NORTHERN INSTITUTE OF APPLIED CLIMATE SCIENCE

Annual Report 2019

NIACS

Northern Institute of
Applied Climate Science

Michigan Tech

AMERICAN FORESTS

NCASI

IMPACT. SCIENCE. SOLUTIONS.

College of Food, Agricultural and Natural Resource Sciences

UNIVERSITY OF MINNESOTA

The UNIVERSITY of VERMONT

NORTHERN INSTITUTE OF APPLIED CLIMATE SCIENCE

The Northern Institute of Applied Climate Science (NIACS) **develops synthesis products, fosters communication, pursues science, and provides technical assistance** in climate change and carbon cycling and management.

niacs.org

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WELCOME

FAST FACTS 2019

19 NIACS TEAM MEMBERS

261 OUTREACH ITEMS AND PUBLICATIONS

300+ demonstration projects

9 GRAPHICS in support of the Shared Stewardship Strategy for the Forest Service Office of Communications

400+ attendees at Northern Forests Climate Hub hosted workshops

75 Radiocarbon Collaborative supported projects since 2011

14 REAL-WORLD PROJECTS have used the TRIBAL ADAPTATION MENU so far

>325,000 SEEDLINGS PLANTED AT ADAPTIVE SILVICULTURE FOR CLIMATE CHANGE SITES

>400 soil samples from **NEON** sites analyzed for radiocarbon

750,000+ Climate Change Atlas pageviews this fiscal year

104,635 **Climate Change Resource Center WEBSITE USERS**

12 **Adaptation Planning and Practices trainings**

WELCOME

FY19 HIGHLIGHTS

AWARDS

CLIMATE ADAPTATION LEADERSHIP AWARD: TRIBAL

Dibaginjigaadeg Anishinaabe Ezhitwaad - A Tribal Climate Adaptation Menu received the 2019 Climate Adaptation Leadership Award for Natural Resources in the "Tribal" category, recognizing the role of the Menu in working to create a stronger connection between indigenous values and climate adaptation planning. The Tribal Climate Adaptation Menu was designed to be used with the NIACS Adaptation Workbook and was developed by a diverse group of collaborators representing tribal, academic, intertribal, and federal entities in Minnesota, Wisconsin and Michigan. NIACS is proud to be part of this effort.

CLIMATE ADAPTATION LEADERSHIP AWARD: STATE GOVERNMENT

The Pennsylvania Department of Conservation and Natural Resources (DCNR) Climate Change Adaptation and Mitigation Plan received the 2019 Climate Adaptation Leadership Award for Natural Resources in the "State or Local Government" category. The DCNR was recognized for its intense effort to conduct vulnerability analyses, develop adaptation strategies, and create mitigation recommendations for all aspects of its work, and NIACS is happy to have been involved in this plan.

SOCIETY OF AMERICAN FORESTERS CO/WY: CITIZENSHIP AWARD

Dr. Linda Nagel, Professor, Department Head of the Forest and Rangeland Stewardship at Colorado State, and NIACS member, was awarded with the Society of American Foresters (SAF) Colorado/Wyoming Citizenship Award at the annual meeting for the state chapter in April. Linda was recognized for her advancement of the forestry profession through her dedication to exploring climate-adaptive forest management solutions for ecosystems within Colorado and across North America and for her service to the local community.

CLIMATE ADAPTATION LEADERSHIP AWARD *for natural resources*

SAF

CHECK OUT OUR NEW WEBSITE!

www.niacs.org

LETTER FROM THE DIRECTOR

A colleague recently joked that NIACS is the Kevin Bacon of climate adaptation. It took me a second (Kevin Bacon?), but she went on to describe how in her experience there are seldom more than a few degrees of separation between any discussion or activity in natural resources adaptation and some connection with NIACS. It was a wonderful compliment from a national leader, even if I was slow on the uptake. It also gave me pause to reflect on the purpose of NIACS and the changing nature of our influence. Simply stated,

> **“our purpose is to inform and facilitate thoughtful adaptation and carbon management.**

We’ve evolved over time in the scale and scope of “informing” and “facilitating.” In recent years we have intentionally expanded beyond our early focus on forest management to include greater consideration of resource areas such as water, recreation, wildlife, agriculture, wetlands, coastal ecosystems, and infrastructure. We’ve also redoubled our efforts in carbon management and delved much deeper into helping to create and support tools better suited to tribal ways of knowing. Finally, we’ve begun to direct more strategic attention beyond our original footprint of the Midwest and Northeast. These shifts in focus are in direct response to feedback from our NIACS charter organizations, as well as the many agencies, organizations, and communities that we serve. There are acknowledged risks to expanding our scope too much, even as the general demand and specific requests for such expansion grow yearly. In fact, it’s a recurring theme in this annual letter. It can be difficult to balance a sense of ethical imperative to do everything we can with a realistic understanding that we can’t do everything. We have tried to achieve this balance in recent years by working deliberately and intensively with partners who have led the way in expanding and adapting our approaches to their needs and networks. You can see this coming to fruition in the pages of this year’s report. That said, our scope has continued to increase even this year and we’re still learning what it means to inform and facilitate – to live up to our purpose – in these new places, resource areas, and communities. The idea that NIACS is commonly separated by only a few degrees from adaptation discussions and activities is a gratifying reflection of our influence, but it’s absolutely necessary to me that our direct interactions remain positive, productive, and effective. That core working model will be my essential yardstick as we continue to experiment with the scope of our activities and search for the elusive notion of balance.

With kind regards,

Chris Swanston, NIACS Director

PROJECTS

Adaptive Silviculture for Climate Change

Carbon Trends and Management

Climate Change Resource Center

Climate Change Response Framework

Digital Science Communication

Landscape Change Research Group

Radiocarbon Collaborative

USDA Northern Forests Climate Hub

ADAPTIVE SILVICULTURE FOR CLIMATE CHANGE

The Adaptive Silviculture for Climate Change (ASCC) project is a replicated, operational-scale experiment testing the effectiveness of climate adaptation strategies in silvicultural planning and on-the-ground actions.

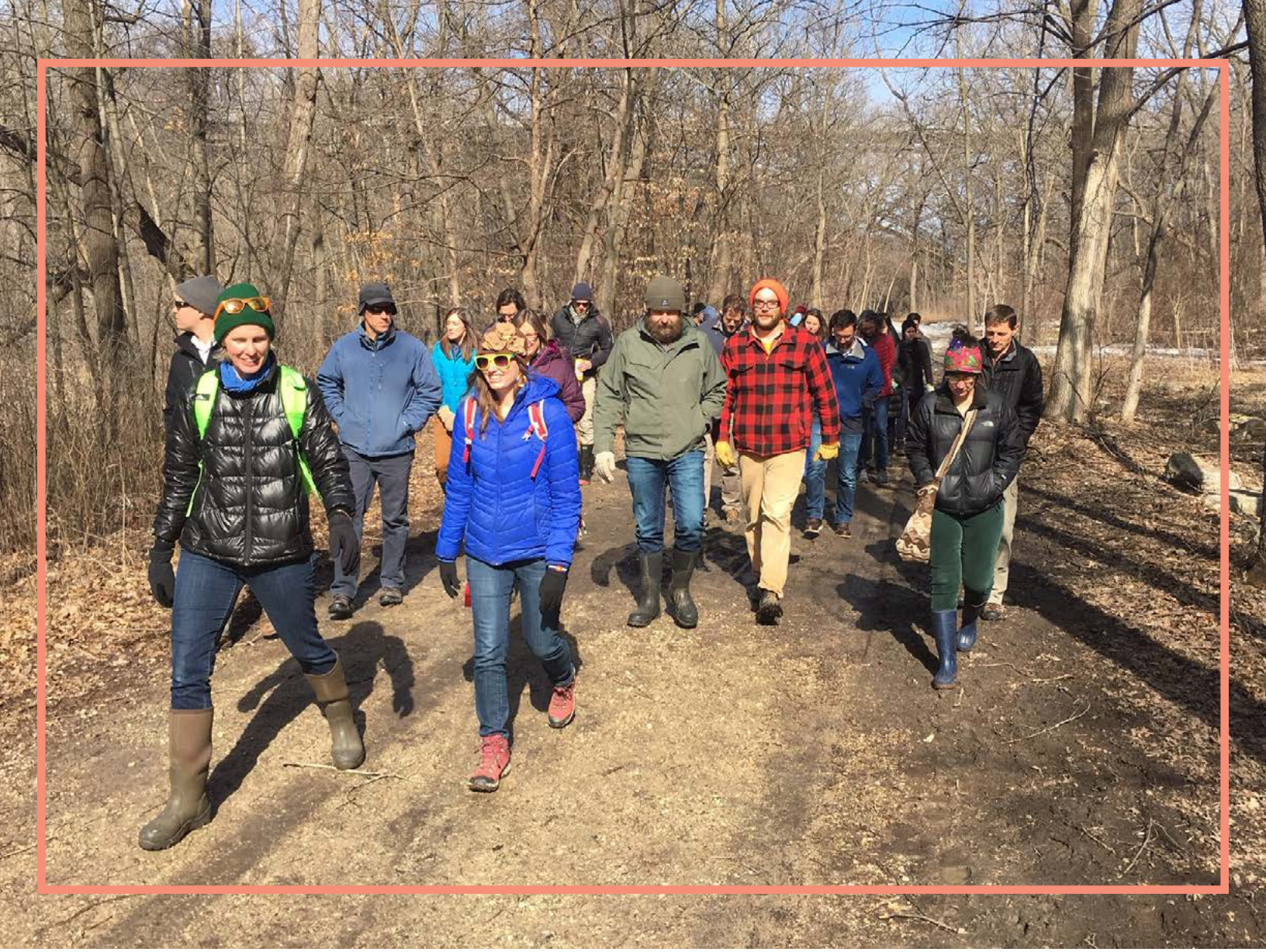
adaptivesilviculture.org

NIACS Team:
Leslie Brandt
Maria Janowiak
Linda Nagel
Courtney Peterson
Chris Swanston

2019 FACTS

2500 acres
currently being harvested (or designated no action) and measured

2 Countries
U.S. + CANADA
involved in ASCC



SCIENCE APPLICATIONS

The Adaptive Silviculture for Climate Change (ASCC) project is a collaborative effort led by Linda Nagel at Colorado State University (but NIACS claims her, too!) to establish a series of experimental silvicultural trials in various forest ecosystem types across the United States and Canada. Scientists, land managers, and key partners have developed a network of fully-replicated operational sites with new affiliate sites underway to study long-term ecosystem responses to a range of climate change adaptation actions. Silvicultural treatments at each study site were developed using the *Forest Adaptation Resources* process and encompass treatments that approximate three broad climate adaptation options: resistance, resilience, and transition.

