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**Makah Traditional Knowledge and Cultural Resource Assessment:
A Preliminary Framework to Utilize Traditional Knowledge into Climate Change Planning**

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Abstract

Since time immemorial, *Qʷidiččaʔa-tx̣*, or the Makah Tribe, have lived on the Northwest Olympic Peninsula in what is currently Washington State. Climate change has already impacted the Makah Tribe and will continue to do so in the future. Our history, archaeological archives, stories, and knowledge have proven that the Makah Tribe has an extensive history of adapting to changing climates. Traditional, cultural, and Indigenous knowledges can play an important role in climate adaptation planning, and for Tribes and Indigenous peoples, it can be a crucial component in ensuring that planning strategies and outcomes are culturally-appropriate and aligned with community values. The Makah Climate Change Workgroup, an internal workgroup of the Makah Tribe, has begun a Makah Traditional Knowledge and Cultural Resource Assessment to complement and inform our Makah Climate Impacts Assessment and Makah Climate Adaptation Plan. In this paper, we outline our preliminary framework demonstrating how Tribes and Indigenous groups can utilize Traditional and Indigenous knowledges within

their own planning processes in the following ways: 1) provide historical baselines and fill in gaps in monitoring data; 2) identify cultural resources that are vulnerable to future climate change; 3) identify potential climate adaptation and mitigation strategies; and 4) to engage the community on climate change impacts.

Keywords

Climate adaptation, Traditional Knowledge, Cultural resources, Community-based process, Climate change planning

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Makah Traditional Knowledge and Cultural Resource Assessment:
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1. Introduction

For many Indigenous communities, culture and nature are synonymous. Place-based Indigenous communities are often dependent on natural resources. Ensuring that cultural and natural resources are present for future generations is critical for many Indigenous cultures and economies to survive (Wildcat 2013; Donatuto et al. 2016; Chisholm Hatfield et al. 2018). There is broad scientific consensus that anthropogenic climate change is occurring at unprecedented rates (Pachauri and Meyer 2014) and has already disproportionately impacted Indigenous communities across the world (Wildcat 2013; Bennett et al. 2014; Norton-Smith et al. 2016). Climate change has led to the loss of traditional homelands, livelihoods, and customs for Indigenous peoples. Though the act of adapting to environmental changes is not new for Indigenous peoples, attempting to frame climate science and climate adaptation from an indigenous perspective have been steadily building momentum (Gómez-Baggethun et al. 2013). Utilizing Traditional and Indigenous knowledges strengthens an Indigenous community's self-determination through inclusive, informed, respectful, and culturally-relevant planning (Walker et al. 2013, Prusak et al. 2016, Whyte 2017). Within this paper, we outline current examples of how Traditional Knowledge or Traditional Ecological Knowledge has been incorporated into conservation, management, and climate change adaptation. We then highlight examples from our own Makah community-led process of incorporating Makah Traditional and cultural knowledge into our climate change planning process to increase our community's resilience to future climate conditions. For the Makah Tribe, utilizing its traditional and local knowledge is simultaneously leveraging its unique place-based culture and history for climate change planning and adaptation in order to continue preserving its culture and relationship with the land and ocean for future generations.

2. *The Makah Tribe context*

Qʷidiččaʔa-tx̣, or the Makah Tribe, is a U.S. federally-recognized Tribe and is indigenous to the Cape Flattery Region on the West Coast of Washington State of the United States. Since time immemorial the Makah people and culture have been dependent on harvesting resources from the ocean and the land. The Makah Indian Reservation is currently located at the northwestern tip of the Olympic Peninsula of Washington State and encompasses a land area of 47 square miles and includes Tatoosh and Wa'adah Island. The Washington Coast is a highly productive ecosystem that has sustained the Makah people for thousands of years. Currently, there are 2,850 enrolled members of the Makah Tribe. A total of 1,463 people lives on the Makah Reservation, including 1,168 Makah tribal members (Chang et al. 2018). Climate change has already impacted the Makah Tribe's natural resource economy, culture, and infrastructure (Chang et al. 2018). The Makah Climate Change Workgroup (MCCWG) is an internal Makah cross-departmental planning team that was formed in 2015 at the direction of the Makah Tribal Council, the Tribe's governing body.

