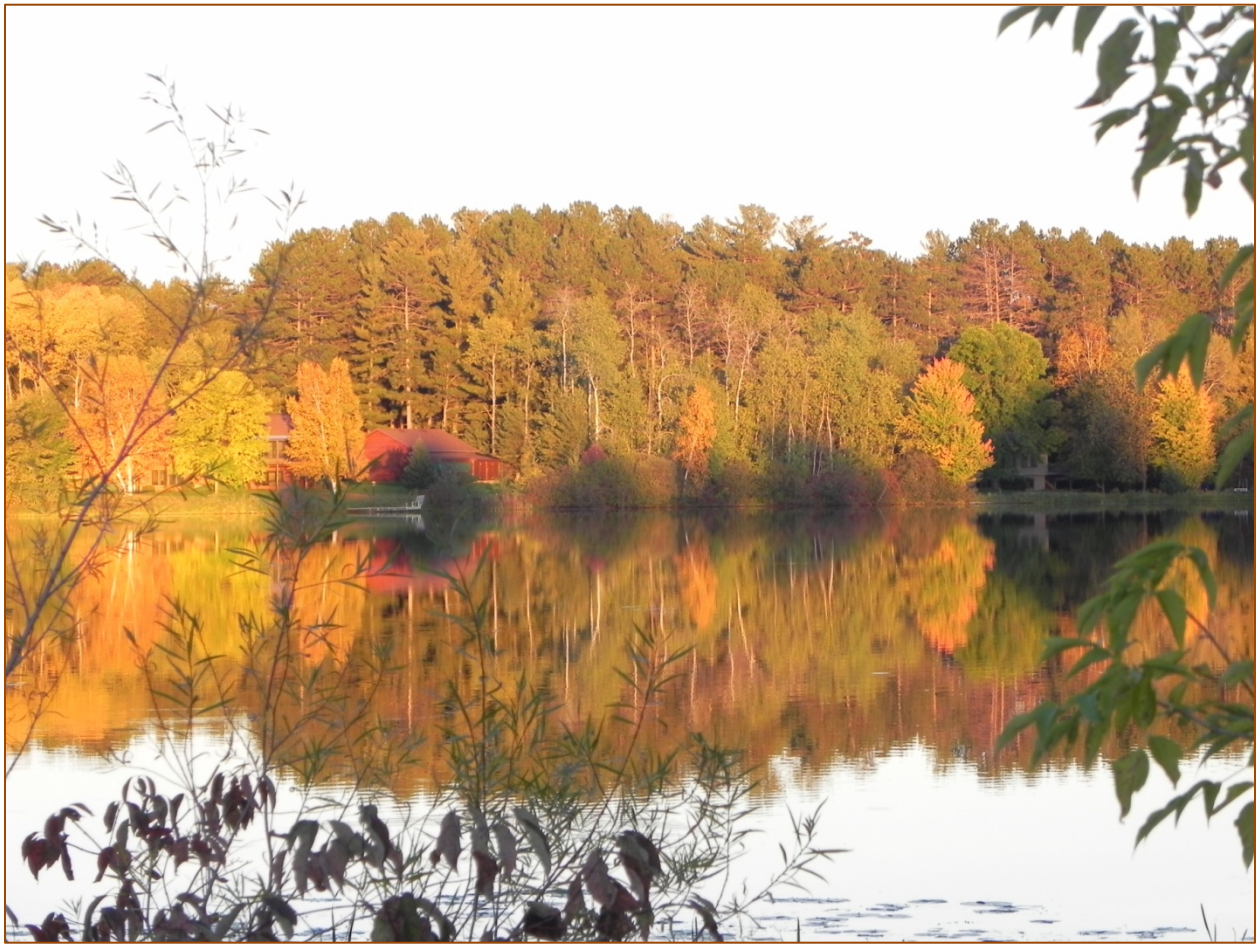
LESSONS LEARNED

from the
CLIMATE CHANGE RESPONSE FRAMEWORK PROJECT
in northern Wisconsin



NIACS
Northern Institute of Applied Climate Science

A white paper from the Northern Institute of Applied Climate Science June 2011

Contents

I. Introduction **3**
About this Document *3*
II. The Climate Change Response Framework Project **4**
Organization and Timeline *5*
Lessons Learned – Climate Change Response Framework Project *6*
III. Climate Change Response Framework Project Components **9**
ASSESSMENTS 9
Organization and Timeline *10*
Lessons Learned – Assessments *11*
SHARED LANDSCAPES INITIATIVE WORKSHOP 12
Organization and Timeline *13*
Lessons Learned – Shared Landscapes Initiative Workshop *13*
SCIENCE APPLICATIONS AND NEEDS WORKSHOP 15
Organization and Timeline *16*
Lessons Learned – Science Applications and Needs Workshop *16*
FOREST ADAPTATION RESOURCES: CLIMATE CHANGE TOOLS & APPROACHES FOR LAND MANAGERS 17
Organization and Timeline *18*
Lessons Learned- Forest Adaptation Resources document *19*
IV. Concluding Remarks **20**
V. Appendices **22**
APPENDIX 1. Agenda for the Shared Landscapes Initiative Workshop. *22*
APPENDIX 2. Agenda for the Science Applications and Needs Workshop. *23*

This report was prepared by Patricia Butler, Maria Janowiak, Leslie Brandt, and Chris Swanston. More information on this project is available at www.nrs.fs.fed.us/niacs/climate/cnnf/.

Acknowledgements

The Climate Change Response Framework Project in northern Wisconsin was funded by the USDA Forest Service Global Change Research Program, Eastern Region, Northern Research Station, and Northeastern Area (State & Private Forestry).

I. Introduction

Land management organizations, including federal and state agencies, local governments, and private organizations, are committed to improving the ability of ecosystems to adapt to the current and future effects of climate change[1,2]. The USDA Forest Service (USFS) has laid out a *Strategic Framework for Responding to Climate Change*[3] with seven goals for carrying out the Forest Service's mission of sustaining forests and grasslands under a changing climate. The USFS *National Roadmap for Responding to Climate Change*[4] builds on the strategic framework to identify measurable standards of progress, and the related *Climate Change Performance Scorecard*[5] tracks implementation on each Forest. The Climate Change Response Framework Project (CCRFP) in northern Wisconsin predates the *Scorecard* and influenced *Scorecard* elements—it's no coincidence that CCRFP activities and products directly address the *Scorecard* metrics.