>325,000 SEEDLINGS PLANTED

>275,000	CUTFOOT EXPERIMENTAL FOREST/CHIPPEWA NATIONAL FOREST (MN)
40,000	FLATHEAD NATIONAL FOREST/CORAM EXPERIMENTAL FOREST (MT)
7,400	SECOND COLLEGE GRANT (NH)
4,000	JOSEPH W. JONES ECOLOGICAL RESEARCH CENTER (GA)
1,200	MISSISSIPPI NATIONAL RIVER AND RECREATION AREA (MN)

ACCOMPLISHMENTS

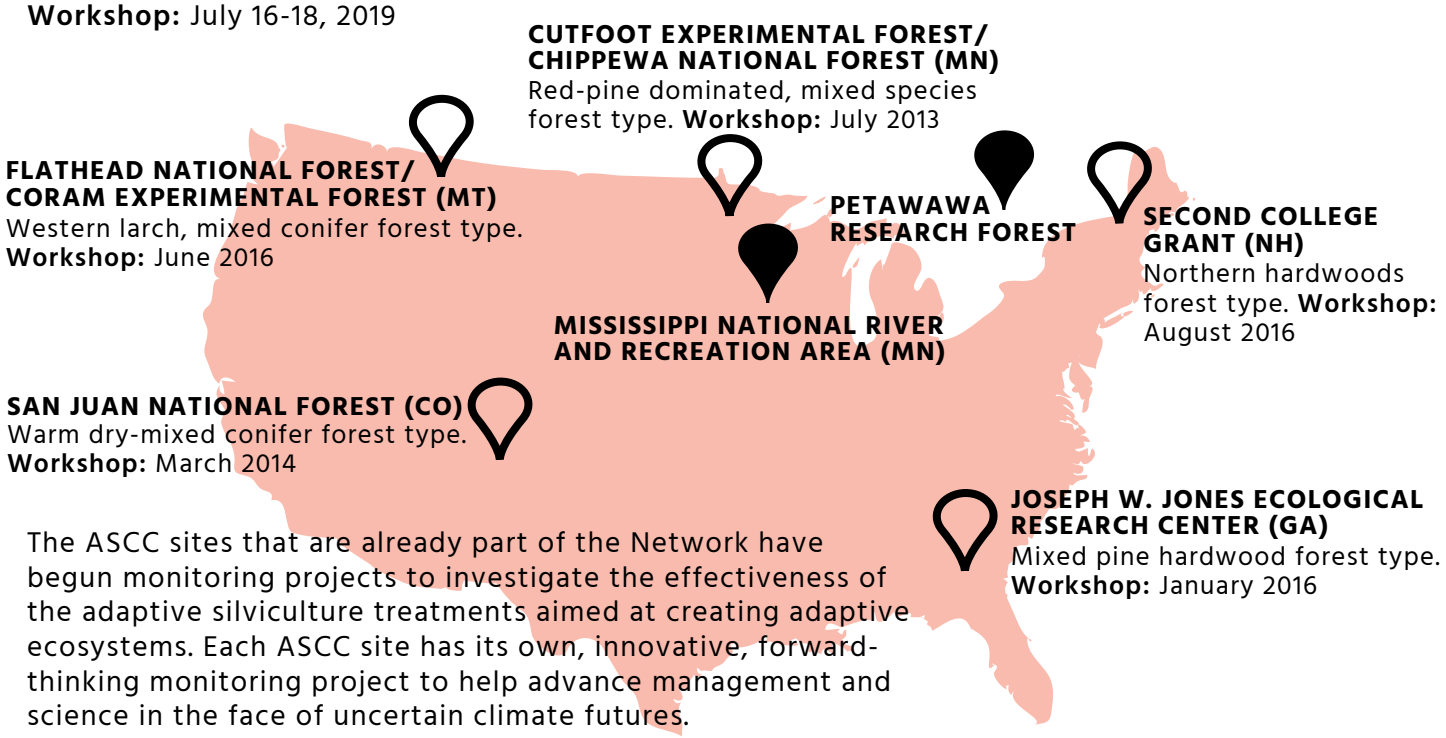
The ASCC Network welcomes two new sites in 2019. Colorado State University and NIACS led workshops to develop the following new ASCC trial installations:

MISSISSIPPI NATIONAL RIVER AND RECREATION AREA (MNRRA)

Leslie Brandt initiated the first urban affiliate ASCC site and will be located at Crosby Farm Regional Park in St. Paul, MN. The site is located in a floodplain forest ecosystem, dominated by an ash-elm mixed lowland hardwood forest type. **Workshop:** March 25-26, 2019

PETAWAWA RESEARCH FOREST

The ASCC project at the Petawawa Research Forest is our first international ASCC trial. The site is located in a white pine-dominated forest within the St. Lawrence-Great Lakes Region.
Workshop: July 16-18, 2019



The ASCC sites that are already part of the Network have begun monitoring projects to investigate the effectiveness of the adaptive silviculture treatments aimed at creating adaptive ecosystems. Each ASCC site has its own, innovative, forward-thinking monitoring project to help advance management and science in the face of uncertain climate futures.

HIGHLIGHT

The Jones Center: Prescribed Fire Monitoring Treatments

The Jones Center ASCC site began prescribed fire treatments in spring 2019. Initial fire assessments are focused on individual hardwood trees to evaluate how hardwoods affect the spatial extent of fire energy release. Two years from now, when the ASCC treatment effects have developed further, scientists from The Jones Center will perform ecosystem-level fire assessments. Preliminary results suggest that on wetter days the prescribed fires are burning better in the ASCC transition plots than in the other ASCC treatment plots due to better-developed ground cover and better ventilation from a sparser canopy.

PARTNERSHIPS

ASCC is a highly collaborative project with partners who have been integral to the advancement of the project since 2012, committing their expertise and experience in planning and execution of each study site. Manager-scientist partnerships built through ASCC are helping to inform research and advance communication of climate change adaptation.

> **Best Workshop ever! Very efficient and focused. Loved it.**
>
> - Petawawa Research Forest Workshop ASCC participant

> **Thank you so much for bringing a true collaborative process to the Mississippi! Bringing together such a complex team from different agencies and philosophies is so challenging and you led them all through it in a way that made them feel heard but also was successful in achieving our goals! I'm so excited for our next steps!**
>
> - Mary Hammes, Mississippi Park Connection

LOOKING FORWARD

Interest in the ASCC project continues to grow. The network is evaluating potential for new sites in six states across the country, including both urban and traditional forest-based sites. Future plans for research include complementary species interactions and the potential of using species mixtures to reduce tree mortality and an initial cross-site research project focused on differences in treatment implementation that will help unify data management across the ASCC Network.

CARBON TRENDS AND MANAGEMENT

Carbon Trends and Management efforts combine creativity, scientific information, and new data to answer questions about the sequestration, variability, vulnerability, and management of forest carbon.

NIACS Team:
Kate Heckman
Maria Janowiak
Luke Nave
Todd Ontl
Chris Swanston

2019 FACTS

$400,000

GRANT FROM THE PAYNE FOUNDATION
for the expansion of the Forest Soil Carbon Partnership

8
PEER-REVIEWED JOURNAL ARTICLES
Published or accepted in FY19

SCIENCE APPLICATIONS

The Carbon Trends and Management theme incorporates NIACS efforts that design, produce, and disseminate scientific information about land use, management, and the carbon cycle. General focus areas include quantifying the effects of land use change and forest management on soil carbon sequestration, assessing how forest biomass production changes with disturbance or succession, and investigating interactions between forest carbon and other ecosystem components, such as hydrology or nutrient cycling. Education and training efforts are an important part of this theme.

6th **Annual Soil Carbon Training Workshop**

82 scientists from 13 countries have been trained

>400 soil samples

from **NEON** sites analyzed for radiocarbon

ACCOMPLISHMENTS

FOREST SOIL CARBON PARTNERSHIP

American Forests (AF) and NIACS initiated the Forest Soil Carbon Partnership. A pilot project quantified the impacts of land use and management on soil carbon stocks in Maryland and the surrounding region. The is the latest evolution of data synthesis and meta-analysis techniques developed by NIACS staff. Findings were published in *Forest Ecology and Management* and additional products are in development.

SOIL CARBON WORKSHOP

The 6th annual workshop on estimation of carbon in soils was hosted at the University of Michigan Biological Station (UMBS) as a partnership between NIACS, USFS-International Programs, SilvaCarbon, and USAID. The 9-day event trained 11 participants from Mexico, Honduras, and Guatemala and is now the longest-running of any offered by USFS-IP.

ADAPTIVE ASPEN MANAGEMENT EXPERIMENT

A new 77-acre experiment at UMBS compares resistance, resilience, and transition options for aspen-dominated forests. The experiment builds upon 5 years of baseline research on the hydrology, carbon cycling, and biogeochemistry of the Honeysuckle Creek Watershed. Timber sale revenue is funding research regarding management and climate change impacts on forest growth, carbon sequestration, hydrology, and soil organic matter dynamics.

ADAPTATION STRATEGIES AND APPROACHES FOR FOREST CARBON MANAGEMENT

The *Practitioner's Menu of Adaptation Strategies and Approaches for Forest Carbon Management* integrates climate adaptation and mitigation in land management. NIACS used this new menu with diverse partners to demonstration alignment in adaptation and carbon mitigation practices. The menu has also been used by U.S. Climate Alliance states in collaboration with American Forests through the Natural and Working Lands Initiative Learning Labs.

HIGHLIGHT

Partnering on Online Forest Carbon Education

NIACS partnered with Michigan State University Department of Forestry's Forest Carbon and Climate Program to develop a self-guided online course on carbon education. *Understanding Forest Carbon Management* is an intensive short course on forest carbon management for practitioners. NIACS staff contributed to the course design and the development of carbon management modules. NIACS also developed the standalone module *Forest Carbon Science, Policy, and Management*, which introduces carbon science, forest carbon policy, markets, and management while providing additional resources for viewers to explore at their own pace.