3. *Ethics and definitions of Traditional and Indigenous Knowledge systems*

Ethical considerations of the use of Traditional Knowledge (TK) in climate adaptation is essential for any community-based, Indigenous planning and research. In this paper, we adopted the IPCC's 4th Assessment Glossary definition of "Planned Adaptation", identifying actions that are "the result of a deliberate policy decision, based on an awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve a desired state" (IPCC 2007). Although the term "climate change adaptation" has been criticized by various Indigenous communities for being a colonial framework associated with the forced adaptation or assimilation of Indigenous peoples (Golden et al. 2014), this sentiment has not come up for the MCCWG.

The study of "traditional ecological knowledge" (TEK) emerged from the fields of ecological anthropology and ethnobiology and was sometimes used in an extractive and neo-colonial means against non-native peoples (Berkes et al. 2000; ISE 2006). This led to the evolution of the terms

Traditional Knowledge (TK), Indigenous Knowledge, and numerous variations thereof, as well as an increased emphasis on decolonized methodologies of using TK that empower Indigenous peoples, rather than reinforce colonial power imbalances. Increasingly, collaborations involving the sharing of TK are founded on the concepts of free, prior, and informed consent and intellectual property rights of the Indigenous communities and individuals sharing TK (UNDRIP 2008). Other approaches to reducing these inherent ethical challenges of TK-Western science (WS) collaborations include: emphasizing a broader acceptance of different types of knowledge systems, ontologies, and epistemologies and their methods of transmission; directly addressing how scientific research is an extension of colonialism; and gathering TK through mutually agreed upon methods and frameworks (Gadamus et al. 2015).

For the MCCWG, the use of TK is unique in that the process in its entirety, as well as the approach to collecting and compiling information, is owned, directed, and approved by the Makah Tribe itself. The inter-departmental MCCWG and the Makah Cultural Research Center (MCRC) work collaboratively to ensure that TK is used appropriately and ethically.

For the purpose of this paper, we adopt the definition of Traditional Knowledge presented in Pearce et al. (2015, 235):

TK or TEK is built on personal experience and interaction with peers, including people from other communities (Huntington 1998; Berkes 1999) and passed on through stories, apprenticeship, and practice (Condon 1996; Noongwook et al. 2007; Oskal et al. 2009). It can be understood as knowledge and skills that are fluid, dynamic, flexible, adaptable, and continually updated and revised in light of new observations and experiences, and it can incorporate new technologies alongside the traditional (Stevenson 1996; Berkes 1999; Usher 2000; Takano 2005; Bravo 2009).

This definition recognizes and reflects our view that TK is a dynamic and robust knowledge system, particularly in relation to new conditions and experiences. TK is based on observations, experiences, and knowledges developed and tested, often by an entire community over millennia. While some authors have likened this to the “peer-review” of WS (Cochran et al. 2013), or even called for the dissolution of the dichotomy between TK and WS (Agrawal 1997), it is important to emphasize that TK is fundamentally distinct from WS (Berkes 2000; Finn et al. 2017; Chisholm Hatfield et al. 2018). The MCCWG views TK as a necessary and important *complement* to WS in our climate change planning process, grounding our work in a culturally and socially relevant context.

4. Methods of utilizing Makah Traditional Knowledge

Traditional knowledge comes in different forms and varies across Indigenous communities. Typical social science methods are often time-consuming and costly and may reinforce historical colonizer-colonized paradigms (Smith 1999). For this project, our preliminary results are derived from four main sources (Table 1). While much of the TK utilized within the Makah planning process is analyzed using Western-based methods, TK does not necessarily need to be analyzed using these methods in order to present a robust and meaningful way for Indigenous communities to incorporate their own knowledges and science into planning.

Source	Data collected	How did it inform?
Previous work from archival data	Subsistence diets, interviews on traditional knowledge and Makah culture	Historical baselines; identifying critical resources; identifying adaptation/mitigation strategies
2017 community surveys	Climate change impacts and concerns	Identifying critical resources; community engagement
2018 community surveys	Climate change adaptation strategies	Identifying adaptation/mitigation strategies; community engagement
2018 Traditional Knowledge interviews	Climate change impacts, cultural resources, climate change adaptation strategies	Identifying critical resources; identifying adaptation/mitigation strategies; community engagement

Table 1. Makah Traditional Knowledge data sources to inform Makah climate change planning and resilience.

