

SPECIAL REPORT



National Indian
Health Board

CLIMATE READY TRIBES

2020-2023

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EXECUTIVE SUMMARY

The National Indian Health Board offered its inaugural Climate Ready Tribes initiative from 2020 to 2023. Its goal was to recognize the outsized threat that climate change poses to American Indian and Alaska Native Tribes while harnessing the strengths and assets Tribes possess that support resilience and to build capacity to protect Tribes and their members from harm and adverse health effects. This effort is based on Tribes' sovereign rights to self-determine their priorities and approaches to adapt to the effects of climate change. ***This lookback focuses on the experiences and efforts of three participating tribes: The Lummi Indian Nation, the Pala Band of Mission Indians, and the Sitka Tribe of Alaska.*** Each Tribe approached the challenge uniquely, reflecting their cultural heritage, environmental context, and specific needs. The Lummi Nation focused on safeguarding traditional food sources and providing real time information and data to ensure safer harvesting of shellfish particularly seasons of higher health risks from the effects of climate change. The Pala Band of Mission Indians concentrated on developing a comprehensive community-driven adaptation plan, addressing risks of droughts, wildfires and flooding in their region. The Sitka Tribe of Alaska, like the Lummi Nation, deeply connected to the ocean, worked on enhancing their capacity to monitor changes impacting their traditional diet, yet forging its own path and offering a different model.

These Tribal efforts were supported by the National Indian Health Board's Climate Ready Tribes' three primary activities: providing funding for local climate

health work or research, hosting an Environmental Health and Climate Track at the National Tribal Public Health Summit, and disseminating educational materials through the Climate and Health Learning Community. The overarching goals included reducing climate-related morbidity and mortality in Tribal Nations. Emphasis and importance of building adaptive capacity, demonstrated during an unprecedented global pandemic, within Tribal governments and fostering collaboration and data and information sharing among a broad swathe of stakeholders was proven to be instrumental to successful project design and implementation.

The experience of these three Tribes, as captured in this lookback document, offer valuable lessons in Tribal approaches, community engagement, fostering partnerships, capacity-building and supporting Tribal community resilience. They underscore the importance of flexibility, proactive involvement of Tribal leadership, and stakeholder collaboration in easing the burden of adverse health effects resulting from climate change. While each approach is different, they offer models for Tribes and their programs to consider in designing and planning for climate change preparedness or response activities. The effects of climate change are more and more evident and post particular and significant risk to Tribes.

The work and effort of the Climate Ready Tribes initiative and this lookback is intended to provide models vital in shaping future responses and strategies for Tribes nationally.

Tribal communities are particularly vulnerable to the health effects associated with climate change.

Introduction

PROJECT BACKGROUND

The National Indian Health Board through its Climate Ready Tribes program focused on building capacity of American Indian and Alaska Native (AI/AN) Tribes to identify, assess, and take action to mitigate climate-related health threats. This program was built on the understanding that Tribal communities are particularly vulnerable to the health effects associated with climate change. Tribal communities have a disproportionate share of high vulnerability and exposure to climate hazards than the general U.S. and have less capacity and resources to effectively deal with adverse climate-related health effects. Preparing, mitigating, and adapting for climate change effects is not a choice or even a point in the future, rather Tribes are forced to grapple with these adverse impacts and have done so for several decades. In doing so, Tribes have developed many strengths and resilience factors that when supported can serve as a model to other Tribes and non-Tribal communities. Through guidance and participation from Tribes and support from the Centers for Disease Control and Prevention, NIHB has developed and implemented its Climate Ready Tribes initiative.

Three Tribes served as the initial participants in the Climate Ready Tribes initiative: *Lummi Indian Nation*,

Pala Band of Mission Indians, and the *Sitka Tribe of Alaska* from 2020 through 2023. This report serves as a look back at their timeline and milestones, project evaluations, lessons learned, and impacts in their planning, preparation and adaptation efforts to lessen the adverse impacts created by climate change.

The Climate Ready Tribes Initiative currently has four primary activities:

- Funding Tribes to conduct local climate health work or research – up to six Tribes receive funding amounts of \$5,000 or \$50,000
- Awardees from 2020 to 2023: Lummi Climate Ready Tribes (CRT) project, Pala Band of Mission Indians, and Sitka Tribe of Alaska
- Hosting an Environmental Health and Climate Track at the Annual National Tribal Public Health Summit – Tribal work and stories are highlighted in a national forum and up to five track presenters receive travel scholarships
- Sharing materials including NIHB, awardee, partner, and general resources, information, and opportunities, largely through the Climate and Health Learning Community

CRT OBJECTIVES AND SCOPE

The goals of the Climate Ready Tribes initiative are to:

- Reduce climate-related morbidity and mortality in Tribal Nations and communities;
- Build capacity to identify and assess climate-related health threats to Tribes;
- Build climate and health adaptation capacity within Tribal governments;
- Increase collaboration and data sharing among the Tribes, the federal government, state/local governments, and other partners on issues of climate and health; and,
- Increase communication and information sharing about the health effects of climate change.

Climate Ready Tribes (CRT) is a part of NIHB's nationally-focused public health program and is funded by the Centers for Disease Control and Prevention (CDC)

2020-2023 CLIMATE READY TRIBES OVERVIEW

LUMMI CLIMATE READY TRIBES PROJECT

The Lummi Nation describe themselves as “the Lhaq’temish, the Lummi People. We are the original inhabitants of Washington’s northernmost coast and southern British Columbia. For thousands of years, we worked, struggled and celebrated life on the shores and waters of Puget Sound ... We are fishers, hunters, gatherers, and harvesters of nature’s abundance. We envision our homeland as a place where we enjoy an abundant, safe, and healthy life in mind, body, society, environment, space, time and spirituality; where all are encouraged to succeed and none are left behind.”¹ **Their own words provides their worldview and serve as a foundation for their participation in the Climate Ready Tribes (CRT) initiative.** The Lummi Nation recognized that preparedness is better than disaster response² and identified food security and traditional gathering activities to better protect their communities and Tribal members. They focused on the health risks associated with consuming traditional foods made toxic by climate change from their reservation tidelands. They fortified and established partnerships, conducted outreach, and took steps, such as oyster restoration and worked to ensure safe

access to shellfish harvesting beaches, to address climate change challenges. They worked to build trust within their communities and interdepartmentally to enhance shellfish safety and ensure the well-being of their people.

