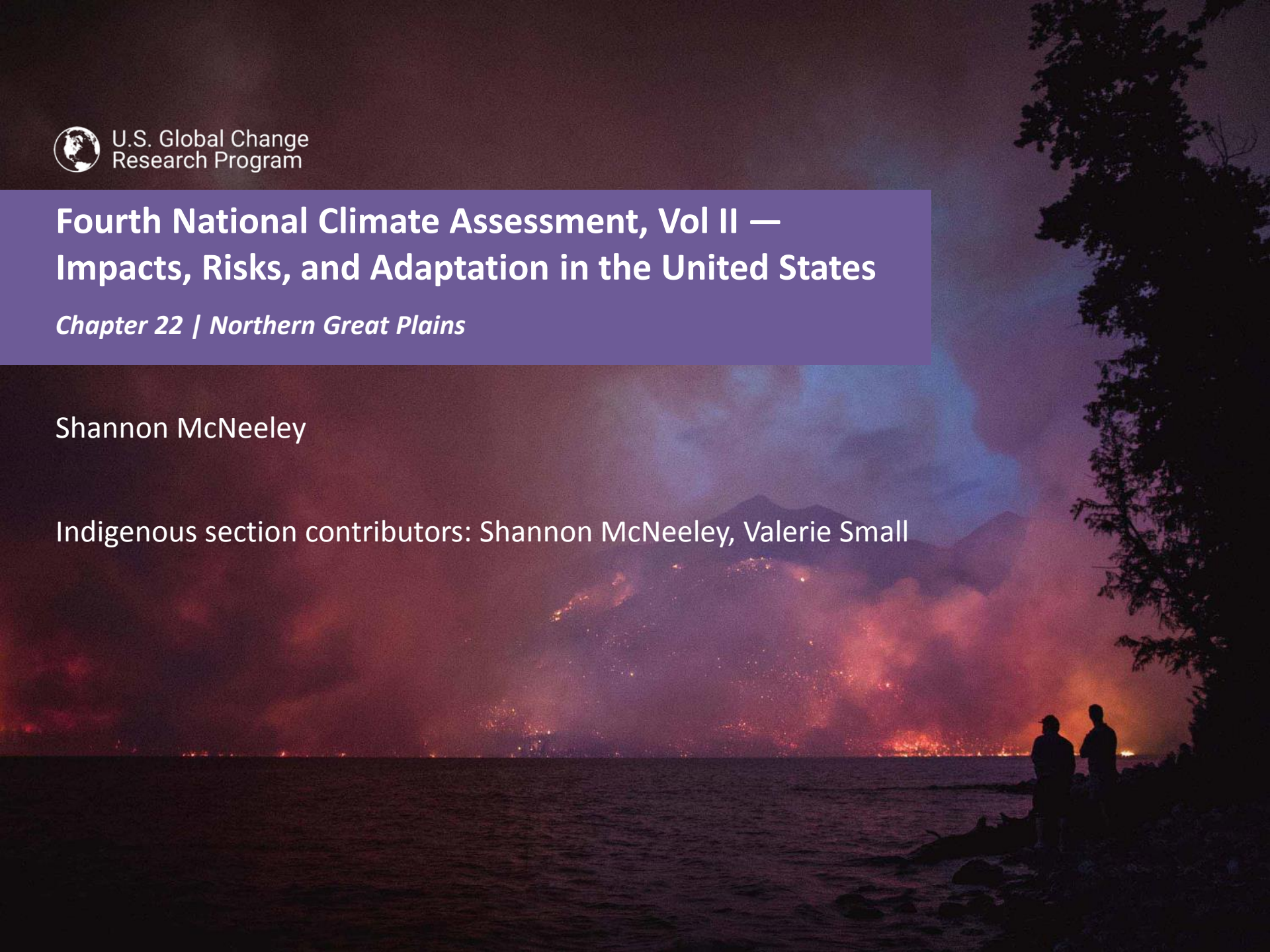


Fourth National Climate Assessment, Vol II — Impacts, Risks, and Adaptation in the United States