For many resource-limited communities, opportunistic data gathering is often the easiest and most cost-efficient way to provide space for community members to share their knowledge and observations. Some communities may have archived research from previous work conducted by departments or previous partners. Utilizing previous research is important since TK is a dynamic body of knowledge, and research archives from the past can provide a richer breadth of knowledge by acknowledging, honoring, and incorporating the knowledge and wisdom from previous generations. It is also already completed work and will cost little for a planning team to access and incorporate into current processes. The MCCWG utilized previous work done by the MCRC and their research partners, which is proprietary to the Makah Tribe.

Community events are another opportunistic and low-cost method to gather traditional and local knowledge into the planning process. It is customary for Makah tribal departments to have annual events to update the community on multi-year projects. In 2017 and 2018, the MCCWG utilized these community events to conduct annual surveys regarding community concerns perceptions, and support of climate change adaptation planning. In this paper, we present analyses from our 2017 community surveys and preliminary results from our 2018 community surveys.

The MCCWG, MCRC, and researchers from Washington Sea Grant partnered to conduct 15 semi-structured interviews with Makah community members in April 2018. These community members represented a diverse range of cultural perspectives - commercial and subsistence fishers, harvesters, hunters, basketweavers, and elders. Transcripts were analyzed using Atlas T.I. using a grounded theory to text analysis approach, which inductively elucidates ideas and themes while minimizing bias from the researcher (Glaser and Strauss 1967). This paper will present some preliminary results of these interviews.

5. Makah Traditional Knowledge and Climate adaptation framework

From the TK gathered from the Makah community and archived research from MCRC, there were four preliminary ways that Makah TK framed and informed our climate change adaptation planning (Figure 1):

- Inform or establish historical environmental baselines and environmental changes;
- Identify critical cultural resources that may be vulnerable to future climate change;
- Identify culturally-relevant adaptation and mitigation strategies; and
- Engage the Makah community in the climate planning process.

