Climate Adaptation Science Center Network

(formerly the Climate Science Center network)

Doug Beard, Chief of CASC Network
May 8, 2018

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CASC Network Mission

Delivering science to help fish, wildlife, water, land, and people adapt to a changing climate

Focusing on impacts & adaptation

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Actionable Science

Science results leading to knowledge that meets constituent needs

Policy relevant – NOT prescriptive
Directly reflects expressed constituent needs
Understandable to users
Available at needed times/places
Accessible and available to the user community
Users and producers working together from the start
Evaluation of success: science usefulness to society

CASC Network History

2008 National Center Established

National Center
Congress funds the National Climate Adaptation Science Center

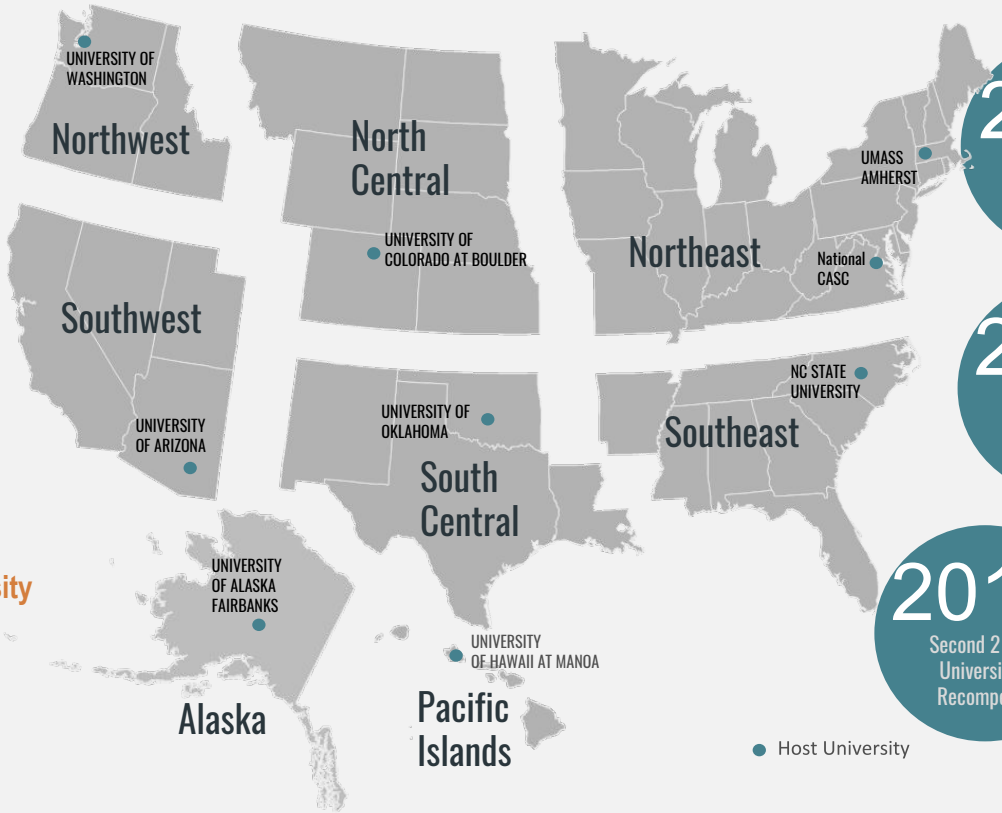
200 Stakeholders
Identify research priorities, partnerships & operational structure for the Network

2009 DOI Climate Adaptation Science Centers Established

CASCs Launched
Work with natural resource managers to inform decisions & planning

2010 First 3 Host Universities Selected

First 3 CASC Federal/University Partnerships Announced
Alaska, Southeast & Northwest



2011 2 New Host Universities Selected

2 New CASCs
North Central & Southwest

2012 Last 3 Host Universities Selected

Last 3 CASCs
Northeast, South Central & Pacific Islands

2016 First 3 Host Universities Recompeted

Recompetition
Northwest, Alaska & Southeast CASCs

2017 Second 2 Host Universities Recompeted

Recompetition
Southwest & North Central CASCs

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CASC University Partners

ALASKA CASC
★ **University of Alaska Fairbanks**
University of Alaska Anchorage
University of Alaska Southeast

NORTH CENTRAL CASC
★ **University of Colorado at Boulder**
Conservation Science Partners
Great Plains Tribal Water Alliance
South Dakota State University
University of Montana
Wildlife Conservation Society

NORTHEAST CASC
★ **University of Massachusetts Amherst**
College of Menominee Nation
Columbia University
Marine Biological Laboratory
University of Minnesota
University of Missouri Columbia
University of Wisconsin – Madison