PARTNERSHIPS

NIACS work related to Carbon Trends and Management maintains and cultivates partnerships to ensure technically robust science, effective information delivery, and strategic growth. Scientific partnerships include research collaborators from government, academia, and non-profits. These partnerships are the foundation of NIACS projects ranging from pure research into soil organic matter radiocarbon dynamics, to applied research into management impacts on carbon sequestration. Collectively, NIACS and its partners work together strategically, to ensure that new projects are responsive to stakeholder needs, programmatic opportunities, and growth areas

> **Luke is the star of the course [Soil Carbon Workshop].**
>
> - Rafael Flores, U.S. Forest Service International Programs Mexico

> **I really enjoy taking a concept and being able to run with it, and having the right people with capacity and skills has made a big difference. Thank you for sharing your team with us.**
>
> - Lauren Cooper, Michigan State University, Department of Forestry, Forest Carbon and Climate Program

LOOKING FORWARD

New funding from the Payne Foundation will expand NIACS-AF work on the Forest Carbon Partnership into 3-4 more regions to better understand how management can be used to reduce soil carbon losses or even achieve soil carbon gains. Organizers of the soil carbon training event are already planning the 7th annual workshop for June 2020. Intensive sampling on the Adaptive Aspen Management Experiment will build an unparalleled dataset on real-time changes in soil organic matter dynamics and hydrologic carbon transport during the immediate post-harvest period. NIACS will continue to work with partners using the forest carbon management menu with managers.

CLIMATE CHANGE RESOURCE CENTER

The Climate Change Resource Center (CCRC) is a web-based, national resource that connects land managers and decision-makers with useable science to address climate change in planning and application.

fs.usda.gov/ccrc

NIACS Team:
Hannah Abbotts
Shawn Klomparens
Kailey Marcinkowski
Chris Swanston

2019 FACTS

200,000+ pageviews

visits from **211** **countries**
according to Google Analytics

SCIENCE APPLICATIONS

The Climate Change Resource Center (CCRC) delivers relevant and credible science-based information on climate change to natural resource and land managers through its online platform. Resources from the CCRC are also adapted for the USDA Climate Hubs and shared through Hub activities.

The Climate Change Resource Center (CCRC) is continuing to evolve into a multi-agency resource on land management and climate change. In particular, the CCRC partners with the Department of the Navy, providing the basic climate change science education component for its environmental courses.

104,635 USERS

an increase of
45%
from FY18

an increase of
60%
from FY17

Most Visited Topic Pages

Forest Carbon
Insect Disturbances
Grasslands
Wildlife

ACCOMPLISHMENTS

The CCRC continued to expand content offerings on forest-related topics, tools, and online training materials for climate change education. The biggest accomplishments of the year were the integration of the Adaptations Examples into the Compendium of Adaptation Approaches section, a new carbon module, and behind-the-scenes migration of the CCRC content to the next generation of our content management system.

COMPENDIUM OF ADAPTATION APPROACHES

- 6 new adaptation examples
- Updated existing adaptation examples to integrate with the Compendium

EDUCATION

- Development of online climate change curriculum in partnership with Michigan Tech University
- New carbon module in partnership with Michigan State University
- 4 Department of the Navy Environmental Compliance course climate change sessions, delivered through the USDA Climate Hubs
- Updated Frequently Asked Questions design and information

SITE INFRASTRUCTURE

- Site upgrades including structural and user interface improvements to the video pages, adaptation approaches, adaptation examples, and education pages
- Expansion of the Compendium of Adaptation Approaches to include adaptation examples that feature the approaches being implemented in real-world management
- Major security updates
- Migration of content to Drupal 8

AND MORE

- Topic Pages
- Featured Stories
- Tools
- Videos

PARTNERSHIPS

The CCRC is working with Forest Service Research and Development, Office of Knowledge Management and Communications, which has built a new steering group for the CCRC, with representation from across the Forest Service.

> **The CCRC is in the forefront of providing science-based information and resources that give forest managers the ability to incorporate cutting edge strategies into their forest stewardship.**
>
> - Paul Catanzaro, State Extension Forester, University of Massachusetts

> **Your presentation was very informative and inspiring... so much so that I have decided to begin dedicating my research and free time to climate change in hopes of perhaps becoming the first in-house subject matter expert for my field (Natural Resources Management).**
>
> - Jamie Ignowski, Natural Resources Management Specialist, Naval Facilities Engineering Command, Washington D.C.

LOOKING FORWARD

The CCRC will continue to provide new content, with a focus on adding Adaptation Examples and new approaches to the Compendium of Adaptation Approaches. New and updated Topic Pages and a comprehensive update to the Tools section are also in the works. Work has already begun on the styling and layout upgrade to our Drupal 8 migration, with a projected live launch at the end of FY2020.

CLIMATE CHANGE RESPONSE FRAMEWORK

The Climate Change Response Framework (CCRF) is a collaborative, cross-boundary approach among scientists, managers, and landowners to incorporate climate change considerations into natural resource management.

forestadaptation.org

NIACS Team:

Leslie Brandt
Stephen Handler
Maria Janowiak
Patricia Leopold
Todd Ontl
Kristen Schmitt
Danielle Shannon
Chris Swanston

2019 FACTS

300+

demonstration projects

HUNDREDS

of partners

(Federal, Tribal, State, Private)

SCIENCE APPLICATIONS

There is no single solution for how natural resource managers and landowners should adapt to climate change. Every manager and landowner has different goals and information needs, as well as a range of tolerances for risk. The CCRF works side-by-side with people across the land management community to help them consider how climate change may affect their lands and what options they have for responding to changing conditions.

The CCRF uses the best available science to advance climate change adaptation through four interrelated efforts: Partnerships, Vulnerability Assessments, Adaptation Resources, and Adaptation Demonstrations.

14

REAL-WORLD PROJECTS

have used the
Tribal Adaptation Menu
so far

12 Adaptation Planning and Practices trainings

ACCOMPLISHMENTS

VULNERABILITY ASSESSMENTS

The Mid-Atlantic vulnerability assessment and accompanying StoryMap was published, wrapping up a series of 8 ecoregional assessments. New field guides for Wisconsin and Pennsylvania provide accessible summaries of the assessments. NIACS also helped lead an ongoing vulnerability assessment with Apostle Islands National Lakeshore and launch an urban vulnerability assessment for the city of Austin.

ADAPTATION RESOURCES AND DEMONSTRATIONS

Partner interest has spurred several new menus of adaptation strategies and approaches on a wide array of topics. New menus for tribal perspectives, forested watersheds, and non-forested wetlands were developed and published with the help of numerous partners and can be used with the Adaptation Workbook. Several additional menus are in development and undergoing review.

The network of Adaptation Demonstrations continues to expand, providing hundreds of real-world examples of climate-informed management. An updated website showcases more than 150 adaptation demonstration projects.

NIACS staff worked closely with many state agency partners over the past year, expanding agency-wide efforts beyond Pennsylvania DCNR to agencies in New York and Colorado. We continue to support all 15 regional National Forest units, and worked on integrating climate change into the forest plan revision for the Wayne National Forest.

TRAINING

NIACS continues to be a recognized leader in delivering high-quality training to natural resource professionals. Twelve trainings were hosted using the Adaptation Planning and Practices curriculum, including 3 online offerings. During the past 6 years, NIACS has delivered 50 of these trainings to more than 1,000 natural resource professionals!

HIGHLIGHT

A Tribal Climate Adaptation Menu

NIACS is thrilled to be part of the team that developed an adaptation menu that reflects indigenous perspectives in climate adaptation, *Dibaginjigaadeg Anishinaabe Ezhitwaad: A Tribal Climate Adaptation Menu*, along with the Great Lakes Indian Fish and Wildlife Commission (GLIFWC), 1854 Treaty Authority, College of Menominee Nation, Northeast Climate Adaptation Science Center, and other organizations. NIACS co-hosted two hands-on workshops with GLIFWC, the Institute of Tribal Environmental Professionals, and others to help participants identify adaptation actions for a variety of natural and cultural resources. There has been tremendous excitement about this work, with much more planned for next year.

PARTNERSHIPS

Climate change is a cross-boundary issue that affects all lands. Effective partnerships expand the capacity of individual organizations to cope with climate change complexities. Collaborative partnerships are the foundation for all CCRF activities.

> **I just wanted to let you how happy I am with the workshop up in Minnesota. The Tribal Adaptation Menu is fantastic. The way Kristen and the others did the workshop was beneficial because not only was it hands on, but we had to do preparation before the workshop.**
>
> - Yvette Wiley, Director, Office of Environmental Services, Iowa Tribe of Oklahoma

> **I found the process of going through the workbook to be very helpful. I especially liked the freedom to discuss non-traditional or seemingly extreme management tactics. It is definitely easy for land managers to get stuck in a specific way of thinking and have rigid expectations for what a natural community should look like. I think this exercise will generally lead to a more flexible way of thinking.**
>
> - Andre Otte, Land Conservancy of West Michigan

LOOKING FORWARD

The CCRF turned 10 in 2019, and it just keeps growing! The CCRF is increasingly influencing the rest of the country through the USDA Climate Hubs, with American Forests spurring the development of a CCRF project in California in partnership with NIACS and the California Climate Hub. Work funded through the Great Lakes Restoration Initiative and USDA Climate Hubs is taking on issues related to adaptation in forested watersheds and riparian areas. New menus of adaptation strategies and approaches menus are expanding the Adaptation Workbook to new subjects, including carbon, wildlife, and recreation.

DIGITAL SCIENCE COMMUNICATION

Digital Science Communication efforts support online science delivery through website creation, informative content, graphic design, and educational multimedia.

NIACS Team:
Hannah Abbotts
Shawn Klomparens
Kailey Marcinkowski

2018 FACTS

9
GRAPHICS
in support of the **Shared Stewardship Strategy** for the Forest Service Office of Communications

10+
infographics
for the Forest Service Research & Development newsletter

SCIENCE APPLICATIONS

The Digital Science Communication theme aggregates an increasing portfolio of web-based activities that help to convey information, tools, and other resources regarding climate change and other land management challenges. NIACS staff organize, create, manage, and maintain numerous websites as a means to provide user-friendly online platforms for delivering climate change science information. These efforts also use graphic design as a communication tool to visually represent and simplify scientific information and ideas.