Chapter 22 | Northern Great Plains

Shannon McNeeley

Indigenous section contributors: Shannon McNeeley, Valerie Small



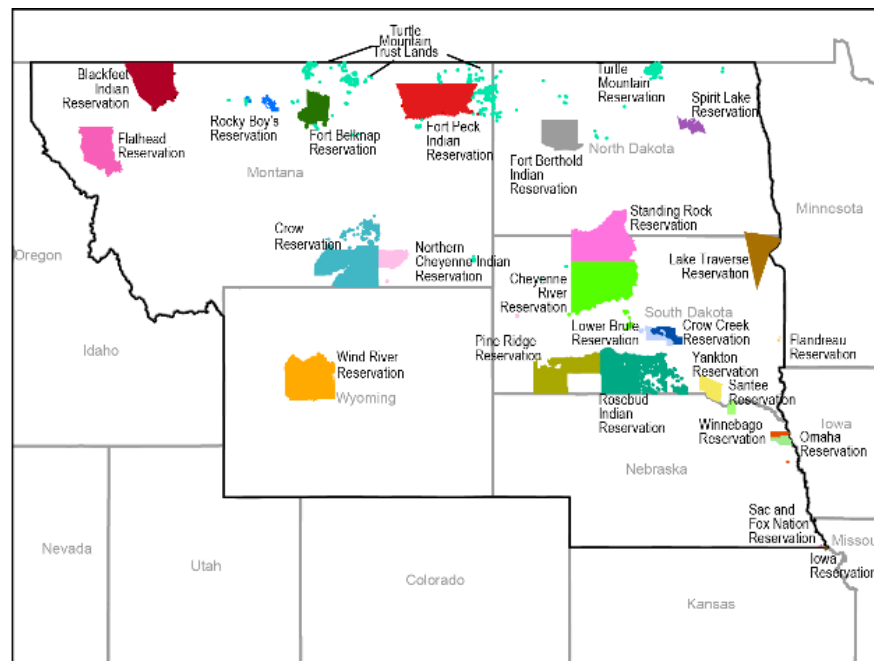
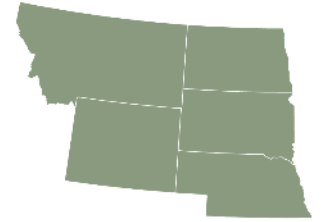


Fig. 22.7: Northern Great Plains Tribal Lands

The map outlines reservation and off-reservation tribal lands in the Northern Great Plains, which shows where the 27 federally recognized tribes have a significant portion of lands throughout the region. Information on Indigenous peoples' climate projects within the Northern Great Plains are described in Chapter 15: Tribes and Indigenous Peoples. *Sources: created by North Central Climate Science Center (2017) with data from the Bureau of Indian Affairs, Colorado State University, and USGS National Map.*

22 Key Message #5



Indigenous Peoples

Indigenous peoples of the Northern Great Plains are at high risk from a variety of climate change impacts, especially those resulting from:

- ❖ Hydrological changes, including changes in snowpack, seasonality and timing of precipitation events, and extreme flooding and droughts as well as melting glaciers and reduction in streamflows.
- ❖ These changes are already resulting in harmful impacts to tribal economies, livelihoods, and sacred waters and plants used for ceremonies, medicine, and subsistence.
- ❖ At the same time, many tribes have been very proactive in adaptation and strategic climate change planning.

Table 22.4: Reservation Irrigation Projects: Deferred Maintenance and Replacement Costs

This table shows deferred maintenance and replacement costs for U.S. Bureau of Indian Affairs irrigation projects on six Northern Great Plains reservations (in 2014 dollars).

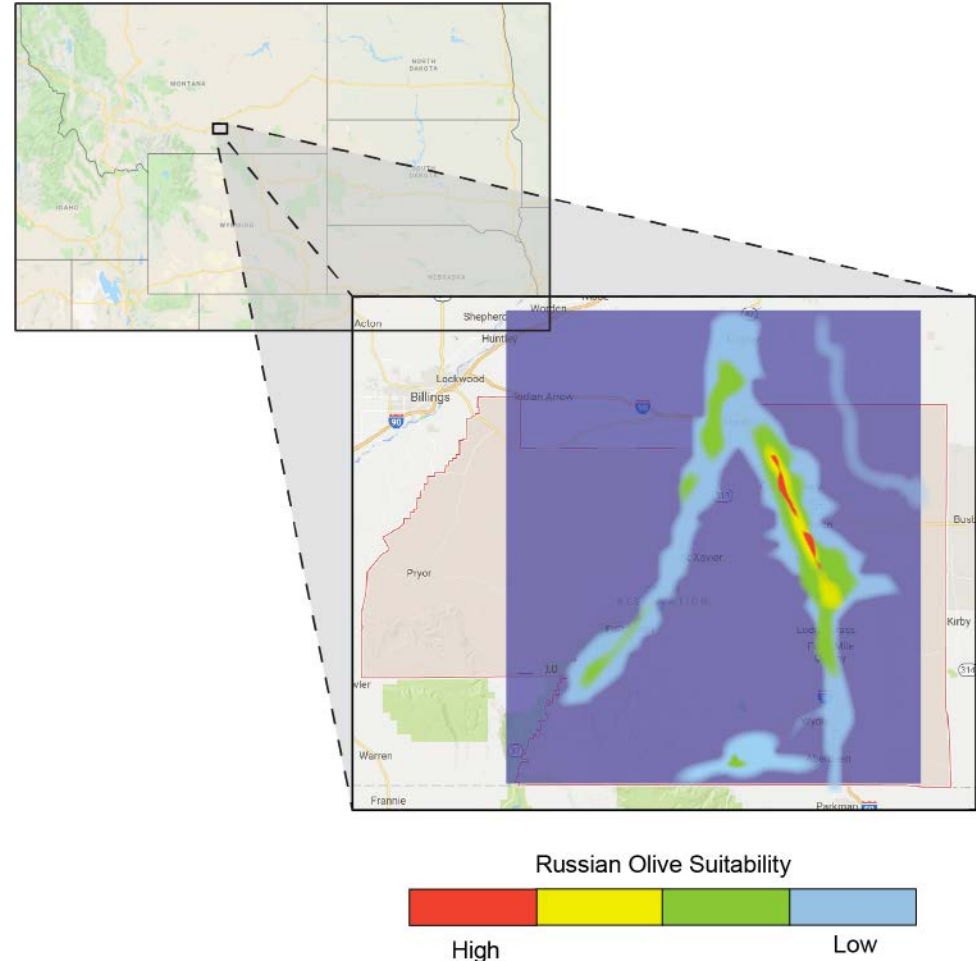
Source: U.S. Government Accountability Office 2015. [126](#)