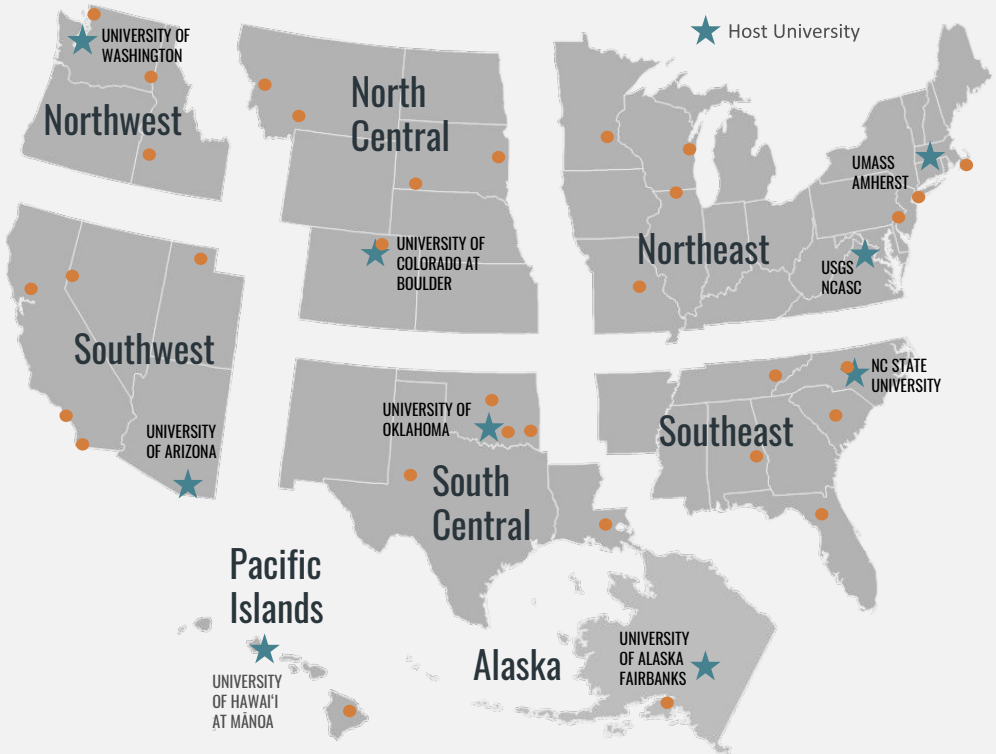
NORTHWEST CASC
★ **University of Washington**
Boise State University
University of Montana
Washington State University
Western Washington University

PACIFIC ISLANDS CASC
★ **University of Hawai'i at Mānoa**
University of Hawai'i at Hilo
University of Guam

SOUTH CENTRAL CASC
★ **University of Oklahoma**
Chickasaw Nation
Choctaw Nation of Oklahoma
Louisiana State University
NOAA Geophysical Fluid Dynamics Laboratory
Oklahoma State University
Texas Tech University

SOUTHEAST CASC
★ **North Carolina State University**
Auburn University
Duke University
University of Florida
University of South Carolina
University of Tennessee

SOUTHWEST CASC
★ **University of Arizona**
Colorado State University
Desert Research Institute (Nevada)
Scripps Institution of Oceanography
University of California, Davis
University of California, Los Angeles
Utah State University



Network Accomplishments

More than **2000** publications

More than **700** datasets

More than **400** projects

5 new BIA Tribal Liaisons Hired

Program initiatives:
Tribal engagement (SC CASC), sea-level rise (SE CASC), ecological vulnerability (NE CASC), coastal adaptation (PI CASC), translational ecology (SW CASC), altered hydrology (AK CASC), decision support tools (NC CASC), and traditional ecological knowledge (PI CASC)

Awards:
Received 11 national or international awards, including five separate Climate Adaptation Leadership Awards in 2016 and 2017, a DOI Environmental Achievement Award, and a USGS Excellence in Leadership Award

Defining ecological drought for the 21st century

- Product of the Ecological Drought Expert Working Group
- Defines “ecological drought” and provides a novel, integrated framework for ecological drought
- Important step in understanding and managing drought risks

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Development: Network Strategic Plan

Implementation & Evaluation

- Focus on strong partnerships with resource managers
- Enhance coordination with science partners

Partner & Stakeholder Feedback

- Increase adaptation research
- Increase capacity building for managers
- Expand partnerships with states and tribes

DOI & USGS Strategic Guidance

- Provide science for DOI land, water, and species management
- Reflect Administration priorities

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DOI/USGS Alignment: Network Strategic Plan

The CASC Network Strategic Plan advances the following overarching priorities:

Secretarial

1. Creating a conservation stewardship legacy second only to Teddy Roosevelt
3. Restoring trust with local communities
4. Ensuring sovereignty means something

