NORTHERN INSTITUTE OF APPLIED CLIMATE SCIENCE

Annual Report 2020

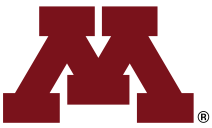
NIACS
Northern Institute of
Applied Climate Science

Michigan Tech

AMERICAN FORESTS
- SINCE 1875 -

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

Annual Report 2020

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 2020

20 NIACS TEAM MEMBERS

265 OUTREACH ITEMS AND PUBLICATIONS

350+ demonstration projects

540+ attendees at NFCH hosted, or co-hosted, workshops

54 **Topic Pages** on the Climate Change Resource Center

3,000+ acres currently being harvested and measured, or designated no action, on **Adaptive Silviculture for Climate Change** sites

10 ADAPTATION PLANNING AND PRACTICE TRAININGS

2,074 soil samples from NEON sites archived for outreach and sharing with the research community

14 **Infographics** for Forest Service Research & Development outreach materials

73 **Projects Supported by the Radiocarbon Collaborative**

10 STATES worked with NIACS to include climate change information into their **2020 State Forest Action Plans**

215,000+ **Atlas Web Page Viewers**

WELCOME

Letter from the Director

This has been a tumultuous year. Our nation has suffered heartrending loss of life, engaged in a widespread and painful awakening to pervasive racial injustice, and endured economic hardship and upheaval. We've been physically separated from our friends and even our families, just when we need each other the most. Most of us have shifted to working from home, many coping for the first time with the realities of full-time telework and the breakdown of numerous support systems such as childcare. It's important for me to acknowledge that these things are happening and have strained NIACS as a group and as individuals.

But that's not where this story ends.

What amazes me is the continued and expanding demand for our carbon and climate services. Now – while we're all struggling – would be the best time to sideline the hard work of mitigation and adaptation, right? Yet that's just not what I'm seeing, which is both humbling and inspiring. Our partners are doing the hard work to look past the darkness of the moment and fulfill their long-term commitment to conservation and investment in the future. Their continued and demonstrated commitment gives me what I need most: hope.

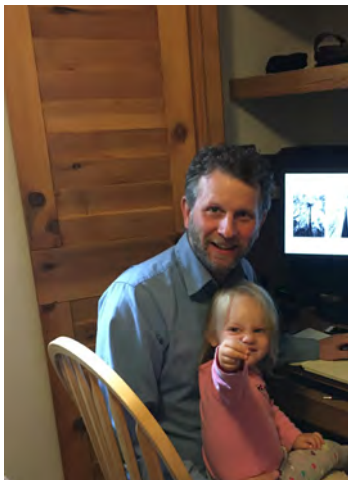
Adapting to the combination of COVID-19 and increasing demand for our services has forced NIACS to walk our talk: we set out our plans for the year, considered evolving risks associated with the pandemic, and then reconsidered some objectives while adapting our actions and working spaces to meet others. We've shifted to virtual work, flexible hours, and more concentrated work time – and I've never seen this team work harder or more creatively than they have this year. They've risen to every challenge and maintained a dizzying pace. We've made significant gains in our work in carbon science and stewardship, and continued to accommodate the rapid adoption of our processes and services in the adaptation realm. You'll see these accomplishments reflected in the text, numbers, and pictures in the pages of this report. I've always felt honored lead this team, but never more than now. Every day I see their dedication shine through as we light each other's paths and keep moving forward together.

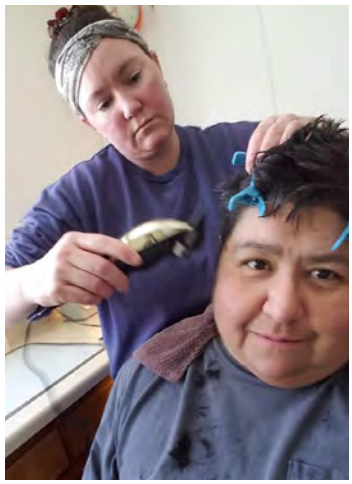
With kind regards,

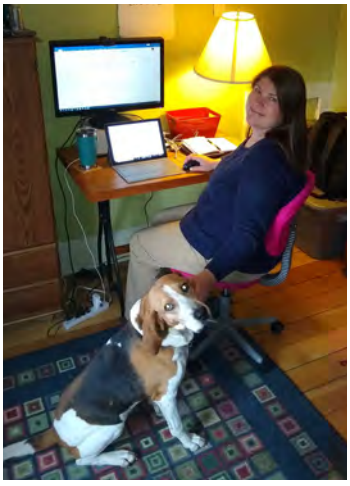
Chris Swanston, NIACS Director

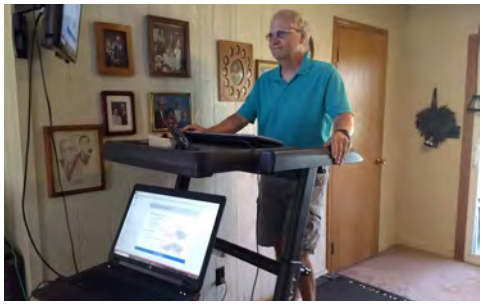
Work-Life Balance During COVID-19

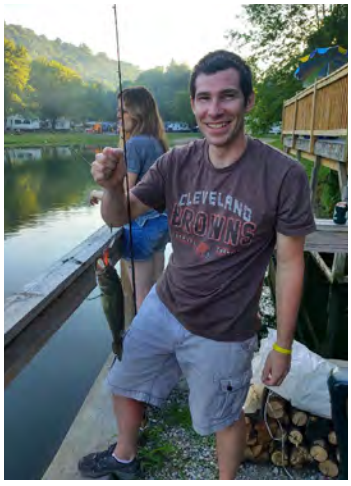
NIACS AT WORK AND AT PLAY











WELCOME

FY20 Highlight

ONLINE CLIMATE SERVICES

Getting stuff done... online!

Related NIACS Projects:

Climate Change Response Framework

Northern Forests Climate Hub

3

Online Adaptation Planning and Practices

(Winter, Spring, Summer)

136

course participants

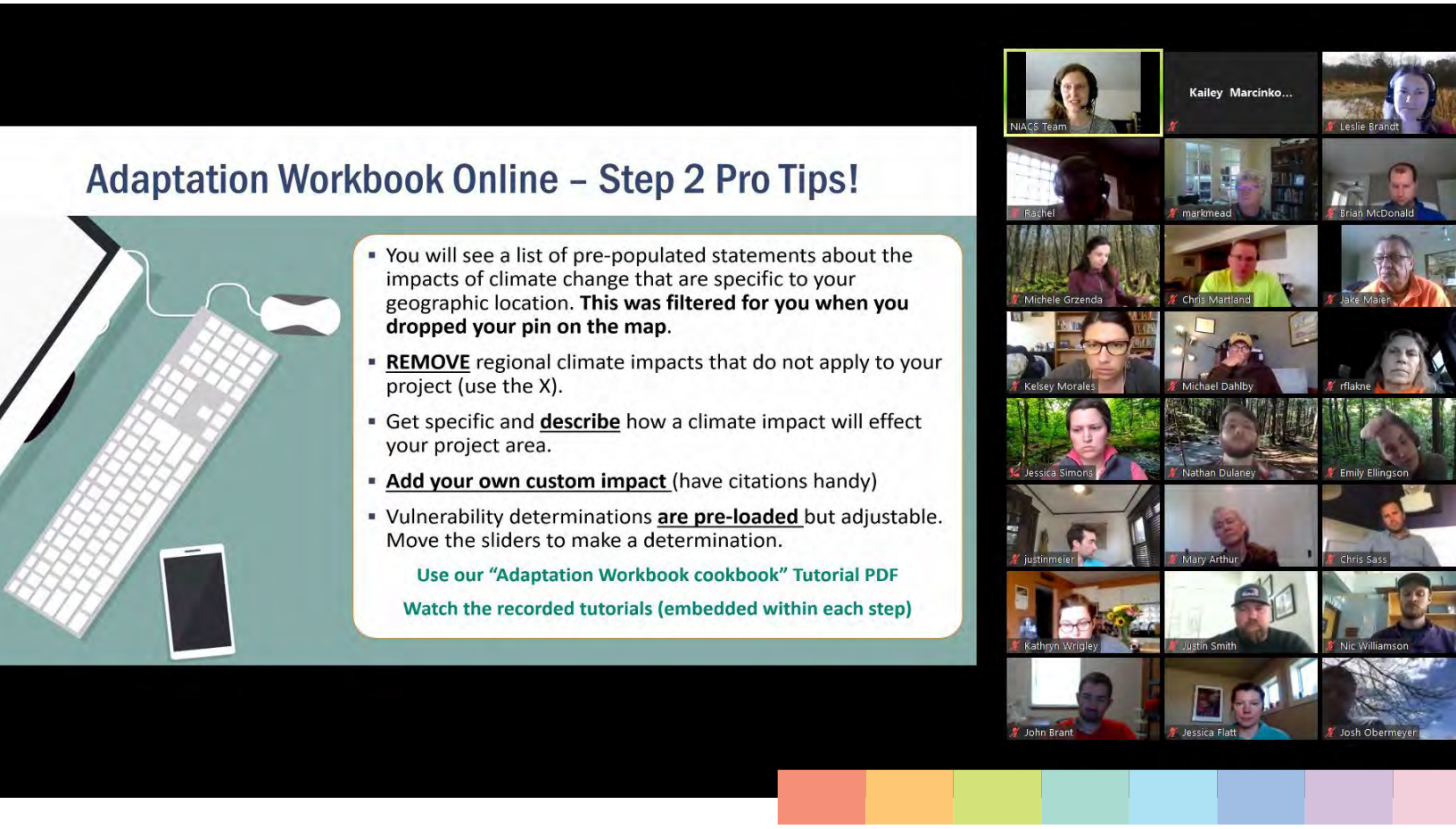
8

WEBINARS IN THE NEW ENGLAND SERIES

(100+ attendees at each webinar)

66

VIDEOS ON OUR YOUTUBE CHANNEL



NIACS has been expanding its offerings of unique hands-on virtual trainings and other climate services for several years. In light of the COVID-19 pandemic, this experience in virtual education and outreach led us to pursue several new and unexpected opportunities. We rapidly adjusted to the need for greater online resources by expanding online content, extending our training curricula to meet growing demand, and tailoring our climate service offerings for virtual environments.

- We hosted the online Adaptation Planning and Practices **three times**, with special spring and summer sessions that were offered to accommodate 2-3 times our typical participation.
- NIACS's **twelfth annual** instruction to the USFS National Advanced Silviculture Program was adapted to an interactive virtual format, and many other workshops and presentations were given virtually.
- We continued to provide a wide range of hands-on climate services with our partners working virtually, including support of the Wayne National Forest Plan Revision and FS NEPA projects.
- We've made more content available through on our YouTube page! Check us out at: https://tinyurl.com/NIACSYoutube

WELCOME

FY20 Highlight

US CLIMATE ALLIANCE REGIONAL LEARNING LABS

Helping states sequester carbon on their natural and working lands.

Related NIACS Projects:

Climate Change Response Framework

Northern Forests Climate Hub

Carbon Trends and Management

4
Learning Labs

22
STATES

278
attendees

7
NIACSERS INVOLVED

The US Climate Alliance convened four Regional Learning Labs in the fall of 2019, focused on carbon mitigation on natural and working lands. American Forests led the organization of these events, bringing together **22 states** and **278 attendees** to **four regional locations** to help states identify opportunities for land-based mitigation and share best practices from successful programs.