Irrigation Project	Deferred Maintenance for FY 2014	Replacement Value
Blackfeet	\$26,000,000	\$50,000,000
Flathead	\$82,000,000	\$237,000,000
Fort Belknap	\$8,000,000	\$19,000,000
Fort Peck	\$13,000,000	\$33,000,000
Crow	\$17,000,000	\$59,000,000
Wind River	\$30,000,000	\$93,000,000
Total	\$176,000,000	\$491,000,000

Fig. 22.8: Projected Expansion of Russian Olive Habitat

The map shows the projected expansion by 2021 of Russian olive habitat. Warmer colors indicate favorable habitat for future spread of Russian olive based on mapped presence points along the Little Bighorn and Bighorn Rivers within the Crow Indian Reservation in south central Montana. The Crow Reservation is outlined and shaded in red. Purple areas are outside of the suitability zone.

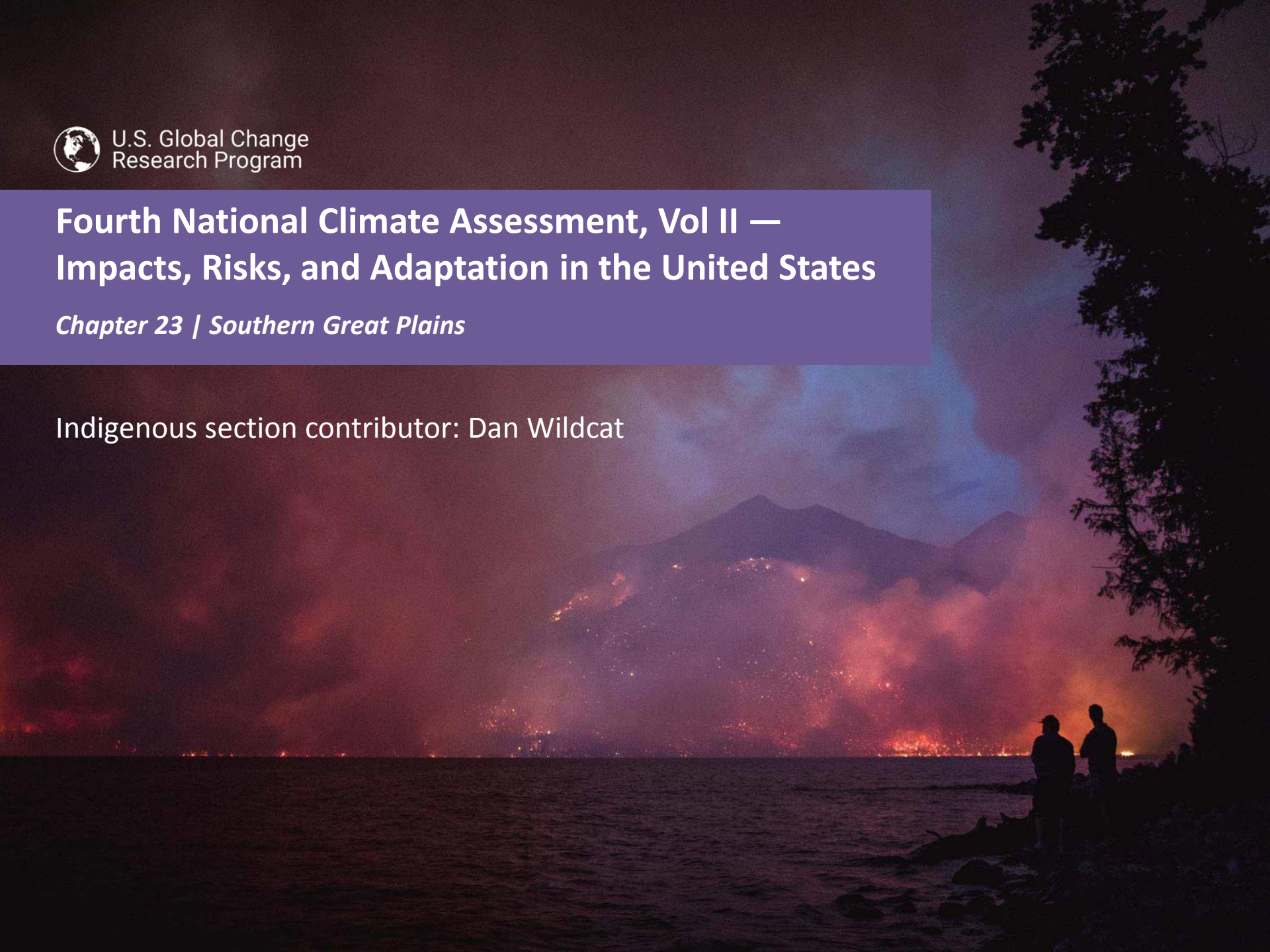
*Source: University of Arizona.
Map data © 2018 Google, INEGI.*