PALA BAND OF MISSION INDIANS

The Pala Band of Mission Indians Tribe is located on the Pala Reservation in southern California, their ancestors’ homelands since time began. The reservation is located approximately 30 miles east from the coastline in Northern San Diego County and includes approximately 13,000 acres that are **increasingly at risk for adverse effects from increasing temperatures contributing to droughts, wildfires, and risk of flooding** which threatens “the physical, cultural, and spiritual health of the [Pala Band of Mission Indians], its habitats and ecosystems, and its built environment.”³ The Pala Band of Mission Indians’ participation in NIHB’s Climate Ready Tribes initiative parleyed its existing strengths focusing on its Collaborative Climate Adaptation for Tribal Community Wellbeing (CCATCW). The CCATCW aimed to build Tribal community resilience, support health, psychosocial, and mitigate impacts of climate change through

implementation and tracking of community-driven adaptation plans and strategies, strengthen partnerships, increase community engagement, and build/sustain Tribal capacity to prepare and respond to climate change-related events.

SITKA TRIBE OF ALASKA

The Sitka Tribe of Alaska Mission is “[t]o exercise sovereign rights and powers, to preserve the integrity of tribal society, and to improve the lives of individual Tribal Citizens.” The Sitka Tribe of Alaska is a federally recognized government with more than 4,500 enrolled Tribal Citizens. Their Tribal enrollees are predominantly of Tlingit, Haida, Aleut and Tsimshian Heritage from the Sheet’ka area of Southeastern Alaska.⁴ The Sitka Tribe of Alaska Tribal Citizens have

long depended on the ocean for sustenance and as an anchor to deep-rooted cultural practices. Their involvement in NIHB’s Climate Ready Tribes initiatives centered on **building capacity to support testing and notification of threats to traditional shellfish and sea-dependent diets**. Their work included creating a “Mobile Harmful Algal Bloom (HAB) Workshop” to share information and build community awareness and partnership building with the Southeast Alaskan and Coastal Alaskan Tribes to develop standards for data collection and analysis and to increase testing capacity. Working with state and federal partners, they created methodologies and equipment procurement allowing for monitoring sockeye salmon runs and measuring hydrological and freshwater conditions that impact fish populations.

Summary of Objectives and Milestones: Lummi Nation

The Lummi Nation’s Climate Ready Activities in 2020 centered around addressing the impacts of climate change by mitigating shellfish biotoxin health risks. They pursued three key objectives during the year: The first was to continue to develop partnership with the Northwest Indian College’s Salish Sea Research Center (hereafter the Salish Sea Research Center) by developing virtual outreach around Harmful Algae Blooms and Biotoxins. The second objective revolved around expanding outreach efforts to increase the tribal community’s awareness of climate change impacts and potential biotoxin risks. These efforts

included conducting outreach presentations, installing biotoxin closure signs, creating educational materials and monitoring biotoxin levels in shellfish. The third objective focused on fulfilling award requirements, such as participating in check-in calls, attending conferences, engaging in learning community events, and submitting reports. The Lummi Nation worked to educate and protect its community from the potential impacts of climate change, including threats from harmful algae blooms, and shellfish biotoxins through collaborative partnerships and comprehensive outreach efforts.

1. <https://www.lummi-nsn.gov>

2. https://www.lummi-nsn.gov/userfiles/360_Climate%20Change%20Assessment%20FINAL.pdf

3. <https://oehha.ca.gov/climate-change/epic-2022/impacts-tribes/impacts-climate-change-pala-band-mission-indians#:~:text= Rising%20temperatures%2C%20drought%2C%20wildfires%2C,ecosystems%2C%20and%20its%20built%20environment.>

4. <https://www.sitkatribes.org>

In 2021, the Lummi Nation shifted efforts towards evaluating the potential impacts of climate change on intertidal shellfish, which are critical for cultural and subsistence harvests. Their first objective in 2021 was to summarize these potential climate change impacts, especially in context of climate change adaptation planning for shellfish. This initiative aimed to foster community engagement and broaden conversations about climate change with inter-Tribal partners such as the Lummi Nation Department. Particular attention was dedicated to educating community members to ensure safe food harvests. Tying efforts to the second objective in 2021, which was to maintain and expand educational outreach efforts. The Lummi Nation created an outreach video for youth in schools as a holistic approach to reach families. Their outreach efforts extended partnerships and collaborations with entities such as the Lummi Health Clinic, providing more opportunities to expand the community’s awareness of health risks associated with harvesting and consuming shellfish exposed to HABs. They continued building capacity to monitor shellfish for biotoxins and maintained information about shellfish harvest closures.

The year 2022 was focused on community engagement for the Lummi Nation. Their first objective was to host a traditional clam bake, serving as an avenue for gathering and engaging Tribal community members. This event created another opportunity to inform the community about climate change risks to shellfish and provided opportunity for a focused discussion on food sovereignty. The event integrated education materials and lessons that incorporated a

mix of traditional knowledge and facts about shellfish biotoxins. The second objective for 2022 was to continue maintaining and fostering relationships to increase the Lummi Nation’s community awareness and understanding of shellfish health risks in the context of a changing climate. The Lummi Nation continued to collect and test shellfish for biotoxins regularly and ensured that information about harvest closures was updated following established protocols.