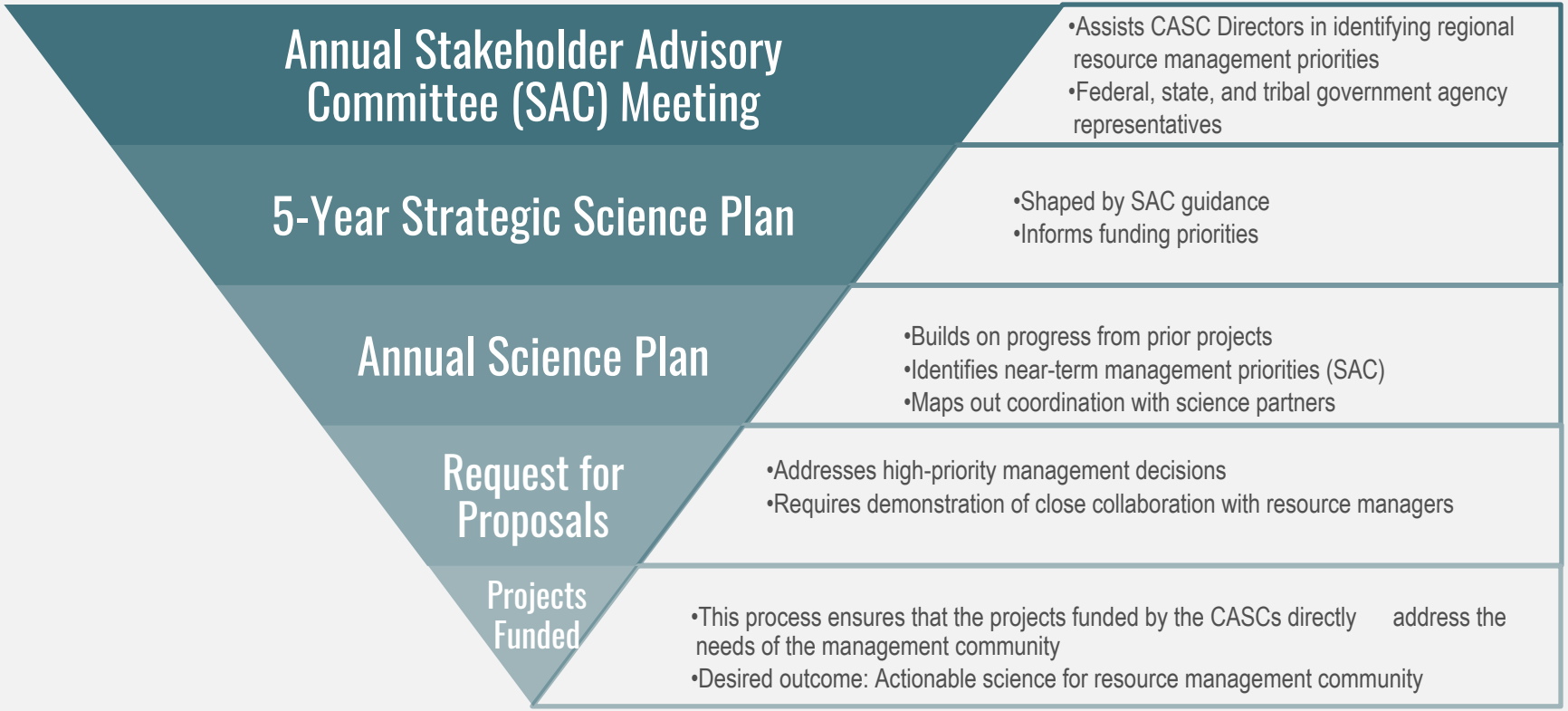
Departmental

Conserving land and water, specifically with the goal of utilizing science in land, water, species and habitat management for adaptation to environmental changes

USGS

Science to inform land, water, and species management

How CASCs Work: Strategic & Operational Planning



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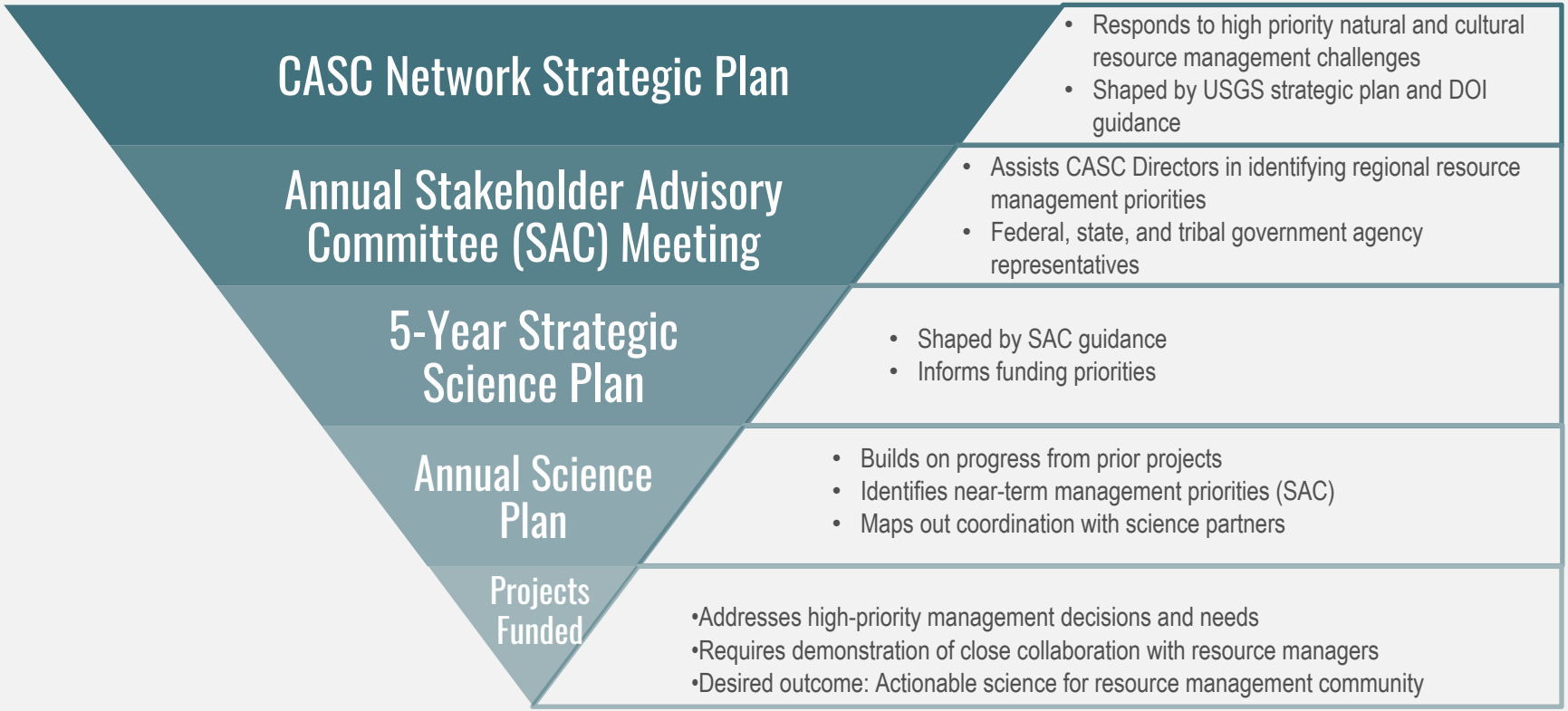
How CASCs Work: Regional Priorities



