Cannabis Impacts on Native Lands: On the Need for Inclusion of Native Perspectives in Extension Work

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For submission to the Journal of Extension

Introduction

The U.S. Cooperative Extension system was founded through the expropriation, distribution, and sale of Native lands (Joseph Myers Center 2020; Lee and Ahtone 2020). Yet with the exception of several successful long-term Tribal-University partnerships (see for example Sowerwine et al. 2019; Martenson et al. 2011), Extension services are not adequately reaching Tribal communities. Relevant Extension programming for Tribal communities is limited by a lack of knowledge and funding (Emm and Breazeale 2008). For example, existing programs – such as the USDA-funded Federally Recognized Tribes Extension Programs (FRTEP) (formerly the Extension Indian Reservation Program), the 1994 Tribal Colleges Extension Program (TCEP), and early Tribal Extension programs – reach only 10% of Native populations on reservations (Hiller 2005). Moreover, reservation lands are not the only areas of concern to Native American and American Indian (hereafter "Native") communities. Many contemporary Native communities sustain connections with traditional sacred and historic sites, including village and gravesites, ceremonial sites, gathering and hunting sites, and other landscape features woven into Native identity and practice (Baldy 2013). Hence, Native communities have a vested interest in areas used for agriculture and forestry, including areas outside of Native ownership and control.

The connection between Native communities and sites of cultural practice and identity has recently entered the legal lexicon through the language of "Tribal Cultural Resources" (TCRs) included in California Assembly Bill 52 ("AB 52") . As defined in AB 52, TCRs are "sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a tribe" that are either listed or eligible for listing in local, state, and national registers of historical resources (§21074). Importantly, TCRs are not only objects of historical interest to archeologists, but are also areas and landscape features of contemporary use and significance to Tribes. The prevalence of TCRs throughout rural areas underscores how Native communities are indirectly affected by Extension's services and why they need to be included as partners in this work. The inclusion of Native perspectives in Extension initiatives and programming should be a priority across land-grant institutions.

This article highlights the need for Cooperative Extension to strengthen partnerships with Tribes and include Native perspectives in Extension work, with special attention to agriculture and natural resources. In personal communications, two authors of this study, both Cooperative Extension Specialists at UC Berkeley, learned that Tribes were concerned about the impacts of cannabis cultivation on TCRs. After cannabis production became legalized with the passage of California Proposition 64 in 2016, a Tribal colleague raised concerns about additional potential for adverse impacts on Native communities and the general issue of Tribal sovereignty over the

permitting process of non-tribal cannabis grows on ancestral lands (Leaf Hillman, pers comm, 2018). Another study author was informed about the co-location of cannabis grows within TCRs and ancestral territories in Northern California. Assessing threats to TCRs is especially difficult for land-poor Tribes. These conversations led these two authors to inquire whether other Tribes might be facing similar concerns, what other concerns Tribes have, and whether and how those concerns are being addressed by county and state agencies. Further inquiry demonstrated that rural counties in California are experiencing extensive development in cannabis facilities and infrastructure in areas that are home to a high proportion of Tribal Nations in California. Tribal concerns about unregulated cannabis production on cultural and environmental resources had also appeared in local news outlets (Kemp 2018; Kemp 2022). These factors led the study's authors to propose a project to document cannabis's threats to TCRs – threats that may be new following legalization – and what we can learn from this emergent industry about how TCRs can be better protected.

In Summer 2022, a collaboration between UC Berkeley researchers and a Tribal Advisory Committee, with funding from the California Department of Cannabis Control, surveyed Tribal representatives about their perceptions of cannabis impacts on Tribal territories, Native ancestral homelands, and cultural resources. The survey examined concerns about different cannabis-related activities and perceptions of impacts in terms of social, environmental, and economic indicators. Survey responses varied significantly, suggesting different priorities for the cultivation and adult use of cannabis across Tribal governments and geographic regions and highlighting the importance for local-level engagement in Extension work. The survey found that Tribal governments are generally in favor of the transition from the unregulated to the regulated cannabis market with potential opportunities to either participate in or help regulate, via the consultation process, cannabis production on Tribal ancestral lands. The survey also found that among the different social, environmental, and economic impacts of cannabis cultivation, Tribal governments perceive the strongest impacts with regard to the environment, especially in terms of water quality, access, and availability. Respondents' concern about the impact of cannabis production on the environment and on other cultural resources underscores for Extension's work to address Native concerns across all agricultural and natural resource sectors. Including Native perspectives in land use and management is essential for protecting Tribal Cultural Resources, including the natural environment.

Spatial Analysis of Cannabis Impacts

All of California is Native ancestral land, not just the areas within reservation boundaries. This section visually represents the extent of legal cannabis cultivation in California and the potential for adverse impacts to Tribal ancestral territories.

The first map (Fig. 1) spatially represents Department of Cannabis Control permit data for legal cannabis grows in the state. In Northern California, these grows are concentrated in Humboldt, Trinity, and Mendocino counties (also known as the "Emerald Triangle"), which is recognized as the historic center of illicit and medical cannabis production in the state (Polson 2021). The second map (Fig. 2) shows the same parcel layers, coded for density, from the 1978 "Handbook of North American Indians, Vol. 8." TCRs in these territories are disproportionately impacted by cannabis cultivation. To access remote regions, cannabis cultivators have relied on

the historic corridors of California Indian trails, many of which are culturally significant to Tribes. Additionally, the same factors making an area ideal for cannabis cultivation – such as elevation, slope, aspect, presence of a natural water source – are also suitable for cultural use, indicating that cannabis cultivators have actively selected for TCRs (Steve Lazar, pers comm, 2022; Janet Eidsness, pers comm, 2022). A geospatial analysis of DCC parcel data juxtaposed on Native ancestral land reveals that 27 of 72 distinct ethnolinguistic territories (37.5%) contain at least one permitted cannabis agricultural site, with some territories containing several hundred sites.

