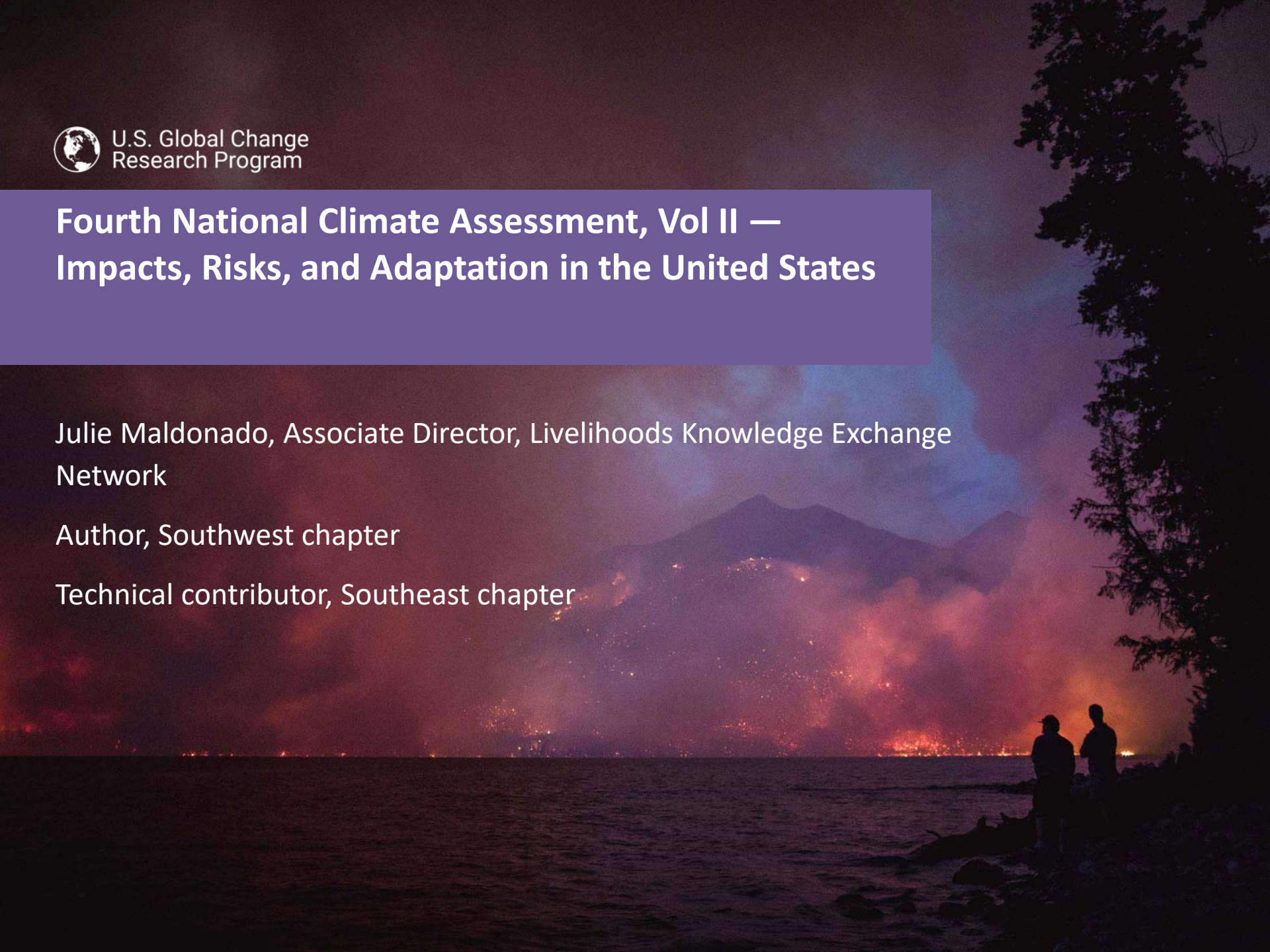

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Fourth National Climate Assessment, Vol II — Impacts, Risks, and Adaptation in the United States

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Fourth National Climate Assessment, Vol II — Impacts, Risks, and Adaptation in the United States