NIACS and partners from Michigan State University provided critical support in designing, facilitating, and providing technical assistance for these hands-on workshops. A major NIACS contribution was the integration of climate adaptation and carbon mitigation concepts using our experience and resources, including use of the "Practitioner's Menu of Adaptation Strategies and Approaches for Forest Carbon Management".

States emerged with specific policy objectives for their own teams and a better understanding of regional and national opportunities for collaboration. This effort extended progress that was made during the 2018 National Learning Lab, and will be followed by a virtual web series in 2020 in lieu of an in-person national convening.

Photo: Eli Sagor, Sustainable Forests Education Cooperative

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

adaptivesilviculture.org

The Adaptive Silviculture for Climate Change (ASCC) Network is a replicated, operational-scale experiment testing the effectiveness of climate adaptation strategies in a diversity of forest ecosystem types across North America.

NIACS Team:

Leslie Brandt
Maria Janowiak
Linda Nagel
Courtney Peterson
Chris Swanston

2020 FACTS

325,000+ SEEDLINGS PLANTED

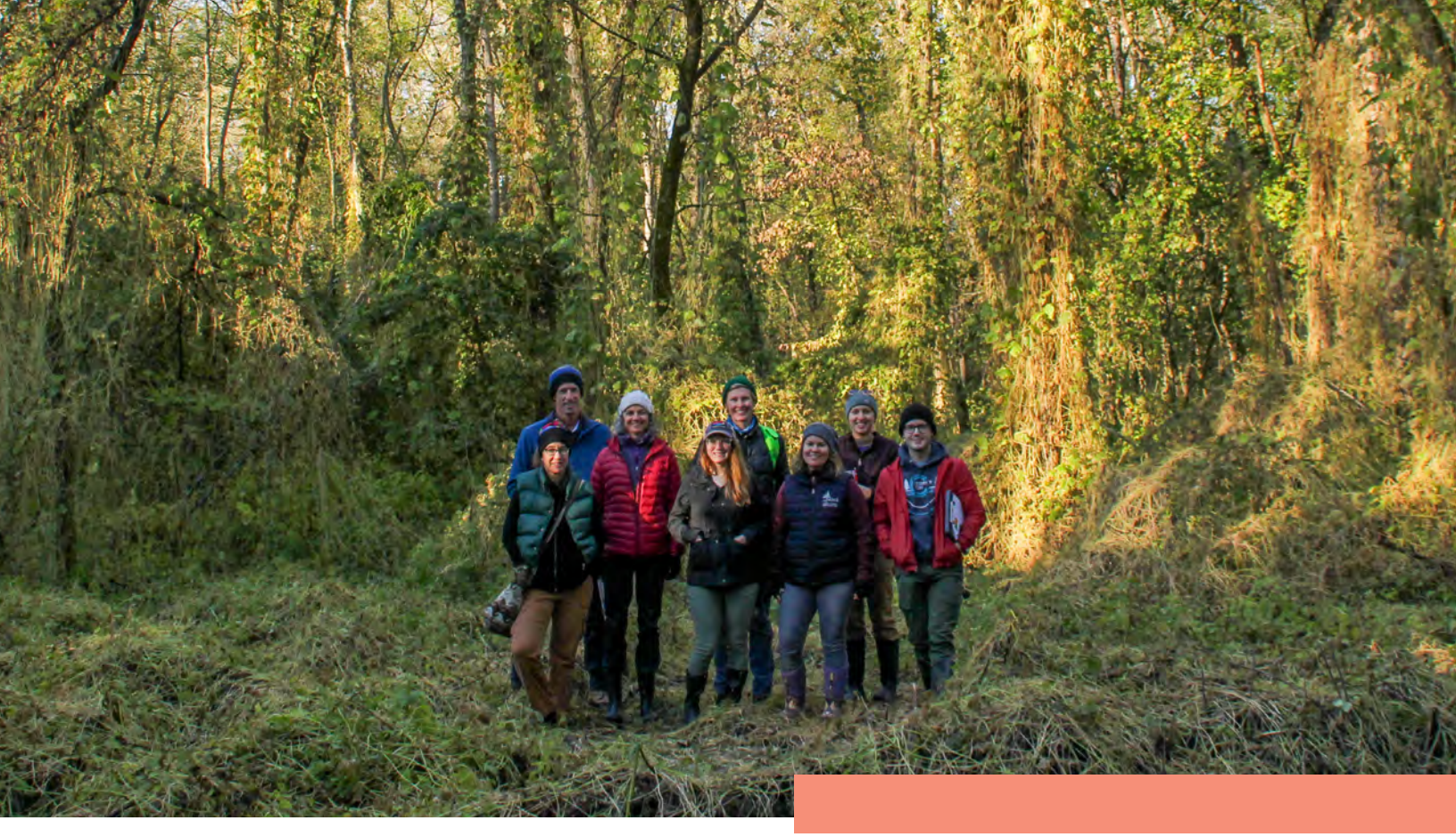
275,000 Cutfoot Experimental Forest/ Chippewa National Forest (MN)

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)



SCIENCE APPLICATIONS

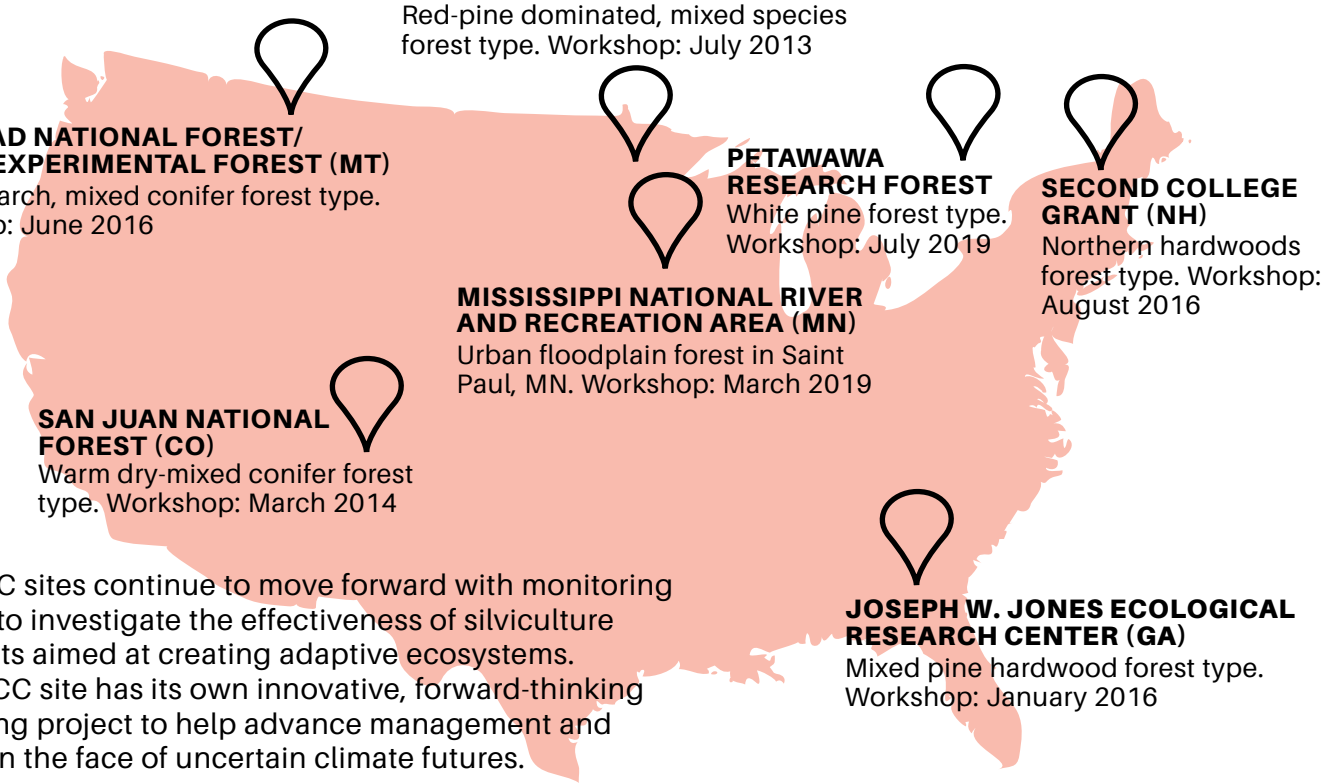
The Adaptive Silviculture for Climate Change (ASCC) Network is a collaborative effort led by Linda Nagel at Colorado State University (but NIACS claims her, too!) to establish a series of experimental silvicultural trials in various forest ecosystem types across the United States and Canada. Scientists,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

3,000+ acres
currently being harvested (or designated no action) and measured

2 COUNTRIES
involved in ASCC (U.S. + Canada)

ACCOMPLISHMENTS

Although the COVID-19 pandemic has changed the way we can do research and work on-the-ground, the ASCC Network continues to find innovative solutions for continuing climate adaptation efforts at the experimental trials across the United States and Canada. From drafting manuscripts, to data collection, to planting future-adapted seedlings, the ASCC Network continues to "adapt" to changing conditions.



CUTFOOT EXPERIMENTAL FOREST/ CHIPPEWA NATIONAL FOREST (MN)
Red-pine dominated, mixed species forest type. Workshop: July 2013

FLATHEAD NATIONAL FOREST/ CORAM EXPERIMENTAL FOREST (MT)
Western larch, mixed conifer forest type. Workshop: June 2016

PETAWAWA RESEARCH FOREST
White pine forest type. Workshop: July 2019

SECOND COLLEGE GRANT (NH)
Northern hardwoods forest type. Workshop: August 2016

MISSISSIPPI NATIONAL RIVER AND RECREATION AREA (MN)
Urban floodplain forest in Saint Paul, MN. Workshop: March 2019

SAN JUAN NATIONAL FOREST (CO)
Warm dry-mixed conifer forest type. Workshop: March 2014

JOSEPH W. JONES ECOLOGICAL RESEARCH CENTER (GA)
Mixed pine hardwood forest type. Workshop: January 2016

The ASCC sites continue to move forward with monitoring projects to investigate the effectiveness of 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

Planting During COVID-19 at Crosby Farm

In the midst of the COVID-19 pandemic and widespread demonstrations for racial justice in the Twin Cities, half a dozen nurseries delivered 1,200 bareroot trees to the Mississippi National River and Recreation Area (MNRRA) Affiliate Urban ASCC site in Saint Paul, MN. With tremendous support from volunteers and park partners, the team put the last tree in the ground on June 3 at the Crosby Farm Regional Park, the location of the MNRRA Affiliate Urban ASCC site. These saplings will fill in large gaps in the tree canopy where ash trees were lost because of the emerald ash borer and test future-adapted species within the floodplain forest.

It's been an exciting experience working toward a better understanding of climate change adaptation strategies with the ASCC Network. It is such a relevant and timely project being studied across a range of ecosystems and approaches with a range of scientist expertise. I look forward to the continued collaborations among scientists and managers and look forward to building new ones.

- Mike Battaglia, Research Forester, USFS Rocky Mountain Research Station

PARTNERSHIPS

ASCC is a highly collaborative network whose partners have been integral to its advancement since 2009, 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.

