4th National Climate Assessment (NCA4): NCA Overview, Alaska Chapter, and Public Feedback/Input for the 2018 Report

Dr. Fred Lipschultz
Senior Scientist, National Climate Assessment

Carl Markon
Non-Federal Chapter Lead, Alaska Chapter

February 14, 2017

U.S. Global Change Research Program

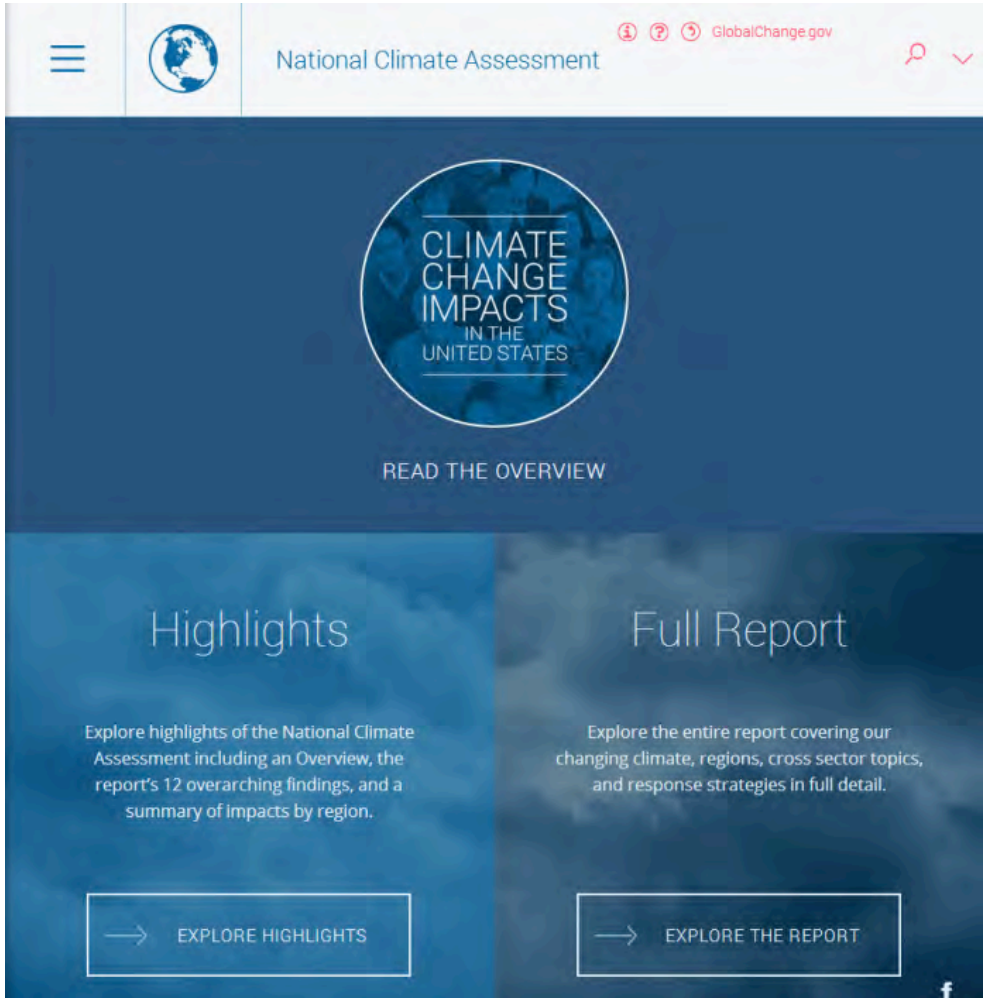
The National Climate Assessment: A Congressionally-Mandated Endeavor

Global Change Research Act of 1990 (Section 106):

…not less frequently than every 4 years, the Council… shall prepare… an assessment which –

- **integrates, evaluates, and interprets** the findings of the Program (USGCRP) and discusses the scientific uncertainties associated with such findings;
- **analyzes the effects of global change** on the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems, and biological diversity; and
- analyzes current trends in global change, both human- induced and natural, and **projects major trends for the subsequent 25 to 100 years.**

Building on the Success of NCA3



Five aspects of NCA3 (2014) were crucial to its success:

- Assessment based on broad scientific and technical inputs
- Stakeholder engagement
- Clear communication principles
- Transparency of process and information
- An extensive review process

Sustained Assessment: Vision and Motivation

Vision

The quadrennial NCA is a "**living timestamp**" on a constantly evolving and improving process