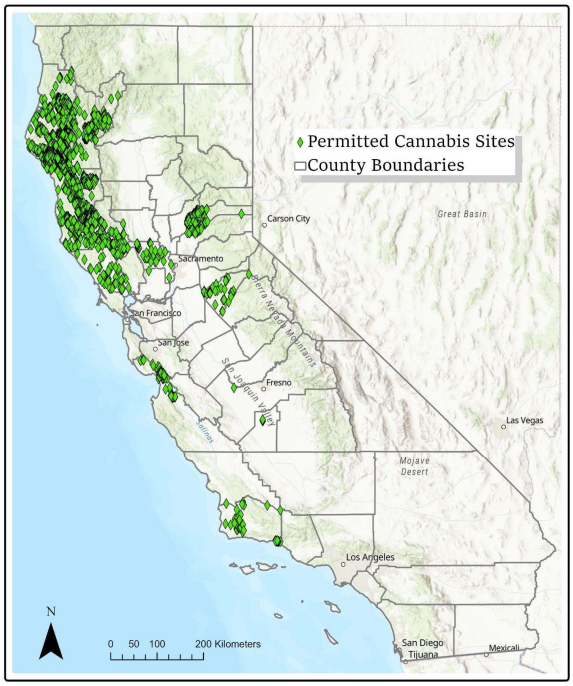


Fig. 1. DCC Parcel Layers

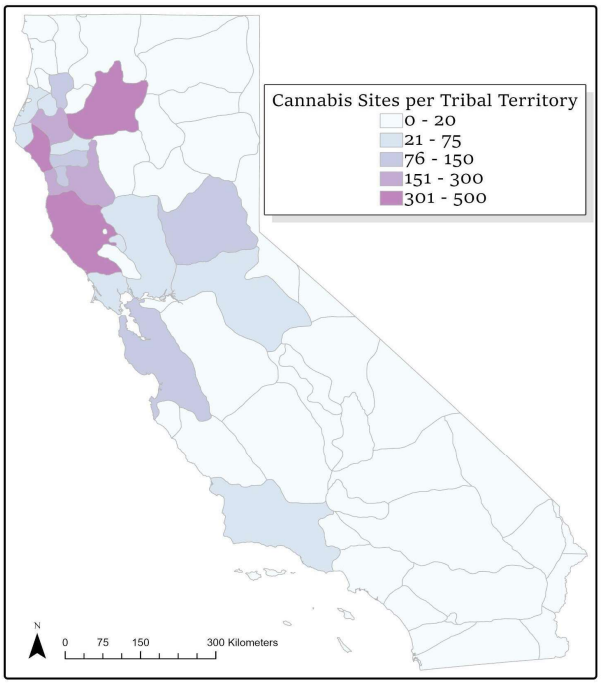


Fig. 2. Density of legal grows on ethnolinguistic map

The map below (Fig. 3) displays the outline of Bear River Band's (BRB) Tribal ancestral territory, which we use with permission of the Bear River Band of the Rohnerville Rancheria, a federally recognized Tribe in Northern California. The red pin and inset map mark the location of Bear River's reservation land. This map clearly demonstrates the extent of ancestral territory beyond reservation lands, and the potential for adverse impacts from cannabis cultivation. Of the 2,670 cannabis cultivation permits issued by the state, 919 permitted cannabis sites or 34% fall within Bear River's ancestral territory, not including any provisional permits currently being processed or any illegal grows.

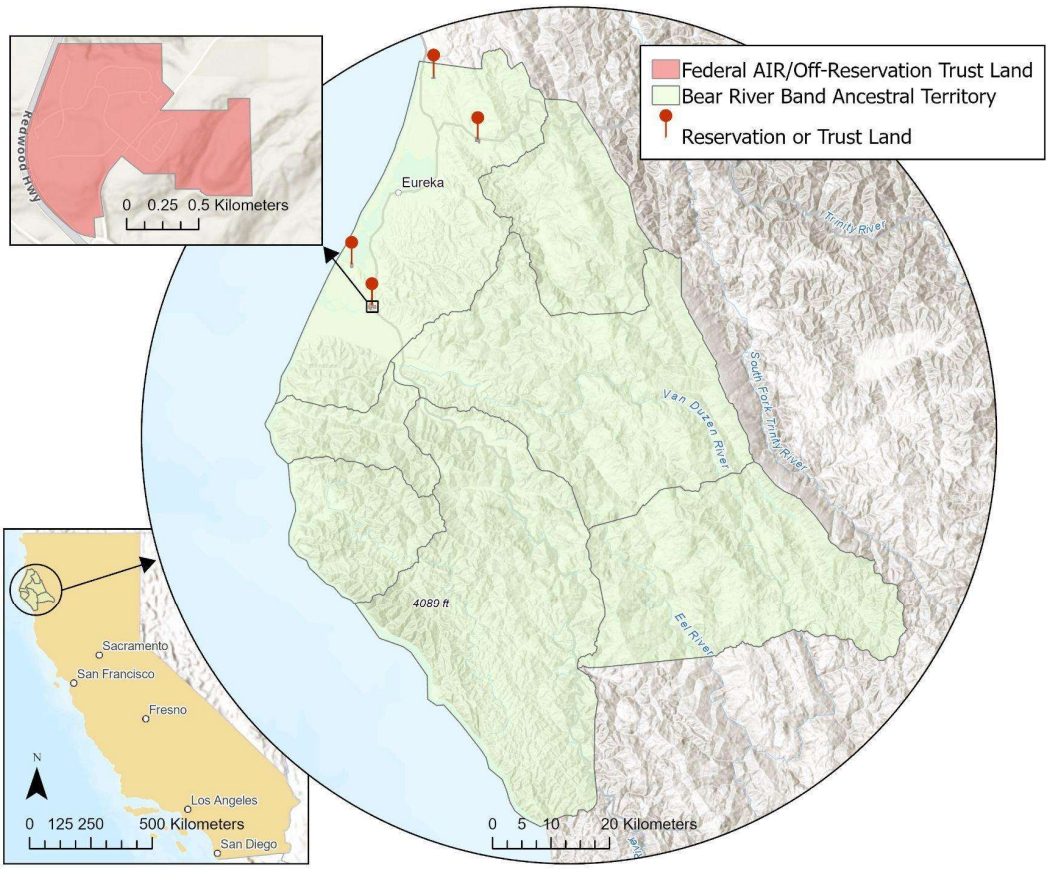


Fig 3. The aboriginal territory of BRB, shown in green on the map, is 7288km^2. The red area is BRB's "Tribal Land," defined by the federal government as reservation or trust land, totaling 0.74km^2. 34% of cannabis grows in California are sited within BRB's aboriginal territory of which BRB owns only 0.0001% under federal law. The other red pins on the map are Trinidad Rancheria, Blue Lake Rancheria, and Table Bluff Reservation.

Methodology

Survey design

Using participatory action research (Adelman 1997) and Indigenous methodologies (Kovach 2021), the UC researchers ("UC") convened a Tribal Advisory Committee ("AC") to co-develop key questions through an iterative series of conversations. The UC team consisted of two cooperative extension specialists, one non-extension faculty person, one post-doc, and one doctoral student. The seven members of the AC included Tribal Historic Preservation Officers (THPOs), a cultural resource specialist, and a Tribal Chair, all of whom have direct experience with the impacts of cannabis on Native lands and cultural resources. Through an iterative series of conversations, UC asked the AC to identify their concerns about cannabis cultivation and

related cannabis activities. The UC aggregated these concerns and developed them into specific survey questions, which they refined and expanded through further discussion with the AC.