LOOKING FORWARD

Interest in ASCC continues to grow. We are working with many collaborators on potential ASCC core and affiliate sites at the following locations:

- The Colorado State Forest, located in a high-elevation spruce-fir forest near Walden, CO
- The John Prince Research Forest, a dry, sub-boreal spruce forest managed cooperatively between Tl'azt'en First Nation and the University of Northern British Columbia, Canada
- An ex-urban affiliate ASCC site at the Mohegan State Forest, CT with the University of Connecticut and the Connecticut Department of Energy and Environmental Protection
- A series of affiliate ASCC sites in the Driftless Area in IA, WI, and MN

We will also be convening another ASCC Network-wide virtual meeting in winter 2020-21 to continue building collaboration opportunities across sites.

CARBON TRENDS AND MANAGEMENT

Carbon Trends and Management assesses the stocks, sequestration, management, and vulnerability of carbon at ecosystem to global scales and applies this knowledge through outreach to help managers incorporate climate considerations into forest carbon management.

NIACS Team:

Kate Heckman
Maria Janowiak
Luke Nave
Todd Ontl
Chris Swanston

2020 FACTS

2,074

soil samples

from NEON sites archived for outreach and sharing with the research community

124 PAPERS REVIEWED

for the **Forest Soil Carbon Partnership** meta-analysis

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 with efforts to provide tools and resources that help forest managers consider climate change impacts and identify adaptation actions that maintain or enhance carbon benefits of forests. The focus for research efforts include quantifying the effects of land use change and forest management on soil carbon, assessing forest biomass change from disturbance and succession, and investigating interactions between forest carbon and other ecosystem processes. Forest carbon management outreach efforts use the best available science to advance the integration of climate adaptation and mitigation through education, training, and collaboration on research and program development efforts with a diversity of partner organizations.

3

workshops

to develop regionally specific climate-informed forest carbon management practices

5 peer-reviewed journal articles

2 book chapters

2 outreach and education pubs

ACCOMPLISHMENTS

GLOBAL SOIL CARBON MANAGEMENT BOOK CHAPTER

NIACS scientists authored a chapter on soil carbon management in the book *Global Change and Forest Soils: Cultivating Stewardship of a Finite Natural Resource*, published by Elsevier. The chapter places an up-to-date literature review in the context of international soil and eco-climatic classification frameworks, offering spatially explicit management options for maintaining or increasing soil carbon stocks based upon soil and ecosystem properties.

ADAPTIVE ASPEN MANAGEMENT EXPERIMENT ENTERS MONITORING PHASE

Our operational-scale forestry experiment at the University of Michigan Biological Station comparing reference, resistance, resilience, and transition options for aspen-dominated forests has entered the post-treatment monitoring phase. With harvesting completed, the experiment is now building upon 5 years of baseline research on the Honeysuckle Creek Watershed. Timber sale revenue is funding a sensor network and sample analyses aimed at measuring the carbon cycling, biogeochemistry, hydrology, and microclimate in reference and manipulated management units.

ADAPTATION STRATEGIES AND APPROACHES FOR FOREST CARBON

NIACS and American Forests co-led the "Practitioner's Menu of Adaptation Strategies and Approaches for Forest Carbon Management", published in the Journal of Forestry. This paper included two case studies that demonstrate alignment in adaptation and carbon mitigation practices. State efforts as part of the U.S. Climate Alliance to establish mitigation goals on natural and working lands continue to use this menu to identify management practices that integrate climate adaptation with carbon sequestration and storage in forest ecosystems.

HIGHLIGHT

The Family Forest Carbon Program Pilot for Southern New England

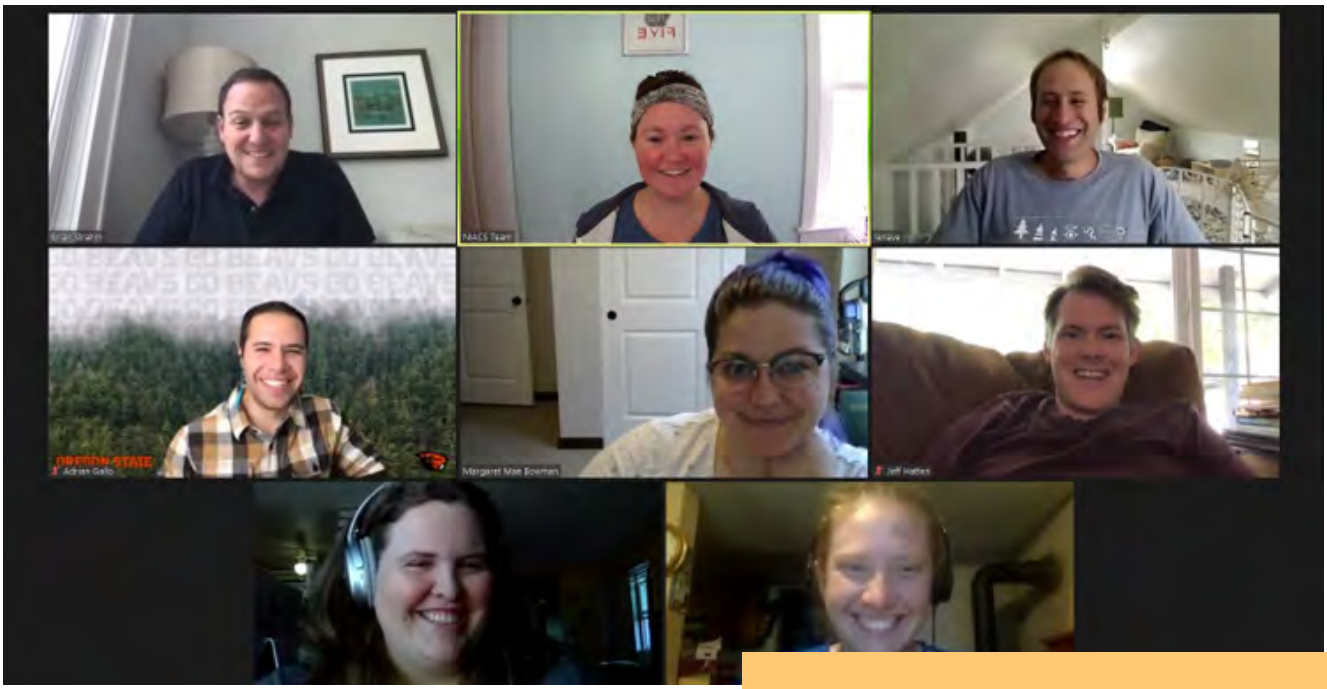
NIACS has been working with several partners to develop a New England pilot for the Family Forest Carbon Program, which helps solve the challenge of limited access to carbon markets for small family forest owners from their high cost and complexity. NIACS led efforts to develop a list of regionally appropriate forest management practices, followed by two workshops to provide input from managers and experts to refine and finalize a set of paid practices that landowners can implement to help sequester and store carbon.

I am very closely tracking Luke's papers. I've read all of them. He does a lot of very good work.

- Werner Kurz, Senior Research Scientist, Canadian Forest Service

It has been so much fun to carry out this workshop with you over the years...it's been one of the highlights of our program and a great collaboration with SilvaCarbon.

- Alexandra Zamecnik, USDA Forest Service, International Programs



PARTNERSHIPS

Our partnerships ensure integration of science and management expertise with effective delivery of useful products to our stakeholders. They bring together wide-ranging skills in forestry, biogeochemistry, statistical meta-analysis, GIS, policy analysis, and science communication, to develop and deliver a comprehensive forest carbon management outreach program. Partners in this program range from the Pacific Northwest National Laboratory in Washington State to American Forests in Washington, D.C., and include numerous federal, state, university and conservation partners in the US and Canada.

LOOKING FORWARD

NIACS will accelerate our work with partners to provide information on forest carbon management. The Forest Soil Carbon Partnership will complete regional assessments in the Lake States and Pacific Northwest. A new research-outreach partnership between NIACS, AF, Michigan State University's Forest Climate and Carbon Program (FCCP) and the Canadian Forest Service will develop innovative approaches to understanding carbon impacts from forest management scenarios in six states (MD, MI, MN, OR, PA, and WI). NIACS and the FCCP will continue creating online educational materials, developing additional content to provide region-specific information on carbon management in the Midwest and Northeast and piloting multiple 2-day field-based courses for land managers.

CLIMATE CHANGE RESOURCE CENTER

fs.usda.gov/ccrc

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

NIACS Team:

Hannah Abbotts
Shawn Klomparens
Kailey Marcinkowski
Chris Swanston

2020 FACTS

440 adaptation approaches

visits from 218 countries
(Google Analytics)

SCIENCE APPLICATIONS

The Climate Change Resource Center (CCRC) delivers science-based, relevant, and credible information on climate change to land managers through its online platform. It is the largest and most comprehensive forest adaptation website designed specifically for natural resources professionals. Resources from the CCRC are also adapted for the USDA Climate Hubs and Department of the Navy, and shared through outreach, training, and educational activities.

54

Topic Pages

Topic Pages are natural resources and climate syntheses

Most Visited Topic Pages

Wildlife
Global Carbon
Forest Carbon
Insect Disturbance

ACCOMPLISHMENTS

The CCRC continued to expand content offerings on ecosystem-related topics, tools, and adaptation examples and resources. The Compendium of Adaptation Approaches continued to grow this year, with the integration of additional adaptation examples and expansion of resource areas. Educational resource offerings focused on the expansion of educational videos and supporting materials.

COMPENDIUM OF ADAPTATION APPROACHES

- 9 new adaptation examples
- 77 new adaptation approaches added, representing 3 resource areas

EDUCATION

- Continued development of online climate change curriculum in partnership with Michigan Technological University
- New educational videos to support climate change curricula
- 2 Department of the Navy Environmental Compliance course climate change sessions, delivered through the USDA Climate Hubs

SITE INFRASTRUCTURE

- Completed styling and layout upgrades to Drupal 8 migration, with a live launch in August 2020
- Upgrades to tag and display related content in the right hand side bar of Topic Pages
- Major security updates

AND MORE

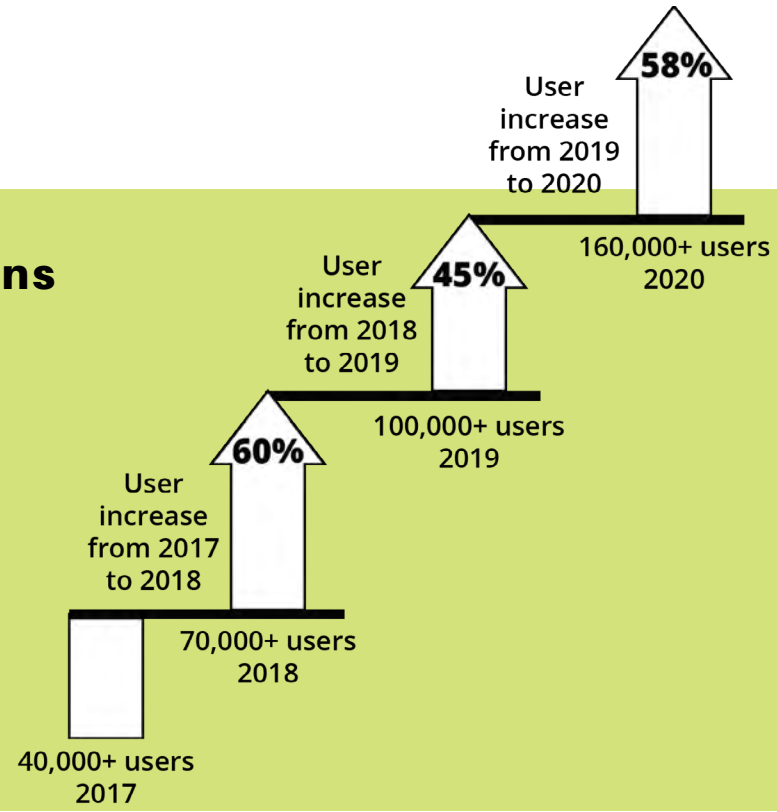
- New Topic Pages
- New and updated Tools
- New Videos

HIGHLIGHT

CCRC Website Traffic Patterns

Traffic to and use of CCRC continues to grow steadily, averaging a **55% annual increase** in usership over the past 4 years. And these users aren't just looking at the first page they come to and leaving again - users that look at multiple pages average **5 pageviews** while they are on the site. With over **335,000 pageviews** this year, CCRC users are looking at **67%** more information than the previous year.

