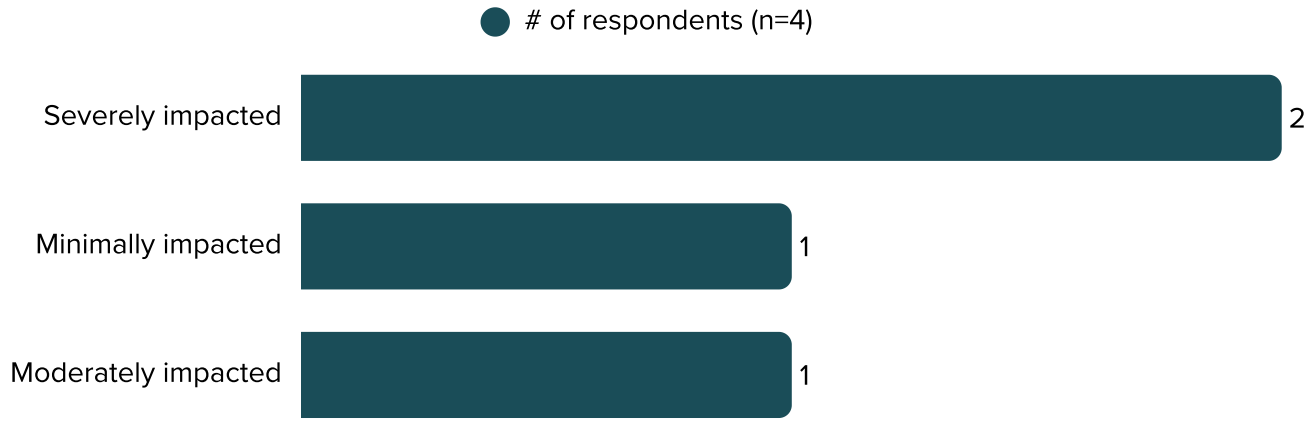
Drought conditions and community needs can change over time, and no plan needs to be perfect from the start. Revisiting and updating this checklist regularly is an important part of building drought resilience.