Beyond the immediate focus on climate readiness, the Lummi Nation also prioritized promoting health and well-being within the community through the education and encouraging the harvesting and consumption of traditional foods as well as other integrating other cultural aspects such as using and supporting exposure to the Lummi language. **The goal was to strengthen cultural identity, particularly among Lummi youth, offering positive benefits to mental and physical health and overall well-being.**

In 2023, the Lummi Nation maintained a dual focus. Their first goal was to summarize awareness of biotoxins. Building on the knowledge gained over the previous four and one-half years of activities. They provided an updated summary of biotoxin sampling results, taking into account climate variables like river discharge and air temperature. The second

objective was to continue to maintain and foster relationships that would further enhance the Lummi Nation's community awareness and understanding of health risks of consuming shellfish that were exposed to HABs, particularly in light of the expected increase of HABs resulting from to the changing climate.

Summary of Objectives and Milestones: Pala Band of Mission Indians

In 2020, the Pala Band of Mission Indians initiated effort to design and implement a community Driven Paula Adaptation Plan. This plan was designed to bolster their preparedness and resilience to the adverse impacts of climate change to health well-being. **A central element of this initiative was the formation of an Adaptation Working Group**, which included community members, key stakeholders, national experts and partner agencies this group was instrumental in providing input from the plan's conceptualization, implementation, monitoring, tracking and evaluation. The Tribe recognized the importance of developing and incorporating evidence-based human resilience strategies to constructively cope with and emerge stronger and healthier from climate related challenges.

The first objective, develop a community-driven adaptation plan, was met through the establishment of the Adaptation Working Group and the development of a collaborative implementation and evaluation system. The system enabled the tracking and reporting of progress as part of the adaptation plan. This helped ensure transparency and accountability. Valuable feedback was obtained from community and Tribal leaders contributing to the ongoing refinement of the plan's design. The second objective, early community-building strategy implementation, included the development of an early warning system, the design of a preliminary outline for emergency response to climate exposure risks and the provision of training to key staff and partners. These activities aimed to increase the emotional and mental resilience of the



Tribal community. The third objective, intertribal collaboration and resource sharing, was an integral part of the Pala Band of Mission Indians' efforts in 2020. The tribe recognized the significance of their project's focus on health and well-being in Tribal climate adaptation. Their commitment to sharing their knowledge and expertise with other tribes was evident in their leadership of an intertribal working group. They engaged in sharing resources and information, publishing public education and staff training materials, and providing and participating in varied activities to further the well-being resilience of Tribal community members. The tribe met all Objective 4 administration and reporting requirements.

The following year, in 2021, Pala focused community resilience by continuing its attention on complementary objectives to those established in 2020. The Community-Driven Adaptation Plan remained central to the Tribe's strategy and included ongoing involve-

ment with community members, key stakeholders, national experts and partner agencies. This collective approach continued to provide input for refinement of the plan's implementation, monitoring, tracking and evaluation components. Objective 2, Post-COVID Community Building Strategy Implementation, incorporated Pala's learned lessons from climate adaptation planning and implementation activities affected by the pandemic. The tribe began to implement community well-being building strategies which included an early warning system, emergency response outlined for climate exposure risks and training for key staff and partners to enhance local community emotional and mental/psychosocial resilience. The focus shifted towards implementing strategies identified in the preceding year and leveraging them to strengthen human resilience. Intertribal collaborations and resource sharing were again central to expanding the Tribe's impact on overall Tribal readiness and preparedness for the changing climate landscape in 2021. Pala's partnership in the Intertribal Working Group supported the compilation and publication of resources served as an internal and external resource to help build climate change readiness capacity locally and nationally. All Objective 4 project administration and reporting requirements were met.

In 2022, the Community-Driven Adaptation Plan enhanced preparedness and resilience to the health and psychosocial impacts of climate change incorporating lessons learned since 2020. Community members, key stakeholders, national experts and partners agencies continued their pivotal role in advancing

the plan's implementation, monitoring, tracking and evaluation goals to ensure the plan's relevance and effectiveness. The Pala Band of Mission Indians continued to implement community well-being building strategies. The focus remained on increasing human resilience putting a greater emphasis on community-building. Intertribal collaboration and resource sharing were still central, supporting the replication of the Tribe's evidence-based approaches in other communities. Administrative and reporting activities continued and were completed.

The final year, 2023, was driven by the Pala Band of Mission Indians' Community-Driven Adaptation Plan, now of well-established framework. Pala's resilience-building objectives. This year, the Tribe introduced the development of outreach tools for

community education and awareness, with a particular focus on providing access to real time health, climate and risk data through a Climate and Health GIS web-based dashboard. This innovative tool aimed to provide the community with crucial information on air quality, temperature extremes, disease incidence rates and more, thereby helping residents manage risks. As in years prior, Pala remained dedicated to nurturing intertribal collaborations and resource sharing. They continued to share its expertise with other Tribes regionally and nationally. Information sharing presentation at NHS's Public Health Summit and ongoing support for other tribes in their outreach endeavors remained essential. Administrative and reporting activities continued on track for completion.

Summary of Objectives and Milestones: Sitka Tribe of Alaska

The Sitka Tribe of Alaska's focused their Climate Ready Tribes objectives on partnering and building capacity, internally, regionally and statewide forums through training. The Sitka Tribe of Alaska established the SEATOR – Southeast Alaska Tribal Ocean Research program initially and primarily to address food security and food safety, particularly cultural and traditional foods harvested from the ocean.⁵ The Climate Ready Tribes supported three substantive objectives in 2020: establish a SEATOR Workshop Training Program for Tribes throughout Alaska including the

production of an educational video, build regional capacity through hosting a training in Kodiak, Alaska on monitoring environmental parameter affected by climate change, and statewide by providing a training at the Alaska Forum on the Environment. The trainings were a collaborative effort between the Sitka Tribe of Alaska, the Kodiak Area Native Association, the and the National Oceanic and Atmospheric Administration (NOAA). The Tribe met all grant and administrative requirements.

The objectives for 2021 expanded to include the development and assembly of ocean acidification kits to support baseline data collection to measure ocean acidification in Southeast and Coastal Alaska again to support capacity building. The Sitka Tribe of Alaska, through its SEATOR Program and supported by the Climate Ready Tribes initiative, built capacity to analyze samples collected by SEATOR partners. Through its second objective, the Tribe developed standard sample collection protocols testing for SEATOR datasets (measuring plankton, shellfish toxin levels, and ocean acidification). They developed education and outreach materials for communicate and trainings on those established protocols and to further the climate change conversation and fuel mitigation efforts. The Sitka Tribe of Alaska met all grant and administrative requirements.