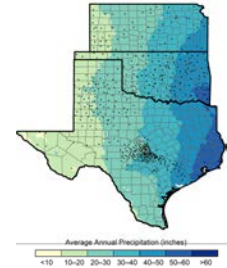
Fourth National Climate Assessment, Vol II — Impacts, Risks, and Adaptation in the United States

Chapter 23 | Southern Great Plains

Indigenous section contributor: Dan Wildcat



Key Message #5



Indigenous Peoples

Tribal and Indigenous communities are particularly vulnerable to climate change due to:

- ❖ Water resource constraints, extreme weather events, higher temperature, and other likely public health issues.
- ❖ Efforts to build community resilience can be hindered by economic, political, and infrastructure limitations,
- ❖ But traditional knowledge and intertribal organizations provide opportunities to adapt to the potential challenges of climate change.

Fig. 23.10: Cheyenne Sun Dance Ceremony

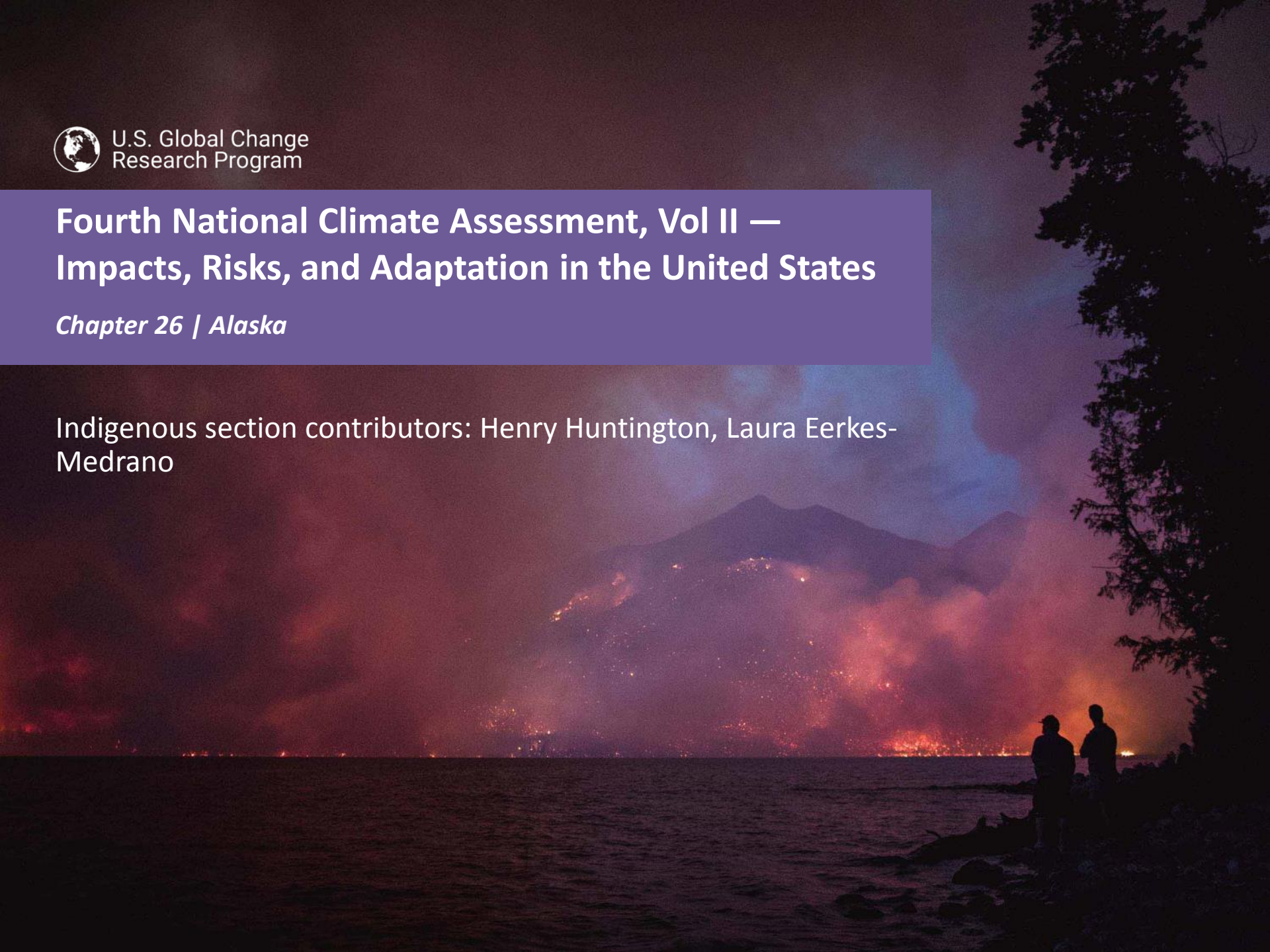
Chief Gordon Yellowman noted that **excessive heat, invasive species, and drought** threatened the Cheyenne Sun Dance ceremony. He related how natural materials are traditionally gathered for the ceremony by young men, called runners. Most significantly, **willow branches for shade arbors were increasingly hard to find** given the prolonged drought experienced in western Oklahoma. In areas where natural materials were gathered for the ceremony, invasive **poison ivy was now present, with the vines choking out willow saplings and taking over**. Many of the young men were **poisoned** to such an extent that they had to seek medical attention beyond traditional medicines in order to participate in the most important ceremony for the Cheyenne. In addition, an increase in the occurrences of **heat illness at these ceremonies** is preventing some tribal members from participating in or completing the ceremony.