Higher visitation Monday-Friday, October-June, with a gap over the winter holidays suggests that we are reaching our intended audience - professionals with an outdoor field season.



I think your work is awesome. I love it.

- Jane Hodgins, Public Affairs Specialist, USDA Forest Service, Northern Research Station,

Please keep up the great work and let us know how we in WO R&D can continue to help support you in this much needed effort of great importance. We could not do any of this without each and every one of you.

- Tracy Hancock, Director, Knowledge Management and Communications, USDA Forest Service, Research and Development

PARTNERSHIPS

The CCRC is housed by the Office of Knowledge Management and Communications within Forest Service Research and Development, and is guided by a steering group with representation from across the Forest Service. Contributors to the CCRC come from all USFS Research Stations, numerous universities, and other federal agencies.

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 Tools are always in the works.

CLIMATE CHANGE RESPONSE FRAMEWORK

forestadaptation.org

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

NIACS Team:

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

2020 FACTS

350+ demonstration projects

10 Adaptation Planning and Practices trainings

SCIENCE APPLICATIONS

There is no single solution for how natural resources 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. Through the CCRF, we work side-by-side with people across the land management community to help them consider how climate change may affect their lands and how they can meet their goals while 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.

10 STATES

worked with NIACS to include climate change information into their **2020 State Forest Action Plans**

Hundreds of Partners

(Federal, Tribal, State, Private)

ACCOMPLISHMENTS

VULNERABILITY ASSESSMENTS

We published two climate change vulnerability assessments focused on smaller landscapes than our regional assessments. We worked with partners to complete assessments for the ecosystems of the Apostle Islands National Lakeshore (WI) and forests of the Austin (TX) metro area, and another assessment for Detroit (MI) is underway. NIACS also produced a series of handouts designed to help private landowners assess risk and consider adaptation actions on their own lands (NY, MI, MN, WI).

ADAPTATION RESOURCES AND DEMONSTRATIONS

NIACS published two new "menus" of adaptation strategies: one focused on forest carbon management and another on outdoor recreation. These menus provide tiered compilations of adaptation actions that help managers move from broad ideas to specific actions, and also express the adaptation intent of these actions. Additional menus are in preparation for other topics, such as coastal ecosystems, fire-adapted ecosystems, grasslands, and wildlife management.

NIACS staff worked closely with many agency partners over the past year, including all 15 regional National Forest System units. We are supporting the Wayne National Forest in integrating climate change into its forest plan revision.

TRAINING

We increased our attention to virtual and online education in response to the COVID-19 pandemic. NIACS hosted three online sessions of the popular Adaptation Planning and Practices workshops and moved several other events online. Prior to the pandemic, we hosted in-person adaptation workshops focused on tribal perspectives, wildfire management, and other topics.

HIGHLIGHT

Supporting State Forest Action Planning

Building on our success in assisting the Pennsylvania Department of Conservation and Natural Resources (DCNR) Climate Change Adaptation and Mitigation Plan, we pursued adaptation planning with several state agencies. NIACS staff led workshops with teams working on State Forest Action Plans in 4 states (CO, CT, MI, NH) to lead participants through a process to identify and prioritize climate risks and identify potential adaptation actions. We provided scientific information and reviews for these states and others.

Eli Sagor, Sustainable Forests Education Cooperative

I wanted to share my gratitude to you and the other instructors for a fabulous [APPO] program! I can't even imagine the work that goes into putting together such a top-notch program. And to make it free of charge for natural resource professionals to take was so generous!

- Michele Grzenda, Weston Massachusetts Conservation Administrator

Thank you for inviting me to join your meeting yesterday! ...I learned a great deal from the presentations and need to read the excellent reports that were provided. Your work is incredibly important to the future of our forests and biological diversity.

- Nita Settina, Acting Assistant Secretary, Lands Superintendent, Maryland Park Service, Department of Natural Resources

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.

LOOKING FORWARD

The CCRF will continue expanding and providing resources for a broader array of topics that relate to natural resource management. New adaptation menus are in preparation for fire-adapted ecosystems, wildlife management, and oceanic and freshwater coastal ecosystems. We are also working more deeply with partners on important projects, including developing a Climate & Health Action Guide with American Forests and an infrastructure assessment for the Mark Twain National Forest. We will continue to find ways to reach our target audiences and work with partners through online and virtual formats.

DIGITAL SCIENCE COMMUNICATION

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

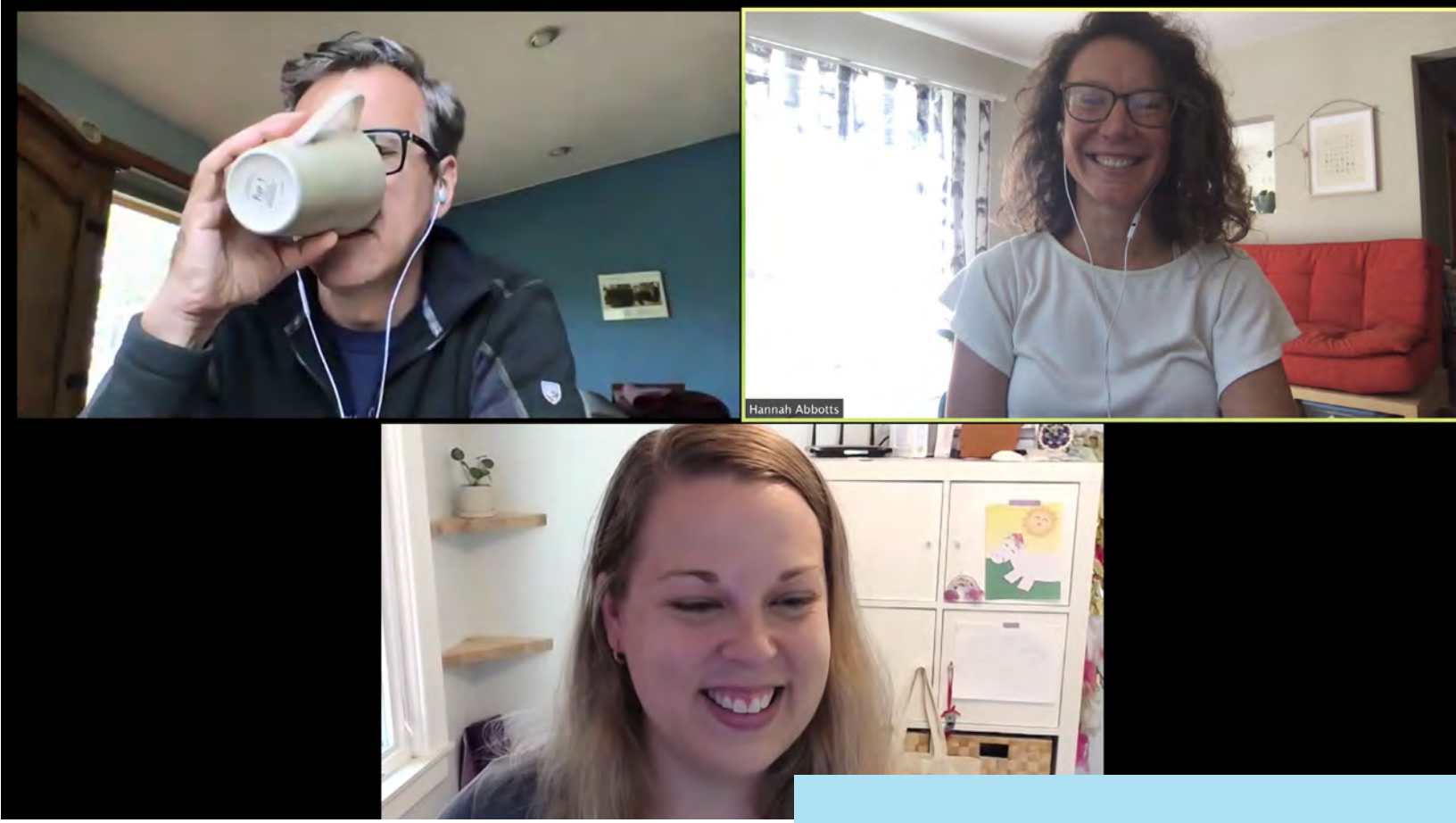
NIACS Team:

Hannah Abbotts
Shawn Klomparens
Kailey Marcinkowski

2020 FACTS

14
Infographics
for Forest Service Research & Development outreach materials

5 WEBSITES MAINTAINED



SCIENCE APPLICATIONS

The Digital Science Communication theme aggregates a growing 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.