131,000 pageviews AND **39,000** users on the USDA Climate Hubs National website

5 WEBSITES MAINTAINED

ACCOMPLISHMENTS

NIACS staff are providing increasing levels of assistance, web development expertise, and design services for several major web-based platforms and communication outlets, including the USDA Climate Hubs and U.S. Forest Service Research and Development (USFS R&D) at a national level.

NIACS STAFF HAVE EXPANDED THEIR PORTFOLIO. MAJOR ACCOMPLISHMENTS THIS YEAR INCLUDE:

- The new niacs.org website was established to better convey NIACS activities and partners.
- The USDA Climate Hubs and Climate Change Resource Center (CCRC) websites continue to serve as flagship efforts, with ongoing work to maintain web security, ensure site functionality, and enhance the user experience.
- NIACS staff provided support to USDA Climate Hubs web content managers in building, organizing, improving, and maintaining the website.
- The Adaptive Silviculture for Climate Change website continues to grow as the scope of the ASCC network increases.
- Maintenance and security updates were made for the Radiocarbon Collaborative, Adaptive Silviculture for Climate Change, and NIACS websites.
- New server infrastructure was established to improve future site development and updates.
- Graphic design products were created to complement the work of the USFS R&D's Knowledge Management and Communications staff
- NIACS staff with web development and content responsibilities developed new skills for programming and website development to expand their capacity to take on new projects.

HIGHLIGHT

NIACS is now at www.niacs.org

The work that NIACS does continues to grow, and a new website was designed to showcase our work. **Be sure to visit www.niacs.org if you haven't already.**

PARTNERSHIPS

Staff involved with the Digital Science Communication theme have partnered with Forest Service Research & Development, USDA Climate Hubs, and NIACS projects - including Adaptive Silviculture for Climate Change and Radiocarbon Collaborative. We work with partners to create digital media and websites that clearly deliver usable scientific management information on climate change.

> **We love it...love it...love it! Thanks so much for all your changes and for another terrific addition to our collection of infographics, which are being used for many purposes, including the newsletters, presentations, social media and website.**
>
> - Lily Whiteman, National Coordinator, Science Delivery and Communications, Knowledge Management and Communications, Forest Service Research and Development

LOOKING FORWARD

Planning is currently underway for NIACS staff to lead a complete overhaul of the USFS R&D website, which will entail working with R&D for a robust new site design, coordination among multiple research stations, building a new site from the ground up, and moving existing content to a new site. Additionally, NIACS staff will continue to maintain existing web projects and design efforts.

LANDSCAPE CHANGE RESEARCH GROUP

The Landscape Change Research Group specializes in creating ecological assessments using large amounts of biological, climatic, and terrain data with statistical models and geographic information systems (GIS).

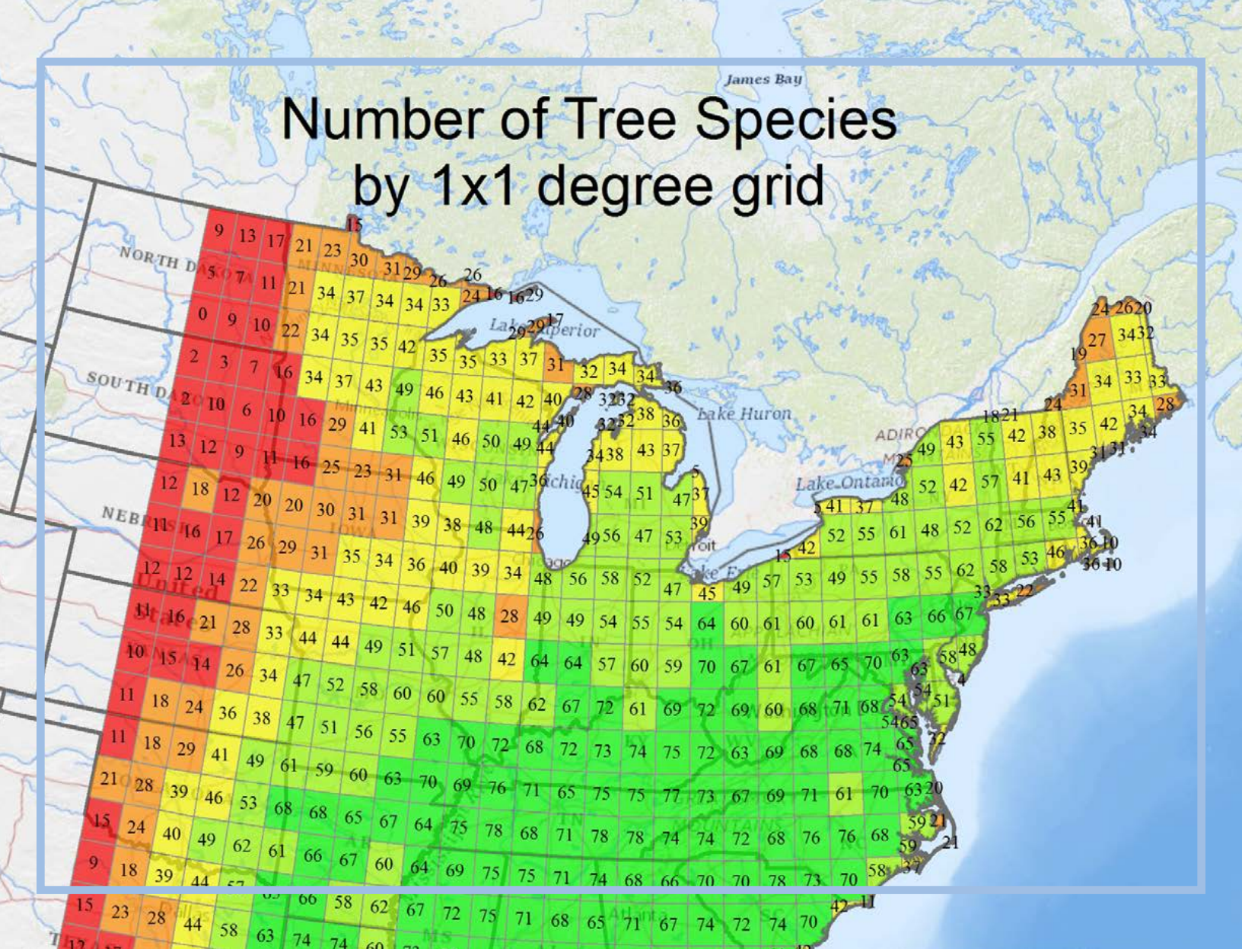
fs.fed.us/nrs/atlas/tree
fs.fed.us/nrs/atlas/bird

NIACS Team:
Bryce Adams
Louis Iverson
Stephen Matthews
Matthew Peters
Anantha Prasad

2019 FACTS

750,000+
pageviews
this fiscal year

222,000
ATLAS WEB PAGE USERS



SCIENCE APPLICATIONS

The scientists of the Landscape Change Research Group (LCRG) create original research as well as valuable tools and data sets for resource managers and decision makers. The integration of the LCRG into the NIACS team allows for more information to be made available to land managers, provides valuable feedback from users about LCRG products, and enhances work to support forest adaptation and inspire new research. The LCRG also takes advantage of local opportunities, working directly with scientists and managers to inform land management decisions in Ohio.

82

citations per month

over the past 18 months
on Google Scholar

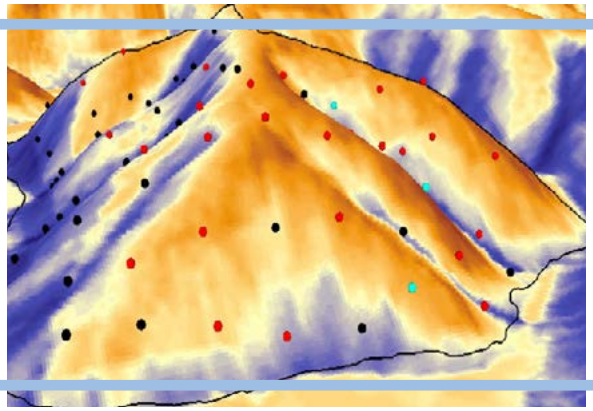
15 **Scientific publications co-authored this year**

ACCOMPLISHMENTS

A tremendous amount of new information was produced in 2019, including 8 journal articles, 2 GTRs, 3 GTR chapters, 2 StoryMaps, and 17 scientific presentations. The Climate Change Atlas remains a primary way to make modeling data available to a large audience, with more than 750,000 page views this fiscal year. Updates to the Bird section of the Climate Change Atlas were published in early 2019.

The team updated their core modeling effort, using the DISTRIB-II and SHIFT models on 125 tree species in the eastern US to produce a wide array of tabular data and maps projecting species responses to future conditions. These data are also summarized for national forests and parks, watersheds, and ecoregions.

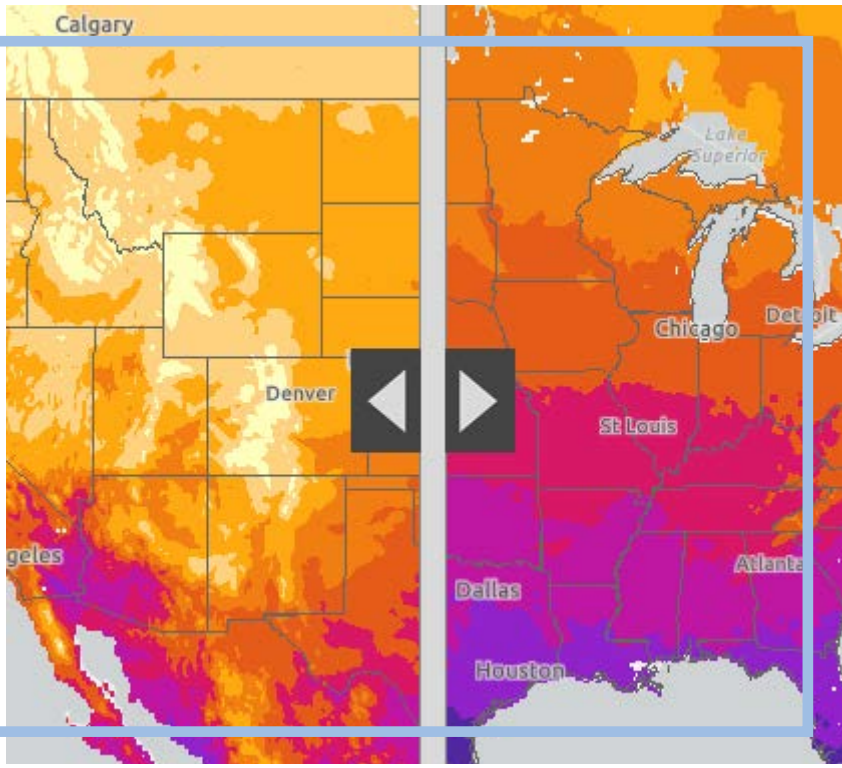
The LCRG worked with the Ohio Interagency Forestry Team and Wayne National Forest (WNF) on promoting oak-dominated forests in the 17-county project area of a USDA Joint Chiefs' Restoration Partnership. Major products include landtype maps, a general technical report on the status and trends of the region, support of the WNF plan revision, and implementation of the Ohio Interagency Forestry Team Five-Year Business Plan.