Appendix B: Lake County Survey Figures

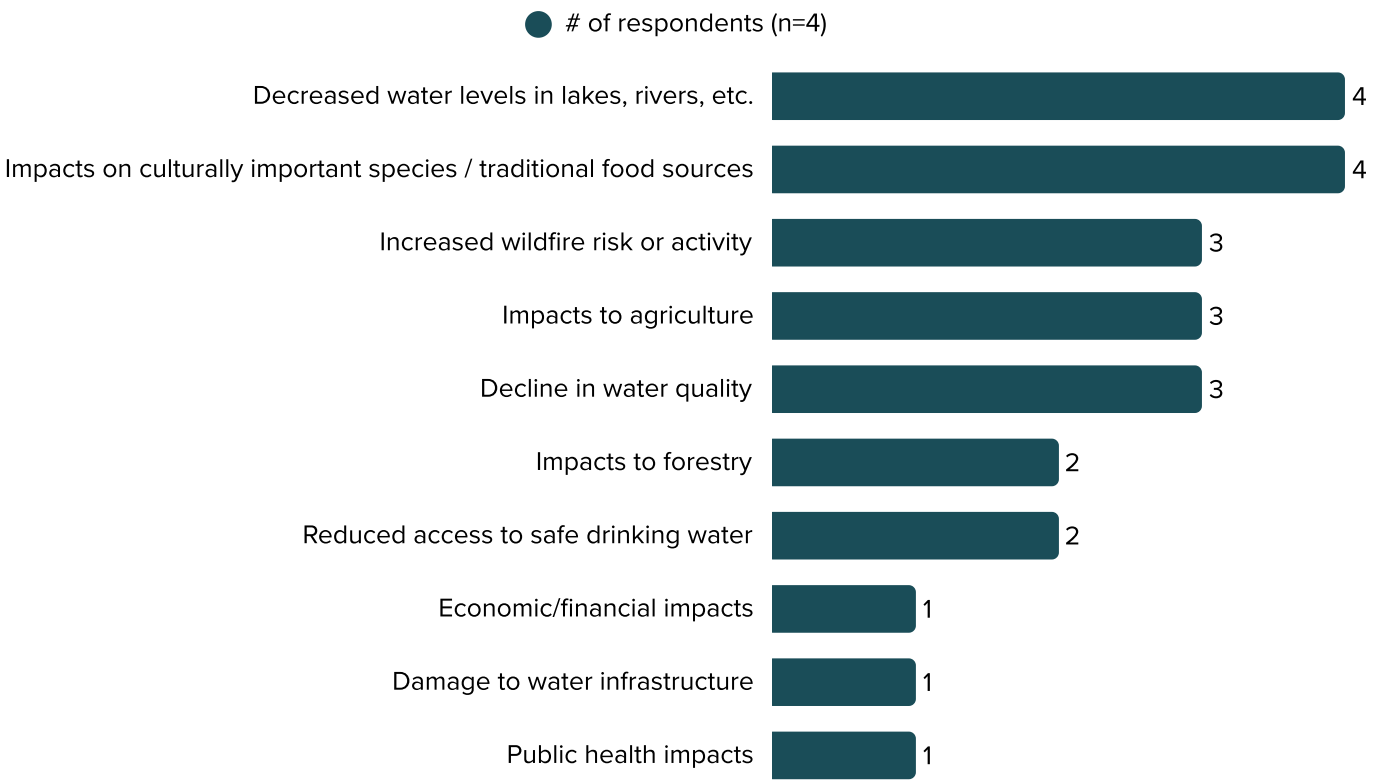




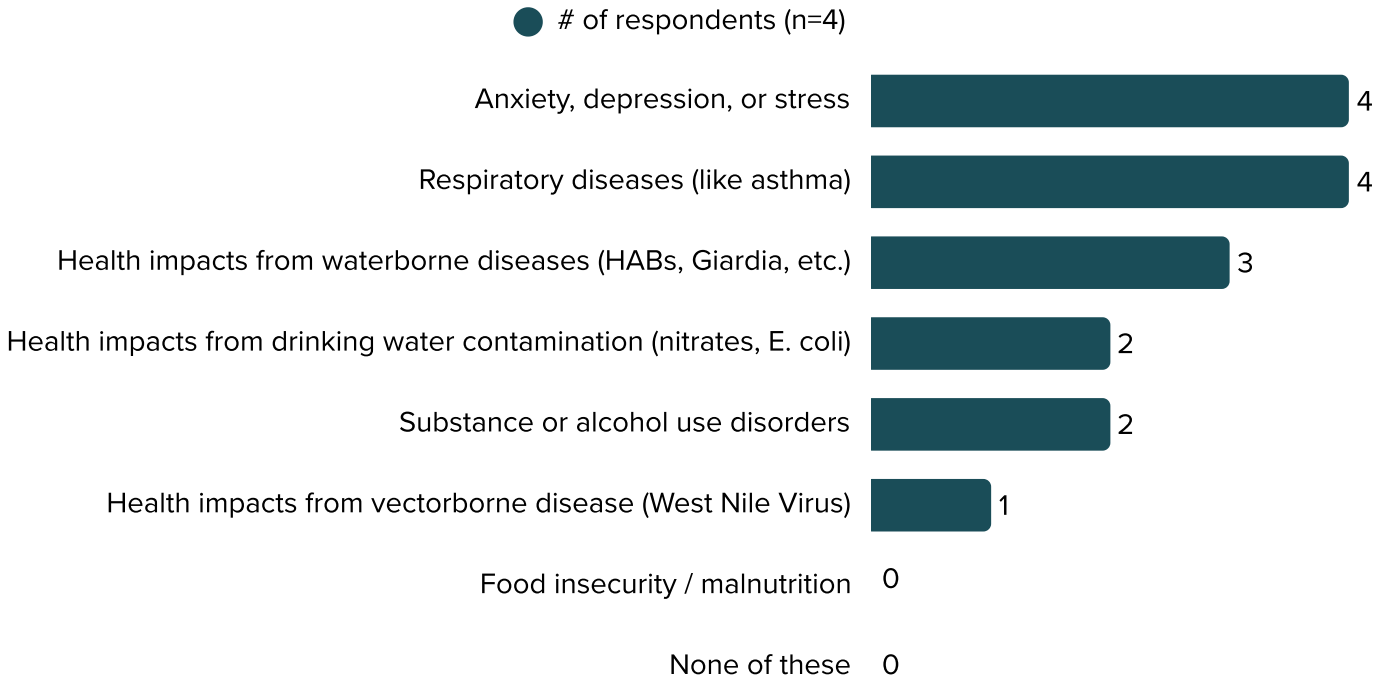
Intensity of drought impact in recent years



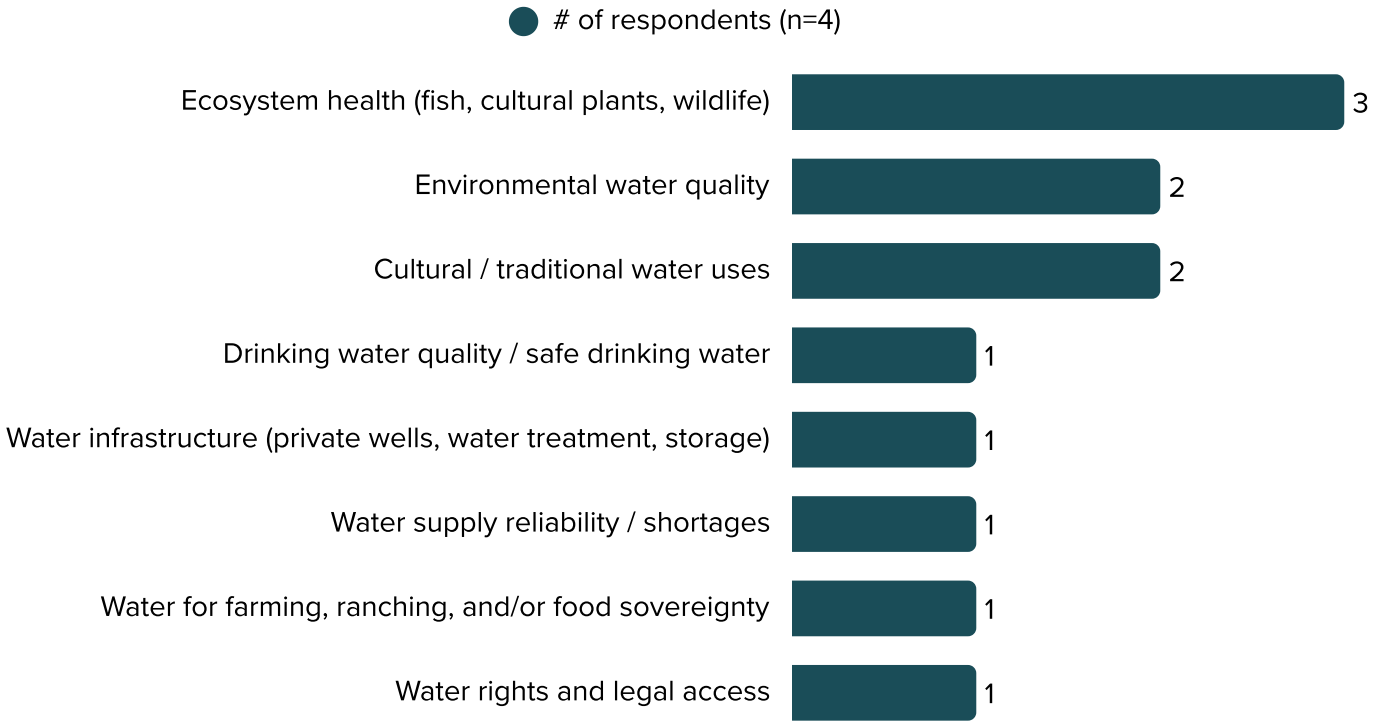
Types of direct impact of drought (choose all that apply)