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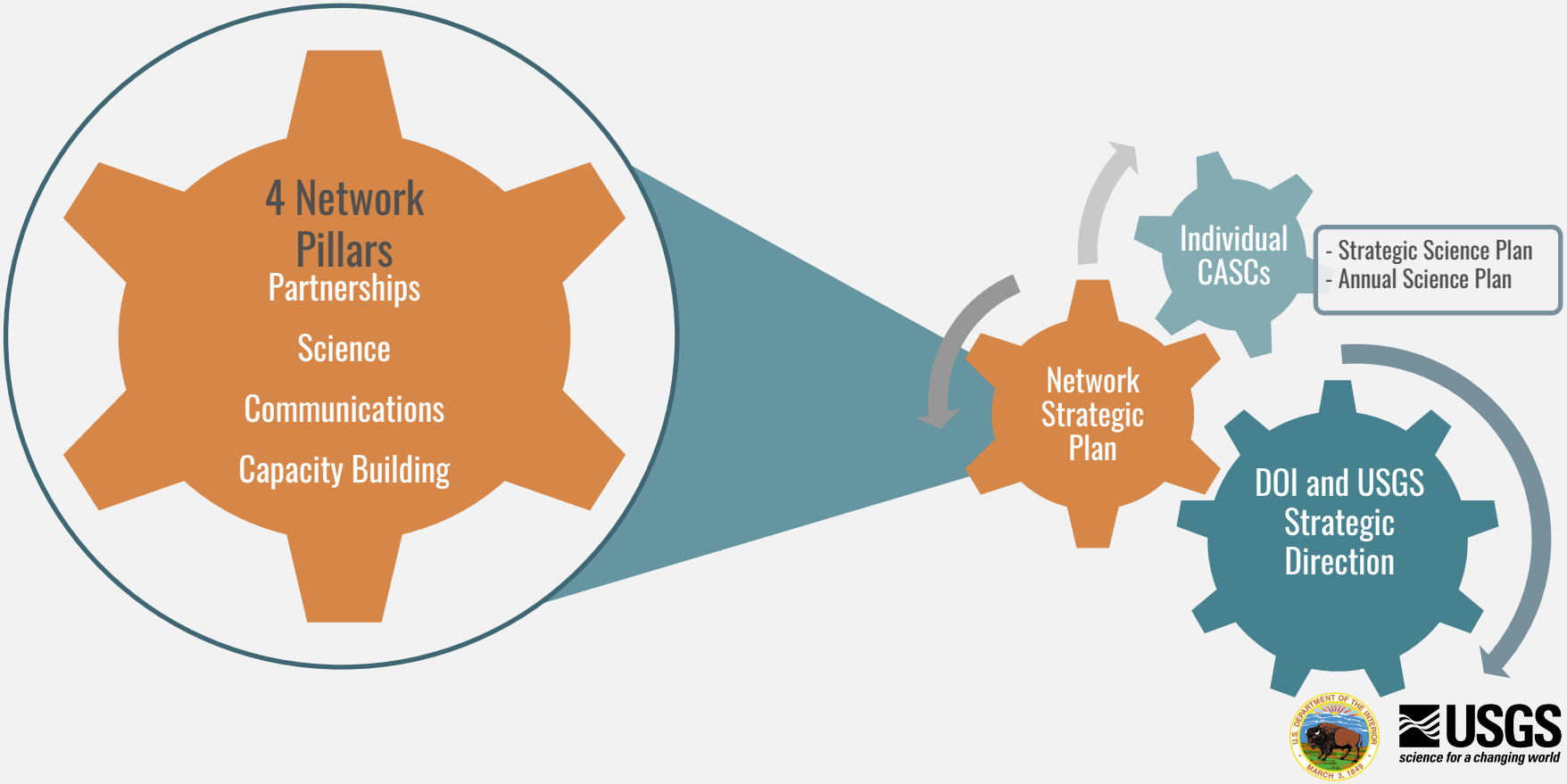
Alignment: Network Strategic Plan



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CASC Network Strategic Plan

Our Communication Goal: To understand and respond to information needs and support the integration of climate adaptation in resource management through usable, useful products and tools.

Meeting Manager Needs

Ensure that our communication products, including publications, syntheses, tools, and trainings meet needs of resource managers.