The survey asked respondents to report on the prevalence and types of cannabis grows on trust lands (including reservations) and in culturally-affiliated areas. We also asked respondents to state whether their Tribe has an official policy on cannabis cultivation. Then, using Likert-scale questions, we asked respondents to rate their level of concern with regard to different cannabis-related activities, including legal grows, illegal grows, the permitting process, and the ability of Tribes to grow, process, and sell cannabis in the State-regulated market. Finally, we asked respondents to evaluate cannabis impacts to cultural and natural resources, such as water quality, water availability and access, and ecosystems and wildlife, as well as impacts to economic opportunities, housing and cost of living, and community health.

The AC helped to distribute the survey and was involved in making sure that the survey distribution strategy was politically appropriate, for example by directing UC to get authorization from Tribal Chairs for collecting data. Subsequently, UC shared findings with the AC and invited feedback on analysis and contributions to presentation materials and publications.

Survey distribution

The UC team obtained approval from UC Berkeley's Institutional Review Board (Protocol #2021-11-14791) to conduct research with human subjects as well as from the California Regional Indian Health Board (CRIHB, Protocol #2020-003), as requested by UCB's Office for the Protection of Human Subjects. This additional level of review helps to ensure that the research will promote the health and social goals of Native communities in California. After developing the survey, the research team (inclusive of UC and the AC) piloted the survey with members of the AC. The surveys were available online through the Qualtrics survey platform in July 2022.

The research team disseminated the survey in two ways. First, we procured the Native American Heritage Commission (NAHC) Tribal contact list, which includes California Native American Tribes, encompassing both federally recognized and federally unacknowledged Tribes in California. Using this list, we reached out to Tribal Historic Preservation Officers (THPOs), cultural resource specialists, and Tribal Chairs. The THPOs, Tribal Chairs, and other Tribal officials we contacted are well qualified and have the experience to speak to concerns about cannabis impacts since they are responsible parties for the political, cultural, and economic life of their Tribes and are the first point-of-contact for public agencies, including planning offices. Moreover, these Tribal officers are typically authorized to interact and speak on behalf of the Tribe on such official matters as land use issues. Some Tribal research protocols require permission from the Tribal Chair to involve Tribal members in a research study, so we copied Tribal Chairs when contact information was available so they could be aware of our request. Through follow-up emails, we targeted Tribes in regions that have a high density of cannabis cultivation, such as in the Emerald Triangle and in Coastal California between the San Francisco Bay Area and Los Angeles.

Second, we distributed an anonymous survey link through our networks, which included UC's collaborators from previous projects and the AC's professional networks. Since the NAHC

list is incomplete and out-of-date, it is often necessary to rely on personal contacts to reach the appropriate person.

Using the first, individualized dissemination strategy, we sent the survey (and several reminders) to 244 distinct email addresses and received a total of 37 usable responses (a 7% response rate). We do not know how many emails were sent out using the second, snowball method, but we received nine additional survey responses.

Results

Survey Results

Overall, 46 surveys were sufficiently complete for analysis (we eliminated 9 surveys for insufficient data). Since responses to individual questions were optional and some surveys were only partially completed, the number of responses varies between questions.

Tribal identity, federal recognition, and work affiliation

35 out of 46 respondents (76%) identified as Native American and 39 out of 46 respondents (84%) work for a Native American Tribe in California. Of the 39 respondents who work for a Tribe, 31 (79%) work for a Tribe that is federally-recognized and 8 (21%) work for a Tribe that is not federally acknowledged. 25 work in Tribal government, 25 as Tribal staff, 6 as volunteers, 3 as consultants, with many of the respondents working in multiple roles. Several respondents declined to answer.

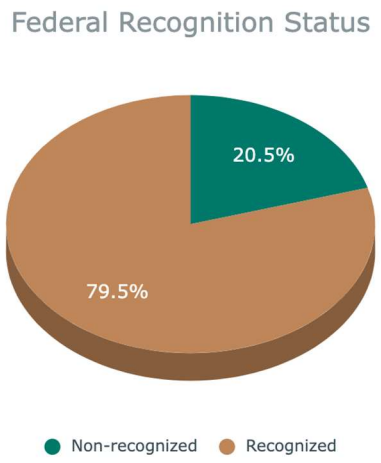


Fig. 4. This represents the breakdown in federal recognition status with which respondents answered the survey.

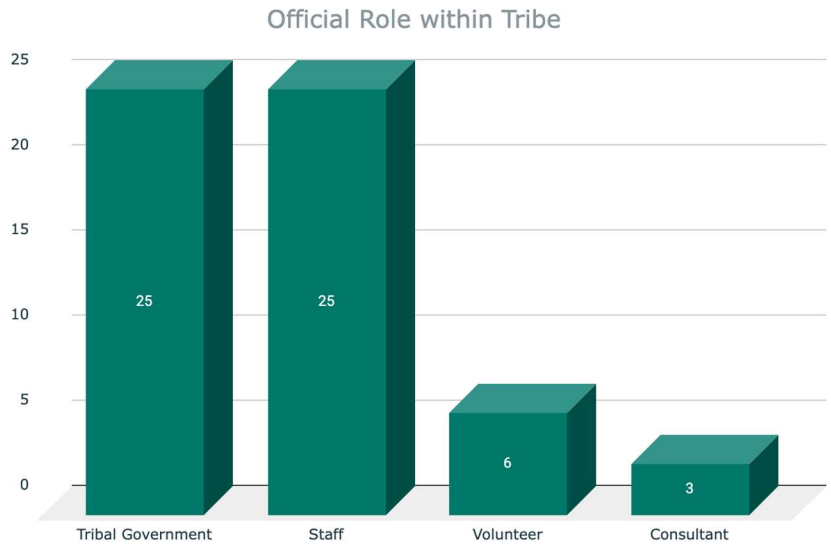


Fig. 5. Official Role within Tribe. Many respondents marked more than one role.

Survey respondents who indicated they were enrolled citizens of a Tribe may have worked for their own Tribe or another Tribe. We asked respondents who are both enrolled citizens and who work for a Tribe to answer the remaining survey questions from the perspective of their official role working for a Tribe. Two participants who did not identify as Native American and do not actively work with a Tribe were routed to the end of the survey. Hence, the following responses come from a maximum of 44 respondents, 9 of which were coded as non-federally recognized based on the Tribe for which they offered a response. Response rates to specific questions will vary.