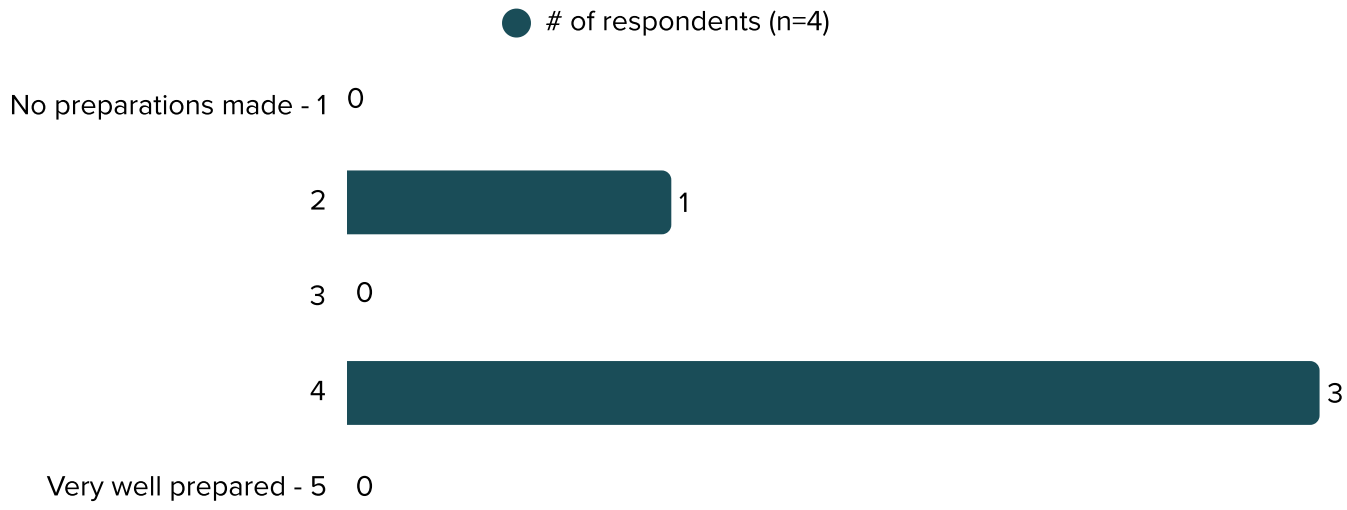
Health conditions caused or worsened by drought (choose all that apply)



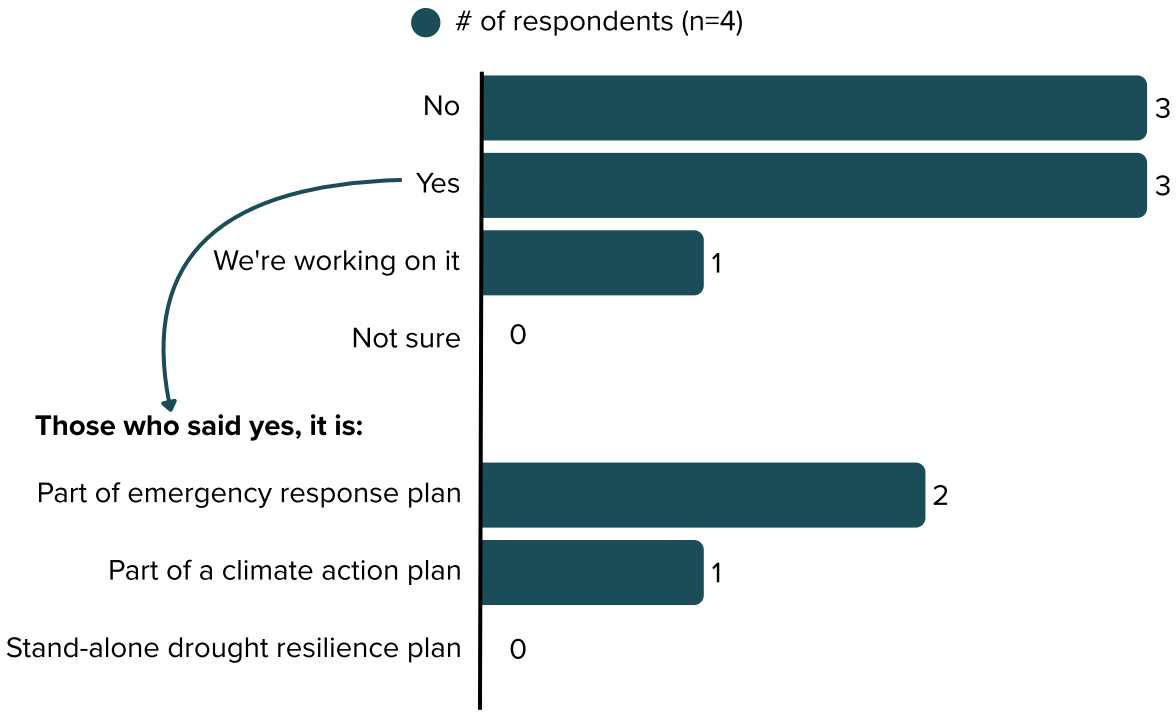
Water-related issues that are highest priorities (select up to 3)



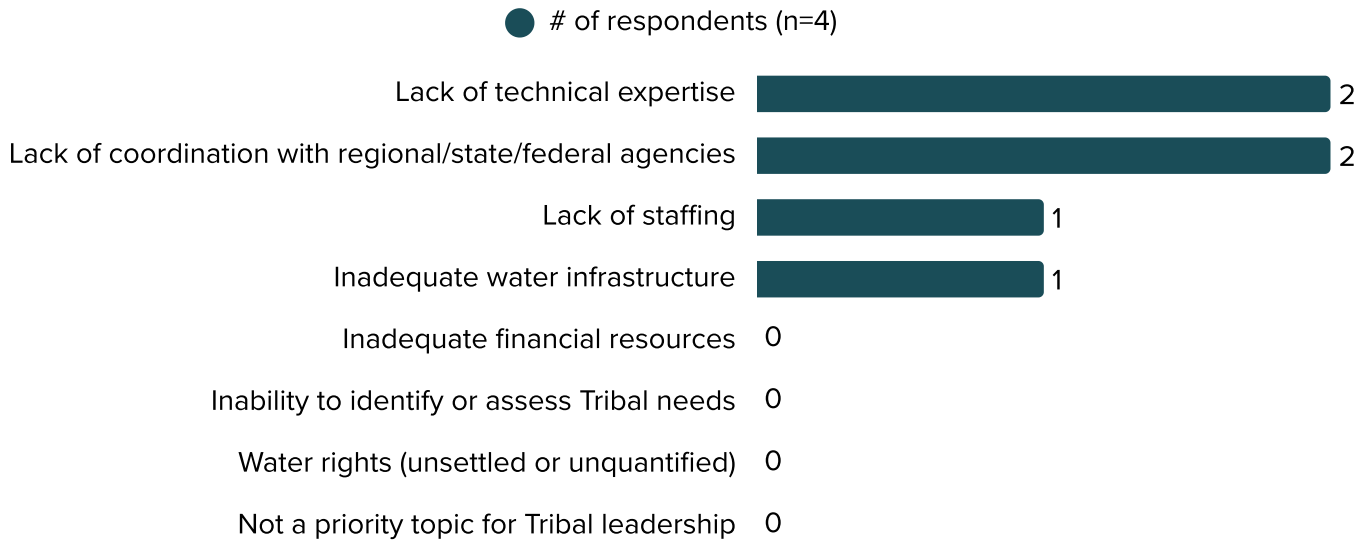
Preparedness to respond to drought emergency (1–5 scale)