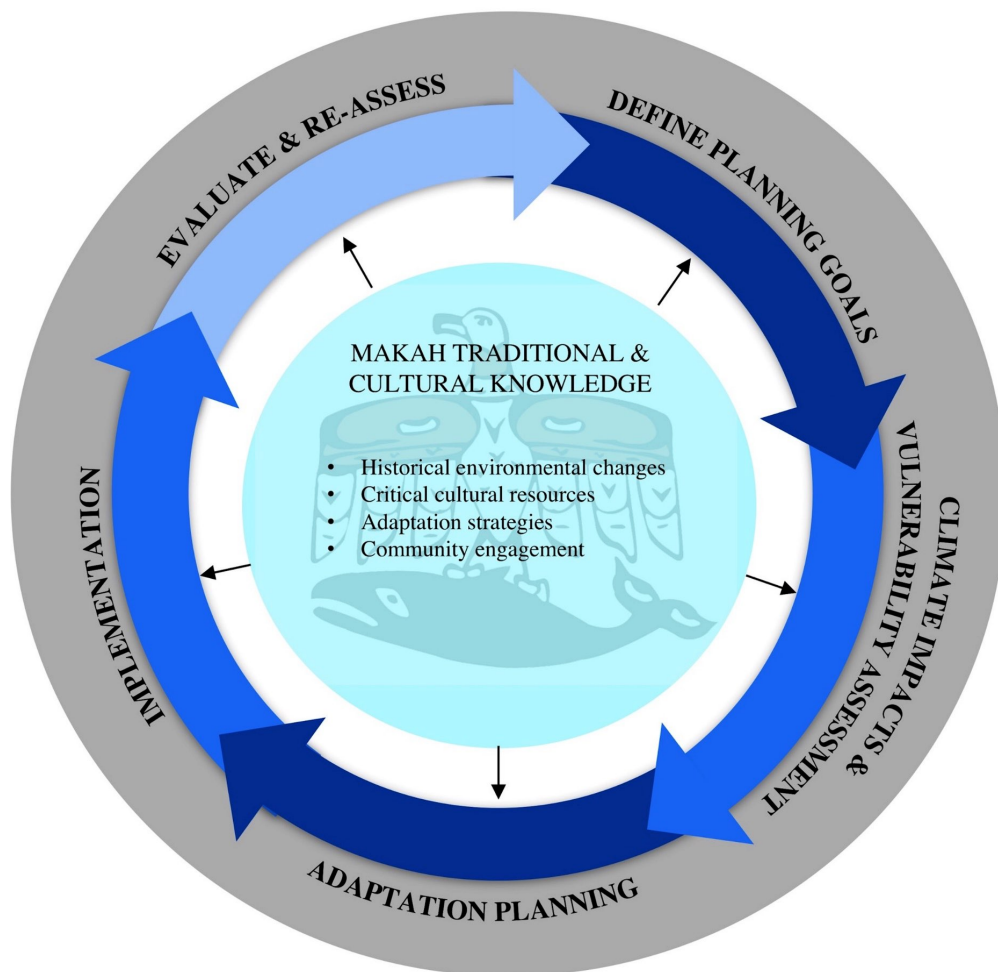


Figure 1. Makah's framework to utilize TK within climate change adaptation planning.

Below, we present a brief summary of how other Indigenous communities and researchers have utilized TK within climate adaptation and offer an example of how Makah has applied these methods within our own process. Although we have created a preliminary framework on how Makah has utilized TK, by no means is this the only framework for Indigenous communities to utilize TK within climate change planning. Each Indigenous community and individuals have their own right of self-determination and how best to use their own knowledges. This framework is presented as an example of how the Makah Tribe and community have approached climate change adaptation through a community-based method, even so, this approach can potentially serve as a template for other communities.

5.1 Establishing historical baselines

Though natural resource use is frequently higher in modern tribal communities compared to non-tribal communities, the rate of resource utilization is also often higher under baseline conditions when the state of the environment was without the current level of degradation and contamination (Harper et al. 2012). These baseline conditions should be the goal when conducting conservation, restoration, or developing environmental policy. It is not enough to restore to a recent baseline state, as that state's environmental quality level has often deteriorated beyond the state needed by Indigenous groups for subsistence, cultural, and traditional practices. For many Indigenous groups, historical baselines are typically considered as the pre-contact state of the environment and the availability and quality of resources at that time.

For Tribes in the Pacific Northwest, including the Makah, the use of historical baselines is particularly relevant when considering policies, adaptation strategies, or restoration projects that address the access to fish, shellfish, or their habitat. Many Tribes' heritage rate, or the pre-contact traditional fish consumption rates of Indigenous communities (EPA 2016), have been suppressed by lack of fish availability, habitat contamination, or a combination of both. This heritage rate should be used when setting water quality goals so that natural resources are protected, as required by Treaties signed by Tribes with the U.S. Government (Donatuto and Harper 2008).

Anthropological and ethnographic approaches often inform heritage rates, which illuminate nutritional, ecological, and biomedical information under historical environmental conditions (Donatuto and Harper 2008). Additionally, heritage rates and understanding traditional tribal subsistence lifestyles can increase understanding of the different environmental exposure risks of Tribes and Indigenous peoples based on ecoregion conditions (Harper et al. 2007). A number of studies have shown how TK and local ecological knowledge (LEK) can inform historical baselines (Drew 2005; Eckert et al. 2017). Eckert et al. (2017) worked in collaboration with First Nations of British Columbia to utilize TEK and LEK to understand historical body size and abundance of yelloweye rockfish, its recent population decline, and to inform restoration targets. The Makah Tribe and MCRC have worked extensively in determining historic and current heritage rates of traditional subsistence resources (Sepez 2001; Sepez 2008). Additionally, MCRC has worked on defining and gathering information on the Ozette Tribal Cultural Landscape, an area of historical and cultural importance for the Makah Tribe, to establish historical uses, baselines, and changes within the cultural landscape area (Ball et al. 2017). Though climate adaptation planning recognizes that restoration to historical baselines is challenging, knowing the baselines elevates goal setting and provides a deeper understanding of the changes that have already occurred.