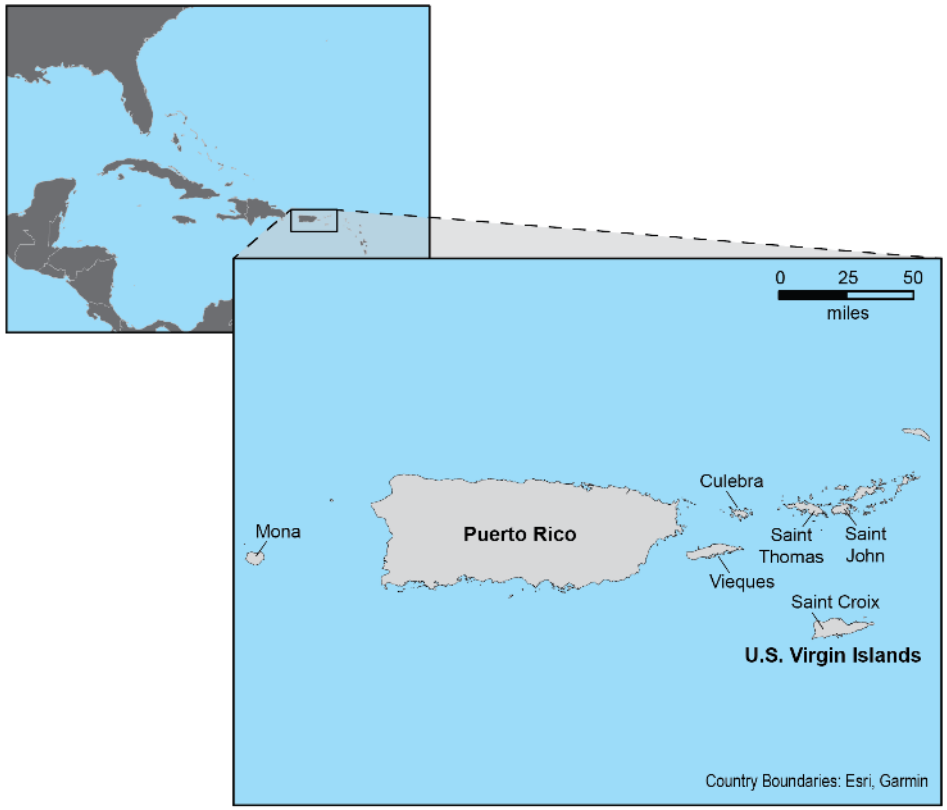
Chapter 20 | U.S. Caribbean

Chapter authors: Gould, W.A., E.L. Díaz, (co-leads), N.L. Álvarez-Berríos, F. Aponte-González, W. Archibald, J.H. Bowden, L. Carrubba, W. Crespo, S.J. Fain, G. González, A. Goulbourne, E. Harmsen, E. Holupchinski, A.H. Khalyani, J. Kossin, A.J. Leinberger, V.I. Marrero-Santiago, O. Martínez-Sánchez, K. McGinley, P. Méndez-Lázaro, J. Morell, M.M. Oyola, I.K. Parés-Ramos, R. Pulwarty, W.V. Sweet, A. Terando, and S. Torres-González, 2018: U.S. Caribbean.

Read the full chapter:
https://nca2018.globalchange.gov/chapter/caribbean

Fig. 20.1: U.S. Caribbean Region

The U.S. Caribbean includes the Commonwealth of Puerto Rico and the territory of the U.S. Virgin Islands. The region includes seven inhabited islands and nearly 800 smaller islands and cays.



20 Key Messages

KM1 Freshwater: reduced rainfall, constrained freshwater availability; increasingly intense extreme rainfall events and flooding

KM2 Marine Resources: threatened by changes in ocean surface temperature, ocean acidification, sea level rise, and changes in the frequency and intensity of storm events

KM3 Coastal Systems: Sea level rise, combined with stronger wave action and higher storm surges, will worsen coastal flooding and increase coastal erosion

KM4 Rising Temperatures: will likely lead to decreases in agricultural productivity, changes in habitats and wildlife distributions, and risks to human health

KM5 Disaster Risk Response to Extreme Events: Increasing hurricane intensity and associated rainfall rates will likely affect human health and well-being

KM6: Increasing Adaptive Capacity Through Regional Collaboration

20 Adaptation & Resilience

Traditional fishing, subsistence agriculture, and plant harvesting practices may provide a better understanding of how Caribbean Indigenous knowledge systems have sustained generations in the past and can benefit future generations.