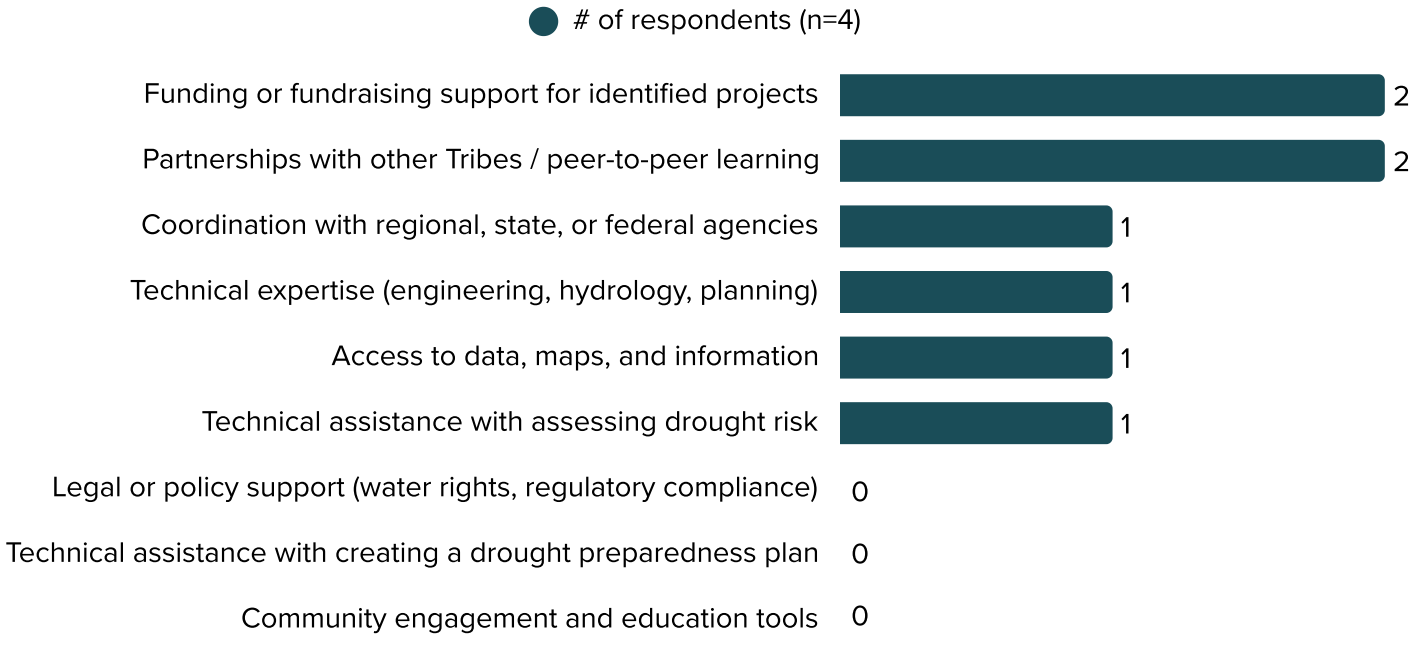
Drought resilience/response plan



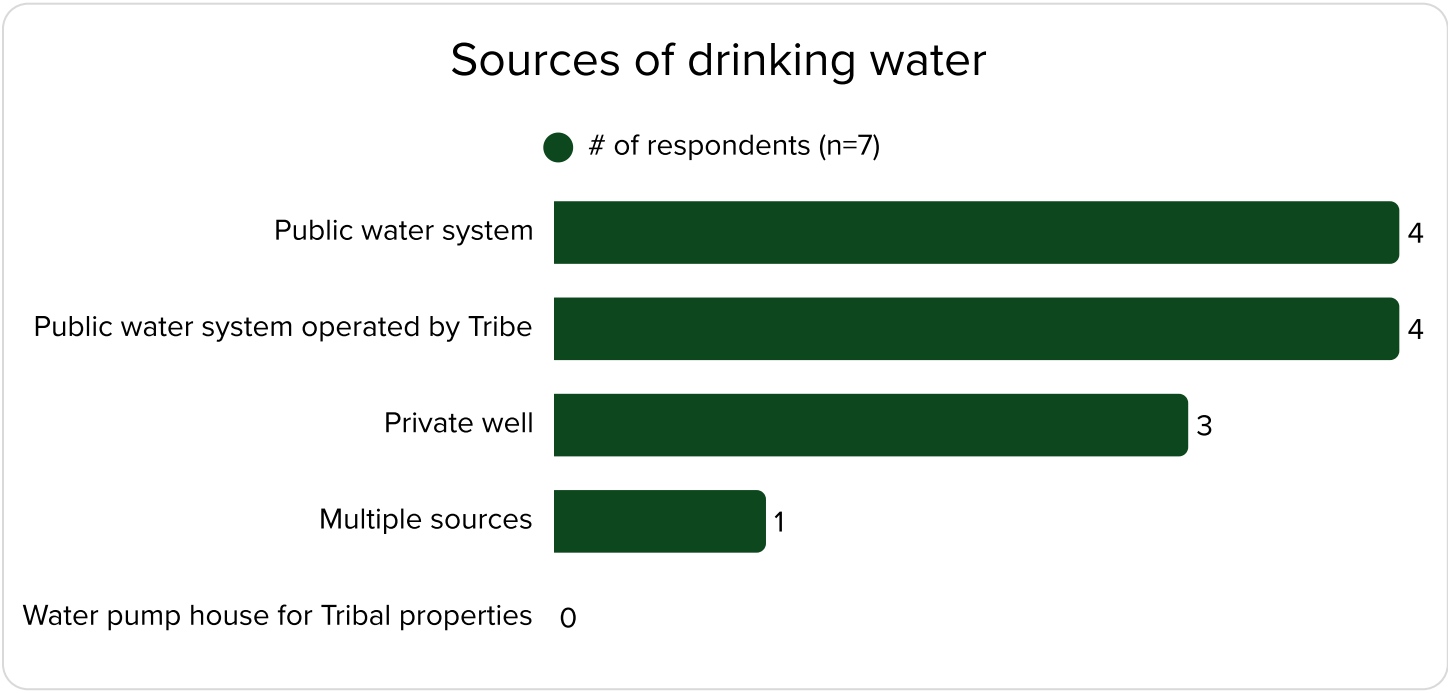
Main barriers in addressing water or drought priorities (select up to 3)