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

Chapter 26 | Alaska

Indigenous section contributors: Henry Huntington, Laura Eerkes-Medrano



Key Message #4

Indigenous Peoples

- ❖ The subsistence activities, culture, health, and infrastructure of Alaska's Indigenous peoples and communities are subject to a variety of impacts, many of which are expected to increase in the future.
- ❖ Flexible, community-driven adaptation strategies would lessen these impacts by ensuring that climate risks are considered in the full context of the existing sociocultural systems.



Fig. 26.6: Variable Weather Affects Harvest Levels

These images of marine mammal meat drying on racks in Gambell, Alaska, in (a) June 2012 and (b) July 2013 illustrate the interannual variability of harvests due to sea ice and weather conditions and suggest what the future may hold if ice and weather trends continue. *Photo credit: Henry P. Huntington.*

Box 26.1: Polar Bears and Walruses

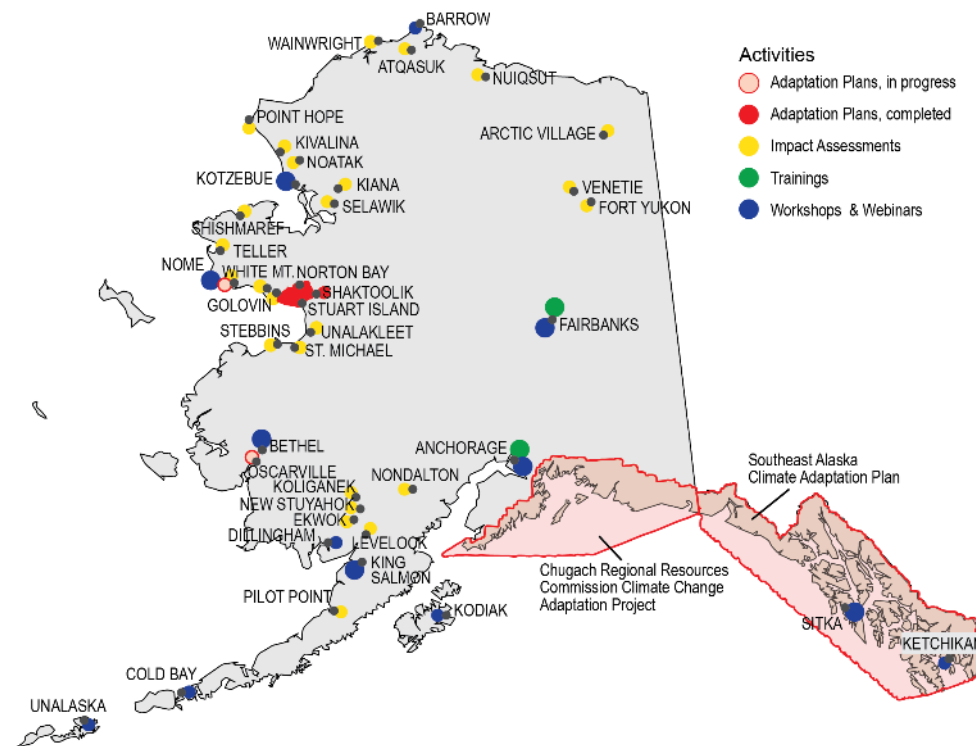
Polar bears and walruses are both dependent on sea ice during parts of their lives. Polar bears rely on sea ice to access prey and establish maternal dens, and Pacific walruses rely on drifting sea ice as a platform to rest on between foraging dives. Changes in the distribution of seasonal sea ice have resulted in changes in the behavior, migration, distribution, and, in some areas, population dynamics of both species. Changes in spring ice melt have affected the ability of Alaska coastal communities to meet their walrus harvest needs, resulting in low harvest levels in several recent years. Ongoing research seeks to forecast the population-level consequences of sea ice changes for polar bears and walruses by studying the animals' behavior changes, especially in response to increased shipping and changes in subsistence harvest practices. Changes in the ability of Indigenous communities to access these two species in the future may be harder to assess, but that access will be crucial for the short- and long-term hunting success and resultant well-being of the communities.