58,000 USERS
on the USDA Climate Hubs National Website

↑ an increase of **48%** from FY19

8 GRAPHICS
in support of the 2020 Resources Planning Act (RPA) Assessment for the Forest Service Washington Office

ACCOMPLISHMENTS

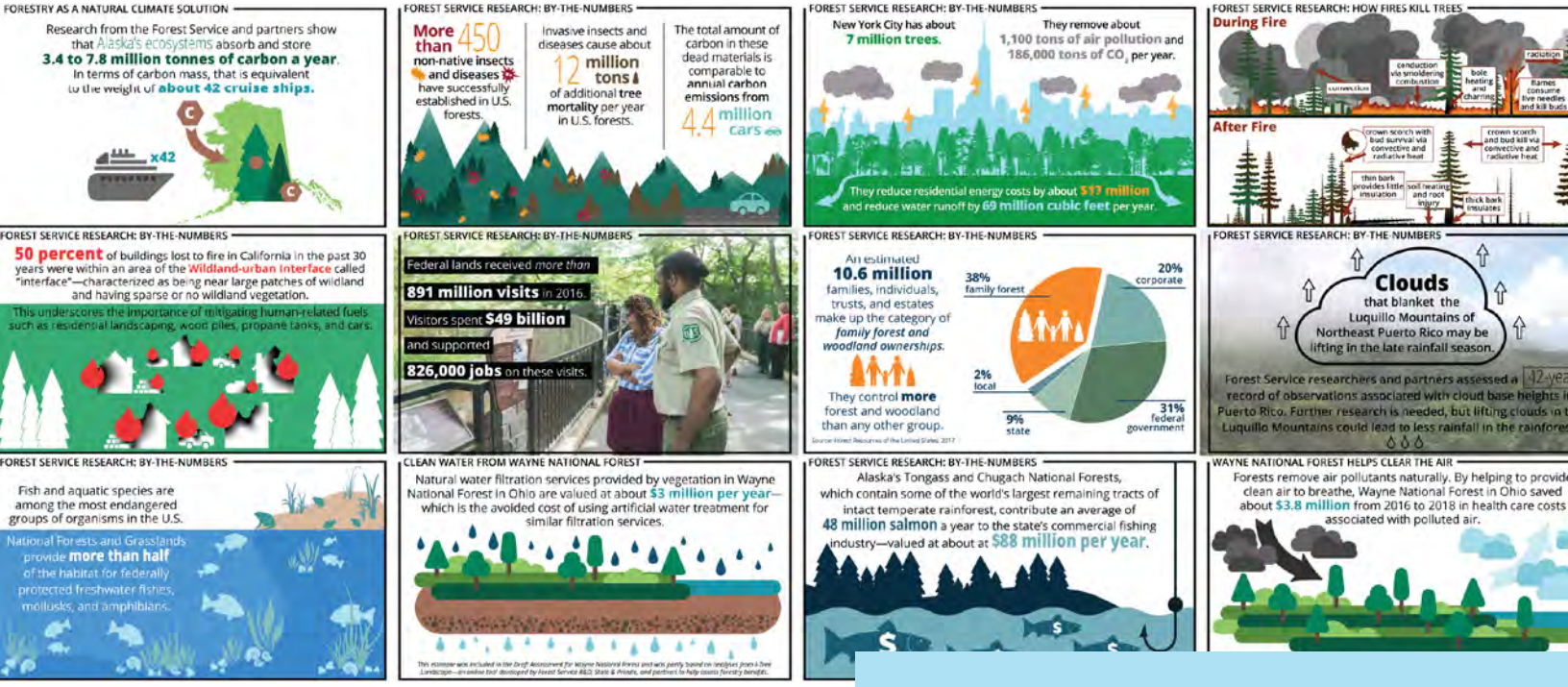
NIACS staff are continuing to provide assistance, web development expertise, and design services for several major web-based platforms and communication outlets, including the USDA Climate Hubs and U.S. Forest Service Research and Development (USFS R&D) at a national level.

MAJOR ACCOMPLISHMENTS THIS YEAR INCLUDE:

- Expanded content, enhanced the user experience, ensured site functionality, and maintained web security of our flagship efforts, the USDA Climate Hubs and Climate Change Resource Center (CCRC) websites.
- Overhauled and expanded the content of the niacs.org website, which was designed to convey the breadth of NIACS activities and partners.
- Provided ongoing technical assistance to USDA Climate Hubs regional web content managers, including individual consultation and coaching, tutorials, documentation and guides, and problem-solving.
- Expanded the Adaptive Silviculture for Climate Change website to keep pace with the ASCC Network expansion.
- Continued critical "under the hood" work—maintenance and security updates—for the Radiocarbon Collaborative, Adaptive Silviculture for Climate Change, and NIACS websites.
- Established new server infrastructure to improve future site development and updates for several supported websites.
- Created graphic design products used in newsletters, presentations, and social media outreach by the Forest Service Washington Office, complementing the work of the USFS R&D's Knowledge Management and Communications.
- Updated the layout and design for the second edition of *Climate Change Field Guide for Northern Wisconsin Forests: Site-level considerations and adaptation*
- Developed new skills for programming and website development to expand capacity for new projects.

We have gotten requests for some of your infographics to be used in presentations by WO staff and the stations. So your infographics are a big, big hit for many uses... We think your infographics give the [R&D] newsletters a lot of zing and really add to it. So thank you so much for all of your fabulous work—which is popular among technical and nontechnical audiences alike!

- Lily Whiteman, retired National Coordinator, Science Delivery and Communications, Knowledge, Management, and Communications, USDA Forest Service Research and Development



PARTNERSHIPS

The Digital Science Communication team is a core component of NIACS' communication efforts, creating and supporting digital media and websites that clearly deliver usable, science-based management information on climate change. The team works across all of the major NIACS efforts, but also partners externally with Forest Service Research & Development and the USDA Climate Hubs at the national level.

LOOKING FORWARD

NIACS staff are currently leading a complete overhaul of the USFS R&D website, which entails coordinating among multiple research stations, building a new site from the ground up, and moving existing content to the new site. Additionally, NIACS staff will continue to maintain existing web projects and design efforts.

LANDSCAPE CHANGE RESEARCH GROUP

fs.fed.us/nrs/atlas

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

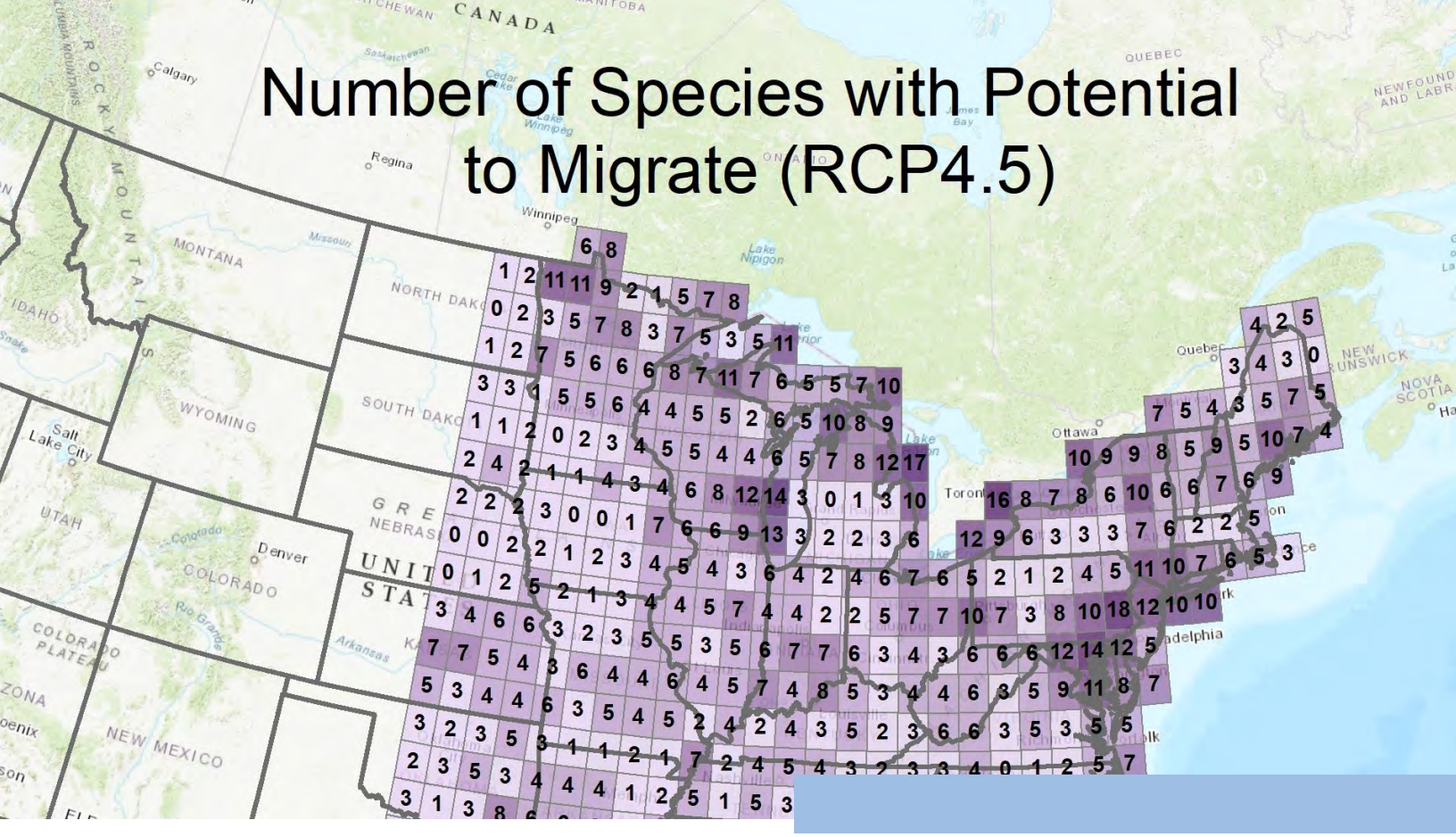
NIACS Team:

Louis Iverson
Stephen Matthews
Matthew Peters
Anantha Prasad

2020 FACTS

713,000+
pageviews
on the Atlas websites this Fiscal year

13 Scientific Publications
authored or co-authored



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 LCRG works closely with the rest of NIACS to effectively deliver relevant information to land managers, collect valuable feedback from users of LCRG products, address information needs for 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.

215,000+

Atlas Web Page Viewers

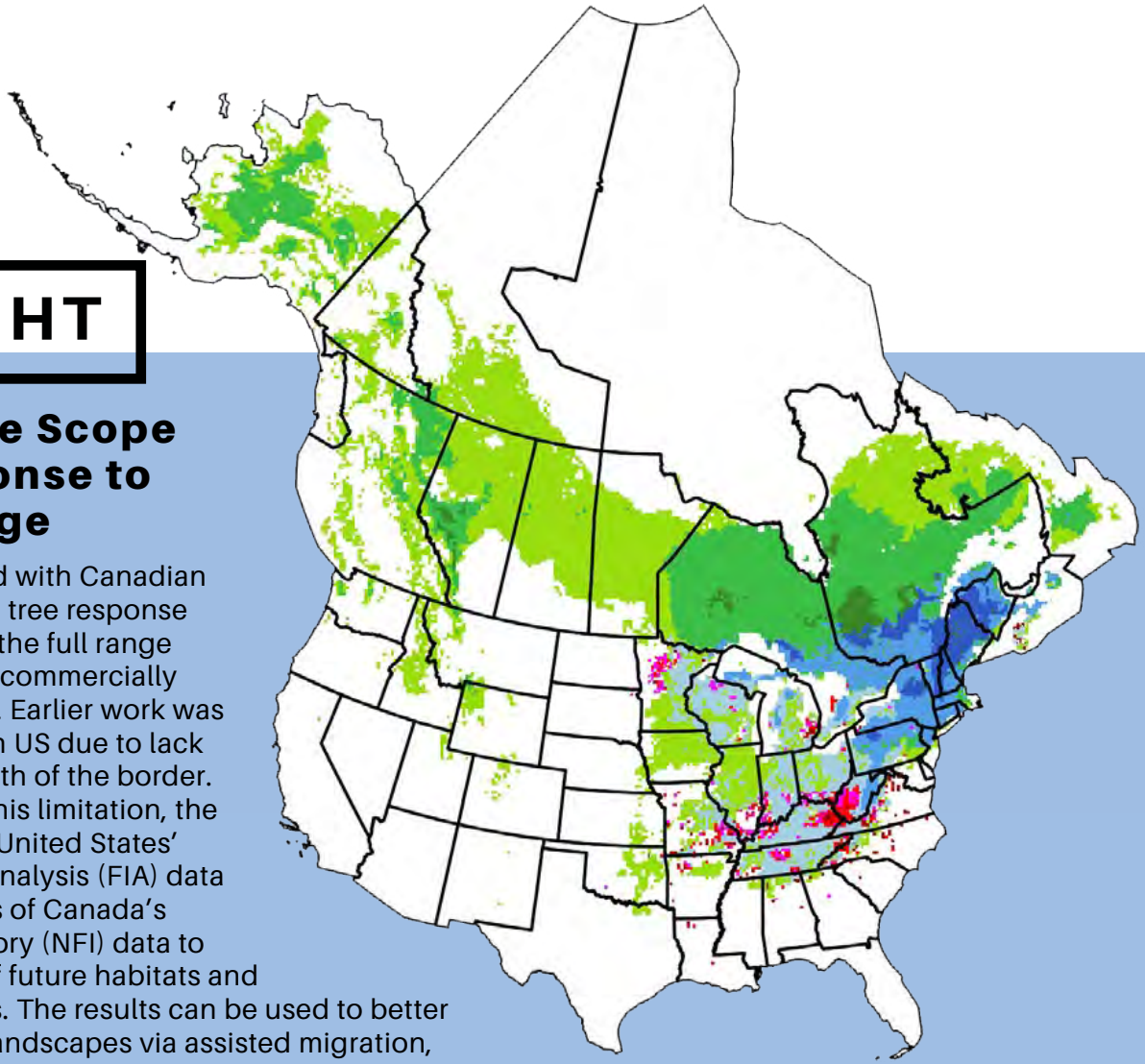
93 CITATIONS

PER MONTH over the last 18 months on Google Scholar

ACCOMPLISHMENTS

The Climate Change Atlas remains one of the Forest Service's most widely used models of climate impacts on forests, with more than 713,000 page views in the last year. Building on major accomplishments in 2019, the LCRG continues to update the Climate Change Atlas website with newer species models. 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, ecoregions, urban areas, states, and various regions.