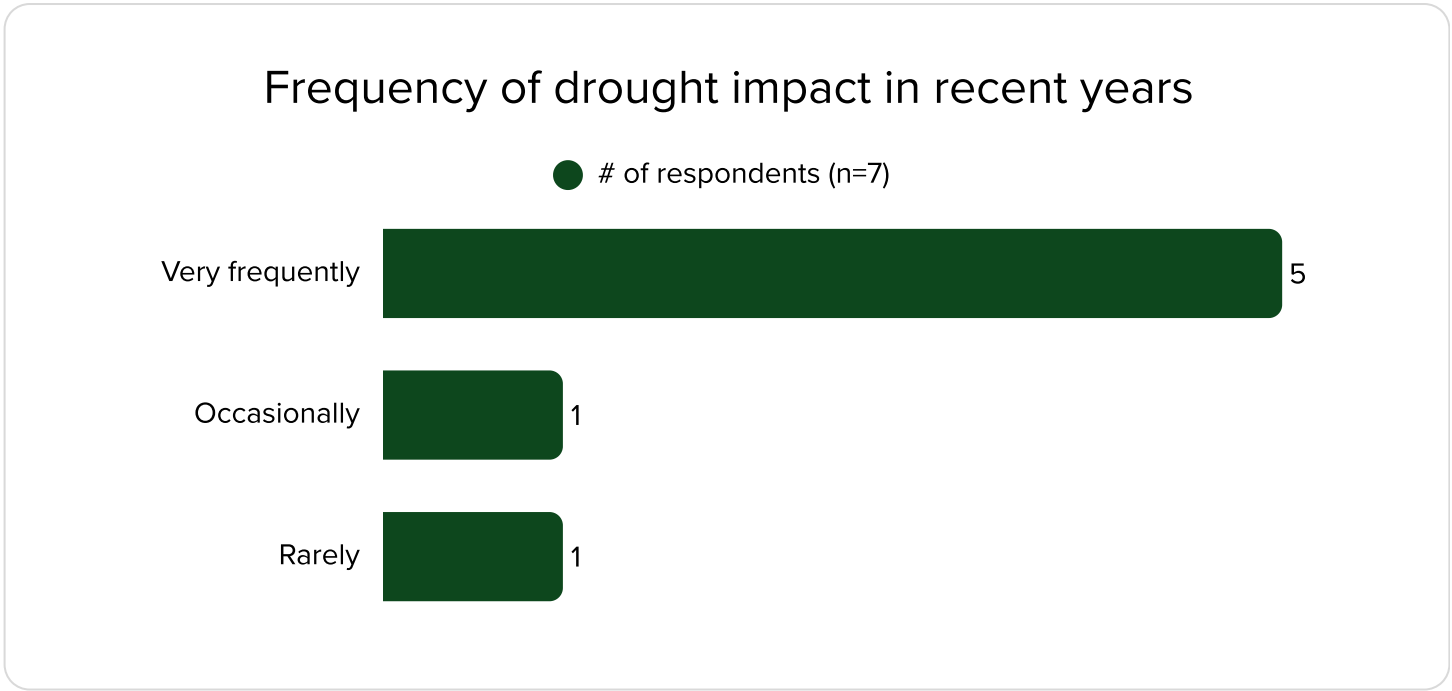


Useful types of support to address water or drought risks (select up to 3)