Legal Status of Cannabis Grows on Native Lands

The first set of questions asked about the legal status of cannabis grows *within* the Tribe's trust or reservation lands, *outside* the exterior boundaries of any trust lands, and whether the Tribe has an official policy on cannabis cultivation.

Legal status of grows on trust lands

Out of 43 respondents reporting on the permitting status of cannabis grows *within* the boundaries of the Tribe's trust or reservation lands, seven (16%) reported that the Tribe has no lands in federal reservation or trust status. This leaves 36 respondents who answered in the context of having federal trust lands. Of those, 21 (58%) reported that there are no cannabis grows on the Tribe's federal trust lands, three (8%) reported permitted grows only, five (14%) reported unpermitted grows only, and two (6%) reported a mix of permitted and unpermitted grows. An additional 5 respondents (14%) were aware of grows but unsure of their status. This question assumes that non-federally recognized Tribes do not have trust or reservation lands.

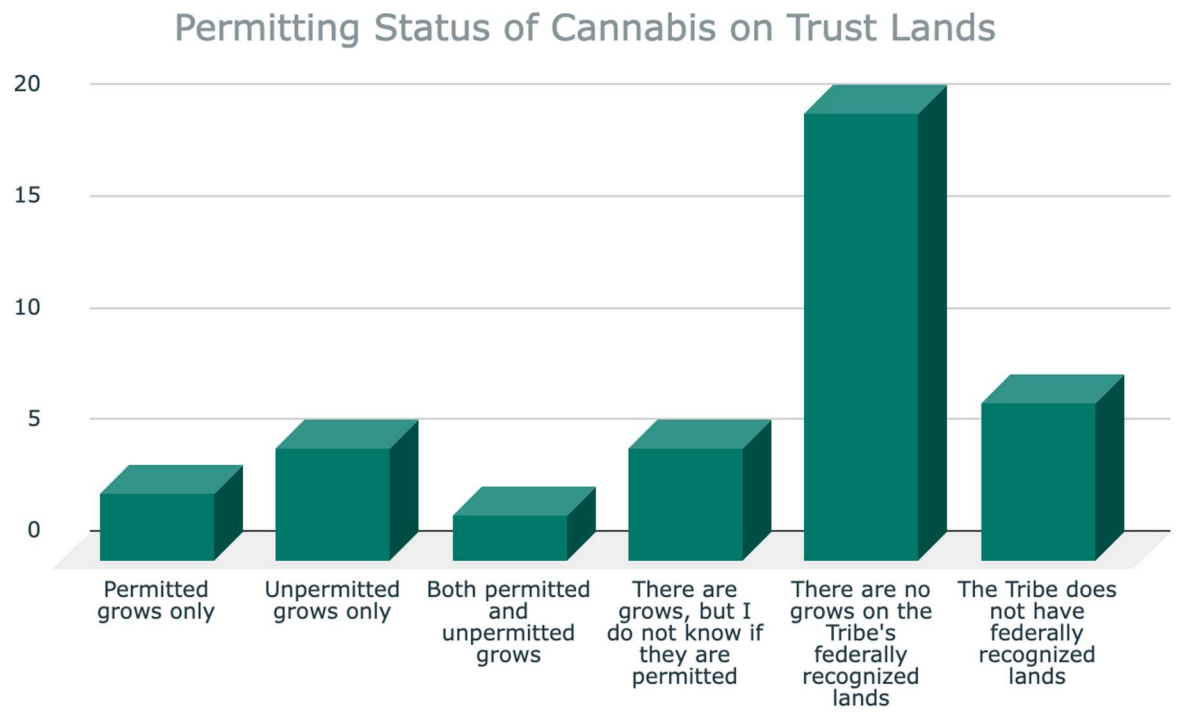


Fig. 6. Permitting Status of Cannabis on Trust Lands. The chart shows that most Trust lands have no cannabis grows.

Legal status of grows outside of trust lands

Out of 44 respondents reported on the permitting status of cannabis grows on culturally affiliated lands *outside* the boundaries of any trust lands. 19 (43%) reported a mix of permitted and unpermitted grows, 14 (32%) were unaware of any grows, five (11%) reported permitted grows only, three (7%) reported unpermitted grows only, and three (7%) were aware of grows but unsure of their status. Of the nine non-federally recognized respondents, five were unaware of any grows, two were aware of both permitted and unpermitted grows, one was aware of permitted grows only, and one was aware of unpermitted grows only.

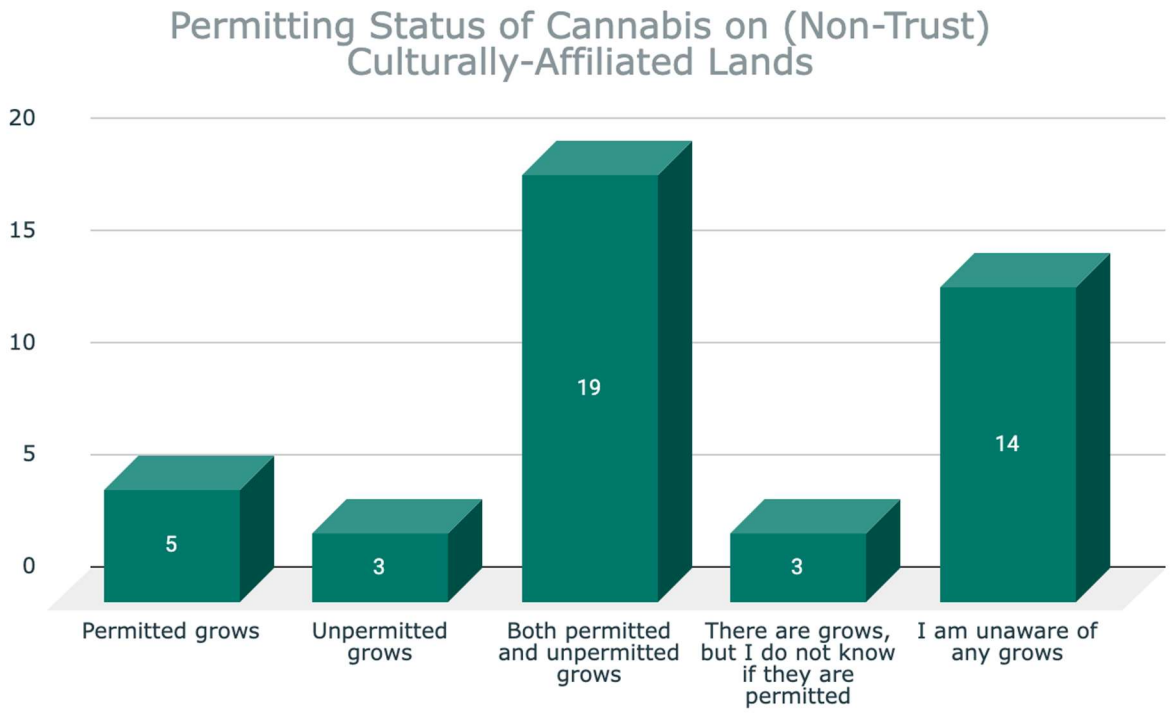


Fig. 7. Permitting Status on (Non-Trust) Culturally-Affiliated Lands.