When considering climate effects and adaptation in the Caribbean, traditional knowledge from those members of the community maintaining the most intimate relationships with the land and natural systems is key to the early stages of the planning process.

Increased resilience will depend on collaboration and integrated planning, preparation, and responses across the region.

Fig. 20.15: Hurricane Impacts in 2017

In September 2017, the U.S. Caribbean region was impacted by two major hurricanes: Irma (Category 5) and Maria (Categories 4 and 5). This figure shows the hurricanes' tracks across both the Caribbean and (inset) the U.S. Caribbean region, as well as (A–E) some of the impacts felt throughout the region. *Sources: (tropical cyclone tracks) NOAA NCEI and ERT, Inc. Photo credits: (A) Ricardo Burgos; (B) Ernesto Díaz, Puerto Rico DNER; (C) Michael Doig, NOAA; (D) Joel Figuero; (E) Greg Guannel, The University of the Virgin Islands.*

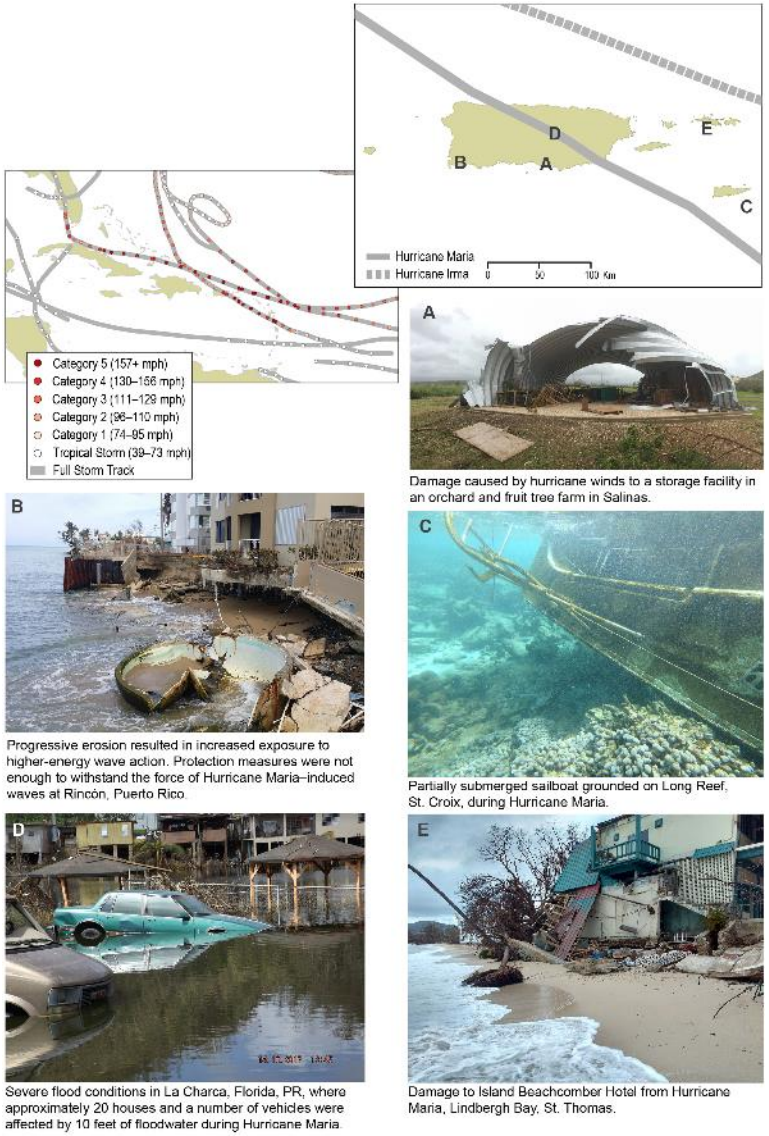


Fig. 20.13: Assessing Vulnerability with Communities

Culebra's Mayor and community members worked on the participatory maps to identify risks, important natural resources, infrastructure, and important services to the community in Culebra. This exercise allowed them to gather information about issues in the territory that are important to the community but not commonly reflected in maps. *Photo credit: Vanessa Marrero, Puerto Rico Department of Natural and Environmental Resources.*

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Chapter 19 | Southeast

Chapter authors: **Carter**, L., A. Terando, K. Dow, K. Hiers, K.E. Kunkel, **A. Lascurain**, D. Marcy, M. Osland, and P. Schramm, 2018: Southeast.