In 2022 work and objectives were reflective of the capacity built in the years prior. The Sitka Tribe of Alaska was able to dedicate resources and efforts to the purchase of supplies necessary to install equipment to monitor and test samples collected on a local stream. For objective two, the Tribe looked to install an additional testing and monitoring system at Klag Bay. 2022 saw the addition of a new objective focusing on the creation of repositories and templates for analysis and data communication to be repeated by partner Tribal organizations. The Sitka Tribe of Alaska followed or modified all NIHB obligations related to grant implementation with the exception of participating in Learning Community calls.

In the final year, 2023, the Sitka Tribe of Alaska expanded limnological analyses of important subsistence sockeye salmon systems and developed analytical tools to be shared with other Tribes. For its second objective, the Tribe developed and prioritized future collaborative projects with US Forest Service. And focused on sustainability in its third objective by developing a metrics to report project efficacy.

The Sitka Tribe of Alaska modeled approaches moving from development and capacity building expanding training, testing, and monitoring ability growing in scope and reach each year and concluding activities looking towards sustainability of efforts.



5. <https://www.seator.org/resources/>



2020-2023

PROJECT PERFORMANCE EVALUATION

Project Performance Evaluation and Impact: Lummi Nation

The Lummi Nation in 2020 was building collaboration with the Salish Sea Research Center to assist in the lab in testing shellfish samples for biotoxin levels, however made changes reflecting challenges raised by the COVID-19 pandemic. The Lummi nation worked with the education outreach coordinator to create an educational outreach video on HABs and biotoxins in shellfish. They identified key objectives for the video, drafted a script, and recorded video footage in 2020. As the video was not ready before the harvesting season when biotoxin risk increased, the Tribe conducted a virtual outreach event to meet the objectives of communicating the health risk of HABs and biotoxins to the Lummi Community. Despite the challenges raised from the pandemic, **they successfully increased monitoring of shellfish biotoxin levels, expanded their outreach efforts, and strengthened their partnerships and collaborations.** The Lummi Nation posted shellfish harvest closure signs at both bays on the Lummi Reservation making shellfish

harvest closure information more visible and accessible. This program increased the Lummi Nation's capacity to test shellfish and subsequently closing beaches to harvest during times of a public health risk and to reopen to species specific harvest when it was safe to do so. This increased safe harvest opportunities in summer 2020.

2020 HIGHLIGHTS

All objectives were met successfully. Notable highlight: the virtual outreach event via Facebook Live reached 1,143 people with 75 reactions, including 39 "Likes", 15 "Loves", and 15 comments. Additionally, the in-person outreach event was attended by 16 people who the Tribe knew harvests shellfish. In meeting the third objective, in addition to meeting all reporting requirements, project staff members attended both the virtual CDC and NIHB meetings as well as three community learning events.

2021 HIGHLIGHTS

In 2021 the Lummi Nation increased their capacity through the establishment of a new Tribal working group, sought to increase grant resources through the USGS, and partnered with the Puget Sound Oyster Restoration Fund. They conducted a habitat suitability evaluation as well as designed a new trail to provide safer access to important shellfish harvest beds on the Lummi Reservation. The project extended the Tribe's reach beyond its Natural Resources office through the development of biotoxin brochures that were distributed to community members at the health clinic. Notably, the Lummi Nation completed its outreach video on how climate change increases the risk of exposure to biotoxins associated with harmful algae blooms, which was and will continue to be shared for many years with middle school students. This video is a significant completion that promises to increase tribal communities' awareness and understanding of climate change impacts and risks to traditional and cultural diets and how to mitigate those risks. Finally, project staff attended three community learning events and the National Tribal Public Health Summit per the project's objectives.

2022 HIGHLIGHTS

The Lummi Nation hosted a clam bake with a local community leader in 2022 that distributed information and facilitated community discussions on the risks of biotoxins and the importance of food sovereignty. There were organizational challenges hosting the event, however, it was a success with over 250

Lummi Nation's outreach video on how climate change increases the risk of exposure to biotoxins will be shared for years with students.

community and partner attendees. The relationship with the Lummi Health Clinic was strengthened which supported coordinated efforts and activities addressing health safety issues regarding climate impacts. Discussions on shellfish safety included the established protocols on biotoxin testing and health notices recalling oysters for norovirus. **The Project served as a source of information building trust and demonstrating its value to partners.** Project staff provided debriefs to clinic staff providing an additional source of information to community members. They promoted health and wellbeing within the Lummi community through consumption of traditional foods and usage of the Lummi language by designing and printing a poster and varied refrigerator magnets that included 26 traditional foods consumed by the Lummi community. The foods were fit to four categories: hunting, gathering, harvesting (inter-tidal shellfish) and fishing. Notably, the project received positive feedback from elders and youth on both the poster and magnets designed. This helped strengthen connections between the Lummi Nation project, the

Lummi school, and Tribal and community students and parents. The project completed all required administrative and reporting activities.

2023 HIGHLIGHTS

Throughout 2023, the project continued their efforts to test for and address biotoxins and harmful algal blooms. They built upon the groundwork laid over that previous four years and disseminated biotoxin sampling results that was integrated with climate variables such as river discharge. This continued to foster community and health professional awareness. The project also participated in the Annual Fisher Meeting and administered a follow up online survey to compare to earlier surveys measuring community awareness of climate factors impacting the cause and increase of HABs. The survey results, recognizing participation is limited to those with access to the online survey, illustrated increased community awareness of those factors increasing HABs and their associated health risks. The Tribe noted that beach

closures between Lummi Bay and Portage differences and revealed HAB spikes at Portage Bay that may be correlated to variables related to climate change, like air temperature. The published an article in the Lummi Nation's newspaper, Squol Quol, warning the community of the coming biotoxin season. In their efforts to foster relationships that increase the Lummi community's awareness and understanding of shellfish health risks, the project facilitated knowledge sharing through a virtual Western Washington University Master's thesis defense and re-established communication with the Lummi Health Clinic. The project noted that ongoing projects could potentially expand approved harvest sites, and may extend to concerns such as investigating or measuring new challenges wrought by the changing climate, such as the surveying invasive species (e.g. European Green Crab). As for grant requirements, though there were some challenges in maintaining monthly check-ins, the Tribe successfully completed all administrative and reporting activities.