5.2 Critical cultural resources

For many non-Indigenous assessments and planning processes, identifying critical and vulnerable resources are often conducted through a Western science lens (Norton-Smith et al. 2016; Cochran et al. 2013). For many Indigenous communities, the notion of prioritizing certain species or resources over others directly conflicts with their holistic worldview that everything within the natural world is interrelated and important. Thus, when prioritizing or identifying critical and vulnerable resources, it is important to engage and account for Indigenous cultural values within the planning process (Cochran et al. 2013; Lynn et al. 2013). For example, a climate vulnerability assessment for the Quinault Indian Nation, the Quileute Tribe, and the Hoh Tribe accounted for the cultural importance of species and resources (Dalton et al. 2016). The Confederated Tribes of the Umatilla Indian Reservation utilized a First Foods framework in their

climate vulnerability assessment by identifying critical food resources and evaluating how climate impacts to these food resources may alter their culture, spirituality, identity, and cultural activities (CTUIR 2015). The Karuk Tribe found that climate change impacts resources but will also alter traditional gender roles, relationships, and cultural activities (Norgaard et al. 2017).

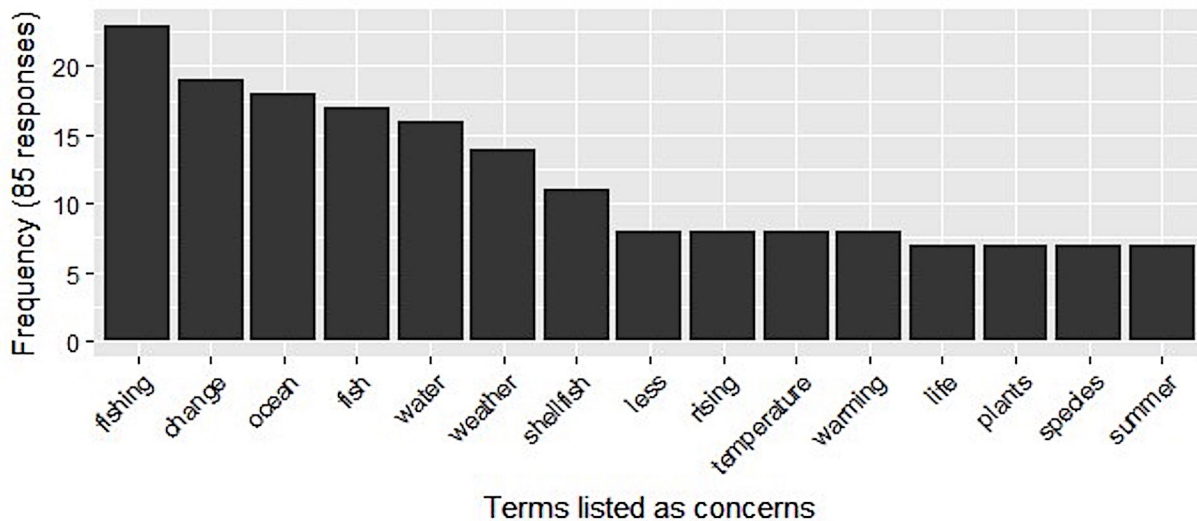


Figure 2. Frequency of climate change concerns from the 2017 community survey.

For the Makah Tribe, the 2017 community surveys provided space for community members to write a list of climate change concerns. Impacts to fishing, fish, the ocean, weather, and shellfish were the most frequent concerns listed by community members (Figure 2). Previous survey work conducted by researchers and MCRC between 1997 and 1999 also identified over 80 species that were important for cultural and subsistence use, with a majority of these species being marine resources (Sepez 2001). For present-day Makah, these subsistence activities provide nutrition, help maintain connections to place and traditions, and contribute to tribal identity and wellbeing, as evidenced by our 2018 TK interviews and archival quotes respectively.

Being on the water - I have to be. There is nothing like it. The water draws me to it. The ocean draws me to it, and I just need to be out there. - Makah commercial and subsistence fisherman, 49 years old.