Figure 26.2: (a) An adult female polar bear and cub are shown near Kaktovik, Alaska, in September 2015. (b) Walruses gathered on the shores of the Chukchi Sea near Point Lay, Alaska, in September 2013. Photo credits: (a) Stewart Breck, USDA (b) Ryan Kingsbery, USGS.

Fig. 26.9: Adaptation Planning in Alaska

The map shows tribal climate adaptation planning efforts in Alaska. Research is considered to be adaptation under some classification schemes.^{1,2} Alaska is scientifically data poor, compared to other Arctic regions.³ In addition to research conducted at universities and by federal scientists, **local community observer programs exist through several organizations**, including the National Weather Service for weather and river ice observations;⁴ the University of Alaska for invasive species;⁵ and the Alaska Native Tribal Health Consortium for local observations of environmental change.⁶ Additional examples of community-based monitoring can be found through the website of the [Alaska Ocean Observing System](#).⁷ Source: adapted from Meeker and Kettle 2017.⁸



Box 26.2: Iñupiat Work to Preserve Food and Traditions on Alaska's North Slope

Local traditional foods are important for nutritional, spiritual, cultural, and social benefits. Many of these foods are sometimes stored in traditional underground ice cellars kept cold by the surrounding permafrost. With warming climate conditions, many of these ice cellars are beginning to thaw, increasing the risks for foodborne illness, food spoilage, and even injury from structural failure. The Iñupiat community of Nuiqsut, located on Alaska's North Slope, is among the communities using new technology to improve the storage environment in existing cellars. Find out more at <https://toolkit.climate.gov/case-studies/i%C3%B1upiaq-work-preserve-food-and-traditions-alaskas-north-slope>.