Project Performance Evaluation and Impact: Pala Band of Mission Indians

2020 HIGHLIGHTS

Throughout 2020, the Pala Band of Mission Indians achieved their objectives in their project year. The re-structured their community stakeholders and advisors into the Pala Environmental Department Advisory Group (PEDAG), institutionalizing the advisory group and helping to ensure practices and procedures for future activities years out. This facilitated enhanced coordination with expert partners and traditional knowledge keepers. It established an efficient implementation and evaluation system. PEDAG's contributions extended to hazard and flood mitigation planning, as well as comprehensive psychosocial resilience training

initiatives, which drew 50 attendees or views for each of the two webinars that they hosted. The collaborative efforts extended beyond the Pala Band of Mission Indians and included multiple Tribes regionally and nationally through their leadership in the Climate Science Alliance Tribal Working Group. They hosted four working group meetings, each with 20 to 40 attendees. The working group also hosted webinars sharing information, research and resources with Tribes across the nation. In addition to these accomplishments, they also negotiated and managed contracts with partners such as Prosper Sustainably. They submitted reports and met all administrative requirements ensuring responsible management of their funds and resources.

2021 achievements included securing funding and initiating implementation of high-priority adaptation strategies.

2021 HIGHLIGHTS

The Pala Band of Mission Indians in 2021 met their climate and health initiatives. They actively involved community members, key stakeholders, national experts, and partner agencies in the ongoing implementation, monitoring, tracking, and evaluation of their community-driven adaptation planning and evaluation plan. Their achievements included securing funding and initiating the implementation of high-priority adaptation strategies. They integrated expertise from partners such as the California Office of Planning and Research, the California Department of Public Health and the CDC, in partnership with and relying on the local cultural and Tribal expertise from knowledge bearers and partner Tribes in the design of adaptation strategies. They completed a new version of their implementation tracking system ensuring efficient and accurate monitoring of their adaptation plan progress. They continued their PEDAG meetings supporting community well-being and added a new contractor, Jamie Caplan Consulting, to refine their emergency response and health management plans with input from a community workshop. The Tribe focused on incorporating COVID-19 pandemic response into climate preparedness plans and strategies to



protect Tribal health and community psychosocial well-being. The Tribe continued its participation and investment in its Climate Science Alliance Tribal Working Group and continued information dissemination offering a webinar training mini-series titled "Getting Ahead of Climate Trauma," featuring expert speakers and incorporated lessons learned from their Climate Ready Tribes' work.

2022 HIGHLIGHTS

In 2022, the Pala Band of Mission Indians continued their work on climate and health adaptation. Through their community-driven Pala Adaptation Plan, they engaged community members, stakeholders, and experts in growing their plans and tracking their strategies to enhance climate preparedness and their Tribal and community resilience. They secured funding for key adaptation strategies, **including emergency planning, well-being initiatives, flood mitigation, and transportation climate change adaptation.** Their tracking system allowed them to monitor and

2020 PALA BAND OF MISSION INDIANS EVALUATION HIGHLIGHTS

DELIVERABLES COMPLETED

- Draft implementation & Final tracking systems
- Updated list of PEDAG members
- List of stakeholders providing feedback
- Emergency notifications
- Preliminary emergency response outline
- Training & education materials developed
- Psychosocial training recorded webinars: <https://youtu.be/NMfV6IPsbsk> and https://youtu.be/eigPV_s6E8w
- Established intertribal working group
- Materials & trainings shared on www.tribalclimatehealth.org and www.ped.palatribe.com/climate-change/
- Contract agreement w/ Prosper Sustainably
- Mid-year and Final reports

ENGAGEMENT

- 3 PEDAG meetings w/ 10 stakeholders providing feedback
- Psychosocial webinars: 2 webinars each w/ 50 attendees/views
- Pala professional training webinar on psychosocial resilience: 8 attendees
- Pala community education webinar on psychosocial resilience: 5 attendees
- Adaptation working group: 3 mtgs w/ 9 attendees each
- Pala Environmental Department website receives approximately 200 visits/month
- Multiple climate change and COVID related posts on PED's Facebook page and the Planet Pala Instagram account
- Intertribal meetings: 4 meetings (in person and remote) each w/ 20-40 attendees per meeting from 8-12 tribes in the San Diego region
- Lessons learned incorporated into one separately funded climate and health training for 141 attendees across the country, comprised of 8 webinars
- Webinar with 20 attendees from tribes in the north-central region

evaluate an updated implementation system, aligning with a broader sustainability plan to manage various focus areas more effectively. To accomplish these goals, the Tribe collaborated with internal departments and external partners. They continued to foster the Climate Science Alliance Tribal Working Group and participate as well as present at national events, including the National Indian Health Board's National Tribal Public Health Summit. They effectively managed administrative tasks and reported progress in a timely manner.

2023 HIGHLIGHTS

The final year, 2023, the Pala Band of Mission Indians worked to enhance community resilience fostering awareness through interdepartmental partnership.

The Tribe experienced difficulty garnering participation from other departments, but through the inclusion and support of Tribal leadership, the program was able to accomplish interdepartmental updates to its implement and tracking system. This facilitated communication between departments to allow effective use of resources and to communicate needs and successes to Tribal leadership. The project focused on its web-based dashboard, allowing projects, departments and community partners and members access to important health, climate, and risk information. Their intertribal work included utilizing other Tribal-serving venues, including the Tribal Climate Health Project website and trainings. Project administration and reporting was kept up to date.