The CCRFP initially grew from the joint commitment of the Northern Research Station (NRS) and the Eastern Region (R9) to work closely together in addressing the challenges of climate change. The Northern Institute of Applied Climate Science (NIACS), chartered in part by both organizations, began collaborating with the Chequamegon-Nicolet National Forest (CNNF), which was identified as a pilot landscape for what was ultimately called the CCRFP. The hallmark of the CCRFP quickly became the high level of cross-boundary collaboration, considered essential to coping with an issue that spans borders, disciplines, and perspectives. Although NIACS coordinates the CCRFP, its leadership role is fully shared with the CNNF, R9, NRS, and Northeastern Area (State and Private Forestry). Early and essential partners also include the University of Wisconsin–Madison, Wisconsin Department of Natural Resources, and Wisconsin Initiative on Climate Change Impacts. As the CCRFP matured, numerous individuals and organizations contributed time, creativity, and resources to its success. The new and strengthened partnerships emerging from the CCRFP highlight the value of approaching sweeping issues through landscape-scale conservation[6]; it is more work, but the approach ideally engenders wider participation and collaboration, greater creativity, expanded land-base, broader perspective, and more effective actions to achieve specific objectives. The "lessons learned" in this document will hopefully reduce some of the work in future efforts, even as they increase the effectiveness.

About this Document

This document records the processes, products, and lessons learned from the CCRFP with the intent that it will provide valuable information as well as inspiration to others working in the arenas of climate change assessment and adaptation response. This document features both major lessons and observations from the CCRFP and related components, as well as more subtle considerations and suggestions for moving forward on similar projects. Additionally, numerous public and private stakeholders have been involved in all aspects of the project, and many of their important roles and contributions are described herein.

---

[1] Wisconsin Department of Natural Resources. 2010. **Wisconsin's statewide forest strategy**. Madison, WI. Available at http://dnr.wi.gov/forestry/assessment/strategy/comment.asp.

[2] Cruce, T.; Holsinger, H. 2010. **Climate change adaptation: what Federal agencies are doing**. Pew Center on Global Climate Change. 47. Available at www.pewclimate.org/docUploads/FederalGovernmentLeadershiponAdaptation_Nov2010.pdf.

[3] United States Department of Agriculture Forest Service. 2009. **Forest Service Strategic Framework For Responding to Climate Change**. Available at www.fs.fed.us/climatechange/documents/framework-briefing-paper.pdf.