U.S. Global Change
Research Program

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

Chapter 27 | Hawai‘i and U.S.-Affiliated Pacific Islands

Indigenous section contributor: Malia Nobrega-Olivera

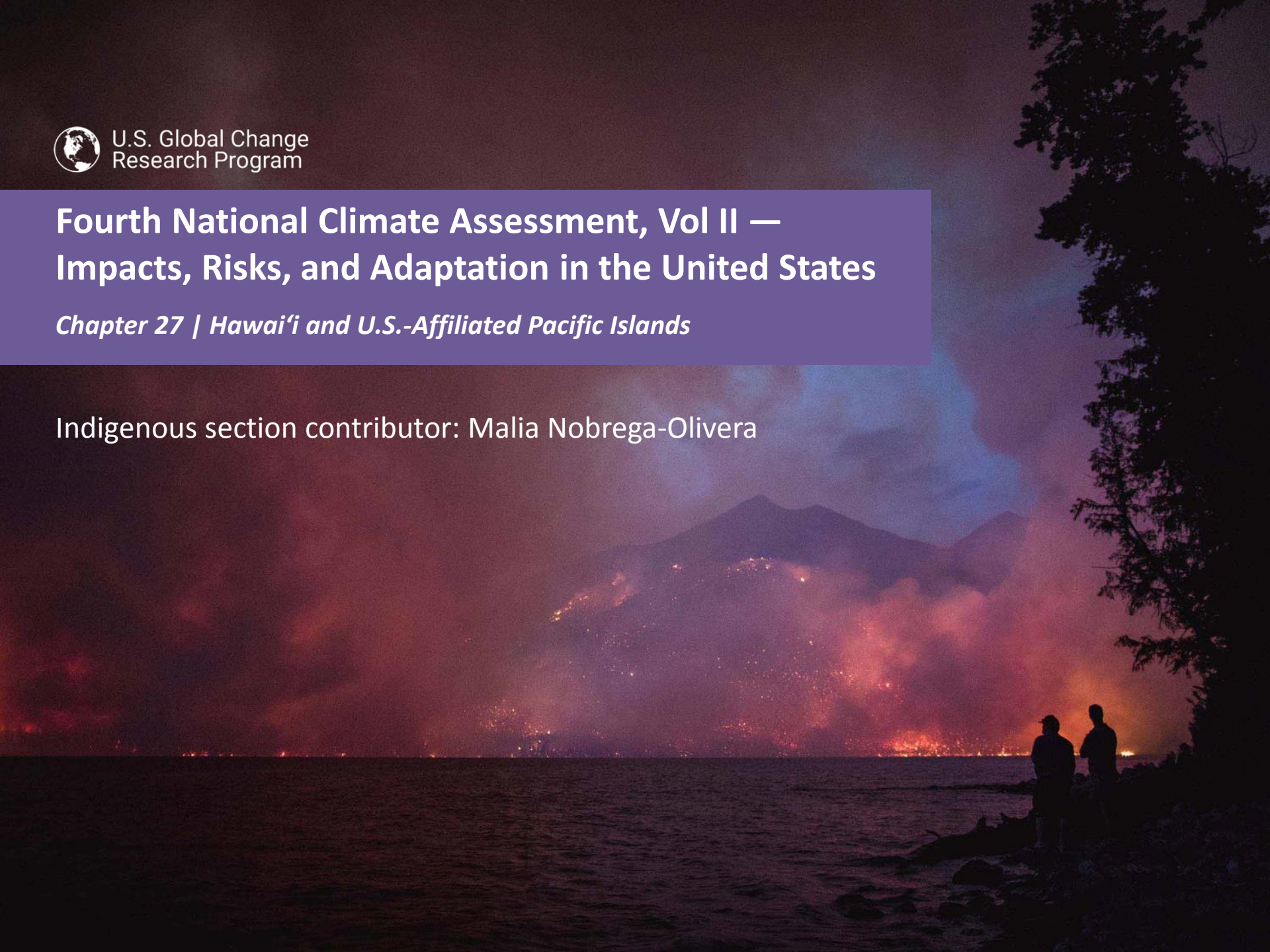
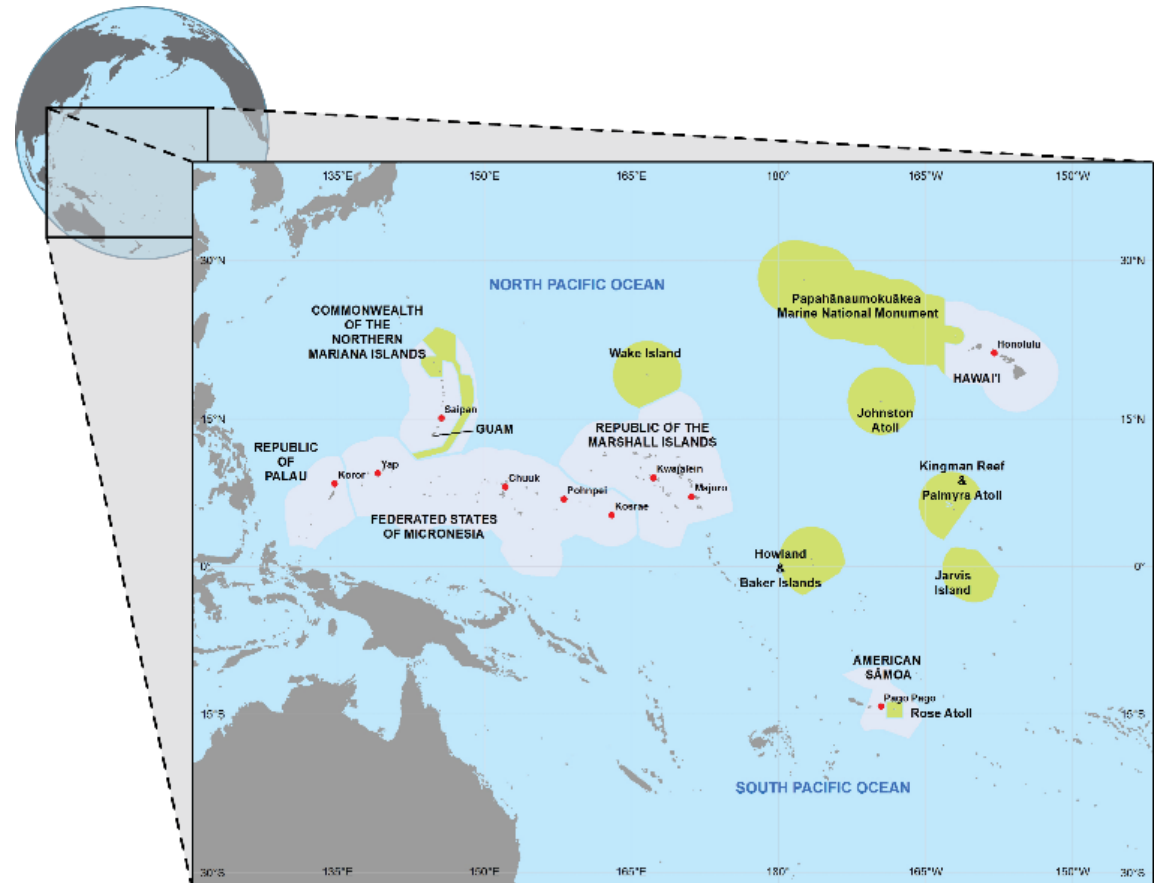