Increasing Access to Information

Provide access to information, such as comprehensive websites, newsletters, and social media.

Supporting Training

Support training and other opportunities to increase knowledge and use of communications best practices.

Working with Researchers

Work with researchers and managers to promote appropriate, effective communication throughout their projects.

Developing Tools & Synthesis

Synthesize data and develop tools to support decision-makers to ensure that information meets the unique needs of managers.

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CASC Network Strategic Plan

Capacity Building

Our Capacity Building Goal: Build a community of researchers and managers and foster their leadership in science-based resource management.

Information Exchange

Support information exchange & foster professional networks of scientists & managers.

Decision Support

Provide decision support and technical assistance to advance the integration of new information in resource management.

Next Generation Training

Provide education, mentoring, professional development, and training for students and researchers.

Training for Managers

Provide training and education to meet the priorities of fish, wildlife, and habitat managers.

Tribes & Indigenous Communities

Collaborate with tribal and indigenous communities and build capacity to adapt to a changing climate.

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CASC Network Strategic Plan

Science

Our Science Goal: To advance the understanding of the impacts of climate change and variability on fish, wildlife, water, land, and people to support sound resource management and adaptation.

Invasive Species

Focus resources on understanding the impacts of changing climate on invasive species and the implications for native species and ecosystems.

Adaptation Strategy Science

Advance science in the design of adaptation strategies.

Habitat

Conduct research to identify refugia, corridors, and habitats to support adaptation of fish and wildlife.

Adaptation Strategy Evaluation

Evaluate and develop methods to monitor the effectiveness of adaptation strategies.

High Priority Species

Invest in developing a better understanding of the implications of changing climate on high priority species, communities, and ecosystems.

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CASC Network Strategic Plan

Science

Our Science Goal: To advance the understanding of the impacts of climate change and variability on fish, wildlife, water, land, and people to support sound resource management and adaptation.

Management of Natural Resources

Improve our knowledge of climate change and variability, particularly as related to management of natural resources.

Understanding Uncertainty

Refine the application of climate models, and increase understanding of the uncertainties associated with related projections and predictive modeling.

Extreme Events

Focus resources on creating a better understanding of the implications of climate change & variability regarding drought, flooding, wildfire, & other extreme events.

Hydrology

Identify the hydrological consequences of climate change and variability.

Coastal Change

Improve our knowledge of flooding from sea level rise and storms, salt water intrusion, and the implications for coastal resources.

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CASC Network Strategic Plan

Our Partnerships Goal: Respond to high priority natural and cultural resource management challenges and foster substantive, sustained engagement between scientists and managers.

Engage Partners & Stakeholders

Engage partners and stakeholders to identify their resource challenges and information needs

Convene Scientists & Managers

Bring together the expertise of scientists and managers to design, develop, and implement research to inform effective resource management

Leverage Resources

Coordinate with partners in the climate impacts and adaptation community to leverage resources

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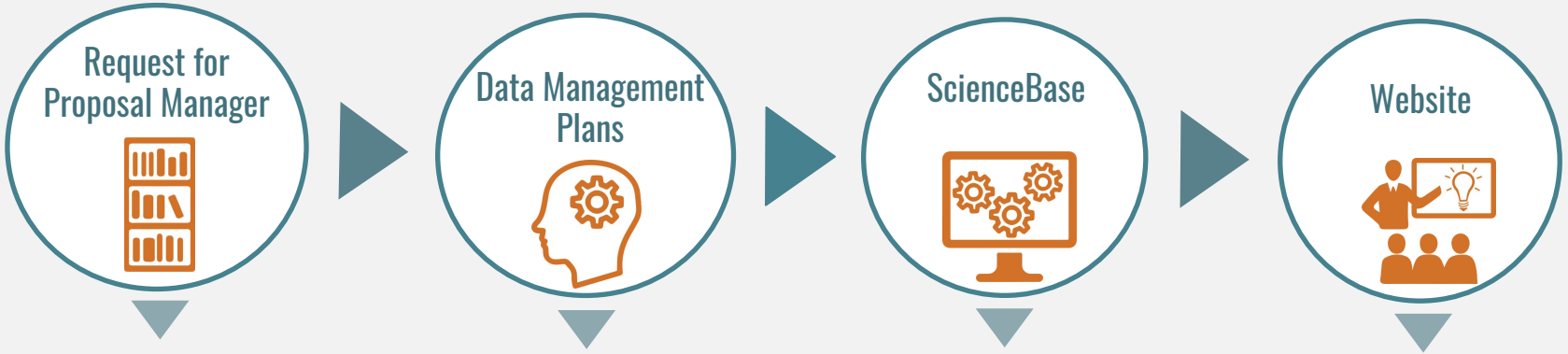
Accountability & Transparency

Data Tracking and Management



Request for Proposal Manager

Project Records

Collect and review project proposals

Track Proposals

PIs asked if proposals submitted or funded elsewhere

Data Management Plans

Products

Identifies expected data products

Core Data Parameters

Data management plans in proposals clarify expectations and identify core data parameters

ScienceBase

DMP Editor

Data Management Plan (DMP) Editor manages and tracks products linked to funded projects

Data Stewards

Coordinate scientists & help manage data

Data.gov

Public records sent to data.gov

Website

Public

Publicly available project information and products

Searchable

By region, fiscal year, and keyword

Resources

Includes other program information and resources

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Federal Agency Partnerships

The Great Basin

Working together across agency and state lines is efficient and effective

WHAT: USGS, US Forest Service, Oregon State University, and Desert Research Institute are partnering to evaluate beaver reintroduction and management alternatives in the Great Basin

IMPACT: Assists managers in selecting effective strategies to address the Great Basin's degradation and restoration

South Central Region Collaboration

Cataloguing and coordinating all projects with climate science partners

WHAT: The South Central CASC regularly works with local NOAA and USDA climate programs to coordinate research, leverage resources and reach stakeholders.