Tribes with official policy on cannabis cultivation

Out of 43 respondents reporting on whether the Tribe has an official policy on cannabis cultivation on the Tribal lands, only ten Tribes (23%) have an official policy on cannabis cultivation, split between five allowing it and five prohibiting it. Seventeen (40%) do not have an official policy on cannabis cultivation. Seven respondents (16%) were unsure whether the Tribe had a policy and an additional nine (21%) declined to answer. Of the eight non-federally recognized respondents, three declined to answer, two had an official policy prohibiting cannabis cultivation, two did not have an official policy on cannabis cultivation, and one was unsure whether the Tribe had a policy.

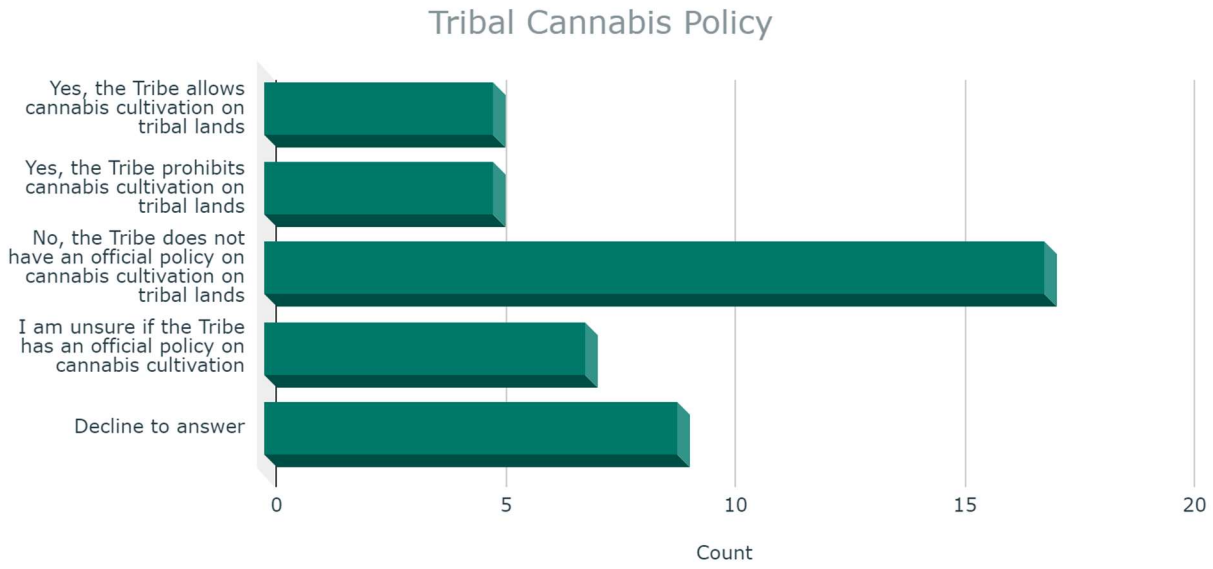
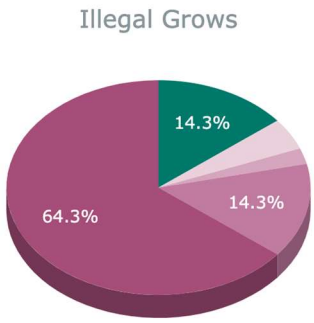
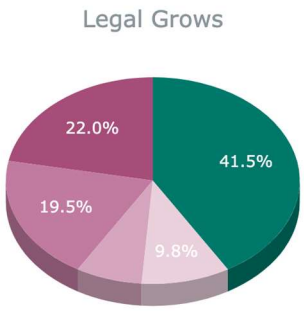


Fig. 8. Tribal Cannabis Policy

Concerns about Cannabis-Related Activities on Tribal lands

The next set of questions asked respondents to evaluate their level of concern with regard to different cannabis-related activities on Tribal lands, including illegal cultivation, legal cultivation, cannabis permitting, and the ability of the Tribe to grow, process, and sell cannabis.





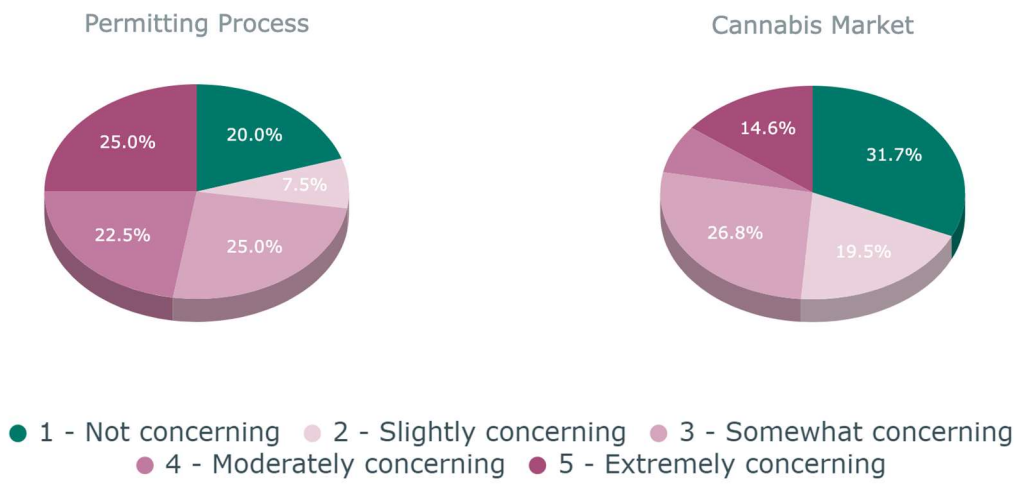


Fig. 9. Concerns about Different Cannabis-Related Activities. Higher levels of extreme concern regarding illegal cannabis indicates that Tribes are in favor of the transition to the legal market. However, the permitting process and the cannabis market were also of high concern to Tribes.