Read the full chapter:
https://nca2018.globalchange.gov/chapter/southeast

19 Key Messages

KM1 Urban Infrastructure and Health Risks: The Seminole Tribe of Florida assessed flooding and sea level rise threats to their water infrastructure and developed potential adaptation measures.

KM2 Increasing Flood Risks in Coastal and Low-Lying Regions: Many have chosen to stay in their homelands, while others have few options but to relocate. Several communities are already discussing the complexities of relocation; most are tribal and Indigenous communities.

KM3 Natural Ecosystems Will Be Transformed : As a result, the ecological resources that people depend on for livelihood, protection, and well-being are increasingly at risk.

KM4 Economic and Health Risks for Rural Communities.

Fig. 19.11: Isle de Jean Charles Planning Meeting

Chantel Comardelle, Isle de Jean Charles Tribe's Executive Secretary, leads a discussion at a community meeting for the Tribe's resettlement planning process in Pointe-aux-Chenes, Louisiana, on January 18, 2016. The meeting was supported by the Lowlander Center. *Photo credit: The Lowlander Center Team.*

Case Study: A Lesson Learned for Community Resettlement: Isle de Jean Charles Band of Biloxi-Chitimacha-Choctaw Tribe

Fig. 19.20: Mountain Ramps

Case Study: Mountain Ramps

The Cherokee have been harvesting ramps, a wild onion, in the southern Appalachians, their ancestral homelands, for thousands of years, for food sustenance and the family-bound harvesting techniques make up part of the deeply held tribal lifeways.

In the southern Appalachians, ramps are threatened by overharvesting pressures and a changing climate that could expose these plants to higher temperatures and lower soil moisture conditions during sensitive growth periods.

This up-close image of a ramp (*Allium tricoccum*), harvested from the wild, shows leaves and the bulb/corm of the plant. *Photo credit: Gary Kaufman, USDA Forest Service Southern Research Station.*

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Chapter 25 | Southwest

Chapter authors: Gonzalez, P., G.M. Garfin, D.D. Breshears, K.M. Brooks, H.E. Brown, E.H. Elias, A. Gunasekara, N. Huntly, **J.K. Maldonado**, N.J. Mantua, H.G. Margolis, S. McAfee, **B.R. Middleton**, and B.H. Udall, 2018: Southwest.

Read the full chapter:
https://nca2018.globalchange.gov/chapter/southwest

25 Key Messages

KM1 Water Resources: Drought and increasing heat intensify the arid conditions of reservation lands where the US restricted some tribal nations to the driest portions of their traditional homelands.

KM2 Ecosystems and Ecosystem Services: Decline of Southwest forests and other ecosystems as a result of recent droughts and wildfire

KM3 The Coast: Many coastal resources have been affected by sea level rise, ocean warming, reduced ocean oxygen and ocean acidification.

KM4 Indigenous Peoples

KM5 Energy: The ability of hydropower and fossil fuel electricity generation to meet growing energy use is decreasing as a result of drought and rising temperatures.

KM6 Food: production in the Southwest is vulnerable to water shortages.

KM7 Human Health: The loss of stability and certainty in natural systems may affect physical, mental, and spiritual health of Indigenous peoples with close ties to the land. For example, extended drought raises concerns about maintaining Navajo Nation water-based ceremonies essential for spiritual health, livelihoods, cultural values, and overall well-being.

Key Message 4

Traditional foods, natural resource-based livelihoods, cultural resources, and spiritual well-being of Indigenous peoples in the Southwest are increasingly affected by drought, wildfire, and changing ocean conditions. Because future changes would further disrupt the ecosystems on which Indigenous peoples depend, tribes are implementing adaptation measures and emissions reduction actions.

Droughts have contributed to declines in traditional Indigenous staple foods. Wildfires affect traditional resources.

Reduced availability of traditional foods often contributes to poorer nutrition and an increase in diabetes and heart disease. Changes in plant and animal ranges can also affect mental and spiritual health, disrupting cultural connections to disappearing plant and animal relatives and to place-based identity and practices.