IMPACT: Agency collaboration allows researchers to address more complex societal and ecological issues that they cannot address on their own.

Integrated Ecosystems Model

Climate change can affect how people live, how they do business and the benefits ecosystems provide

WHAT: A multi-institutional and multi-disciplinary modeling effort aimed at understanding landscape, habitat and ecosystem change.

IMPACT: The Department of Defense and Bureau of Land Management use IEM results to meet their missions while considering ecological implications.

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Remote Sensing

Biodiversity Workshops

WHAT: Explore NASA and other remote sensing products to assist in global biodiversity and ecosystem models

IMPACT:

link

Northern Rocky Mountain's and Great Plain's Ecosystems

WHAT:

IMPACT:

link

Mapping Coastal Change

Using Unmanned Aerial Systems to monitor coastal changes in the Northeast

WHAT: Pilot project to test the utility of Unmanned Aerial Systems (UAS) for mapping and monitoring coastal beaches and marshes.
IMPACT: UAS allows us to monitor habitat change without disturbing wildlife, like the piping plover. UAS is a low-cost, low-risk means of acquiring high-resolution imagery to help managers understand change and future risk..

go.usa.gov/xQnWe

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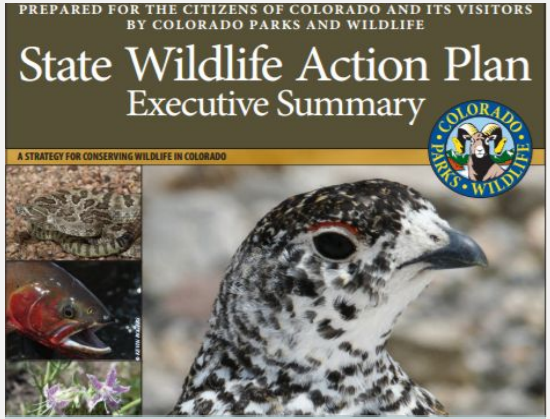
State and Local Partnerships

State Wildlife Action Plans (SWAPs)

Northeast CASC provides science for SWAPs in 22 states



WHAT: SWAPs help state planning and management programs, and support state partnerships for range-wide species conservation.

IMPACT: Northeast & North Central CASCs provide science to help states include climate change impacts in strategic resource management plans.

bit.ly/2watlgw

Wisconsin Sport Fish Habitat

Conducted in collaboration with Wisconsin Department of Natural Resources

WHAT: Assessed thresholds in sport fisheries that can be used by management agencies to evaluate potential impacts of climate change.

IMPACT: Help managers forecast changes to sport fisheries and plan adapative responses to improve resiliency of fisheries in Wisconsin and the northern Great Lakes region.

bit.ly/2vwlSLK

Prairie Pothole Region

Supports the USFWS Prairie Pothole Joint Venture & Plains and Prairie Potholes LCC

WHAT: The region is the continent's most important breeding area for waterfowl. Researchers estimated how the ranges of 29 species might change.

IMPACT: Can strategically focus conservation on the species most at risk of habitat loss.

bit.ly/1nKHbBs

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DOI Partnerships

Science for Colorado BLM

Science to inform BLM decision-making throughout Colorado

WHAT: Provided information to BLM on the potential vulnerabilities of the communities & businesses that rely upon CO's 8.4 million acres of BLM-managed public land.
IMPACT: BLM can ensure that future actions reflect the vulnerabilities and needs of diverse communities & better prioritize resource management.

bit.ly/2tuZx0Z

BOR & The Colorado River

Providing future drought scenarios for the Colorado River Basin

WHAT: Building on past research to investigate, in collaboration with the BOR, potential future drought scenarios for the Colorado River basin.
IMPACT: Water managers can use these scenarios to understand future risks and assess the potential success of different management strategies; Science will inform management plans to address future impacts..

go.usa.gov/xQ89k

Informing NPS Adaptation

Informing adaptation at Badlands NP and Knife River Indian Villages NHS

WHAT: Developed scenarios of potential future conditions for Badlands and Knife River Indian Villages and surrounding federal and tribal lands.
IMPACT: NPS can use the scenarios to understand how different actions might affect focal resources under each scenario; Helps protect wildlife, vegetation, archeological sites.

go.usa.gov/xQ899

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DOI Partnerships

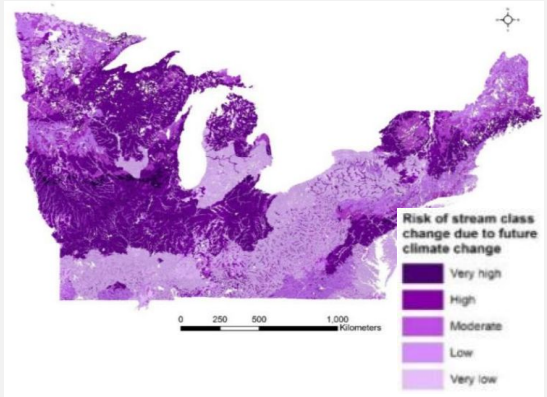
Moose & Caribou in Alaska

Support FWS (e.g. Kanuti, Nowitna, & Tetlin NWRs), BLM Central Yukon Office, NPS, & Alaskan Natives

WHAT: Modeled how changes in snow, rain, fire frequency, and fire management could impact food availability for moose and caribou.
IMPACT: Maps show results based on boundaries of state, federal (NWR, NPS, BLM), and Native lands. Results are informing the Kanuti NWR Fire Management Plan, which aims to maintain moose and caribou habitat.