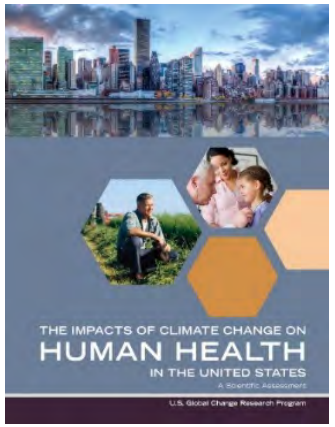
- Advancing science
- Developing targeted scientific reports and other products
- Creating a framework for enduring dialogue with various user groups so assessment products are informed by, and therefore tailored to, more specific needs and decision points

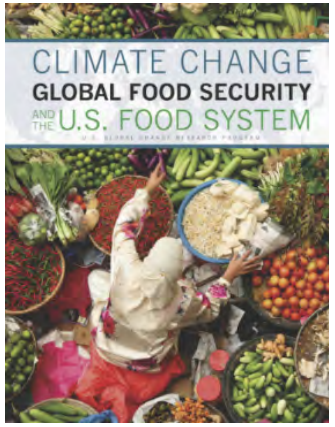
Motivation

- Avoiding ramp-up and high activation energy
- Maintaining momentum
- Mainstreaming climate considerations into decision-making

Sustained Assessment Products: Traditional

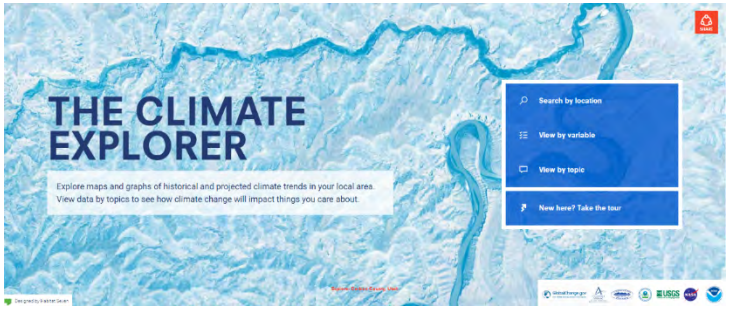
- Climate Change, Global Food Security, and the U.S. Food System *[2015]*
- The Impacts of Climate Change on Human Health in the United States *[2016]*
- SOCCR-2: The 2nd State of the Carbon Cycle Report *[2017]*
- Climate Science Special Report *[expected Fall 2017]*

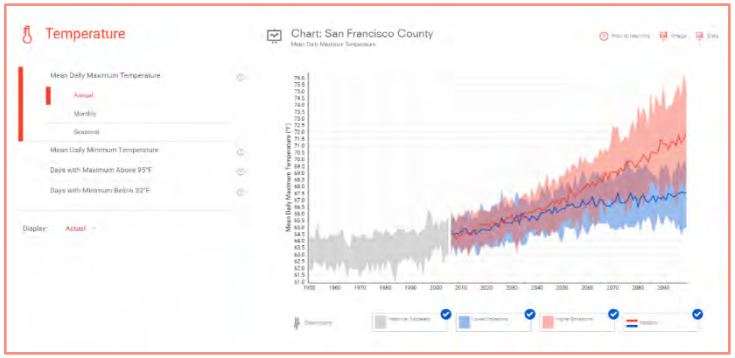




Sustained Assessment Products: Novel

- Climate Resilience Toolkit toolkit.climate.gov
- Localized Sea Level Rise / Land Use / Population scenarios
- LOCA dataset + GCM weighting
- Indicators www.globalchange.gov/explore/indicators





➢ ***The aim is to make the NCA a "living document"***

What's New with NCA4?

Process

- Planned release in late 2018
- Led by a Federal Steering Committee
- Each chapter has a Federal Coordinating Lead Author (CLA) and either a Fed or non-Fed Chapter Lead