Ocean warming affects salmon and other fish on which Pacific Coast tribes rely.

Historical intergenerational trauma, extractive infrastructure, and socioeconomic and political pressures reduce adaptive capacity.

Traditional ecological knowledge of specific plants and habitats can enable Indigenous peoples to provide early detection of invasive species and support to ecological restoration. Some tribes use their knowledge to reintegrate traditional foods into their diets. Others use TEK to guide natural resource management. And some tribes are developing climate adaptation plans.

Fig. 25.7: Cultural Fire on Yurok Reservation

Andy Lamebear, a Yurok Wildland Fire Department firefighter and Yurok tribal member, ignites a cultural burn on the Yurok Reservation. The tribe uses low- to medium- intensity fires to enhance the production of plant-based medicines, traditional basket materials, native fruits, and forage for wildlife. Cultural burning also reduces risks of catastrophic wildfire. *Photo courtesy of the Yurok Tribe.*

Many Indigenous peoples in the Southwest region have traditionally used fire as a tool central to cultural and spiritual practices. Reintroduction of cultural burning by the Yurok Tribe in northern California reduces wildfire risks and protects public and tribal trust resources.

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Fourth National Climate Assessment, Vol II — Impacts, Risks, and Adaptation in the United States

Chapter 24 | Northwest

Chapter authors: May, C., C. Luce, J. Casola, **M. Chang**, J. Cuhaciyan, M. Dalton, S. Lowe, **G. Morishima**, P. Mote, A. Petersen, G. Roesch-McNally, and E. York, 2018: Northwest.

Read the full chapter:
https://nca2018.globalchange.gov/chapter/northwest

24 Key Messages

KM1 Natural Resource Economy: Climate change has already impacted rural and Tribal natural resource economies and will continue to impact these economies in the future.

KM2 Natural World and Cultural Heritage: Many traditional First Foods, such as berries, water, fish, and game species, will have varied responses to climate change.

KM3 Infrastructure: Sea level rise and coastal flooding threaten many coastal Tribes.

KM4 Health: Tribes and Indigenous peoples face multiple physical and mental health risks related to climate change, from exacerbating chronic illnesses to long-term health impacts from potential losses of subsistence and cultural resources. Incorporating more Indigenous-based health and wellness considerations in climate decision-making can increase a community's resilience.

KM5 Frontline Communities: For tribal and Indigenous peoples, in addition to cumulative climate impact exposures, historical trauma from European colonization couple with the ongoing (and legacies) of management barriers has led to many challenges for tribal and Indigenous climate resilience. Strong networks, both within a community and across the region, can strengthen the resilience of Tribes and Indigenous Peoples in the NW.

Fig. 24.6: First Salmon Ceremony of the Lummi Tribe, Washington

First Salmon ceremony of the Lummi Tribe, Washington. Tribes in the Northwest typically honor the first salmon caught in the season through Tribal ceremonies. *Photo credit: Northwest Indian Fisheries Commission (CC BY 3.0).*

Salmon, an iconic NW species and sacred First Food for NW Tribes, has already shown to be negatively impacted by climate change. Future climate impacts will increase salmon mortality across all phases of its life cycle. Species habitat range shifts under future climate scenarios may shift culturally-important species outside of traditional areas. Tribes can increase their adaptive capacity through Indigenous planning and management.

Fig. 24.10: Coastal Flooding in the Quinault Indian Nation

Coastal floodwaters inundated the Quinault Indian Nation's lower village of Taholah in March 2014. This event, and continuing concerns about future climate change, prompted the village to begin relocation to higher ground. *Photo credit: Michael Cardwell.*

Fig. 24.14: Collaborations Can Use Existing Social Cohesion to Build Resilience

Social cohesion and social networks can help communities adapt to changing climate conditions. One example is the Pacific Northwest Tribal Climate Change Network. The Network provides a forum for tribes to work together and with, universities, Federal agencies, and private and non-profit organizations to share information, strengthen connections, and build resilience through events such as the 2017 Tribes and First Nations Climate Summit hosted by the Tulalip Tribes and co-sponsored by the Affiliated Tribes of Northwest Indians, the North Pacific Landscape Conservation Cooperative, and the Pacific Northwest Tribal Climate Change Project. Photo credit: Peggy Harris, Affiliated Tribes of Northwest Indians.

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Thank you!

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