A Tool to Conserve Fish Habitats

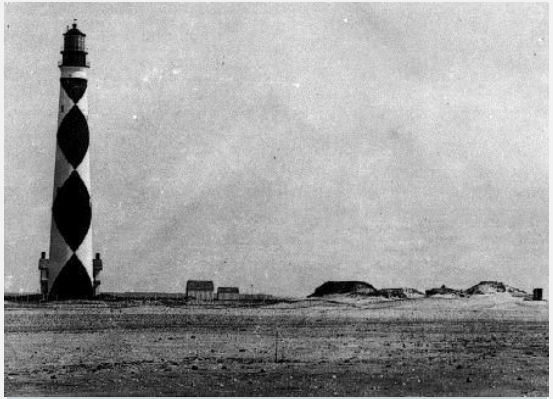
Fish habitat tool developed with input from the FWS



WHAT: Developed an interactive tool integrating current condition of stream habitats in the Northeast and Midwest with estimates of how these habitats might change.
IMPACT: Supporting FWS in identifying which streams to target with protection and restoration efforts in order to maintain important fish habitats in the Northeast and Midwest.

Safeguarding Our Parks

Rising seas are eroding the foundations of historic sites and structures



WHAT: Helping NPS pinpoint impacts of climate change on parks by testing a new approach for prioritizing climate adaptation actions.
IMPACT: Using Cape Lookout as a pilot study, this research aims to help the NPS make more cost-effective decisions about cultural resource climate adaptation.

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Tribal Partnerships

Red River Basin

Supports Chickasaw and Choctaw Tribes; Great Plains, Gulf Coast Prairie, Gulf Coastal Plain & Ozarks LCCs

WHAT: The Red River supports municipal water supplies and ecosystems in the South Central. Modeled how temperature and precipitation in the basin might change.
IMPACT: Results are being used by tribes and municipalities to prepare for changes in the basin's water supply.

bit.ly/2b6S5Lk

Wind River Drought Summaries

Collaborating with managers from the Eastern Shoshone & Northern Arapaho tribes

WHAT: Quarterly summaries of the current water, climate, and drought conditions for the region and what conditions might be expected in the following season.
IMPACT: Summaries are used by the Office of the Tribal Water Engineer to make drought declarations for the reservation.

bit.ly/2bPpPT9

Wild Berry Habitat in Alaska

Wild berries are a valued traditional food for tribes of the Chugachmiut Tribal Consortium

WHAT: Worked with the Consortium to predict and map optimum berry habitat on the southern tip of the Kenai Peninsula.
IMPACT: Maps used by tribal and other land managers to target forest management efforts to sustain healthier, more resilient berry picking areas for local tribes.

bit.ly/2b3bbq8

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Drought and Water Management

The Colorado River

Analyzed droughts over the past 1,000 years to understand the role climate plays in drought

WHAT: Examined how changing temperature and precipitation impact the Colorado River's water flow.
IMPACT: Enhances streamflow forecasts and addresses a gap consistently raised by water managers – what are the conditions that lead to reduced flow in the basin.

bit.ly/2v2ueHK

Rio Grande Cutthroat Trout

Has been restricted to an estimated 12% of its former range

WHAT: Research is needed to understand how temperature and precipitation changes threaten this native fish.

IMPACT: Inform manager decisions to decrease the likelihood of endangered species listing.

bit.ly/2woHPIP

The Madison Aquifer

This karst aquifer is an important water resource in the northern plains, where surface water is limited

WHAT: Examined how future spring flow might be impacted by changes in temperature and precipitation, and what these changes mean for the species it supports.
IMPACT: Showed that hydrologic factors are essential in evaluating the vulnerability of karst ecosystems to climate extremes.

bit.ly/2fc3iS5

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Drought Across the Nation

Red River Basin

Supports Chickasaw and Choctaw Tribes; Great Plains, Gulf Coast Prairie, Gulf Coastal Plain & Ozarks LCCs

WHAT: The Red River supports municipal water supplies and ecosystems in the South Central. Modeled how temperature and precipitation in the basin might change.
IMPACT: Results being used by tribes and municipalities to prepare for changes in the Red River basin's water supply.

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IMPACT: Inform manager decisions to decrease the likelihood of endangered species listing.

National Ecodrought Synthesis

Expected increase in frequency and severity of droughts in the US will have great social and impacts on ecosystems

WHAT: Local experts across disciplines from each CASC region convene to discuss ecological drought impacts on their region and research needs.
IMPACT: Inform drought management plans to minimize socioeconomic and ecological impacts to communities and wildlife.