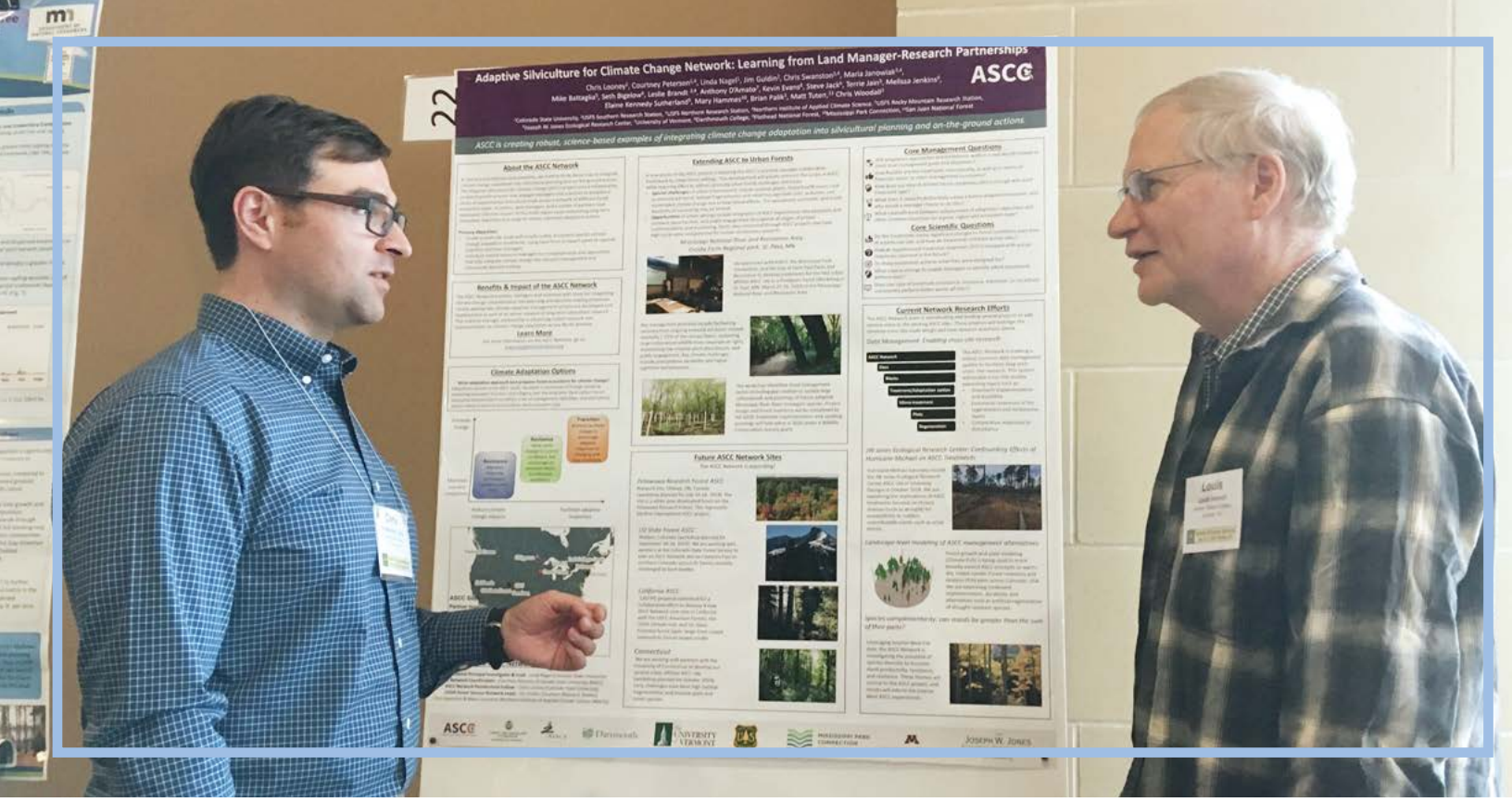


HIGHLIGHT

Climate Change StoryMaps

With more than **85** years of combined experience in geographic information systems, the LCRG has prepared two StoryMaps this fiscal year. The first StoryMap, *Climate Change Pressures in the 21st Century*, was created in collaboration with the Forest Service Office of Sustainability and Climate, and features maps and information on growing degree days, plant hardiness zones, and heat zones from a previous LCRG GTR publication. The second, *Restoration of oak-hickory forests in Southeastern Ohio*, is based on research conducted over **20** years in southern Ohio on issues and opportunities associated with restoring oak-dominated forests in this region (in an era of changing climate).





PARTNERSHIPS

LCRG works with scientists and land managers to create products that support land management and new research. Partners are from federal agencies, state agencies, universities, and also other regional organizations. Additionally, many of the LCRG partners overlap with CCRF partners.

> **The storymap is fantastic! In my opinion, we need more work like this to highlight FS research. This is a great communication tool to reach the masses. Nice work!**
>
> - Jason Stevens, Regional Rangelands Ecologist, Regional Rangeland Management Specialist, Regional Invasive Species Coordinator (R9), Southern and Eastern Regions

LOOKING FORWARD

The LCRG is working with Jim Lootens-White (NRS webmaster) to incorporate the most recent modeling results into a new version of the Climate Change Atlas website, making them available globally. And that's just the beginning! The LCRG will continue to publish new research papers, update the Bird Atlas, explore drought vulnerabilities, and continue coordination with Canadian researchers, heading toward better cross-boundary modeling.

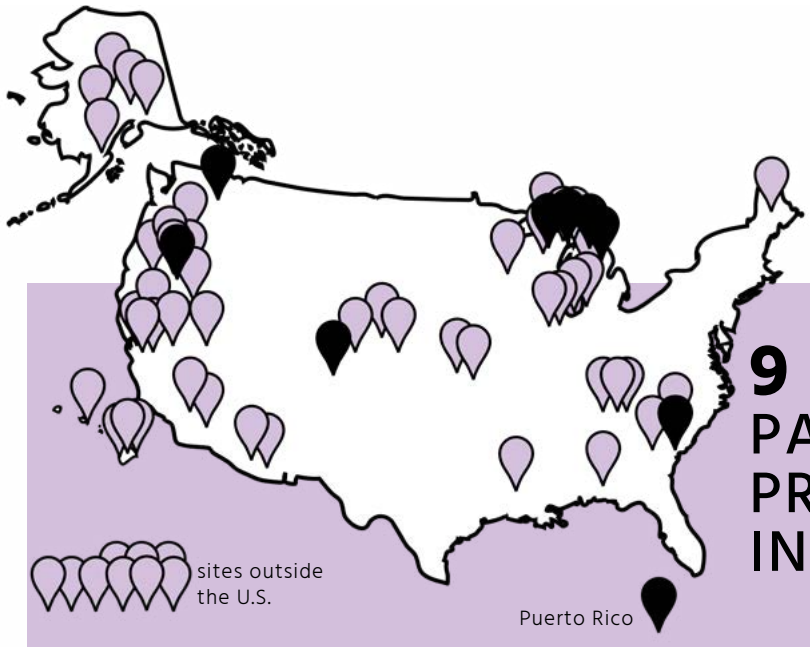
RADIOCARBON COLLABORATIVE

The Radiocarbon Collaborative is dedicated to advancing climate and carbon cycle science by making radiocarbon analysis accessible, decipherable, and collaborative.

radiocarbon.forest.mtu.edu

NIACS Team:
Kate Heckman
Chris Swanston
Paula Zermeño

2019 FACTS



9 NEW PARTNER PROJECTS IN FY19

SCIENCE APPLICATIONS

Radiocarbon abundance measurements have been used to gain unique insight into a wide variety of scientific questions across a diversity of scientific disciplines. Even though scientists have been conducting radiocarbon analyses for nearly 70 years, new users often struggle with the nuances of interpreting complex data. Students and researchers can also struggle to obtain radiocarbon data, due to the expense associated with sample pretreatment and measurement. The Radiocarbon Collaborative addresses these issues by increasing researcher access to this powerful analytical method. The collaborative provides a dynamic and growing resource to support radiocarbon users of all experience levels across a broad range of disciplines.

The Radiocarbon Collaborative is a partnership among scientists at the USDA Forest Service Northern Research Station, the University of California, Irvine, and numerous other federal and private institutions. The Radiocarbon Collaborative is jointly supported by the US Forest Service, the W.M. Keck Carbon Cycle Accelerator Mass Spectrometer Facility at the University of California, Irvine, and Michigan Technological University.

27 soil carbon in temperate ecosystems
17 peatlands, wetlands, and permafrost
9 fire
9 archeology and Heritage Program
7 ecology and land management
6 wildlife conservation

640 **radiocarbon targets** produced

500 **radiocarbon unknowns** processed

ACCOMPLISHMENTS

The Radiocarbon Collaborative supported 9 additional projects in FY19 and supported publication of 6 new peer-reviewed manuscripts ranging in focus from the terrestrial carbon cycle to research in the era of big data.

Through our work with the National Ecological Observatory Network (NEON), the Radiocarbon Collaborative is currently finishing work on a continental-scale soil radiocarbon dataset that will inform future conceptual and mechanistic models of the terrestrial carbon cycle. This work supports five graduate students and is a close collaboration across seven institutions, including the Environmental Molecular Sciences Lab at Pacific Northwest National Lab.

We supplemented our educational activities through collaboration with Michigan Tech's scientific communications team. An instructional article covering the goals and services of the Radiocarbon Collaborative was published as part of Michigan Tech's Unscripted Research series.