The LCRG remains a busy and productive research group, publishing 13 journal articles and giving 12 scientific presentations this past year. We continue to work 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. We provide support on the WNF plan revision and implementation of the Ohio Interagency Forestry Team Five-Year Business Plan.



HIGHLIGHT

Extending the Scope of Tree Response to Cimate Change

The LCRG collaborated with Canadian counterparts to extend tree response models to encompass the full range of 25 ecologically and commercially important tree species. Earlier work was confined to the eastern US due to lack of compatible data north of the border. In order to overcome this limitation, the LCRG have combined United States' Forest Inventory and Analysis (FIA) data with gridded estimates of Canada's National Forest Inventory (NFI) data to model the dynamics of future habitats and colonization potentials. The results can be used to better manage the forested landscapes via assisted migration, better seedlot selection tools, and more.

> Thank you Matt for the quick follow up last week with the newer data and links. I'm sorry I missed that publication last year as I usually try to keep up with developments in the Atlas since we use it so much.
>
> - Melissa Spearing, Seed Program Coordinator, Forest Gene Conservation Association

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 other regional organizations. Long before joining NIACS, the LCRG helped create the Climate Change Response Framework (CCRF) and continues to share many CCRF partners with the rest of NIACS.

LOOKING FORWARD

The LCRG is working to incorporate the most recent modeling results into a new version of the Climate Change Atlas website. The LCRG will continue to publish new research, update the Bird Atlas, explore drought risk, and continue cross-boundary coordination and modeling with Canadian researchers. The LCRG is extending their work westward (west of the 100th meridian) using the FIA data to prepare demographic maps for more than 330 tree species and creating additional information at 1×1 degree grids for the conterminous US. In addition, the LCRG are working with the North American Silvics Planning committee to assist with the release of a newer version of the Silvics Manual.

RADIOCARBON COLLABORATIVE

radiocarbon.forest.mtu.edu

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

NIACS Team:

Kate Heckman
Chris Swanston
Paula Zermeño

2020 FACTS

680 radiocarbon targets produced

560 radiocarbon unknowns processed

SCIENCE APPLICATIONS

The Radiocarbon Collaborative assists researchers in the application of radiocarbon analysis to a wide array of scientific investigations. We generally apply radiocarbon analysis to questions regarding how carbon is cycled and stabilized in ecosystems, and how land management and climate change may influence these processes. These projects include permafrost loss, blue carbon, peatland warming, harvest impacts on soil, and bioenergy cropping systems among others. We also provide traditional artifact dating for archaeologists at the USFS Heritage Program and dendrochronology for ecologists studying threatened tree species. We assist researchers from all backgrounds and levels with projects as small as a single bone to investigations as large as a global survey of tropical peatland accumulation rates.

9

New Partner Projects

in FY2020

Current Projects

- **22** SOIL CARBON PERSISTENCE
- **14** PEATLANDS
- **11** ECOLOGY
- **10** FIRE DYNAMICS
- **6** WILDLIFE CONSERVATION
- **5** PERMAFROST
- **5** HERITAGE PROGRAM (ARCHAEOLOGY)

ACCOMPLISHMENTS

In 2020, the Radiocarbon Collaborative:

- Completed radiocarbon measurements for soil profiles from 40 National Ecological Observatory Network sites across the conterminous US and Alaska. These data will be crucial to assessing differences in how carbon is stored and cycled in soils across different ecodomains.
- Initiated a global-scale radiocarbon survey of tropical peatlands to assess long term accumulation rates in these systems. This information will lend insight into climate and land use influences on peat accumulation or loss in these understudied systems.
- Joined the pika research community in the US and began our fifth and sixth projects centered on understanding climate change effects on American pika extirpation rates.
- Expanded our laboratory space and began work on a new gas handling line to allow for the analysis of radiocarbon in atmospheric samples, including from soil respiration and eddy covariance towers, which measure gas exchange between ecosystems and the atmosphere.

Map of Radiocarbon Collaborative Partner Sites

> Thank you cannot even begin to cover it, but I'll start there - thank you! I am very grateful.
>
> - PhD Candidate, University of Wisconsin Madison

PARTNERSHIPS

In addition to support from the USDA Forest Service for core staffing and facilities, the Radiocarbon Collaborative also receives valuable support from the University of California Irvine, which provides measurement of the samples we process in our facility. Michigan Technological University generously provides administrative and grants/agreements assistance. These three organizations allow the Radiocarbon Collaborative to thrive and provide services and collaboration to the greater scientific community.

LOOKING FORWARD

We look forward to continuing our partnerships with Forest Service researchers, university partners, and state agencies. We will continue our work assisting scientists evaluating accumulation rates and losses in mangroves and peatlands of tropical regions. Next year, we will also begin a 2-year study in collaboration with Oregon State University assessing forest management impacts on soil carbon stocks and turnover. We hope to bring our air extraction line into operation to begin assessing radiocarbon content of soil-respired carbon dioxide from the National Ecological Observation Network (NEON) sites.

USDA NORTHERN FORESTS CLIMATE HUB

climatehubs.usda.gov/hubs/northern-forests

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.

NIACS Team:

Todd Ontl
Courtney Peterson
Kristen Schmitt
Danielle Shannon
Chris Swanston

National Hubs NIACS Team:

Hannah Abbotts
Shawn Klomparens

2020 FACTS

540+ attendees at NFCH hosted, or co-hosted, workshops

16 Educational Trainings and Workshops

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.

Organizations Represented

Tribal
Private
Local
Military

State Agencies
Non-profit
Academic

4 NEW MENUS

Climate Change Response Framework

In Development

Grasslands, Fire-adapted Ecosystems, Freshwater Coastal, and California Forested Ecosystems

ACCOMPLISHMENTS

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

INTEGRATION WITH NRCS

The NFCH hosted Kristen Giesting as our second-ever Climate Hub liaison from the USDA Natural Resources Conservation Service. Her work this year included introducing the Adaptation Workbook and NFCH products to NRCS staff and partners, and developing new climate-informed resources.

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 to co-lead an adaptation planning workshop for the University of California, Davis and is leading the development of a series of climate summary reports with the Midwest Climate Hub. The NFCH partnered with SW FireCLiME to host a workshop on the Kaibab National Forest and test FireCLiME's new Adaptation Strategies and Approaches for Fire-Adapted Ecosystems.

TRAINING AND TECHNICAL ASSISTANCE

The NFCH led 16 adaptation workshops for many organizations and partners, training nearly 550 professionals. NFCH expanded the online Adaptation Planning and Practices (APP) curriculum to land managers outside of the Midwest and Northeast and continued to support the Department of Defense on climate change education using CCRC educational resources. We partnered with the Land Trust Alliance to support land trusts in their efforts to integrate climate change into conservation planning and worked with the Ashland County (WI) Land and Water Conservation Department to create the first climate-informed Resource Management Plan in the state.

HIGHLIGHT

Partnering with SW FireCLiME on a new Fire Menu

The NFCH partnered with SW FireCLiME to co-lead an Adaptation Planning and Practices workshop on the Kaibab National Forest. This workshop was the first practical test of the new Adaptation Strategies and Approaches for Fire-Adapted Ecosystems, led by SW FireCLiME. The Fire-Adapted Ecosystems menu will help managers understand and anticipate climate change impacts, and identify actionable steps to adapt forests to changing fire regimes.

I want to thank you for an excellent workshop. I learned a lot and had a lot of fun too!

- Lillian Ruiz, Executive Director, CT Council on Soil and Water Conservation

Wow - that was amazing! I really appreciate your time, including the time to prepare for the call and provide the handout and be ready for the questions.... I was impressed not only with the amount, but the quality and depth of the questions, which I think shows that people are really beginning to focus on this topic. Your presentation set a great stage. Fantastic job! Serendipity played a part here in that you were the perfect person for this topic – being able to handle forests and grasslands and wetlands.

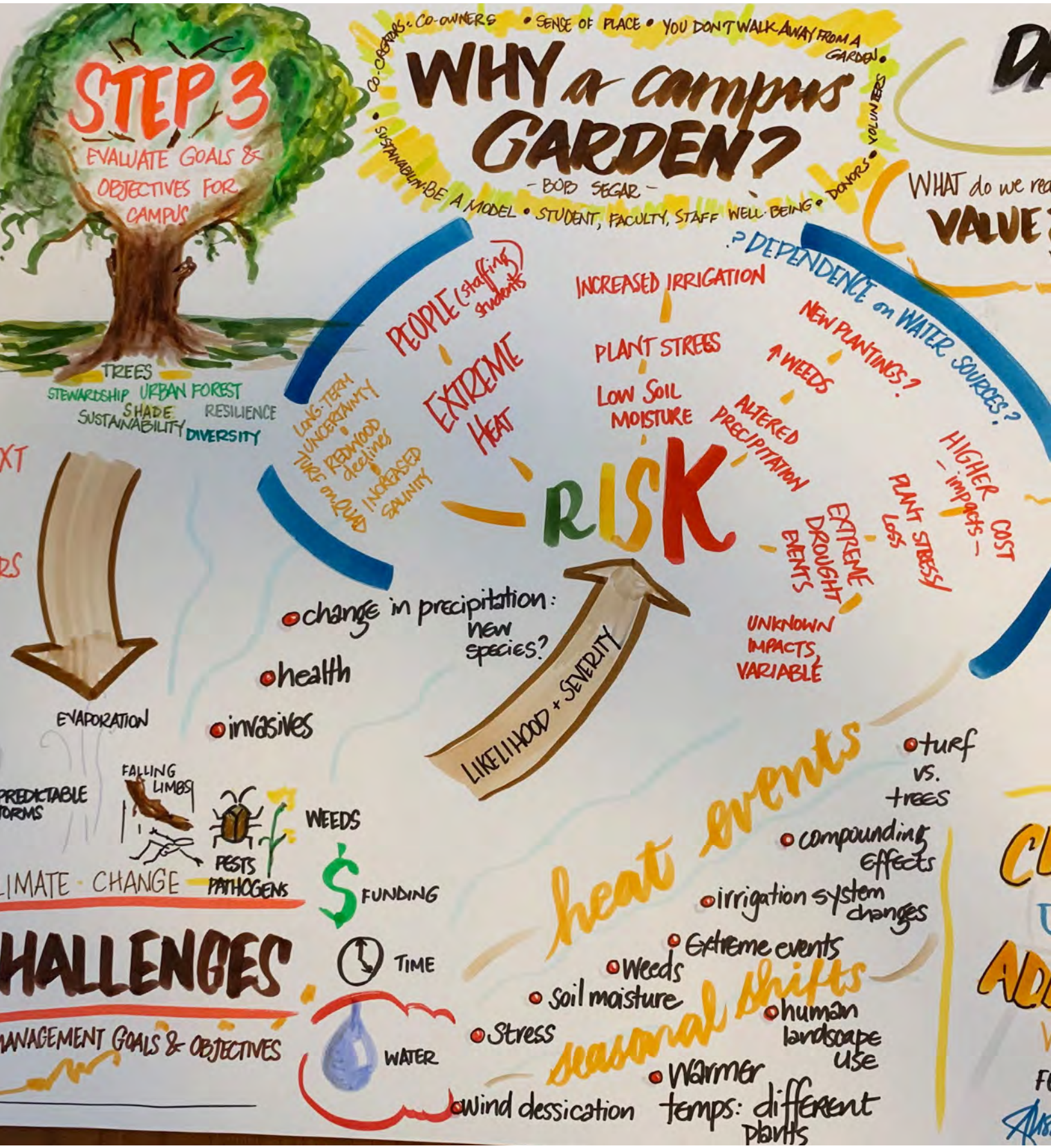
- MaryKay O'Donnell, Midwest Senior Program Manager, Land Trust Alliance - Eastern Division