Many of our tribe members feel that our health problems result from loss of our traditional sea food and sea mammal diet. - Keith Johnson, from *A Whale Hunt* by Robert Sullivan 2000:13.

There has been strong continuity in the use of traditional species, 56% of species identified in the archaeological excavations of Ozette middens, dated to 1500 AD, are still used including 87% of fish taxa and 84% of shellfish taxa (Sepez 2008). The identification of specific cultural resources from the 2018 TK interviews, 2017 community surveys, archaeological and archived research at MCRC has directly informed the MCCWG climate change planning process.

5.3 Culturally-relevant climate adaptation and mitigation strategies

TK can enhance community resilience by facilitating identification of culturally and socially relevant adaptation and mitigation strategies that WS-based assessments may miss and address risks that extend beyond biophysical impacts (Lefale 2008; Donatuto et al. 2014; Reid et al. 2014; Pearce et al. 2015). Incorporating TK not only provides a more complete suite of resilience-enhancing adaptation strategies but is also “an ethical framework” for guiding climate adaptation (Cochran et al. 2013). Indigenous communities have emphasized that TK, culture, and sovereignty are themselves sources of resilience, which enhance a community’s capacity to adapt to environmental change (Pearce et al. 2015; Colombi 2012).

Many Indigenous communities have used TK to identify strategies that enhance community resilience. For example, the Swinomish Tribe of Western Washington has developed Indigenous Health Indicators (IHI) as part of their climate change adaptation process, concluding that Swinomish health and resilience are negatively impacted by degradation of archaeological sites and shellfish resources, which are associated with cultural foods and practices (Donatuto et al. 2014). The Swinomish Tribe and other Canadian First Nations are now reintroducing clam gardens, a traditional maricultural practice to ensure continued access to traditional food and harvest practices (Augustine and Dearden 2014). Other examples of TK-based resilience strategies include: Karuk fishermen taking on new roles as activists and fishery managers to

retain community identity in the face of declining fish populations (Norgaard et al. 2018); Nimiipuu fisheries managers try to “think like the salmon” to protect their cultural keystone species (Colombi 2012). Gitga’at Nation’s focus on inter-generational cultural knowledge transfer (Reid et al. 2014) and on the use of fishermen knowledge of hydro-meteorological processes to enhance preparedness for coastal risks in the Yucatan (Audefroy and Cabrera Sanchez 2017).

The incorporation of Makah TK into climate change adaptation planning has enhanced the MCCWG’s ability to identify important resilience-building strategies. While WS-based strategies to reduce erosion, capture rainwater, and diversify fisheries are important for the Tribe, they alone could not capture the TK-based strategies identified in the 2018 TK interviews.

Interviewees highlighted the importance of traditional foods (for consumption and the practice of harvesting them), as well as social and cultural engagement within the community as important to maintaining community well-being and building resilience to climate change. While many interviewees were aware of red tides, warming water temperatures, and shifting distribution and abundance of traditional species, incorporating TK directly ties these biophysical impacts to family and community events, transferring and sharing cultural knowledge, and the physical and emotional challenges of having to travel much further to harvest, hunt, and gather. Because of this valuable knowledge, the Makah Tribe’s planning outputs will also include strategies that support learning about traditional and cultural foods in the local school, facilitate the sharing of harvest methods and food preparation intergenerationally and across the community, create access to fresh produce and traditional plants, and emphasize community events and social interaction as methods for increasing the Tribe’s resilience to climate change.

5.4 Community engagement

For the Makah Tribe, community engagement was important in the climate planning process for three main reasons: to be able to connect with the community in a culturally-relevant manner, provide space for the community members to have robust agency within the planning process, and ensure that the community commits resources to this effort.

When engaging with Indigenous communities, using language, statistics, scenarios, and models rooted in Western perspectives of climate science can often alienate the community, as communication styles and values often differ between Western science and Indigenous science (Pearce et al. 2009). Refocusing conversations to people's emotions and daily life activities is a more effective means of engaging people on climate change issues (O'Neill and Nicholson-Cole, 2009). For Indigenous communities, reframing climate change science and impacts into cultural stories, traditions, and activities can engage and communicate with community members in a relatable and culturally-relevant method (Pearce et al. 2009; Golden et al. 2015). For the MCCWG, the most effective way of framing climate change impacts and scenarios was framing from the perspective of impacts to cultural activities and subsistence resources.