Concerns about illegal grows

Fory-three respondents reported their level of concern with regard to illegal grows. Thirty-six (84%) were concerned about illegal cultivation on Tribal lands, with 27 (63%) “extremely concerned.” Only seven (16%) reported no concern. Non-federally recognized respondents reported similar levels of concern, with 7 of 8 “extremely concerned” and 1 of 8 reporting no concern.

Concerns about legal grows

Forty-two respondents reported their level of concern with regard to legal grows. Twenty-four (57%) were concerned about legal cultivation on Tribal lands, with nine (21%) “extremely concerned,” eight (19%) “moderately concerned,” three (7%) somewhat concerned, and four (10%) only “slightly concerned.” Eighteen (43%) reported no concern. A higher percentage of non-federally recognized respondents reported concern with legal grows, with 2 of 8 “extremely concerned,” 3 of 8 “moderately concerned,” and only 2 of 8 reporting no concern.

Concerns about the cannabis permitting process

41 respondents reported their level of concern with regard to the cannabis permitting process. 32 (78%) were concerned, with 10 (24%) “extremely concerned,” 9 (22%) “moderately concerned,” 10 (24%) “somewhat concerned,” and 3 (7%) only “slightly concerned.” 9 (22%) respondents reported no concern. Non-federally recognized respondents reported similar levels of concern, with 3 of 8 “extremely concerned,” 2 of 8 “moderately concerned, and 2 of 8 reporting no concern.

Concerns about the Tribe’s ability to grow, process, and sell cannabis

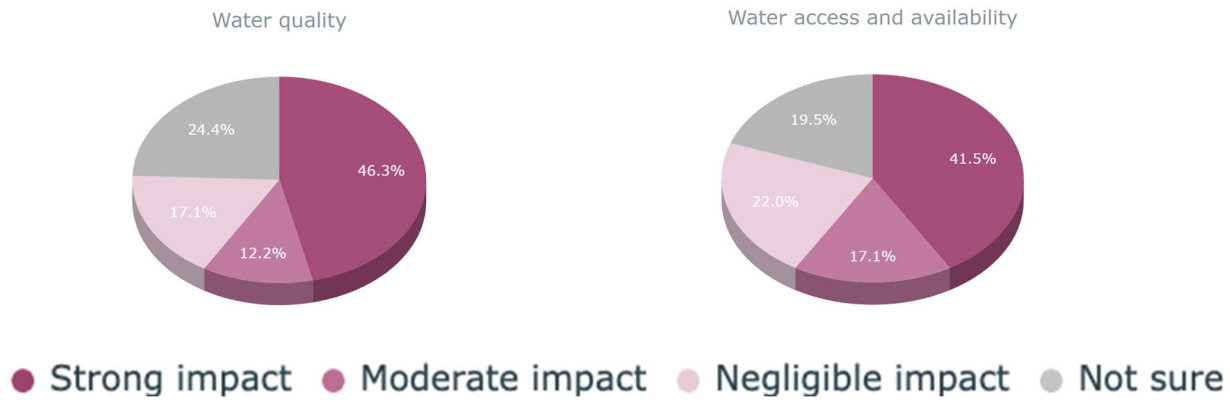
Forty-two respondents reported their level of concern with regard to Tribes’ ability to grow, process, and sell cannabis. Twenty-eight (66%) were concerned, with six (14%) “extremely

concerned," three (7%) "moderately concerned," 11 (26%) "somewhat concerned," and eight (19%) only "slightly concerned. Fourteen (33%) reported no concern. Non-federally recognized respondents reported similar levels of concern, with 4 of 7 concerned to some degree and 3 of 7 reporting no concern.

Short answer descriptions of concerns
Ten respondents wrote in short answers to further explain their concerns, citing water use and water-related concerns (4, or 40%), Tribes' ability to own and operate a marijuana business (2, or 20%), the permitting process (1, or 10%), illegal grow removal (1, or 10%), and drug abuse (1, or 10%).

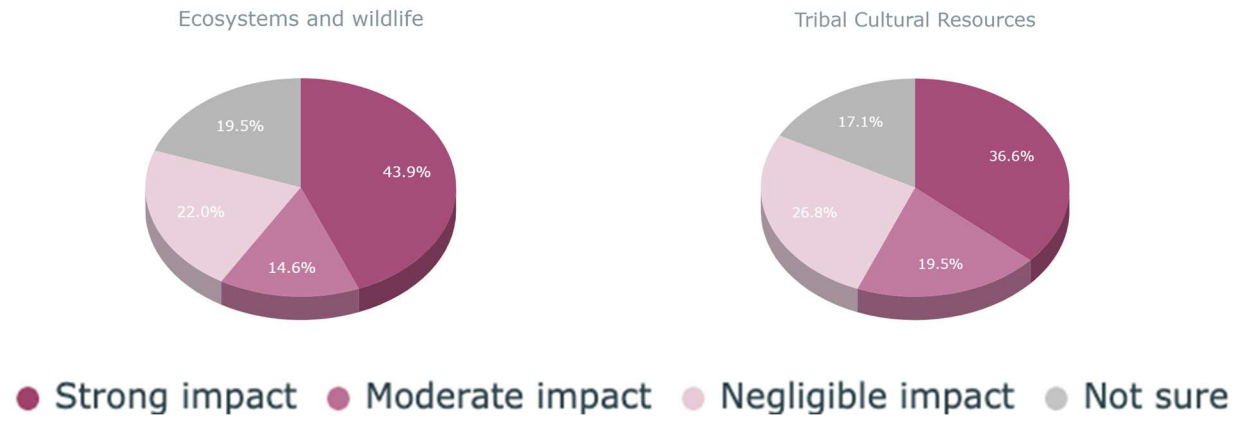
Cannabis Impacts

The next set of questions asked respondents to evaluate the impact of cannabis to different areas of concern, including water access and availability, water quality, ecosystems and wildlife, Tribal Cultural Resources, economic opportunities, community health, and housing/cost of living.



Impacts to water quality
Forty-one respondents reported on impacts to water quality. Twenty-four (59%) reported some level of impact, with 19 (46%) reporting a "strong impact," five (12%) reporting a "moderate impact," and seven (17%) reporting a "negligible impact." An additional ten (24%) were unsure of the impact of cannabis cultivation on water quality. Non-federally recognized respondents reported similar levels of impact, with 4 of 8 reporting a "strong impact," 1 of 8 reporting a "moderate impact," 1 of 8 reporting a "negligible impact," and 2 of 8 unsure of the impact.