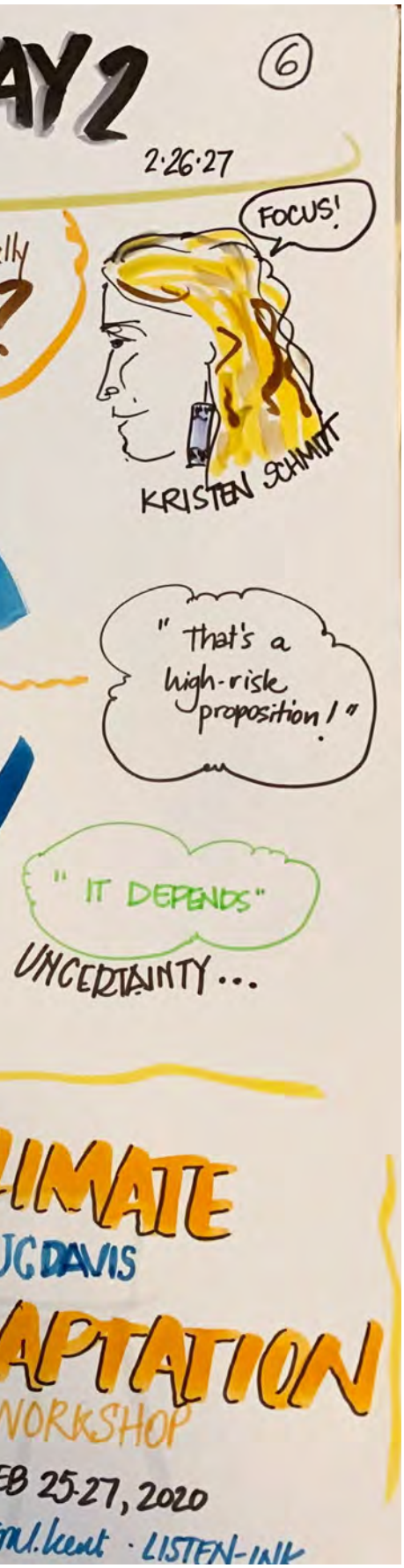
PARTNERSHIPS

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.

LOOKING FORWARD

The NFCH will continue developing and delivering tools for diverse groups of natural resources managers and provide a variety of topic-specific adaptation planning workshops for practitioners. One example is a freshwater coastal ecosystem adaptation menu, in close collaboration with the US Fish and Wildlife Service and a broad group of authors and experts. Additionally, the NFCH will continue working with other Hubs and organizations to help support regional and national efforts. For example, projects in California include a new California forested ecosystems adaptation menu and two planning efforts using the Adaptation Workbook and led by American Forests in the San Bernardino mountains and on the Sierra National Forest.


STEP 3
EVALUATE GOALS & OBJECTIVES FOR CAMPUS
TREES
STEWARDSHIP URBAN FOREST
SHADE RESILIENCE
SUSTAINABILITY DIVERSITY
WHY a campus GARDEN?
- BOB SEGAR -
CO-CREATORS • CO-OWNERS • SENSE OF PLACE • YOU DON'T WALK AWAY FROM A GARDEN • VOLUNTEERS • DONORS • SUSTAINABILITY • BE A MODEL • STUDENT, FACULTY, STAFF WELL-BEING
WHAT do we
VALUE
DEPENDENCE on WATER SOURCES?
INCREASED IRRIGATION
NEW PLANTINGS?
↑ WEEDS
PLANT STRESS
LOW SOIL MOISTURE
ALTERED PRECIPITATION
HIGHER COST IMPACTS
PLANT STRESS/ LOSS
EXTREME DROUGHT EVENTS
UNKNOWN IMPACTS, VARIABLE
PEOPLE (staffing students)
EXTREME HEAT
LONG-TERM UNCERTAINTY
REDWOOD declines
INCREASED SALINITY
TURF on QUAD
RISK
LIKELIHOOD + SEVERITY
change in precipitation: new species?
health
invasives
EVAPORATION
FALLING LIMBS
PESTS PATHOGENS
WEEDS
FUNDING
TIME
WATER
CLIMATE CHANGE
CHALLENGES
MANAGEMENT GOALS & OBJECTIVES
heat events
turf vs. trees
compounding effects
irrigation system changes
Extreme events
seasonal shifts
Weeds
soil moisture
Stress
human landscape use
Warmer temps: different plants
wind dessication



OUTREACH AND SCIENCE

Posters
Presentations
Press
Proposals
Sessions
Workshops
Publications

OUTREACH AND

POSTERS

6
posters

6
NIACSERS PRESENTED POSTERS

1
Virtual poster

PRESENTATIONS

112
presentations

62
INVITED TALKS

42
Webinars

15
NIACSERS GAVE PRESENTATIONS

PRESS

13
press items

9
NEWS ARTICLES

1
Video

1
PODCAST

SCIENCE

PROPOSALS

35
proposals

19
PROPOSALS FUNDED OR ACTIVE

11
Proposals in review or pending

SESSIONS

12
convened sessions

5
U.S. CLIMATE ALLIANCE LEARNING LABS

2
Sessions at the Minnesota Climate Adaptation Conference

WORKSHOPS

36
hosted workshops

1000+
WORKSHOP PARTICIPANTS
(approx.)

68
Major Partners and collaborators

10
ADAPTATION PLANNING AND PRACTICE TRAININGS

OUTREACH AND

PUBLICATIONS

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SCIENCE

51

publications

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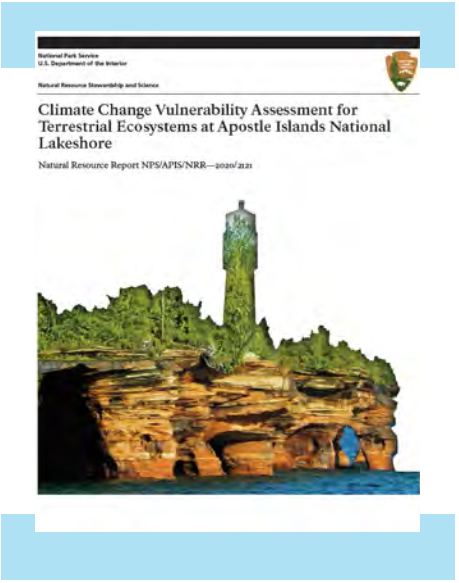

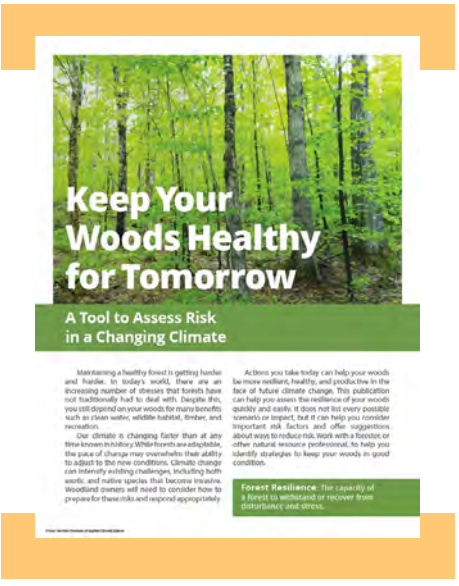

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PUBLICATIONS

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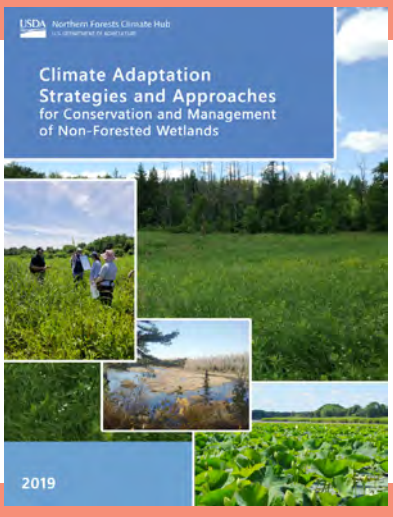

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Reports and Book Chapters

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PEER-REVIEWED JOURNAL ARTICLES

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OUTREACH PUBLICATIONS

PEOPLE

Meet the Staff!

PEOPLE

Hannah Abbotts

Hannah is the content manager for the FS 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 leads climate change vulnerability and adaptation work in urban areas for NIACS. Leslie also co-leads the Mississippi National River and Recreation Area ASCC project and a recreation infrastructure vulnerability assessment for the Mark Twain NF. She lives in St. Paul, MN, with her husband, two kids, and her two cats. She likes running (slowly), knitting, and making ice cream. (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 napping with his son Simon. (stephen.handler@usda.gov)

Kate Heckman

Kate coordinates the Radiocarbon Collaborative, as well as carrying out basic and applied research in soil C cycling and soil biogeochemistry. Outside of work, Kate can be found cooking, remodeling her house, and hanging out with her puppies and partner. Playing in the snow and sunning on the beach are also favorites. (katherine.a.heckman@usda.gov)

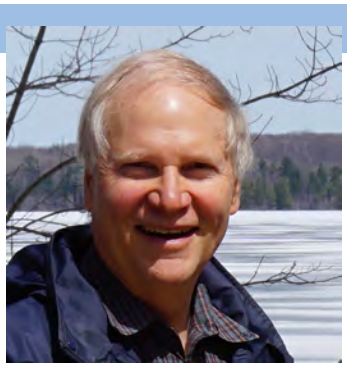
WELCOME OUR NIACS DETAILER

Kristen Giesting

Kristen is on a yearlong detail to NIACS from the Natural Resources Conservation Service (NRCS). She has been developing content related to climate adaptation and agriculture, including a training for NRCS employees. Her primary objective is to learn about NIACS' climate adaptation work and tools, in order to bring that information to the NRCS audience. In her free time, she enjoys foraging for wild foods, hiking, and cooking. (kristen.giesting@usda.gov)

Kristen joined NIACS full-time for the 2020 calendar year as a liaison from the Natural Resources Conservation Service.