It is important to reframe climate science and climate impacts in a culturally-relevant manner because proper and robust community engagement can build a community's agency within the planning process (Norton-Smith et al. 2016). This engagement will ensure that the planning process is culturally-appropriate and rooted in local values and lead to an increase of community "buy-in" and ownership of any climate adaptation strategies that result from the planning process (Sheppard et al. 2011; Reid et al. 2014; Adger et al. 2013). The MCCWG found that over 80% of the Makah community supported some level of climate preparation (Figure 3), The 2017 and 2018 community event not only provided an opportunity for community members to engage within the climate planning process, it also reinforced that the Makah Tribal Council and tribal departments should be concerned and are planning for climate change impacts.

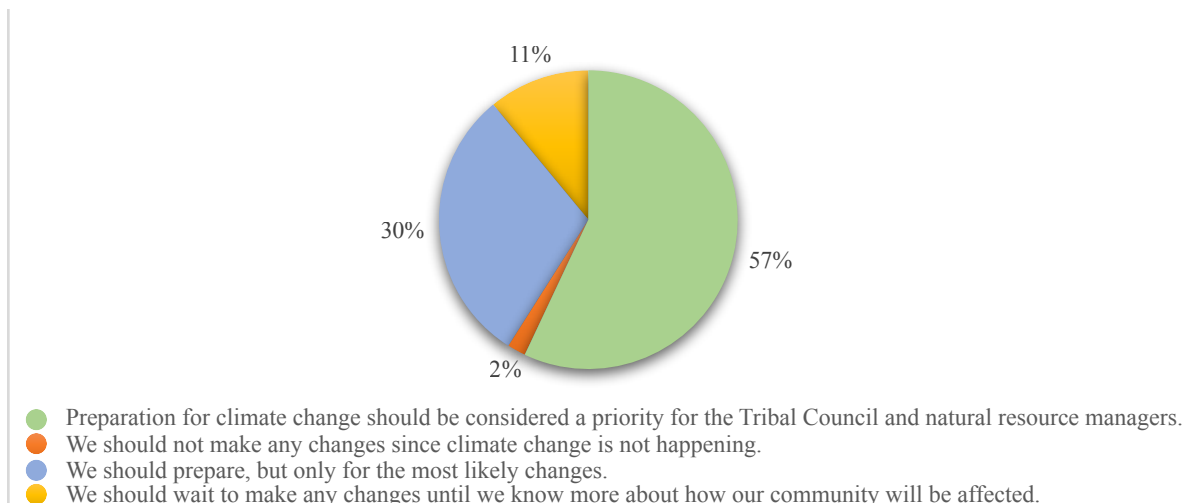


Figure 3. Level of the Makah community support for tribal planning for climate change from 2017 community surveys (n=129).

6. Conclusion

Though there are many different methods of utilizing TK within climate change planning, it is often crucial to approach these in a decolonized and non-extractive manner that empowers and respects the sovereignty and self-determination of the Indigenous community (UNDRIP 2008). Climate change has already and will continue to impact the Makah Tribe’s economic, ecological, social, cultural, and built resources. In the context of the Makah Tribe’s climate change planning process, it was crucial that the process was tribally-led and inclusive of all tribal departments and the community’s perspective. Complementing WS with TK has been demonstrated time and again to create more effective, culturally-relevant, and long-term strategies to increase community resilience to climate change.

It is also important to acknowledge the climate adaptation and climate change impacts are a product and an amplification of historical colonial policies imposed on Indigenous peoples (Whyte 2017). The colonial marginalization of Indigenous peoples in the United States and across the world has meant that these communities sometimes have less adaptive capacity in the form of ecological, financial, and human resources to address the challenges of climate change (Wildcat 2013; Chisholm Hatfield et al. 2018). In presenting this work, the Makah Tribe and the MCCWG hope to provide an example of how Indigenous groups can opportunistically utilize

community events, previous research, archives, and their own staff to enhance their own resilience to climate change.

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