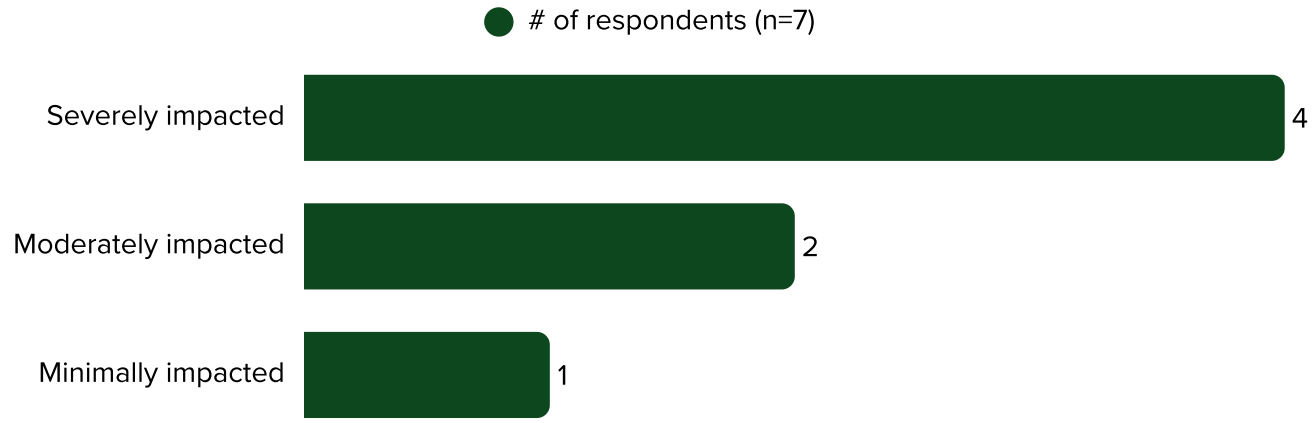


Appendix C: Mendocino County Survey Figures

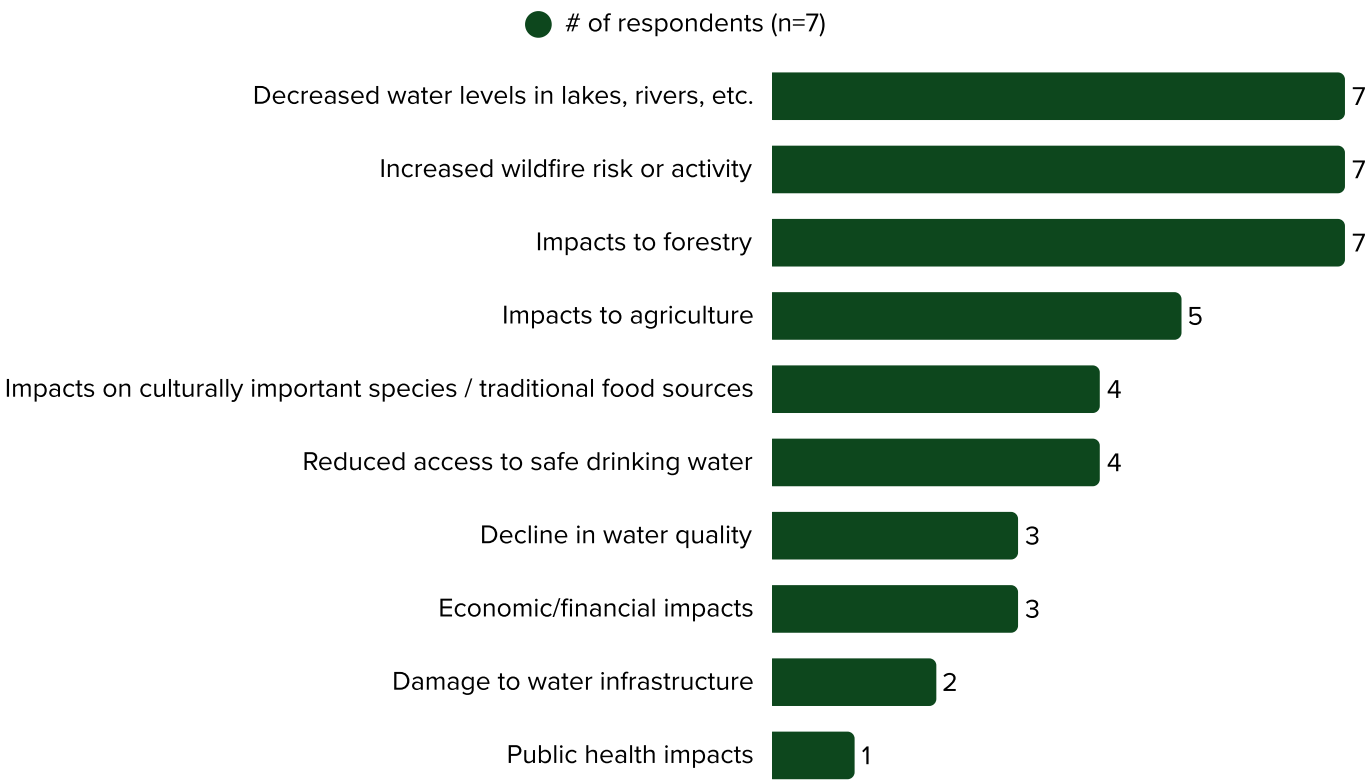




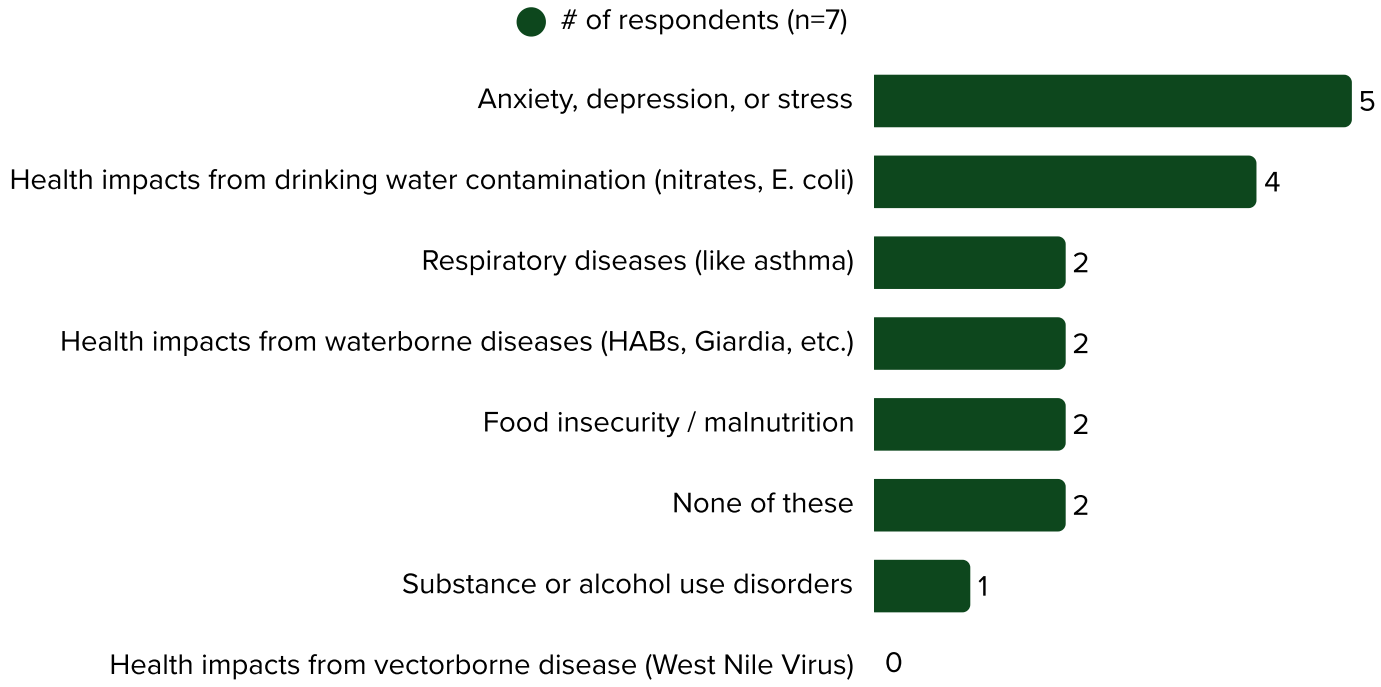
Intensity of drought impact in recent years