Impacts to water access and availability
Forty-one respondents reported on impacts to water access and availability. Twenty-four (59%) reported some level of impact, with 17 (41%) reporting a "strong impact," seven (17%) reporting a "moderate impact," and nine (22%) reporting a "negligible impact." An additional eight (20%) were unsure of the impact of cannabis cultivation on water access and availability. Non-federally recognized respondents reported similar levels of impact, with 5 of 8 reporting a "strong impact" and only 1 of 8 reporting a "negligible impact."

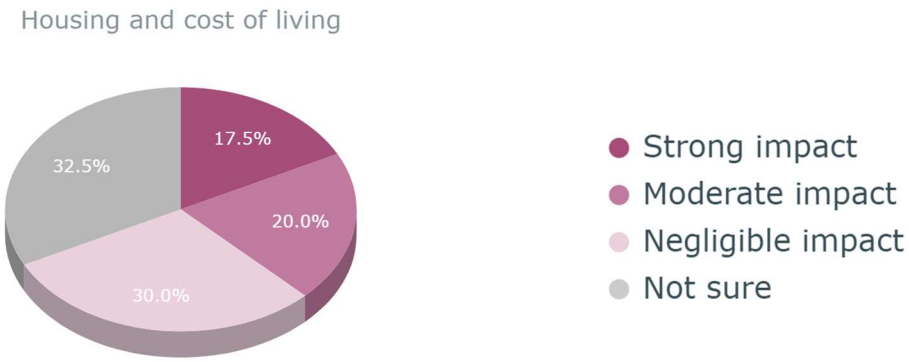


Impacts to ecosystems and wildlife

Forty-one respondents reported on impacts to ecosystems and wildlife. Twenty-four (59%) reported some level of impact, with 18 (44%) reporting a “strong impact,” six (15%) reporting a “moderate impact,” and nine (22%) reporting a “negligible impact.” An additional eight (20%) were unsure of the impact of cannabis cultivation on water access and availability. Non-federally recognized respondents reported similar levels of impact, with 5 of 8 reporting a “strong impact,” 1 of 8 reporting a “moderate impact,” 1 of 8 reporting a “negligible impact,” and 1 of 8 unsure of the impact.

Impacts to Tribal Cultural Resources

Forty-one respondents reported on impacts to Tribal Cultural Resources. Twenty-three (56%) reported some level of impact, with 15 (37%) reporting a “strong impact,” eight (20%) reporting a “moderate impact,” and 11 (27%) reporting a “negligible impact.” An additional seven (17%) were unsure of the impact of cannabis cultivation on Tribal Cultural Resources. A higher percentage of non-federally recognized respondents reported impacts to Tribal Cultural Resources, with 4 of 8 reporting a “strong impact,” 2 of 8 reporting a “moderate impact,” and only 1 of 8 reporting a “negligible impact” (1 of 8 was unsure about impact).



Impacts to economic opportunities
Forty respondents reported on impacts to economic opportunities. Twenty-two (55%) reported that cannabis was impacting economic opportunities, with 11 (28%) reporting a “strong impact,” 11 (28%) reporting a “moderate impact,” and six (15%) reporting a “negligible impact.” An additional 12 (30%) were unsure of the impact of cannabis cultivation on economic opportunities. A lower percentage of non-federally recognized respondents reported impacts to economic opportunities, with only 1 of 8 reporting a “strong impact,” 3 of 8 reporting a “moderate impact,” and 2 of 8 reporting a “negligible impact” (2 of 8 were unsure about impact).

Impacts to community health
Forty-one respondents reported on impacts to community health. Twenty-two (54%) reported that cannabis was impacting community health, with 11 (27%) reporting a “strong impact,” 11 (27%) reporting a “moderate impact,” and eight (20%) reporting a “negligible impact.” An additional 11 (27%) were unsure of the impact of cannabis cultivation on community health. A higher percentage of non-federally recognized respondents reported impacts to community health, with 4 of 8 reporting a “strong impact,” 1 of 8 reporting a “moderate impact,” 1 of 8 reporting a “negligible impact,” and 2 of 8 unsure about impact.

Impacts to housing and cost of living
Forty respondents reported on impacts to housing and cost of living. Fifteen respondents (38%) reported that cannabis was impacting housing and cost of living, with 7 (18%) reporting a “strong impact,” 8 (20%) reporting a “moderate impact,” and 12 (30%) reporting a “negligible impact.” An additional 13 (33%) were unsure of the impact of cannabis cultivation on housing and cost of living. Non-federally recognized respondents reported similar levels of impact, with 1 of 7 reporting a “strong impact,” 1 of 7 reporting a “moderate impact,” 2 of 7 reporting a “negligible impact,” and 3 of 7 unsure of the impact.

Short answer descriptions of impacts
N=9. Of the nine respondents who wrote in short answers explaining the impacts above, over half (5, or 56%) focused on impacts to water quality. For example, one respondent wrote: “The

[river] which runs through the reservation began experiencing cyanotoxins in the flow and it is related to permitted grows and fertilizers. This is a danger to drinking water and swimming." Another respondent wrote: "The areas affiliated with the Tribe have illegal grows that are damaging to water supply and utilize water in drought-ridden areas. They have a negative impact on wildlife and plant habitat, especially the illegal grows on forestry land." Two respondents were concerned about fish habitat in particular: "The Environmental and Natural Resources Department has concerns regarding impacts on fish habitat as well as habitat of other organisms." "We are working to return Chinook to rivers above the [dam] and to make sure Chinook have good cold water all the way to the ocean. Current dumping of pesticides in the rivers and the illegal dumping of agricultural pesticides." These responses demonstrate that Tribes are concerned about permitted and unpermitted grows, reservation and off-reservation lands, and human as well as non-human outcomes. Three respondents (33%) cited impacts from illegal grows specifically, with one reporting that "the response to remove these illegal operations can be physically more damaging than the creation of the operation." Finally, one respondent noted a possible positive impact of legal cannabis, which is that it could create jobs, and another respondent reported that Tribal cannabis operations "meet or exceed California [environmental] regulations."

Discussion

Over 50% of survey respondents reported that cannabis is impacting water quality, water access and availability, ecosystems and wildlife, Tribal Cultural Resources, economic opportunities, and community health. These impacts were rated strongest with regard to natural and cultural resources, with respondents reporting "strong" impacts to water quality (46%), ecosystems and wildlife (44%), water access and availability (41%), and Tribal Cultural Resources (37%). Fewer respondents reported strong impacts with regard to social and economic indicators, although the higher rate of respondents who were unsure for these indicators (between 27% and 33%) suggests that this is because these impacts are more diffuse and harder to measure. However, reports of "strong" impacts to economic opportunities (28%), community health (27%), and housing and cost of living (18%) are nevertheless significant.