The Radiocarbon Collaborative continues to support the Forest Service Heritage Program's mission of discovering the human story etched on the landscape through support of archeological work at the Midewin National Tallgrass Prairie as well as the National Park Service's Isle Royale National Park and Apostle Islands National Lakeshore.

HIGHLIGHT

International Soil Radiocarbon Database

Collaborative efforts with the USGS Powell Center and the Max Planck Institute have resulted in a harmonized soil biogeochemistry and radiocarbon database, the International Soil Radiocarbon Network (www.soilradiocarbon.org) comprising a total of ~200 research studies and totaling over 7,000 radiocarbon data points in our initial dataset. Our database went live in January 2019, following its debut in its own special session at the Soil Science Society of America Annual Meeting. A scientific publication that provides additional details and introduction is forthcoming.

PARTNERSHIPS

The Radiocarbon Collaborative assists researchers will all levels project execution as needed, from experimental design to manuscript preparation. It serves all projects large and small, from a single archeological artifact to global-scale assessments of carbon stocks.

We are currently partnering with researchers from the Forest Service, Colorado State University, Michigan Technological University and Berry College to assist with evaluation of peat carbon stocks, peat ecosystems transition drivers, and fire frequency intervals.

In FY20 we will start processing samples associated with a fourth regional assessment of the American pika and its vulnerability to climate change.

We will additionally continue partnerships with NEON, Oregon State University, University of Wisconsin and others to assess stability and turnover of carbon stocks in minerals soils.

Thank you all again so much for your patience and help through the first part of the process: I am so excited to see this project get off the ground and look forward to working with you all further!

- Jan Van Gunst, Nongame Biologist, Nevada Department of Wildlife

LOOKING FORWARD

The Radiocarbon Collaborative will continue its work with Forest Service scientists and Heritage Program specialists, as well as its collaborations with universities and national labs. A new global-scale project with Forest Service researchers will quantify historical rates of tropical peat accumulation in order to assess the vulnerability of these massive carbon stocks to climate change. Samples processed during the next year will also support a fourth regional assessment of the American pika and its vulnerability to climate change.

Sample handling capacity of the Radiocarbon Collaborative's Carbon, Water & Soils Lab in Houghton, MI, will double in FY20 as we bring our second graphite reduction rig into operation. This substantial improvement will shorten sample processing turnaround times and allow for more efficient laboratory operation.

USDA NORTHERN FORESTS CLIMATE HUB

The USDA Northern Forests Climate Hub (NFCH) helps natural resource managers, woodland owners, and others working in forested ecosystems to integrate climate change information into planning, decision making, and management activities.

climatehubs.usda.gov/hubs/northern-forests

NIACS Team:
Todd Ontl
Kristen Schmitt
Danielle Shannon
Chris Swanston

National Hubs NIACS Team:
Hannah Abbotts
Shawn Klomparens

2019 FACTS

400+
attendees
at NFCH hosted workshops

Organizations Represented:

Tribal, Private, Local, State Agencies, Non-profit, Academic, Military

SCIENCE APPLICATIONS

The USDA Northern Forests Climate Hub (NFCH) provides practical, science-based climate information and climate adaptation training. NIACS leads the NFCH, which tiers to and expands on the work of the Midwest and Northeast Regional Climate Hubs by providing forest sector-specific information and outreach. Additionally, the NFCH collaborates across the country with national partners and regional Hubs to produce specialized adaptation resources and training events.

4 new Climate Change Response Framework ADAPTATION MENUS

forested watersheds, tribal perspective, forest carbon management, non-forested wetlands

21 educational trainings and workshops

ACCOMPLISHMENTS

The NFCH continues to provide leadership in climate change adaptation and response across its region— and beyond!

EDUCATION AND TRAINING

The NFCH developed and led 21 climate and adaptation workshops for regional organizations and Hub partners, providing direct training to more than 400 natural resource professionals. (And this doesn't even include the 12 online and in-person adaptation planning and practices trainings held in conjunction with the Climate Change Response Framework!)

Continued collaboration with the Departments of Defense and Navy resulted in climate change education using CCRC educational resources at six trainings of military natural resource specialists, and engineers, and officers. An additional adaptation planning workshop was held at the National Military Fish and Wildlife Association meeting for natural resource managers from different military branches.

The NFCH also led the development of a forestry-specific curriculum as part of peer-to-peer learning network for climate adaptation among agricultural producers and natural resource managers, in collaboration with partners at the Northeast Climate Hub.

SUPPORT TO USDA REGIONAL CLIMATE HUBS

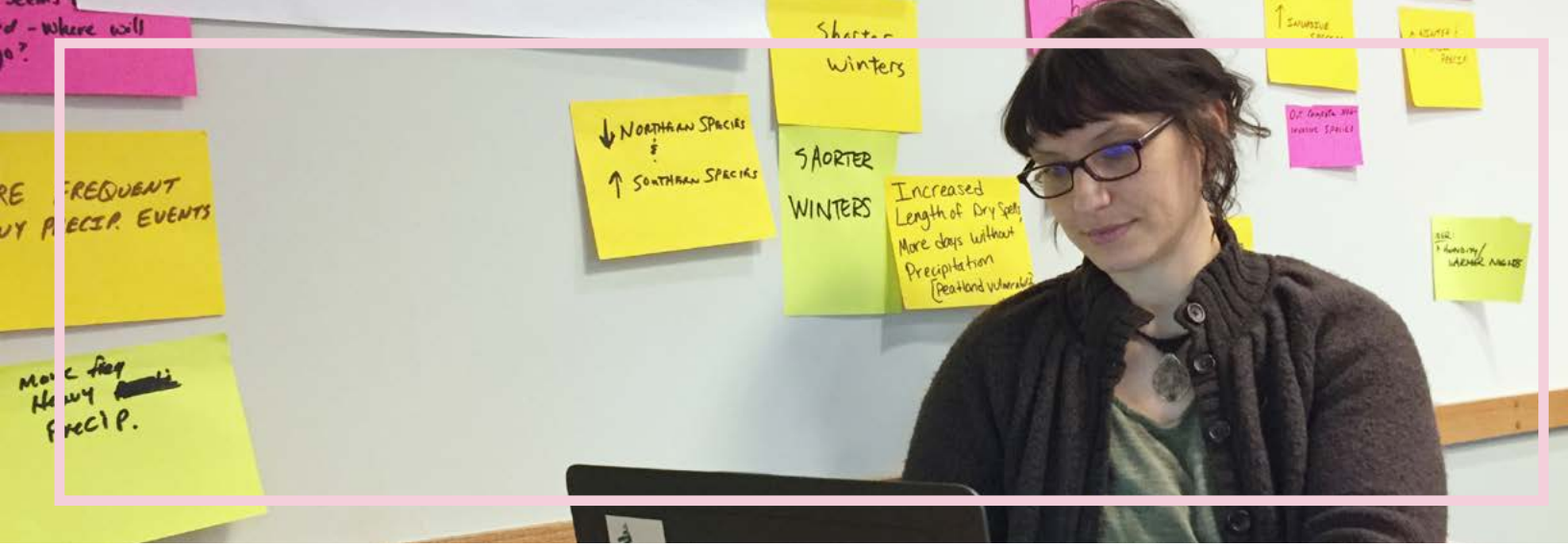
The NFCH continues to be a leader within the national network of USDA Hubs. The NFCH supported the California Climate Hub and USFS Region 5 by training staff from two National Forest to integrate climate considerations and climate-informed actions into management projects.

The NFCH hosted forest ecologist Stacey Clark as a liaison from the USDA Natural Resource Conservation Service. Her work this year included: introducing the Adaptation Workbook and other tools to NRCS staff and partners, developing new climate-informed tools and products, and providing feedback on how to better provide support integration of climate change and adaptation principles within the NRCS conservation planning framework.

HIGHLIGHT

NFCH Supports California Hub

The California Climate Hub and USFS Region 5 invited the NFCH to assist two National Forests with adaptation planning using the Adaptation Workbook and menus of strategies and approaches. Work with the Tahoe National Forest on a vegetation management project reinvigorated efforts by the California Climate Hub to create a menu of strategies and approaches for California ecosystems. Efforts to support the San Bernardino National Forest on a recreation infrastructure project also provided a chance to test a new menu of adaptation strategies and approaches for recreation in the southwestern United States. Both projects are currently moving ahead on environmental analysis.



PARTNERSHIPS

The Northern Forests Climate Hub collaborates across the country with other regional Hubs and national partners, and also integrates activities with the Climate Change Response Framework (CCRF) and its many partners. The Hub partnerships often work at larger scales across the region, while the integration with CCRF leverages more long-standing partnerships engaged in on-the-ground management activities.

> **You did an exceptional job - it was both an enjoyable and extremely informative day. I gained a lot of insight into the climate adaptation planning process.**
>
> - National Military Fish and Wildlife Association 2019 Workshop Attendee

> **I want to thank you again for the amazing job you did presenting as part of the NRCS-ASWM Wetland Training Webinar this week. You provided a stellar presentation, including a wealth of useful information. We had 437 participants join us on the live webinar and have received feedback from several participants (in addition to those who commented during the webinar) that this was a webinar of the highest caliber.**
>
> - Brenda Zollitsch, Senior Policy Analyst, Association of State Wetland Managers

LOOKING FORWARD

The NFCH will develop and deliver tools for diverse groups of natural resource managers and provide a variety of topic-specific adaptation planning workshops for practitioners. Additionally, the NFCH will continue working with other Hubs and organizations to help support regional and national efforts. In the next year, NFCH will be working with American Forests on planning and agenda development for four regional Learning Labs in support of US Climate Alliance work on Natural and Working Lands.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OUTREACH AND SCIENCE