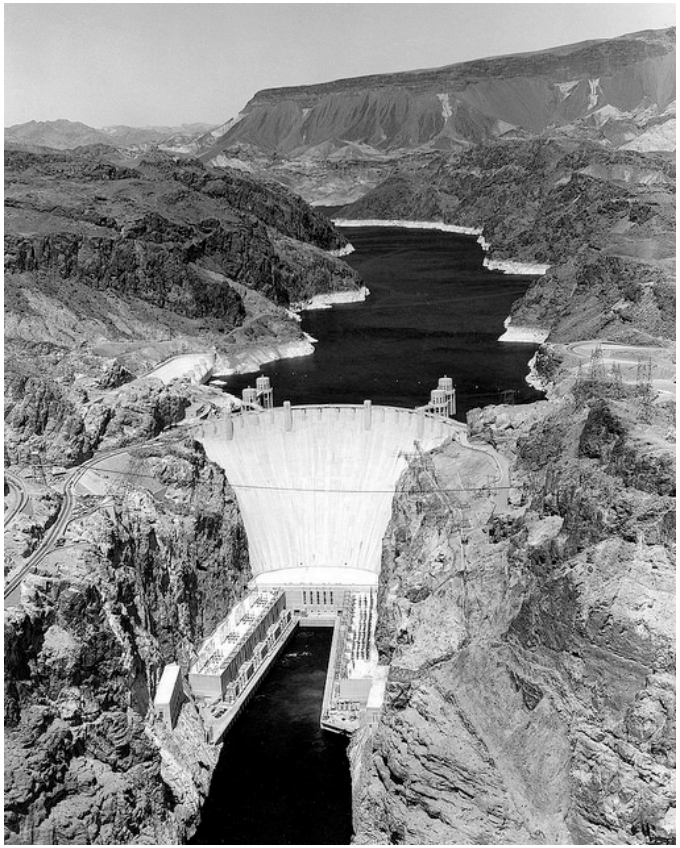
Substance

- Sustained Assessment framework and process
  - Climate Science Special Report underway to provide scientific foundation
- Regional chapters will be given more in-depth treatment in NCA4
- Sectoral chapters will draw upon the regional chapters and provide brief national overviews
- A variety of climate tools & information (e.g., NOAA NCEI State Climate Summaries, Indicators, Scenarios, Climate Resilience Toolkit, LOCA dataset)

NCA4 Chapters

- **I: Overview**
- **II: Our Changing Climate**
- **III: National Overviews**
  - Water
  - Energy
  - Land Cover and Land Use Change
  - Forests
  - Ecosystems, Ecosystem Services, and Biodiversity
  - Coastal Effects
  - Oceans and Marine Resources
  - Agriculture and Rural Communities
  - Built Environment, Urban Systems, and Cities
  - Transportation
  - Air Quality **NEW!**
  - Human Health
  - Tribal and Indigenous Communities
  - Climate Effects on U.S. International Interests **NEW!**
  - Sectoral Interdependencies & Compounding Stressors: The Science of Complex Systems **NEW!**
- **IV: Regional Chapters**
  - Northeast
  - Southeast
  - US Caribbean **NEW!**
  - Midwest
  - Northern Great Plains } **EXPANDED!**
  - Southern Great Plains
  - Northwest
  - Southwest
  - **Alaska**
  - Hawai`i and Pacific Islands
- **V: Response**
  - Near-term Adaptation Needs and Increased Resiliency
  - Mitigation: Avoiding and Reducing Long-term Risks