Since not all Tribes are actively measuring cannabis impacts in quantitative terms, we believe that reports on impacts may also be indicative of overall community concern. A final point worth noting is that, as one respondent wrote, some Tribes do not hold a distinction between natural and cultural resources. Hence, for some Tribes, TCRs encompass water, ecosystems, and wildlife. We view this as a limitation of our survey results.

A significant number of respondents (40%) indicated that their Tribe does not have an official policy on cannabis cultivation. As the data above show, however, not having a cannabis policy does not necessarily mean that a Tribe lacks interest in cannabis. With many Tribal lands held in trust by the federal government and cannabis federally classified as a Schedule 1 illicit substance, the 21% of respondents who declined to answer this question (3 of 8, or 38% among federally non-recognized Tribes) may indicate a general reluctance to take a public position on cannabis. The ten respondents who reported having an official policy on cannabis cultivation, meanwhile, were split 50-50 with regard to whether their policy allows or prohibits cultivation.

This split demonstrates that Tribal governments have different perspectives on the cultivation, use, and sale of cannabis, based on distinct historical experiences with and future aspirations for the crop.

Understanding where Tribal representatives see the strongest cannabis impacts helps to explain their levels of concern regarding different cannabis-related activities, including legal cultivation, illegal cultivation, the permitting process, and the state cannabis market. Eighty-four percent of respondents reported some level of concern about illegal cultivation, with 63% "extremely concerned." By comparison, 57% reported some level of concern about legal cultivation, with 21% "extremely concerned." The data suggest that many Tribal representatives view cannabis cultivation as a significant problem, independent of its legal status. Higher levels of concern regarding illegal cultivation, however, indicates that Tribal representatives are generally in favor of transitioning cannabis cultivation to the legal market, possibly because the impacts of legal cannabis can be more easily regulated. Some illicit cultivators target trust lands for cultivation since Tribal sovereign status can mean that there is less enforcement in these areas (Patricia Rabano, pers comm., 2022). We note further that the cannabis regulatory system is itself a concern to Tribal representatives. Seventy-eight percent of survey respondents reported some level of concern about the cannabis permitting process, with 24% "extremely concerned," and 66% of respondents reported some level of concern with the ability of Tribes to grow, process, and sell cannabis, which they are currently prevented from doing on lands held in trust because of state and federal regulations.

Additionally, there is ambiguity in terms of what survey respondents are specifically concerned *about*. Concerns about legal cultivation may relate to or overlap with concerns about Tribal consultation (or lack thereof) in the cannabis permitting process, Tribal participation in the cannabis market, or something else. The ten respondents who wrote in short answers to further explain their concerns cited water use and water-related impacts (40%) and Tribal cannabis businesses (20%).

We want to highlight that concerns about cannabis impacts and regulatory means to mitigate those impacts are not constrained to reservation and fee lands. Of the 36 respondents with lands held in trust, 21 (or 58%) reported that there is no cannabis cultivation on those lands. Meanwhile, 30 of 44 (or 68%) reported cannabis cultivation of some kind on culturally-affiliated lands outside of the exterior boundaries of trust lands. This finding helps to contextualize reports on concerns and impacts by showing that Tribes are likely tracking the presence of cannabis and its impacts on culturally-affiliated lands, even when those lands are off-reservation. This alone demonstrates the presence and cultural importance of Tribal Cultural Resources outside of Tribal ownership and control, and therefore the real presence of Tribal interests in cannabis cultivation as well as other agricultural and commercial development throughout California.

Our findings indicate that Tribal representatives are primarily concerned about impacts to water systems, ecosystems and wildlife, Tribal cultural resources and community health. This may explain why they tend to be in favor of transitions to the legal market where cannabis cultivation is subject to regulatory control, although we have seen that regulation itself is an area of concern, specifically with regard to the cannabis permitting process and Tribes' ability to participate in the regulated market. Of special significance to Cooperative Extension, concerns about cannabis and perceptions of its impacts by Tribal representatives is not limited to what

happens on lands held in trust: since only 15 of 36 survey respondents (41%) were aware of cannabis cultivation on trust lands, as compared to 30 of 44 (68%) when it comes to culturally-affiliated lands outside of trust lands, the data on impacts and other concerns more strongly relate to non-reservation ancestral lands.

Conclusion

While Native communities in California, many of which are in rural areas, express concern about social and economic well-being with regard to cannabis impacts, the highest level of concern is reserved for impacts to the environment, which many Tribes view as intrinsically related to TCRs (eg. lands, waters, wildlife). This high level of concern about environmental impacts on Tribal cultural resources, whether on or outside of reservation lands, suggests that Tribes have a real interest in land use activities across the agricultural and natural resource sectors that may impact TCRs. Thus, the role of Cooperative Extension in understanding and addressing their concerns is paramount.

Extension should increase investments in partnering with local Native communities to ensure that Tribal concerns and priorities around agricultural and natural resource activities within Tribal ancestral lands (both on and beyond reservation lands), are adequately addressed. This is particularly important given the moral imperative for Land Grant institutions to address their historical origins of being founded on expropriated Indigenous lands. These partnerships could include Tribal advisory boards that oversee Extension activities, increasing transparency and accountability to Native communities through Tribal IRB and data sovereignty processes, ensuring appropriate policies and guidelines are in place for appropriate consultation with Tribes when engaging in new agriculture and natural resource projects that may impact TCRs, and direct funding and programming for Extension work in Native communities. Extension can also benefit from these partnerships by learning culturally appropriate ways of stewarding farmland and ecosystems, rooted in Traditional Ecological Knowledge, that affirm tribal sovereignty and contribute to agroecological resilience. Eco-cultural revitalization efforts within Native communities has led to a resurgence of cultural burns, dry farming, and other traditional land-tending practices and forms of regenerative agriculture that may be key to transitioning agriculture and natural resource sectors to low-emissions and low-impact farming and management, while enhancing Tribal food security and food sovereignty (Mucioki et al. 2021). Our study reveals that Native communities sustain connections with their ancestral lands beyond their reservation boundaries and maintain local knowledge about those environments and the risks associated with cannabis cultivation. Including Native perspectives in Extension work can help alleviate the risks associated with all types of land use activity on Tribal cultural resources, and affirm tribal sovereignty over their ancestral lands and resources.

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