Posters

Presentations

Press

Proposals

Sessions

Workshops

Publications

OUTREACH AND

POSTERS

11
posters

6
FOREST MAPPING POSTERS

2
NATIONAL PARK SERVICE POSTERS

PRESENTATIONS

109
presentations

41
INVITED TALKS

17
NIACSERS GAVE PRESENTATIONS

16 Webinars

PRESS

15
press items

10
NEWS ARTICLES

5
VIDEOS— INCLUDING A TV INTERVIEW AND FACEBOOK LIVE

1 New York Times Article

SCIENCE

PROPOSALS

29
proposals

13
PROPOSALS FUNDED

11
PROPOSALS IN REVIEW

SESSIONS

14
convened sessions

7
SESSIONS ON ADAPTATION

4
AT THE NATIONAL ADAPTATION FORUM

WORKSHOPS

40
hosted workshops

725
WORKSHOP PARTICIPANTS
(approx.)

63
MAJOR PARTNERS AND COLLABORATORS

12 Adaptation Planning and Practice trainings

OUTREACH AND

PUBLICATIONS

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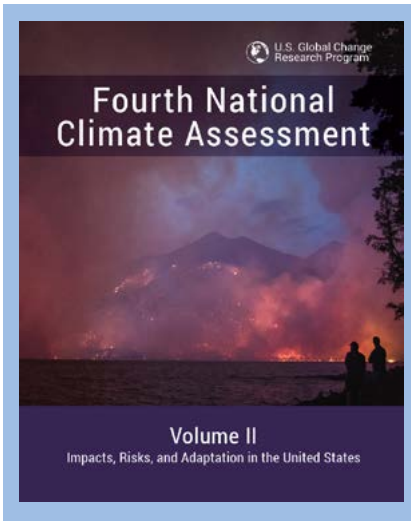

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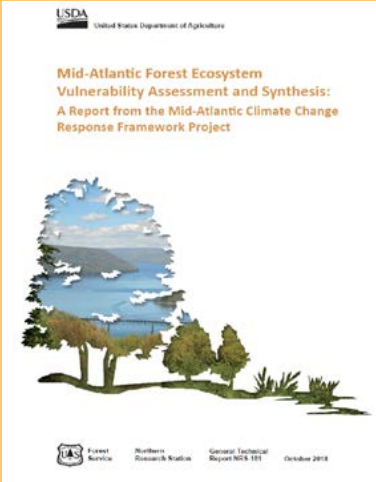
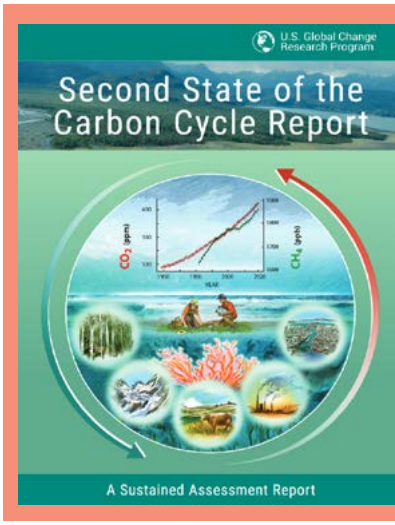
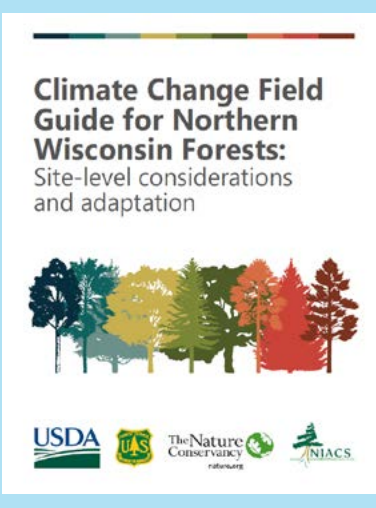
SCIENCE

43
publications







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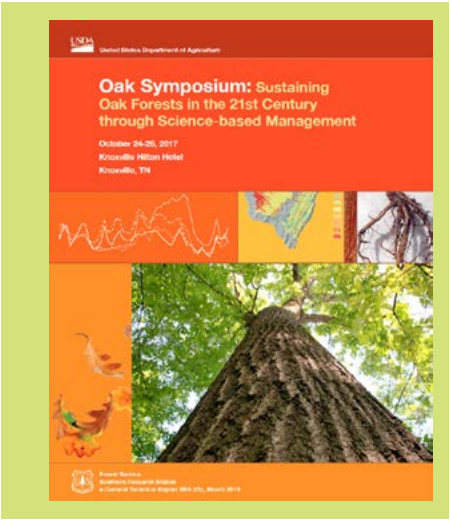

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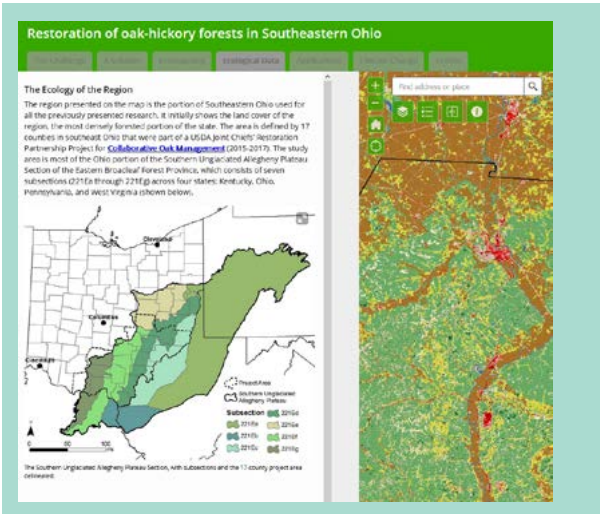

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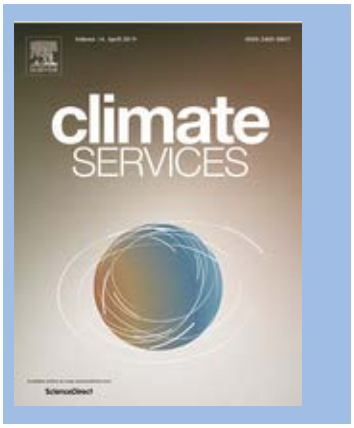

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SCIENCE

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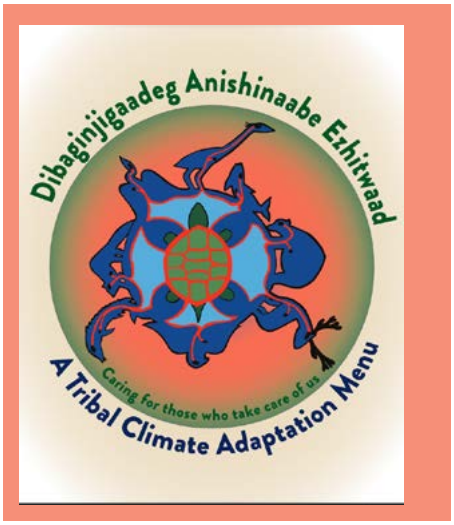


7 REPORT OR BOOK CHAPTERS

2 Storymaps

25 PEER-REVIEWED JOURNAL ARTICLES

PEOPLE

Meet the Staff!

PEOPLE

HANNAH ABBOTTS

Hannah is the content manager for the Forest Service Climate Change Resource Center and USDA Climate Hubs. In addition to creating and managing web content, she plays a supporting role in site building on many projects. Hannah enjoys running and skiing and all things outside. (hwabbott@mtu.edu)

LESLIE BRANDT

Leslie serves as coordinator of the Central Hardwoods and Urban Climate Change Response Framework projects. She is also the regional climate change coordinator for the National Forest System's Eastern Region. She has also been busy working with the Land Trust Alliance on providing technical assistance on climate change to land trusts in the Chicago region. When not working, Leslie spends her time expanding her perennial garden, running, reading for her book club, and going for hikes with her two kids. This summer marks her 10-year anniversary with NIACS! (leslie.brandt@usda.gov)

STEPHEN HANDLER

As a Climate Change Specialist at NIACS, Stephen coordinates the Northwoods Climate Change Response Framework throughout Minnesota, Wisconsin, and Michigan. This includes preparing vulnerability assessments, working with partners, and planning real-world adaptation projects to illustrate climate-informed land management. Stephen spends as much time as possible tending his woodpile, but now he also practices rapid diaper changes and tummy time with his new son Simon. (stephen.handler@usda.gov)

KATE HECKMAN

Kate Heckman is a soil scientist who studies mechanisms and processes associated with the terrestrial carbon cycle and climate change effects on soils. Kate serves as the lead of the Radiocarbon Collaborative, a scientific outreach program focused on increasing researcher access to radiocarbon analysis, aiding in experimental design, data interpretation, and the preparation of grant proposals and manuscripts. Outside of work, Kate has a love for literature, cooking, travel, and learning new things. (katherine.a.heckman@usda.gov)

WELCOME OUR NIACS DETAILER

STACEY CLARK

Stacey is the 1st liaison from the Natural Resources Conservation Service! During Stacey's detail she is working with NIACS to learn about and disseminate tools and information regarding climate change impacts and adaptive management strategies. Stacey has two projects tying into NRCS's conservation planning framework, piloting in WI and PA. In her "regular" job, Stacey is a Regional Ecologist for the NRCS. In her fun-time, she enjoys competing with her horse, cuddling with her other 4-legged children at home, enjoying nature, cooking, music, and strategic gaming. (stacey.clark@usda.gov)

STACEY JOINED NIACS FULL-TIME FOR THE 2019 CALENDAR YEAR AS A LIAISON FROM THE NATURAL RESOURCE CONSERVATION SERVICE.