Project Performance Evaluation and Impact: Sitka Tribe of Alaska

2020 HIGHLIGHTS

The Sitka Tribe of Alaska in 2020 addressed HABs through capacity employing environmental monitoring practices and training. They conducted a Mobile Harmful Algal Bloom Workshop. The Tribe acquired all necessary supplies and developed educational materials for the workshop, completed filming, and assembled sample kits to support the training. They partnered with the Kodiak Area Native Association's (KANA's) environmental staff to co-host a water quality workshop training held in Kodiak, Alaska, and successfully hosted a workshop at the Alaska Forum

on the Environment. Outcomes for 2020 included building site-specific protocols for ten KANA Tribes. The water quality workshop received positive reviews from attendees. The presentation at the Alaska Forum on the Environment was a workshop on climate change mitigation; it was attended by over 20 environmental coordinators and stakeholders from across Alaska and included Tribal representatives, NOAA employees, State of Alaska Department of Environment Conservation personnel, and HAB stakeholders. The project met all of 2020's objectives and adhered to all administrative and reporting requirements.



2021 HIGHLIGHTS

In 2021 the Sitka Tribe of Alaska worked to enhance environmental data collection capacity of Southeast and Central Alaska Tribes. In partnership, they developed standardized protocols and processes. The project centered on ocean acidification data collection and analysis. Tribes and partners collaborated in developing, procuring, and distributing ocean acidification test kits to communities across Southeast Alaska, improving accuracy and timeliness of tests and data. The Tribe was able to parlay CRT funding to engage with stakeholders across the Gulf of Alaska to get input on priorities, challenges and for the establishment of data collection and analysis methods. Data collected by the Sitka Tribe of Alaska was also used to inform the development of educational and outreach materials for Tribal partners. Modifications, though minor, were necessary due to shortages in certified reference materials resulting from the COVID-19

pandemic. The partnership allowed for such adjustments and permitted the continuity of sample analysis. The project was able to archive 366 plankton samples, 471 shellfish samples and 188 OA samples since October 2020. All project administrative and reporting requirements were met, including presenting at the National Indian Health Board's 2021 National Tribal Public Health Summit.

2022 HIGHLIGHTS

Activities in 2022 for the Sitka Tribe of Alaska built upon and increased past capacities by adding the installation of image collection stations on several subsistence streams. The collaboration with the Hoonah Indian Association advanced data collection and analysis capacity as well. These developments allowed for the determination of stage height, discharge, and the creation of hydrologic summary statistics, improving understanding of streamflow dynamics. The project was also able to create repositories and templates for data analysis and communication that have the potential benefit partner Tribal organizations in the region. As in prior years, the Sitka Tribe of Alaska met the National Indian Health Board's CRT obligations and requirements related to the grant implementation.

2023 HIGHLIGHTS

Of note, in 2023, the Sitka Tribe of Alaska expanded and enhanced the monitoring of subsistence sockeye salmon populations in Sitka, Alaska. They completed all deliverables for the year, including the development

of three field data collection protocols, analysis of 44 backlogged zooplankton samples, and the creation of R code for sockeye salmon analysis. This analysis is important in understanding the ecology of subsistence lakes. Project staff reported that there were not sufficient resources to analyze all nutrient and zooplankton samples on hand but handled the scarcity of resources using a prioritization plan analyzing zooplankton sample and devising a plan to analyze nutrient samples in the future. However, the output from the R code includes publication-ready figures. Communication and collaboration between the Sitka Tribe of Alaska and the US Forest Service led to innovative approaches using computer vi-

sion and machine learning technologies to salmon escapement and smolt outmigration estimates. These data and plans combined with the proof-of-concept software and mapping are steps facilitating greater community, policy and researcher access to the work and data of the project. Grounding management and planning in data-driven approaches. Project staff members focused on reporting project efficacy and sustainability, sharing progress reports and a video presentation. ***The Sitka Tribe of Alaska's efforts have laid a strong foundation for future collaborations and advancements in subsistence fisheries management in the Sitka area.***

Changes in Capacity

Capacity for the Lummi Nation 2020-2023

From 2020 to 2023, the Lummi Nation's changes in capacity year over year. In 2020, participation in the National Indian Health Board's Climate Ready Tribes enabled them to enhance infrastructure, increase shellfish sampling and testing capacity, and foster partnerships with the Salish Sea Research Center and the Washington State Health Department. By 2021, they created their climate change working group in conjunction with Lummi leadership involvement and prioritizing shellfish safety and food security. In 2022, the Lummi Nation expanded its capacity through the development of a website providing real-time information on biotoxins and beach harvest status, as well as posting signs and warnings at beach access points. They were also able to collaborate the Lummi Tribal health clinic to improve biotoxin exposure identification and treatment. Partnerships with the Lummi school allowed opportunities for education and outreach to Lummi youth and their families, broadening their outreach. In 2023, participation in

the CRT initiative allowed for the continuation of critical roles, maintaining Lummi's capacity to address health threats related to HABs and biotoxins in shellfish despite project personnel turnover. This project helped supported the employment of a Tribal shellfish field technician, enabling consistent and expanded biotoxin testing and species-specific harvest closures, thereby increasing safer harvest opportunities for the Lummi Nation.

Partnerships with the Lummi school allowed opportunities for education and outreach to Lummi youth and their families.



Capacity for the Pala Band of Mission Indians 2020-2023

Capacity for the Pala Band of Mission Indians centered on the Tribe's community-driven adaptation plan. This approach is innately culturally-driven involving Tribal leadership, community members, key stakeholders, and is informed by expertise from partner agencies as well as national experts. This has enabled them to improve their preparedness and resilience to climate change impacts on health and well-being. The establishment and support of the Pala Environmental Department Advisory Group has allowed for coordination and collaboration with Tribal programs and expert partners responding

to or incorporating Tribal priority adaptation strategies. The Tribe's engagement in intertribal collaborations and resource sharing has expanded their reach, as they participated in various working groups sharing their approaches with and learning best practices from other Tribes and organizations. Overall, the Pala Band of Mission Indians increased its capacity to address climate change impacts on their community well-being, health, and culture through their adaptation strategies increasing their capacity for outreach, intertribal collaboration, and project administration.