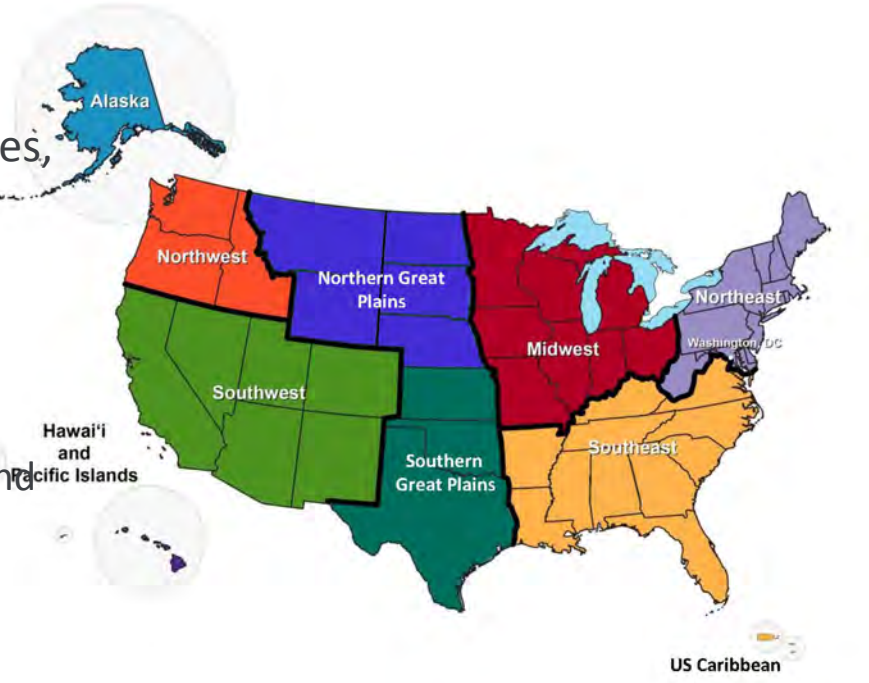
National-Level Overviews



- Short ***(~6 pg)***, national-level overviews of key sectors and cross-cutting topics
  - Encouraged to link to agency resources and existing work
  - Led by one or more agencies
- Chapter Structure:
  - Background/state of the sector
  - Roll-up of information from the regional scale
  - 2-3 national-scale key messages
  - Traceable accounts and references (not part of page limit)
- Response (adaptation and mitigation) will be longer ***(~10 pg)***

Regional Chapters

- The “main course” of NCA4 ***(~20 pages each)***
- Region-specific concerns
- Highlight options, challenges, opportunities, and success stories for minimizing risk
- Chapter Structure:
  - Background
  - 4-6 Key Messages:
    - Linkage between Climate Change and Regional Risks
    - Future Climate Change relevant to Regional Risks
    - Challenges, Opportunities, Success Stories
    - Emerging Issues
- Traceable accounts and references (not part of page limit)



Alaska Region Author Team

Federal Coordinating Lead Author

Steve Gray (USGS)
sgray@usgs.gov

Chapter Lead

Carl Markon
cjmarkon@gmail.com

USGCRP Regional Contacts

Fred Lipschultz
flipschultz@usgcrp.gov

Alexa Jay
ajay@usgcrp.gov

Chapter Authors

- Molly McCammon
- Henry Huntington
- Sarah Trainor

Requested Contributing Authors

- Bruce Richmond
- Lyman Thorsteinson
- Erin Whitney
- Nathan Kettle
- Harry Penn
- Patricia K. Schwalenberg
- Rick Thoman
- Heather Ward
- Robert Rabin
- John Pearce
- Vanessa Skean
- Laura Eerkes-Medrano
- Willow Hetrick

Alaska: NCA3 Key Messages

1. Arctic **summer sea ice** is receding faster than previously projected and is expected to virtually disappear before mid-century.

2. Most **glaciers** in Alaska and British Columbia are shrinking substantially.

3. **Permafrost** temperatures in Alaska are rising, a thawing trend that is expected to continue.

4. Current and projected increases in Alaska's **ocean temperatures and changes in ocean chemistry** are expected to alter the distribution and productivity of Alaska's marine fisheries.

5. The cumulative effects of climate change in Alaska strongly affect **Native communities**, which are highly vulnerable to these rapid changes but have a deep cultural history of adapting to change.

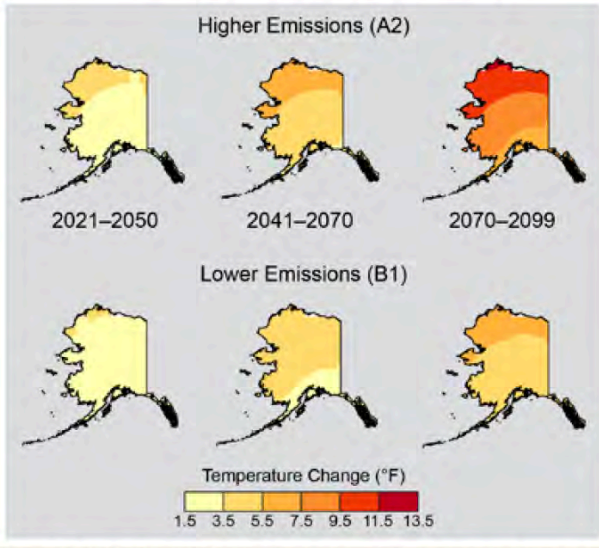


Figure 22.1. Northern latitudes are warming faster than more temperate regions, and Alaska has already warmed much faster than the rest of the country. Maps show changes in temperature, relative to 1971-1999, projected for Alaska in the early, middle, and late parts of this century, if heat-trapping gas (also known as greenhouse gas) emissions continue to increase (higher emissions, A2), or are substantially reduced (lower emissions, B1). (Figure source: adapted from Stewart et al. 2013[7]).