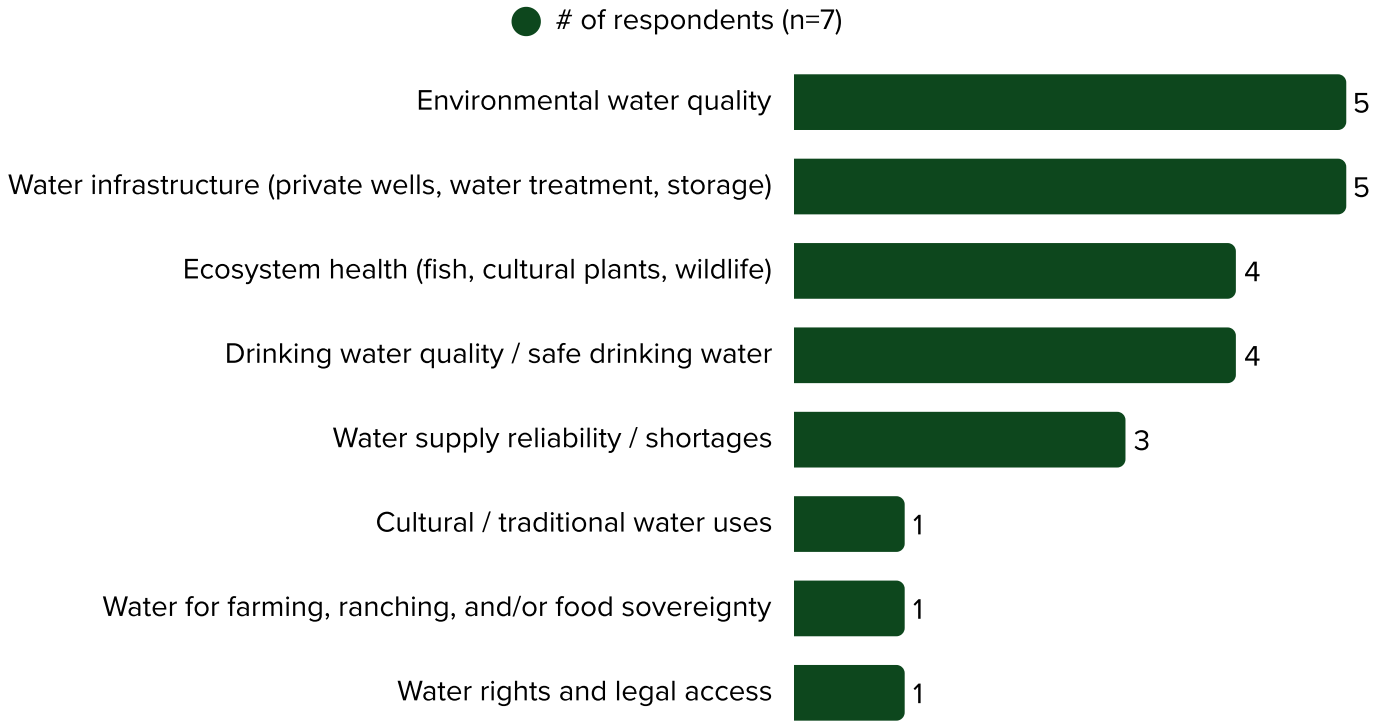
Types of direct impact of drought (choose all that apply)



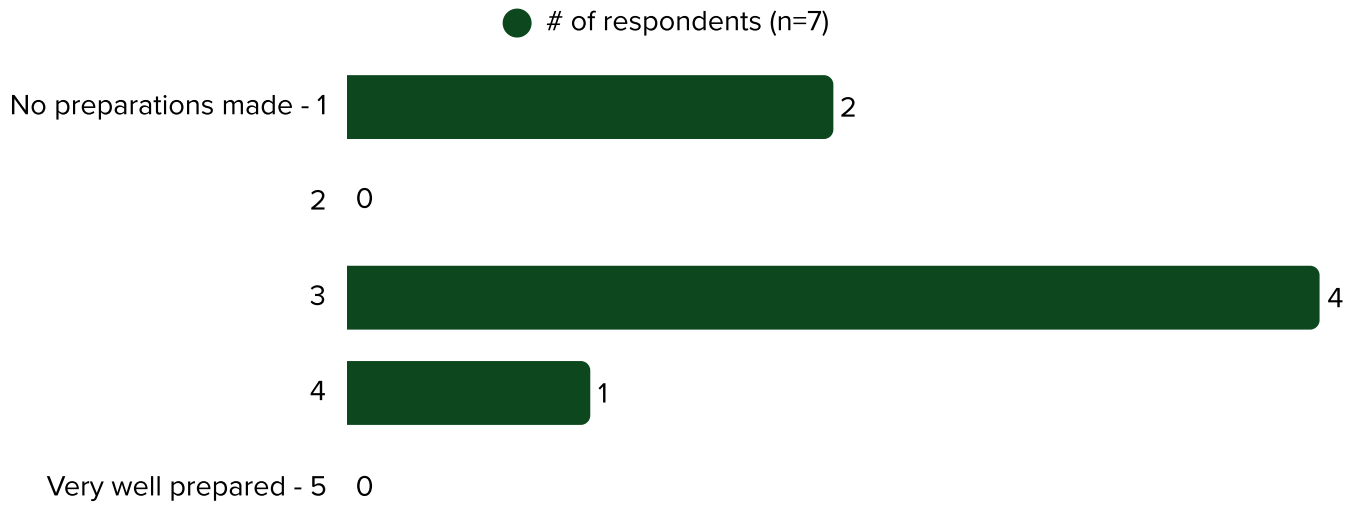
Health conditions caused or worsened by drought (choose all that apply)



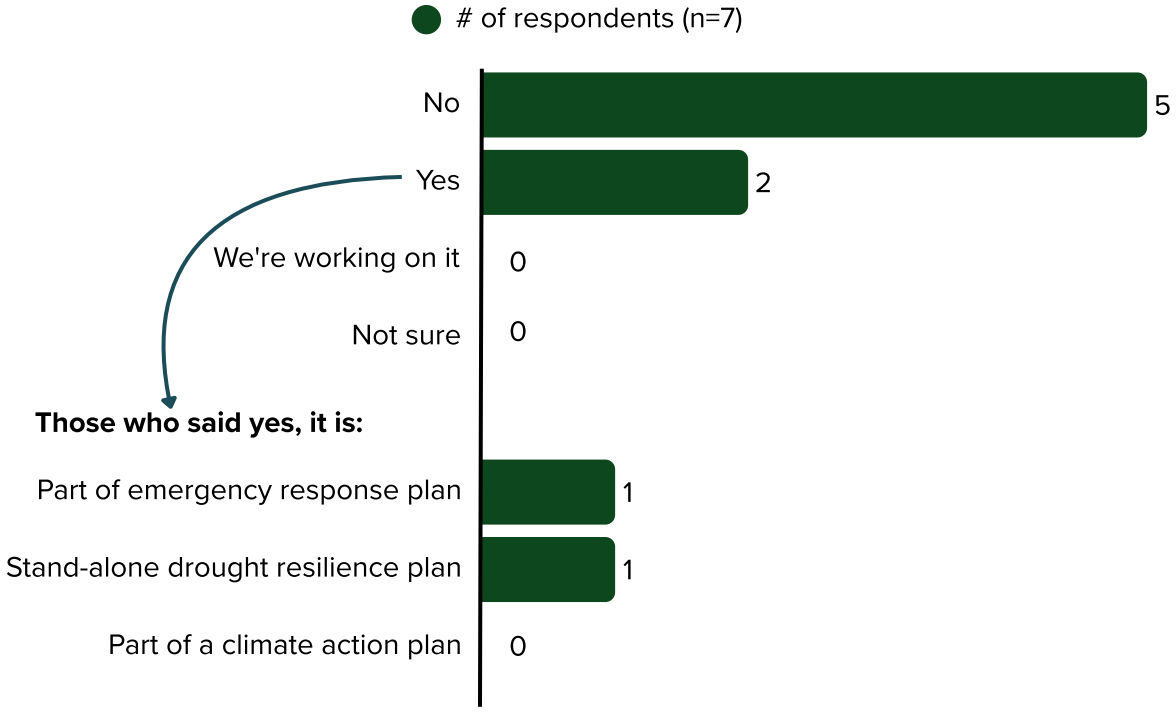
Water-related issues that are highest priorities (select up to 3)