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Wildfire and Water in the West

Increases in Wildfire-Caused Erosion Could Impact Water Supply and Quality in the West

The science:

- The area burned annually by wildfires has increased and is expected to continue to increase
- Climate, fire, erosion data for 471 watersheds in the West
  - **By 2050, sediment in more than 1/3 of watersheds could at least double**
  - In nearly 9/10 of the watersheds, sedimentation is projected to increase by more than 10%

Why does it matter?

- Sedimentation can **negatively impact water supply/quality for communities**, as well as stream stability/flow, aquatic habitats, and fish populations
- Many cities and towns rely on water from watersheds where wildfire and sedimentation are projected to increase
- Findings can help water managers plan for the future and assess risks to water sources

Funding from the Northwest Climate Adaptation Science Center

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Invasive Species

Non-Native Trout in Montana

Montana's westslope cutthroat trout, a coldwater species, is losing habitat to invasive warmwater trout

WHAT: As their range expands, invasive trout are mating with cutthroat trout. Modeled how cutthroat populations and their habitat will change as a result.
IMPACT: Helps managers identify high-value conservation areas that maximize returns on investments and improve trout populations.

bit.ly/2woTmYI

Hawai'i's Invasive Mosquito

Hawai'i's iconic forest birds are threatened by avian malaria, transmitted by an invasive mosquito

WHAT: Researchers found that by 2050, forest birds could suffer major declines as mosquitos move into higher elevation areas that once provided a safe haven from avian malaria transmission.
IMPACT: Support implementation of cost-effective forest-bird conservation strategies.

bit.ly/2fbtM6c

Bark Beetle in Whitebark Pine

Forests provide space for recreation, clean drinking water and habitat for fish and wildlife

WHAT: Outbreaks of insects that kill trees increase in warmer, drier conditions. Information is needed about genetically resistant trees.

IMPACT: Economical approach to screen trees for drought tolerance and beetle resistance for conservation and restoration purposes.

bit.ly/1U8ebQk

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Invasive Species

Cheatgrass

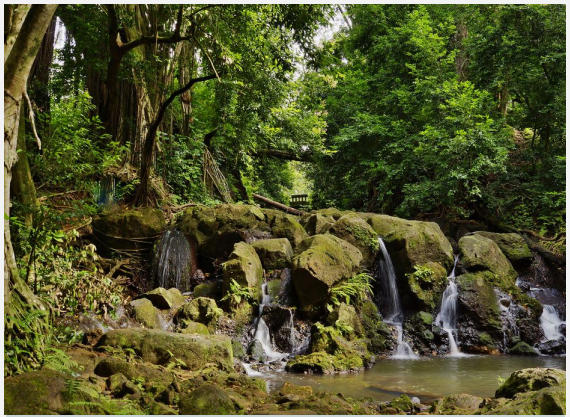
Is highly flammable and as it has expanded, fire in the Great Basin has increased by as much as 200%.

WHAT: Examine current and future interactions among cheatgrass, precipitation and fire across the Great Basin.

IMPACT: Inform decisions about management of vegetation, fire and habitat for sensitive-status birds.

Hawaiian Forest Water Flow

Invasives in Hawaiian forests can increase competition for limited freshwater for humans and ecosystems



WHAT: Better understand how expanding invasive plant populations and changing rainfall will impact water resources in the future.

IMPACT: Vegetation and soil maps that will help resource managers plan for future conditions.

Bark Beetle in Whitebark Pine

Forests provide space for recreation, clean drinking water and habitat for fish and wildlife

WHAT: Outbreaks of insects that kill trees increase in warmer, drier conditions. Information is needed about genetically resistant trees.

IMPACT: Economical approach to screen trees for drought tolerance and beetle resistance for conservation and restoration purposes.

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STEM Initiatives

Training the Next Generation

More than 250 students and fellows were affiliated with the CASCs in 2016

WHAT: CASC network supports early career scientists and managers through training and research opportunities such as the NW CASC Climate Boot Camp.

IMPACT: Builds skills and connections of future scientists and managers responding to climate change effects of fish and wildlife.

Girls on Ice

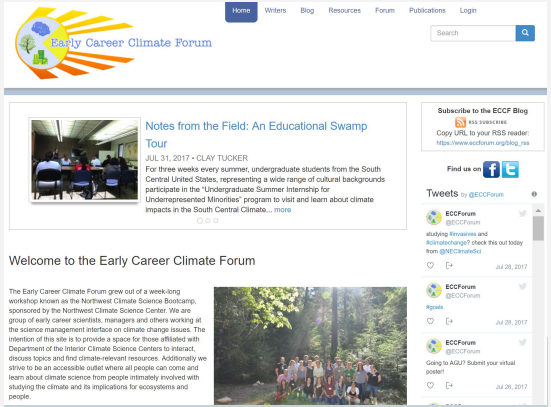
A unique and free wilderness science education program supported by the Alaska CASC

WHAT: Every year, high school girls spend 12 days exploring and learning about science and the region's landscape.

IMPACT: Increases interest and engagement of young women in STEM initiatives through wilderness activities with professional scientists.

Early Career Climate Forum

In 2015, the ECCF launched to increase information sharing and networking across the CASC network



WHAT: Science-based, unbiased venue for collaboration and professional development for early career science professionals.

IMPACT: Creates a community for researchers and professionals and improves the efficiency of climate change research and response strategies.

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