http://nca2014.globalchange.gov/report/regions/alaska

Alaska: NCA4
[DRAFT OUTLINE Jan 2017]

- **Introduction/Background (~ 2-3 pages)**
  - What has happened since the last report.
  - NOAA Alaska Report card
  - General Climate Information

- **Key Messages (~3-4 pages each):**
  - Effect of Climate Related Changes on Alaska's Indigenous Peoples
  - Effect of Climate Change on Human Health
  - Changes in Landscape, Coastal Conditions, and the Ocean Environment
  - Economics of Climate Change
  - Adaptation and Responses to Climate Change

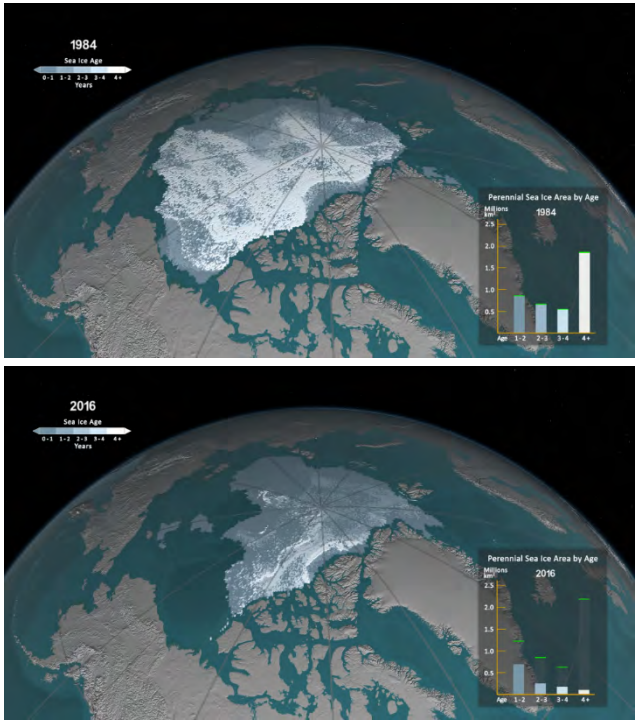
Technical inputs (partial list)

- Climate Science Special Report
- NOAA NCEI State Summaries
- Contributing Authors
- Impacts of Climate Change on Human Health
- Climate Change and Indigenous Peoples Synthesis report
- Adaptation Actions for a Changing Arctic (AACA): Beaufort, Chukchi, Bering Pilot Regional Report
- https://toolkit.climate.gov/regions/alaska-and-arctic

Alaska/Arctic: Climate Science Special Report (DRAFT 2017)

KEY MESSAGES

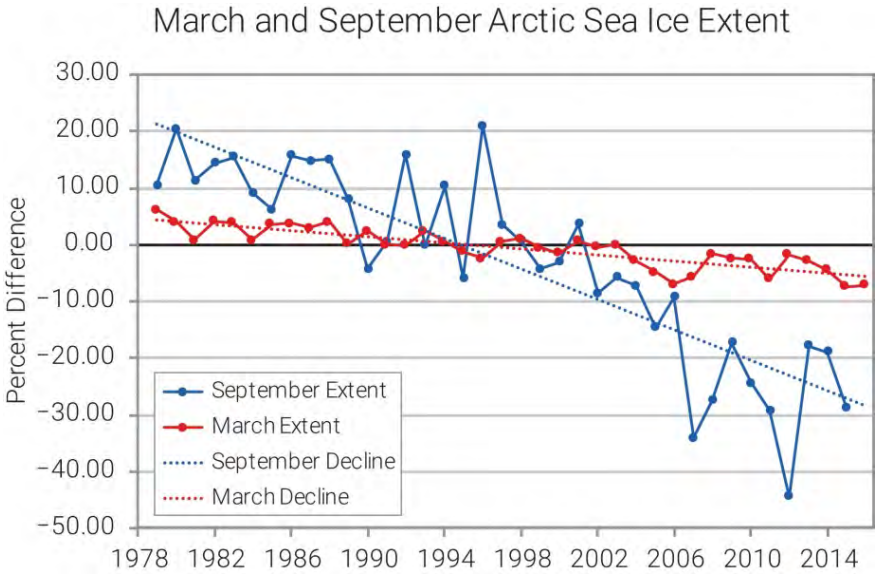
1. For both the State of Alaska and for the Arctic as a whole, near-surface air temperature is increasing at a rate more than twice as fast as the global-average temperature. (*Very high confidence*)
2. Rising Alaskan permafrost temperatures are causing permafrost to thaw and become more discontinuous; this releases additional CO2 and CH4 resulting in additional warming (*high confidence*). The overall magnitude of the permafrost-carbon feedback is uncertain.
3. Arctic sea ice and Greenland Ice Sheet mass loss are accelerating and Alaskan mountain glaciers continue to melt (*very high confidence*). Alaskan coastal sea ice loss rates exceed the Arctic average (*very high confidence*). Observed sea and land ice loss across the Arctic is occurring faster than climate models predict (*very high confidence*). Melting trends are expected to continue resulting in late summers becoming nearly ice-free for the Arctic ocean by mid-century (*very high confidence*).
4. Human activities have contributed to rising surface temperature, sea ice loss since 1979, and glacier mass loss observed across the Arctic. (*High confidence*)
5. Atmospheric circulation patterns connect the climates of the Arctic and the United States. The mid-latitude circulation influences Arctic climate change (*medium to high confidence)*. In turn, current evidence suggests that Arctic warming is influencing mid-latitude circulation over the continental United States and affecting weather patterns, but the mechanisms are not well understood (*low to medium confidence*).