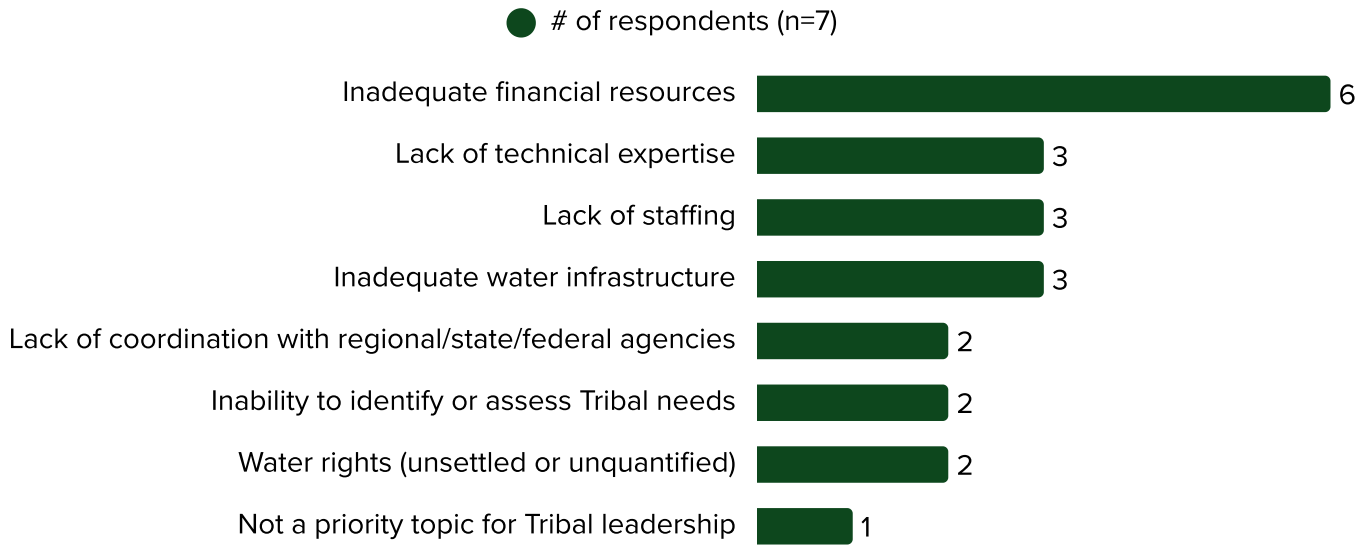
Preparedness to respond to drought emergency (1–5 scale)



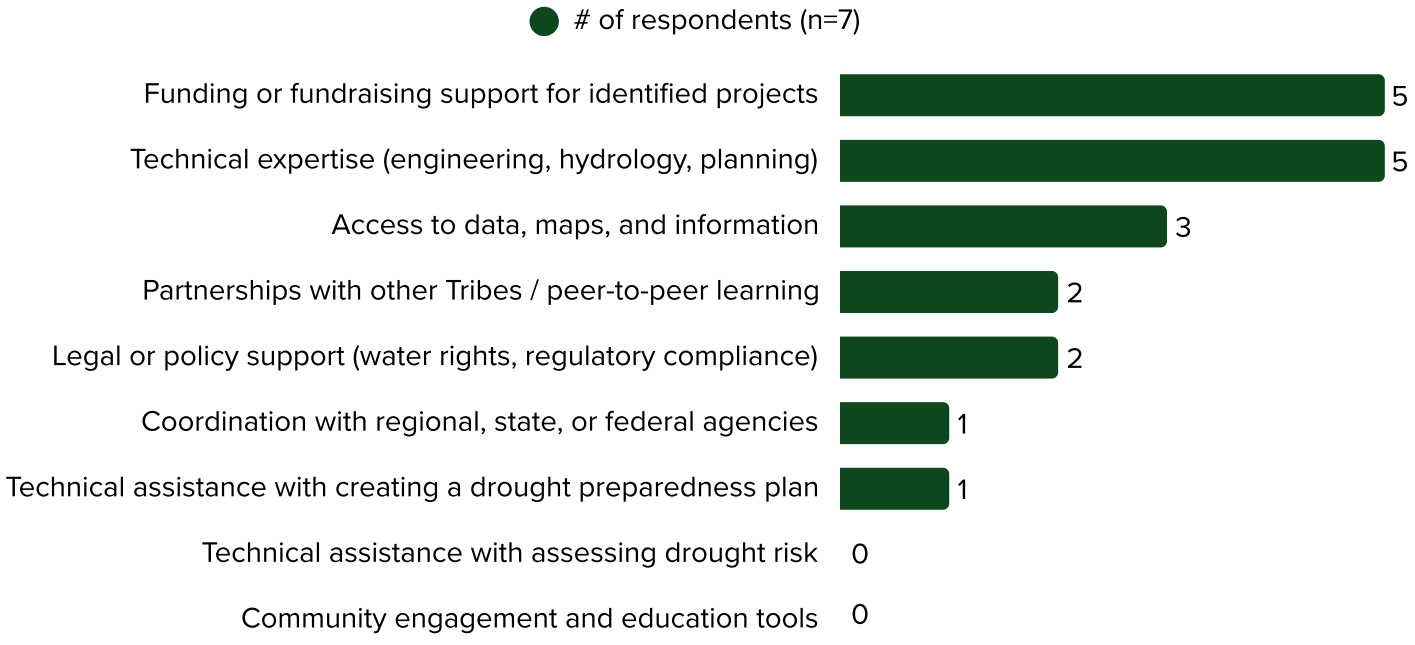
Drought resilience/response plan



Main barriers in addressing water or drought priorities (select up to 3)



Useful types of support to address water or drought risks (select up to 3)



Contact:
Tracking California
trackingcalifornia.org | info@trackingcalifornia.org

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