Capacity for the Sitka Tribe of Alaska 2020-2023

From 2020 to 2023, the Sitka Tribe of Alaska made substantial progress in building its capacity for environmental monitoring and data collection necessary to provide the Tribe, its partner Tribes, and partner agencies tools and information to increase their resiliency and respond to health threats posed by climate change. Beginning in 2020, the Sitka Tribe of Alaska initiated efforts to address HABs through the development of education, outreach and training materials for their training workshops. The increased their reach through partnership with other Tribes and Tribal health organizations allowing for the sharing and exchange of knowledge, improving capacity for all members. In 2021, the Sitka Tribe of Alaska expanded its focus to enhance environmental data collection capacity among Southeast Alaska and coastal Alaska Tribes by leading

and supporting the effort to standardize protocols and facilitating regional meetings. The Tribe was able to distribute ocean acidification test kits strengthening data collection and analysis methods. In 2022, built capacity and infrastructure by installing image collection stations, collaborating with the Hoonah Indian Association, and improving streamflow analysis, data repositories, and communication templates. In 2023, they expanded monitoring of subsistence sockeye salmon populations, developed field data collection protocols, and utilized innovative technologies like computer vision and machine learning to improve salmon estimates. These efforts not only enhanced the Tribe's technical skills but allowed them to share their knowledge and capacity improving Alaska's capacity for data-informed subsistence fisheries management.

Partnerships

Partnerships for the Lummi Nation 2020-2023

The Lummi Nation established and nurtured a network of partnerships throughout the Climate Ready Tribes initiative from 2020 to 2023. They strengthened their collaboration with the Northwest Indian College and its foundation's Salish Sea Research Center focusing on education and outreach. The Tribe increased monitoring of shellfish for biotoxins through strengthening their partnership with state and local health departments. They also increase partnerships with national partners such as the National Indian Health Board and federal agencies such as CDC. In 2021, the Lummi Nation established five new partnerships, including the Puget Sound Restoration Fund, USGS, Lummi Health Clinic, Lum-

mi Nation Education and Outreach coordinator, and a Lummi Nation planning engineer. In 2022, their network grew to include the Lummi Public Health Director, contacts from Western Washington University, and Lummi community knowledge bearers, and the Lummi Shelangen (Cultural) Department. In 2023, they established new partnerships with Western Washington University faculty. These partnerships allowed for the sharing of knowledge and resources, increase outreach capacity, and assisted with improving or increasing monitoring shellfish biotoxins and exploring traditional ecological knowledge, supporting cultural and health resilience in the face of climate change.

Partnerships for the Pala Band of Mission Indians 2020-2023

The Pala Band of Mission Indians, through the Climate Ready Tribes initiative, established and strengthened vital partnerships. In 2020, they initiated collaboration with various entities including the reconstituted Pala Environmental Department Advisory Group, Climate Science Alliance Tribal Working Group, Rising Voices, San Diego County Department of Public Health, Southwest Climate Adaptation Science Center, North Central Climate Adaptation Science Center, Prosper Sustainably, and the Institute for Tribal Environmental Professionals. In 2021, they expanded their network to include the California Tribal Epidemiology Center, private consultants including Jamie Caplan Consulting, Kimley Horn, and Stetson Consulting, as well as state governmental bodies such as the California Office of Planning and Research,

the California Office of Environmental Health Hazards Assessment, the California Department of Public Health, and the California Energy Commission. In 2022, the Pala Band of Mission Indians made new connections with medical professionals at the University of Colorado, Anschutz School of Medicine, which resulted in multiple presentations on the health impacts of climate change on Tribes and an opportunity for Project Director, Shasta Gaughen, to contribute as an author to a successfully submitted article. The Pala Band of Mission Indians also recognized that while the COVID-19 pandemic posed many challenges, it increased their comfort with virtual meetings which allowed for greater interactions with stakeholders, including fellow Tribes and organizations dedicated to Tribal public health and climate change.

Partnerships for the Sitka Tribe of Alaska 2020-2023

The Sitka Tribe of Alaska, as part of the Climate Ready Tribes initiative, expanded and enhanced its partnerships from 2020 to 2023. They engaged with multiple partner Tribes and organizations. Notably, they collaborated with the Kodiak Area Native Association to host a workshop and training for 10 Tribes on Kodiak Island as well as establishing a relationship with the Hoonah Indian Association. They also established relationships with vendors such as a new microscope vendor as well as engaged with multiple Tribes interested in their self-produced training video. Presenting at the Alaska Forum on the Environment allowed the Sitka Tribe of Alaska to establish numerous partnerships and collaborations with relatively distant Tribes/Tribal Health Organizations

such as Norton Sound Health Corporation (representing 21 Tribes), Chugach Regional Resources Commission (representing 12 Tribes), and many individual Tribes throughout Alaska, including connections with five Tribes, three regional Native corporations (representing 43 Tribes). They established new partnerships with Alaska Department of Fish and Game, Tidelines Institute, Oregon State University, and US Forest Service, and fostered a partnership with the Wild Salmon Center. The Sitka Tribe of Alaska also strengthened existing relationships with 17 SEATOR partners, Kachemak Bay Research Reserve, Hakai Institute, Alaska Ocean Observing System staff, Alaska Harmful Algal Bloom staff, State of Alaska, NOAA, and the National Indian Health Board.

Lessons learned AND MODIFICATIONS

Lessons and Modifications for the Lummi Nation 2020-2023

Over the course of 2020 to 2023, Lummi Nation's Climate Ready Tribes project operated through challenging conditions. The project required adaptability due to the unprecedented disruption wrought by the COVID-19 pandemic. They transitioned to remote communications via phone and online meeting forums such as Zoom or Facebook Live. They successfully pivoted to virtual events. They also learned that preparedness for the unexpected, such as changing health risks related to shellfish biotoxin levels, for example those causing paralytic shellfish poisoning versus risk of vibrio bacteria illness, meant flexible strategies are necessary for prompt response. The project staff also learned that patience is crucial when working within large government working groups, but also requires a balance of consequent follow through. Building and maintaining connections with Lummi community members and developing trust is fundamental to effective communication and decision-making particularly on delivering

messaging on shellfish biotoxins and health. Relationships take time to cultivate but are essential for community receptivity. On a practical note, when communicating with the public, character limitations can hinder messaging, the program switched from one method with character limitations to one without in order to provide symptom descriptions bettering community understanding of the health risks.