September sea ice extent and age (thickness) shown for 1984 (top) and 2016 (bottom), illustrating that significant reductions have occurred in sea ice extent and age. The bar graph in the lower right of each panel illustrates the amount of ice in each age category.

Alaska: NOAA NCEI State Summary (2017)

- Average annual temperature has increased since 1925, but with large multi-decadal variations; most of the increase has occurred in the winter and spring seasons. Under a higher emissions pathway, historically unprecedented warming is projected by the end of the 21st century.
- Average annual precipitation is projected to increase by 10% or more across all of Alaska by the middle of the 21st century under a higher emissions pathway.
- Late summer Arctic sea ice extent and thickness has decreased substantially in the last several decades. Climate models project that Arctic waters will be virtually ice-free by late summer before 2050.



Time series of Arctic sea ice extent anomalies in March (the month of maximum ice extent) and September (the month of minimum ice extent). The anomaly value for each year is the difference (%) in ice extent relative to the average values for the period 1981–2010. The red and blue dashed lines indicate ice losses of -2.6% and -13.4% per decade in March and September, respectively. Both trends are significant at the 99% confidence level. Source: NOAA Arctic Report Card.

NOAA National Center for Environmental Information State Summary (2017), https://statesummaries.ncics.org/ak

Climate Change and Indigenous Peoples: A Synthesis of Current Impacts and Experiences (2016)

Defines and describes the key frameworks informing indigenous understandings of climate change impacts and pathways for adaptation and mitigation:

- Tribal sovereignty and self determination
- Indigenous culture and cultural identity
- Indigenous community health indicators

Citation: Norton-Smith, Kathryn; Lynn, Kathy; Chief, Karletta; Cozzetto, Karen; Donatuto, Jamie; Hiza Redsteer, Margaret; Kruger, Linda E.; Maldonado, Julie; Viles, Carson; Whyte, Kyle P. 2016. Climate change and indigenous peoples: a synthesis of current impacts and experiences. Gen. Tech. Rep. PNW-GTR-944. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 136 p. http://www.treesearch.fs.fed.us/pubs/53156

How to get involved

- Alaska Marine Science Symposium
  - 23-27 January (flyer)
- Alaska Forum for the Environment, 6-10 February
  - 1.5h session 8 February
- Alaska Center for Climate Assessment and Policy Webinar
  - 14 February, 10am
- NCAnet: ncanet.usgcrp.gov

Contact Us

USGCRP ALASKA REGIONAL CONTACTS

Fred Lipschultz
flipschultz@usgcrp.gov
Alexa Jay
ajay@usgcrp.gov

Connect with us:

@usgcrp

usgcrp

GlobalChange.gov

www.globalchange.gov/nca4

U.S. Global Change Research Program

- What are the most pressing climate-related challenges or issues for your region that should be emphasized in NCA4?
  - What do we value/what is at risk?
  - What outcomes do we wish to avoid to these valued things?
- What are some cross-cutting issues to consider for NCA4?
- Are there areas of concern (or opportunities) that are emerging, but are poorly understood?
- What types of information would be of most value to you when addressing these challenges or issues?
- What (types of) case studies or examples would you like to see in NCA4?
  - Places where NCA3 was used to inform decisions
  - Examples of successful adaptation or mitigation actions