Louis Iverson



Louis Iverson is a recently retired (February 28, 2020) Research Landscape Ecologist with NRS and NIACS, and as of June 22, 2020, is a part-time employee with the Senior Services, as part of the Agriculture Conservation Experienced Services (ACES) program. As such, he continues to do what he previously did with the Landscape Change Research Group within NIACS, only in a part-time fashion. He also is graced with additional free time for gardening, exploring, interacting with family, and many outdoor activities. (louis.iverson@usda.gov)

Maria Janowiak

As the Deputy Director of NIACS since 2016, Maria manages many of the day-to-day operations of the productive and busy NIACS team. She also works with a variety of natural resource professionals and land management organizations to integrate climate change considerations into their management and coordinates Climate Change Response Framework activities in New England and northern New York. In 2020, Maria spent much of her time at home establishing a new vegetable garden, fruit orchard, and tree nursery. (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 her personal time, Patricia enjoys skiing, hiking, and exploring natural areas. (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 graphic visualization resources 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 Matthews is 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 U.S. Forest Service Northern Research Station. His research focuses on how climate and land use change influences forests and birds. Outside of work Steve spends time with his family exploring the outdoors and the kitchen. (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 and NIACS Central in Houghton. He joined NIACS in 2010 and conducts collaborative research in forest ecology, management, biogeochemistry and the carbon cycle with partners in NIACS, NGO's, 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 coordinates the forest carbon management outreach efforts , as well as supporting the work with natural resource professionals in the New England region to integrate climate change considerations into forest management. Outside of work, Todd spends as much time as possible exploring forests with his wife and daughter. He can often be found in his workshop designing and building furniture (and the occasional musical instrument). (taontl@mtu.edu)

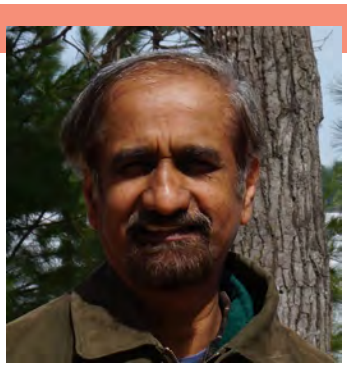
Matthew Peters

Matt is an Ecologist and provides technical support for the Climate Change Tree and Bird Atlas by conducting spatial analyses and data processing, statistical modeling, and generates cartographic products. He provides GIS analyses for other Northern Research Station researchers and various National Forests within the region. Matt enjoys camping and hiking with his family. (matthew.p.peters@usda.gov)

Courtney Peterson

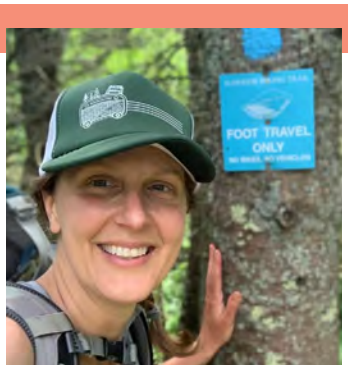
Courtney Peterson is a Research Associate at Colorado State University. She is the Adaptive Silviculture for Climate Change (ASCC) Coordinator, leading the development of potential sites and dissemination of project findings through outreach and training with land managers and scientists. Courtney also supports partners in climate science communication, adaptation planning, resources, and training as a climate adaptation specialist. Courtney loves playing violin in a local volunteer orchestra, traveling the world to experience new places, and any outdoor adventure with her family and friends. (Courtney.Peterson@colostate.edu)

Anantha Prasad



Anantha Prasad is a Research Ecologist with the U.S. Forest Service, Northern Research Station. His research focuses on modelling range-wide climate change dynamics of tree species and their intraspecific responses. Outside of work Prasad spends time with family, reading, gardening and taking walks in various parks around his house. (anantha.prasad@usda.gov)

PEOPLE



Kristen Schmitt

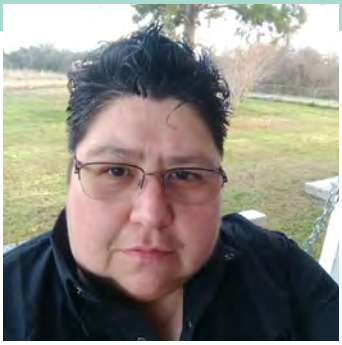
Kristen is a climate change adaptation specialist working in support of the Northern Forests Climate Hub. She works with a variety of partners to create new tools and to plan and execute trainings that help natural resources professionals integrate climate change into their work. As a relatively new resident of Duluth, MN, Kristen continues to spend time exploring the various trails and water bodies in the greater Twin Ports area. (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 likes to focus on using adaptation resources to aid management decisions in forested watersheds, and wetlands. Outside of work, Danielle is most often found running after her two kids who are daredevil bike riders.
(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.
(Paula.Zermeno@usda.gov)

HAPPY "RETIREMENT" LOUIS!

Louis Iverson started his career with the USDA Forest Service in 1992, as a Landscape Ecologist, and retired in Febuary 2020 after 29 years of distinguished service. His main research focus was on the impacts of climate change on habitat suitability of eastern U.S. tree species, but also included oak restoration by prescribed fires; modeling the spread of emerald ash borer; and developing an integrated moisture index. Over his tenure, Louis has authored or co-authored **250+** journal articles, technical reports, and book chapters which have been cited **13,687** times. Louis has been a member of professional organizations, and he was awarded a Distinguished Service Award by the International Association for Landscape Ecology (IALE) in 2015 for distinguished service over 25+ years to IALE and U.S. Chapter of IALE (US-IALE) and a Distinguished Landscape Ecologist Award in 2002, the highest honor given by US-IALE.

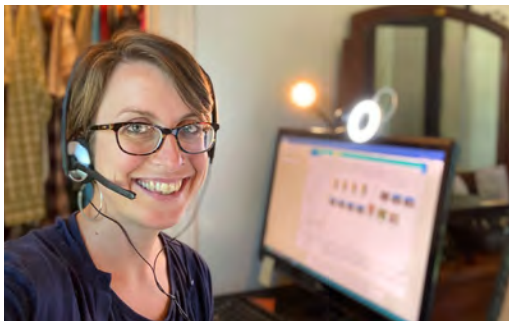
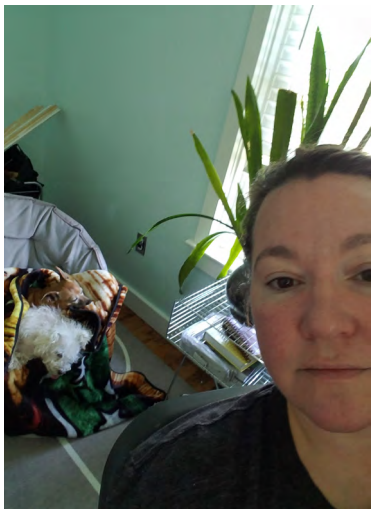
Louis is a pioneer in the field of landscape ecology – a participant in the first conference in 1983, which established landscape ecology as an academic discipline in North America. Louis served as the President of the US-IALE between 1996 and 1998. As a mentor, Louis has been on committees for several graduate students and has directly influenced the careers of Anantha Prasad, Steve Matthews, and Matthew Peters.

NIACS PARTNER ORGANIZATIONS

Partner Organization	Steering Group Member	Programmatic Contact
American Forests	Jad Daley	Rebecca Turner
Great Lakes Indian Fish & Wildlife Commission	Jonathan Gilbert	Robert Croll
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	Gina Owens	Kevin Moody
USDA Forest Service Northern Research Station	Tony Ferguson	Lon Yeary

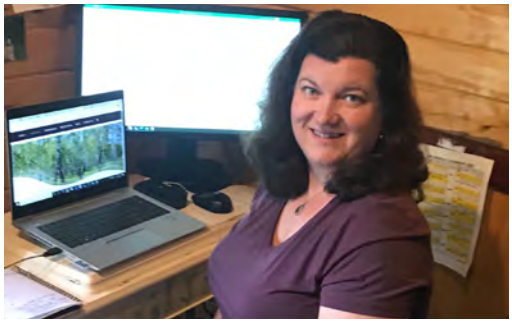
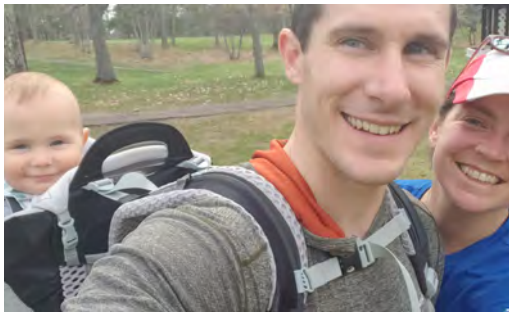
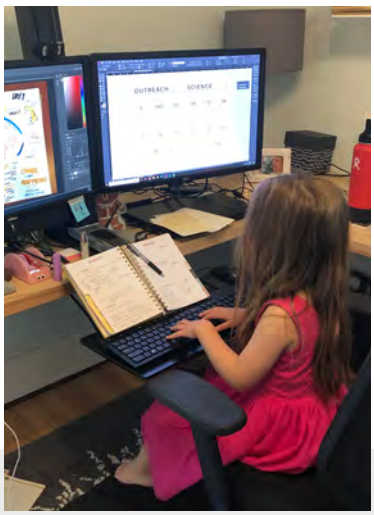
NIACS MEMBERS

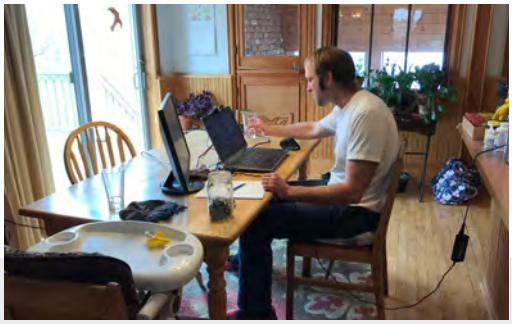
Name	Title	NIACS Affiliation
Knute Nadelhoffer	Director, Biological Station, University of Michigan	Carbon Trends and Management
Linda Nagel	Department head, Forest & Rangeland Stewardship Department, Colorado State University	Adaptive Silviculture for Climate Change (ASCC)








NIACS AT WORK AND AT PLAY

NIACS.ORG

ADAPTATION WORKBOOK
adaptationworkbook.org

ADAPTIVE SILVICULTURE FOR CLIMATE CHANGE
adaptivesilviculture.org

CLIMATE CHANGE ATLAS
fs.fed.us/nrs/atlas

CLIMATE CHANGE RESOURCE CENTER
fs.usda.gov/ccrc

CLIMATE CHANGE RESPONSE FRAMEWORK
forestadaptation.org

RADIOCARBON COLLABORATIVE
radiocarbon.forest.mtu.edu

USDA NORTHERN FORESTS CLIMATE HUB
climatehubs.usda.gov/hubs/northern-forests

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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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