Regarding modifications for the Lummi Nation, in 2020 a modification resulted between the project and the Salish Sea Research Center due to the closure of their lab during the COVID-19 pandemic; the project pivoted to the development and creation of an educational video on HABs. This endeavor also experienced challenges as the project was also hindered by social distancing and shelter-in-place directives. Cancellation of in-person outreach events also hindered partnership development with the Lummi Health Clinic as were national meetings and presentations.

In 2021, the community engagement around climate change impacts on shellfish was postponed opting instead to collaborate on with a larger climate change working group incorporating sea level rise predictions for risk assessment slated for the following year. In 2022, objective 1 shifted from a clam bake to a clam

feast with cultural respect in mind. That same year, objective 3 was modified as it was no longer required that year. Objective 4 modified the plan to create language flashcards to refrigerator magnets that included Lummi traditional foods with both Lummi and English descriptors.

Lessons and Modifications for the Pala Band of Mission Indians 2020-2023

The Pala Band of Mission Indians gleaned several valuable lessons from their Climate Ready Tribes project from 2020 to 2023. They successfully implemented their community-informed adaptation plan focusing on well-being. However, the project experienced challenges of garnering community engagement, particularly during the COVID-19 pandemic when people were required to shelter-in-place. The Tribe was able to pivot to webinars and online meetings and communication methods and relying on partnerships, particularly the intertribal groups in support higher engagement and increased interest in the health effects of climate change and how to plan for them. They learned that strengthened relationships and partnerships enhance their ability to pursue Tribal grant opportunities regionally. These relationships also increased engagement in climate change health impacts and mitigation strategies. COVID-19 also underscored the urgency of emergency notifications, emergency preparedness, psychosocial resilience, and mental well-being. Learning from these experiences, the Tribe continued to advance collective knowledge through webinars and expert

trainings such as its training mini-series, “Getting Ahead of Climate Trauma.” Virtual proved successful in engaging participants as well as hosting outdoor community events.

Modifications for the Pala Band of Mission Indians included in a change based on a PEDAG determination that the FEMA IPAWS system was not the best fit for Tribe’s emergency notification needs. Instead, they implemented a customized text alert system, using an opt-in system that allowed the Tribe to push text notifications for disaster and emergency alerts and other critical community information. This system also allowed outreach systems to push COVID emergency communications and planning as eligible activities under our grant. In 2021, the Pala Band of Mission Indians modified objective 2 reflecting the Tribe’s emergency planning consultant advisement that a full emergency planning process should be iterative and would require more time to do properly. They identified critical elements of emergency planning that provided building blocks for the remaining elements of the plan.

Lessons and Modifications for the Sitka Tribe of Alaska 2020-2023

Lesson learned for the Sitka Tribe of Alaska for 2020 to 2023 during their participation in the National Indian Health Board’s Climate Ready Tribes initiative are valuable for other Tribes looking to build their capacity and resiliency to the adverse health impacts from climate change. Challenges experienced in the implementation process included logistical hurdles like interruptions or difficulty in supply procurement. Mitigation strategies include ordering supplies early and the establishment of relationships with trusted vendors. The Sitka Tribe of Alaska worked with numerous Tribes with varying levels of capacity. To meet the varying needs, the project developed scalable processes and programs adaptable to partner capabilities. They built upon existing environmental programs within partner Tribes; this approach facilitated program expansion and data validity and capitalized on multi-year collaborations to build or support stability and sustainability. In 2022, they recognized the importance of setting up a mock system in a local watershed before field deployment, allowing for troubleshooting and system fixes before actual set up in remote sites. They also realized the need for specific tools like a cordless masonry drill for unexpected site conditions. In 2023, the importance of sincere engagement in collaborations is critical to program success. This was highlighted in their partnership with the USFS, whose subsistence biologist took time to engage in meaningful discussion in program implementation and work, facilitating many of the collaboration’s successes. However, lengthy approval processes for partnership agreements and technical

capacity, for example in developing R code, was challenging and emphasized the need for more efficient collaboration mechanisms and technical development or support.

The Sitka Tribe of Alaska worked with numerous Tribes with varying levels of capacity and developed scalable processes and programs.

The Sitka Tribe of Alaska modified its project in 2021 due to the COVID-19 pandemic and the resulting shortage of certified reference materials. This change required them to adjust their analysis procedures, leading to slight delays. Regional meetings, originally set to conclude by March 15, 2021, were extended due to stakeholder input and value for the meetings which support community-building and process improvement. Surveys for tribal stakeholders were postponed ensuring that gaps could be addressed. In 2022, the project partnered with the Hoonah Indian Association, utilizing 23 game cameras for river restoration tracking and enhancing image analysis protocols. An additional monitoring station was installed in Hoonah, Alaska, on Spasski Creek.



Conclusion

The Climate Ready Tribes initiative through the experiences of the Lummi Nation, Pala Band of Mission Indians and the Sitka Tribe of Alaska provides models in community engagement, partnership development, in priority setting, decision-making, and program development designed to enhance American Indian and Alaska Native Tribal capacity and a resilience to address climate-related health issues.

Evaluation and lessons learned from the Tribes underscore the importance of flexibility, community and Tribal leadership involvement, and the power of collaboration in mitigating the adverse impacts on health that climate change poses to Tribes and their communities. Looking forward, it is essential to build upon these successes and lessons outlined herein to meet the individual needs of Tribes, who bear an outsized burden of the oft devastating and life-threatening impacts resulting from climate change. ***These Tribes offer models for resilience that can inform and inspire other communities facing similar challenges.***



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