Fig. 27.1: Pacific Islands Region Map

The U.S. Pacific Islands region includes the state of Hawai'i, as well as the U.S.-Affiliated Pacific Islands (USAPI): the Territories of Guam and American Sāmoa (AS), the Commonwealth of the Northern Mariana Islands (CNMI), the Republic of Palau (RP), the Federated States of Micronesia (FSM), and the Republic of the Marshall Islands (RMI).



Key Message #5

Indigenous Communities and Knowledge

Indigenous peoples of the Pacific are threatened by:

- ❖ Rising sea levels, diminishing freshwater availability, and shifting ecosystem services.
- ❖ These changes imperil communities' health, well-being, and modern livelihoods, as well as their familial relationships with lands, territories, and resources.
- ❖ Built on observations of climatic changes over time, the transmission and protection of traditional knowledge and practices, especially via the central role played by Indigenous women, are intergenerational, place-based, localized, and vital for ongoing adaptation and survival.

- Sea level rise is faster than the global average
 - Impacts agriculture, coastal infrastructure, food security, livelihoods, and disaster management
 - Alters traditional practices such as fishpond management, salt cultivation, and nearshore fishing
- Traditional crops threatened by drought, reduced streamflow, sea level rise and saltwater intrusion
 - Increased dependence on imported food and contribution to poor health outcomes (e.g. obesity, diabetes)



Fig. 27.11 Flooding impacts salt cultivation on Kauaʻi



Fig. 27.13 Breeding saltwater tolerant taro in Palau

- **Ocean acidification and drought** will continue to negatively affect fisheries and livelihoods
 - In 2013, 12.5% of the Native Hawaiian population worked in a tourism intensive industry
- **Adaptations** include: shifting lunar and seasonal calendars for crops, salt tolerant taro cultivation, collaboration, migration

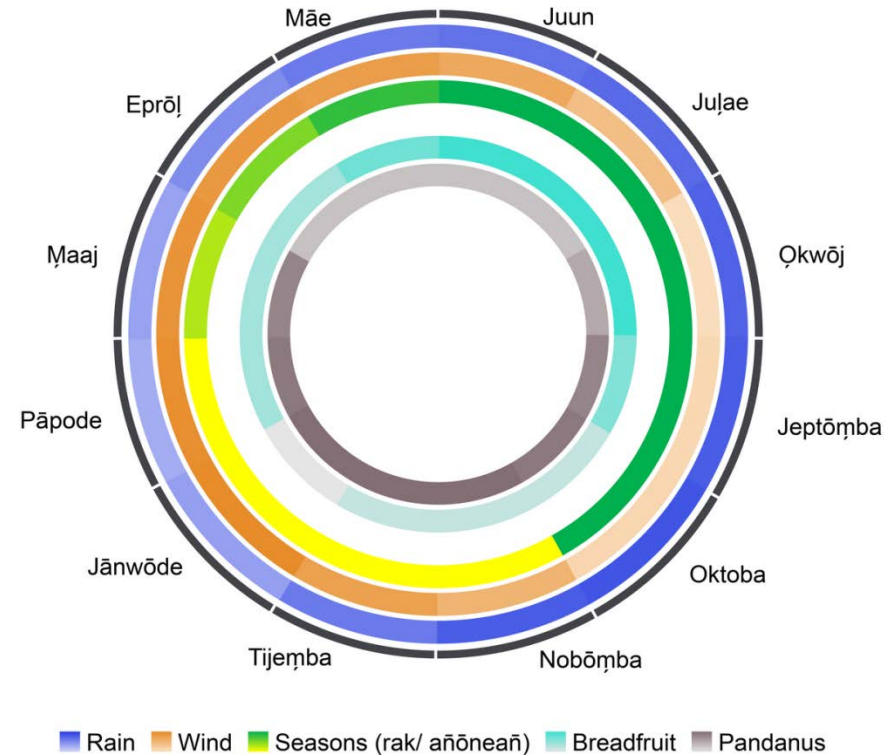


Fig.27.14 – The Marshallese Agroforestry Calendar combines ENSO data with traditional seasonal crops