LOUIS IVERSON

Louis is a Research Landscape Ecologist with NRS in Delaware, OH, since late 1992! A farm boy from North Dakota, he also spent 10 years with Illinois Natural History Survey prior to FS. His research centers on assessment of climate change impacts on forests, oak-hickory management, and modeling for oak restoration. Louis enjoys square and round dancing, making music at his church, chasing 4 grandchildren around, and pursuing extreme reduction of resource use via gardening, hunting, biking to work, and solar-powered heating, cooling, and local transportation. (louis.iverson@usda.gov)

MARIA JANOWIAK

As the Deputy Director of NIACS, Maria manages many of the day-to-day operations of the productive and busy NIACS team. She is also the coordinator of the New England Climate Change Response Framework project and works with a variety of natural resource professionals and land management organizations to integrate climate change considerations into their management. Outside of work, Maria spends as much time as possible in her garden and enjoying the woods around her home. (maria.janowiak@usda.gov)

SHAWN KLOMPARENS

Shawn is the webmaster of the Climate Change Resource Center and USDA Climate Hubs. He is a longtime advocate for Open Source software and is dedicated to clear and effective presentation of information online in a technically efficient fashion. A Michigan native now living in Jackson, Wyoming with his wife and two children, Shawn enjoys running, cycling, and camping in the summer, and Nordic and backcountry skiing in the winter. (scklompa@mtu.edu)

PEOPLE

PATRICIA LEOPOLD

Patricia coordinates the Mid-Atlantic and Central Appalachians Climate Change Response Framework, where she is actively expanding partnerships, creating resources, and promoting implementation of adaptation actions in inland and coastal forest ecosystems, and at scales ranging from state agency planning to on-the-ground projects. In October, 2019, Patricia is celebrating her 10th year with NIACS and is still trying to keep up with the newest publications. In her summer personal time, Patricia competes in sail boat racing, and enjoys skiing, and snowshoeing in the winter. (pleopold@mtu.edu)

KAILEY MARCINKOWSKI

Kailey is a Climate Change Education Specialist with NIACS, working with the Climate Change Resource Center to expand online education materials. She focuses on developing interactive modules and other graphic visualization materials to make climate change science more accessible, fun, and understandable for everyone. Kailey enjoys reading, cooking, working on house projects, and spending time with her husband and daughter. (kfmarcin@mtu.edu)

STEPHEN MATTHEWS

Stephen is an Associate Professor of Wildlife Landscape Ecology in the School of Environment and Natural Resources at Ohio State University and also holds an affiliation as an ecologist with the Forest Service Northern Research Station. Two general themes of his research focus are climate and land use change and wildlife habitat relationship. Collectively he aims to link these themes across scales to more fully understand and address the global change pressures faced by forests and wildlife. Outside of work, he spends time pondering nature and exploring the outdoors via many modes with his family. (matthews.204@osu.edu)

LUKE NAVE

Luke is an Associate Research Scientist with the University of Michigan. He splits his time between the UM Biological Station, in northern Lower Michigan, and NIACS Central in Houghton. He joined NIACS in 2010, and his role as a scientist is to conduct collaborative research in forest ecology and management, focusing on carbon management, with partners in NIACS, federal agencies, and academia. Luke loves his family and all things outdoors, especially hunting, fishing, skiing, hiking, gardening, and making maple syrup. (lukenave@umich.edu)

TODD ONTL

Todd works with natural resource professionals to integrate climate change considerations into their management, with a focus on the New England region. Additionally, he provides information and resources on forest carbon management for adaptation and mitigation benefits. Todd enjoys spending time with his wife exploring the outdoors with their daughter, and designing and building furniture (and the occasional musical instrument) in his workshop. (todd.ontl@usda.gov)

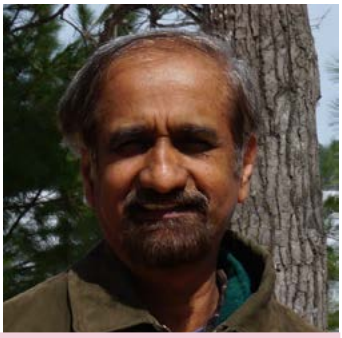
MATTHEW PETERS

Matt is an Ecologist and provides technical support for the Climate Change Tree and Bird Atlas by conducting geospatial analyses and data processing, statistical modeling, and generates cartographic products. Matt has been with the Forest Service Northern Research Station since 2007. He graduated from Ohio University with a B.S. in GIS Analyst and Arizona State University with a M.S. in Applied Biological Sciences. Matt also provides GIS processing and analysis to other Northern Research Station researchers and the Wayne National Forest. (matthew.p.peters@usda.gov)

COURTNEY PETERSON

Courtney Peterson is a Research Associate at Colorado State University in Fort Collins, Colorado. She serves as the Adaptive Silviculture for Climate Change (ASCC) Coordinator, where she focuses on disseminating ASCC project findings and translating them into outreach and training opportunities with land managers and scientists working to manage forests for climate change adaptation. When she is not working, Courtney loves playing violin in a local volunteer orchestra, traveling the world to experience new places, and outdoor adventures with her family and friends. (Courtney.Peterson@colostate.edu)

ANANTHA PRASAD



Prasad is a Research Ecologist and has worked for the Forest Service since 1993. His research focus is to understand within-species variation of trees with respect to genetic, ecological, and environmental differences using multiple modelling techniques. He is involved in modelling colonization likelihoods of suitable habitats under future climates. He loves tinkering with models and scripts to help management and conservation. Outside work, his interests include gardening, hiking, global big history, and spending time with family. (anantha.prasad@usda.gov)

PEOPLE

KRISTEN SCHMITT

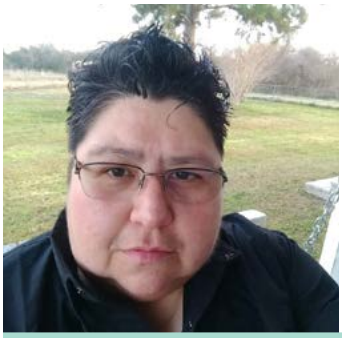
Kristen works in support of the USDA Northern Forests Climate Hub, helping natural resource professionals apply climate adaptation tools to their work. This work spans multiple regions and allows for new and expanded partnerships with other Hubs and organizations interested in climate adaptation. 2019 marks Kristen's 10th year with NIACS! Kristen relocated this year to Duluth, MN, where she is busy getting to know the city, running local races, and exploring the Northwoods. (kmschmit@mtu.edu)

DANIELLE SHANNON

Danielle is the coordinator of the USDA Northern Forests Climate Hub, and helps land managers cope with and adapt to the challenges of climate change. She is responsible for expanding the suite of adaptation resources at NIACS into the field of forest hydrology and the management of forested watersheds, and wetlands. Outside of work, Danielle is most often found running after her two kids in the woods. (dshannon@mtu.edu)

CHRIS SWANSTON

Chris Swanston has served as director of NIACS since 2008 and played an active role in most of the Institute's major efforts, including directing the USDA Northern Forests Climate Hub. Chris is also project leader for NRS' Climate, Fire, and Carbon Cycle Sciences group. He holds a PhD in forest science from Oregon State University. Chris embraces his home in the upper Midwest through snowshoe running (moving for warmth), and trail running (running from mosquitoes). Chris does not like cooked vegetables or mushrooms, because they're gross. (christopher.swanston@usda.gov)



PAULA ZERMEÑO

Paula manages the Carbon, Water and Soils Lab and has over 20 years of expertise in the preparation of environmental samples for radiocarbon dating. Paula serves as a vital part of the Radiocarbon Collaborative, providing expert laboratory analysis as well as serving in the role of mentor to students and technicians. When not moving snow, Paula enjoys hiking with her pups and traveling near and far. (pzermeno@mtu.edu)

NIACS POST-DOCS

BRYCE ADAMS

Bryce works as a post-doctoral researcher and instructor with the School of Environment and Natural Resources at The Ohio State University and affiliated with NIACS. His work seeks to improve our understanding of climate change related impacts on forest composition at fine spatial resolutions. Bryce enjoys visiting parks and going on long walks and bike rides with his family. (adams.861@osu.edu)

CHRIS LOONEY

Based out of the Forest and Rangeland Stewardship Department at Colorado State University, Chris is a Postdoctoral Fellow for the Adaptive Silviculture for Climate Change (ASCC) project. Chris is collaborating with ASCC scientists and land managers on the development of cross-site research to better inform climate-adaptive forest-management strategies and support outreach at the national level. Chris is an outdoor enthusiast who enjoys biking, hiking, kayaking, rock-climbing, and snowshoeing in his free time. (Chris.Looney@colostate.edu)

NIACS PARTNER ORGANIZATIONS

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Michigan Technological University	David Reed	Andrew Storer
National Council for Air & Stream Improvement	Darren Miller	Kevin Solarik
University of Minnesota, College of Food, Agriculture and Natural Resource Science	Brian Buhr	Marcella Windmuller-Campione
University of Vermont	Nancy Mathews	Anthony D'Amato
USDA Forest Service Eastern Region	Bob Lueckel	Stacy Lemieux
USDA Forest Service Northern Research Station	Tony Ferguson	Lon Yeary

NIACS MEMBERS

NAME	TITLE	NIACS AFFILIATION
Knute Nadelhoffer	Director, Biological Station, University of Michigan	Carbon Trends and Management
Linda Nagel	Department head, Forest & Rangeland Stewardship Department, Colorado State University	Adaptive Silviculture for Climate Change (ASCC)

NIACS.ORG

ADAPTATION WORKBOOK

adaptationworkbook.org

ADAPTIVE SILVICULTURE FOR CLIMATE CHANGE

adaptivesilviculture.org

BIRD ATLAS

fs.fed.us/nrs/atlas/bird

CLIMATE CHANGE RESOURCE CENTER

fs.usda.gov/ccrc

CLIMATE CHANGE RESPONSE FRAMEWORK

forestadaptation.org

RADIOCARBON COLLABORATIVE

radiocarbon.forest.mtu.edu

TREE ATLAS

fs.fed.us/nrs/atlas/tree

USDA NORTHERN FORESTS CLIMATE HUB

climatehubs.usda.gov/hubs/northern-forests

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NIACS

A Collaborative Partnership

American Forests

USDA Forest Service Northern Research Station (NRS)

USDA Forest Service Eastern Region (R9)

USDA Forest Service Eastern Region State and Private Forestry

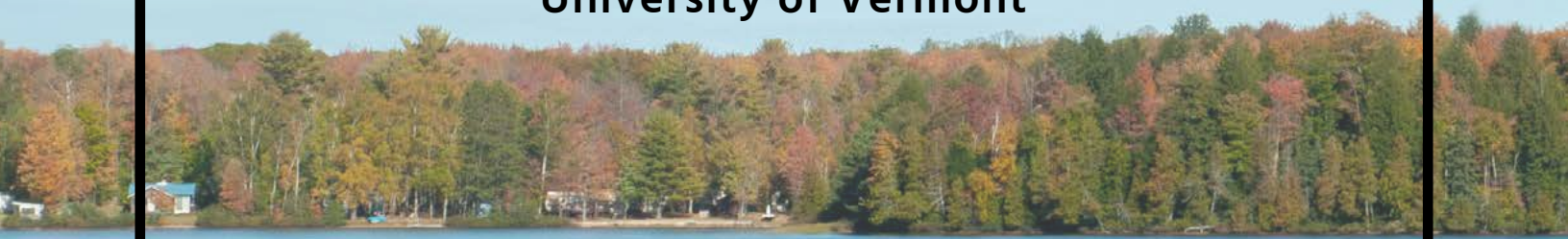
Great Lakes Indian Fish & Wildlife Commission (GLIFWC)

Michigan Technological University

National Council for Air and Stream Improvement (NCASI)

University of Minnesota - College of Food, Agriculture and Nature Resource Science (UMN CFANS)

University of Vermont



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