[4] United States Department of Agriculture Forest Service. 2010. **National Roadmap for Responding to Climate Change**. Available at www.fs.fed.us/climatechange/pdf/roadmap.pdf.

[5] United States Department of Agriculture Forest Service. 2010. **The Forest Service Climate Change Performance Scorecard (version 1.2)**. Available at www.fs.fed.us/climatechange/pdf/Scorecard.pdf.

[6] United States Department of Agriculture Forest Service. 2009. **Landscape Scale Conservation in the Northeast and Midwest**. Available at www.na.fs.fed.us/stewardship/pubs/**conservation**/land**scale_conservation**.pdf.

II. The Climate Change Response Framework Project

The CCRFP was designed to bridge the gap between scientific research on climate change impacts and on-the-ground management response to climate change impacts. Efforts therefore focused on incorporating information and expertise from a wide variety of scientists and land managers, with communication and flexibility identified as the two most important aspects of the framework. The Climate Change Response Framework is a six-step process designed to be applicable on many geographic, temporal, and administrative scales (Fig.1). The process itself is adaptive, and incorporates information, ideas, and lessons learned during the process into other components and activities (Fig.2).

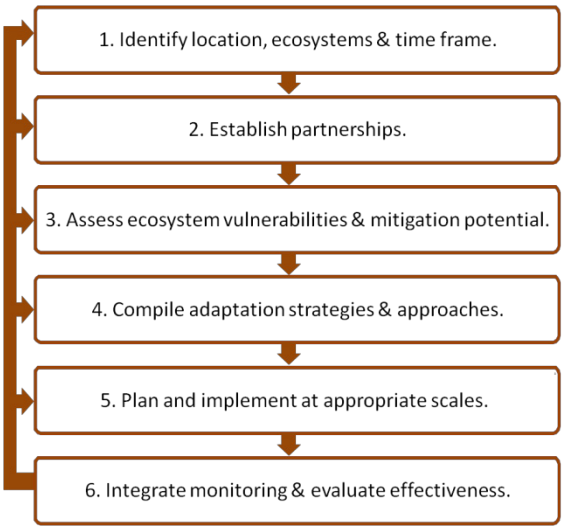


Figure 1. The CCRFP is an adaptive six-step process for responding to climate change.

Even as project components were developed, constant feedback from planners, managers, and other stakeholders was used to refine the overall process, how the components fit together, and how the processes integrate into local, regional, and national efforts. At the time of this writing, many of these activities have been completed or are in the final stages of development:

- An ***Ecosystem Vulnerability Assessment and Synthesis*** (*EVAS*) examines the potential effects of climate change on forest ecosystems in northern Wisconsin. It compiles a variety of information to inform the CNNF about which ecosystem components are most vulnerable to change under a range of future climate scenarios. The ***Preliminary Mitigation Assessment*** describes current carbon stocks in northern Wisconsin and summarizes available information on how forest management, land use, and other changes could alter the amount of carbon stored in forests and wood products. Both assessments are first versions that compiled available information even while new information is being generated for second versions.

- The **Shared Landscapes Initiative** was established to bring together local forest owners, managers and others to discuss the ecological and management challenges of climate change and to evaluate opportunities for partnerships. A **Shared Landscapes Workshop** was held in February 2010 to launch the Initiative, and a **Shared Landscapes Work Group** was organized to continue cross-boundary communication and cooperation. The Work Group met again in person on May, 2011 to share feedback on the first version of the *EVAS* and to discuss potential cross-ownership adaptation demonstrations of using the *Forest Adaptation Resources* (see below).

- Scientists and managers were convened at a **Climate Change Science Applications and Needs Workshop** in March 2010 to discuss available and needed research and monitoring of climate change and climate change impacts, and potential application of science across northern Wisconsin. This workshop was held after the SLI Workshop so that input and perspectives from the broader management community could inform discussions of science needs and applications. A **Climate Change Science Roundtable** was established to provide scientific perspectives on climate change to the CNNF, and incubate linkages in climate-related studies taking place in the CNNF and the broader northern Wisconsin landscape to continue science-based land management.

- As a final product, ***Forest Adaptation Resources: Climate Change Tools & Approaches for Land Managers*** (*FAR*) incorporates information from the above activities into a document designed to help land managers consider regional climate change impacts and use adaptation strategies and approaches to address those impacts in their decision-making processes.

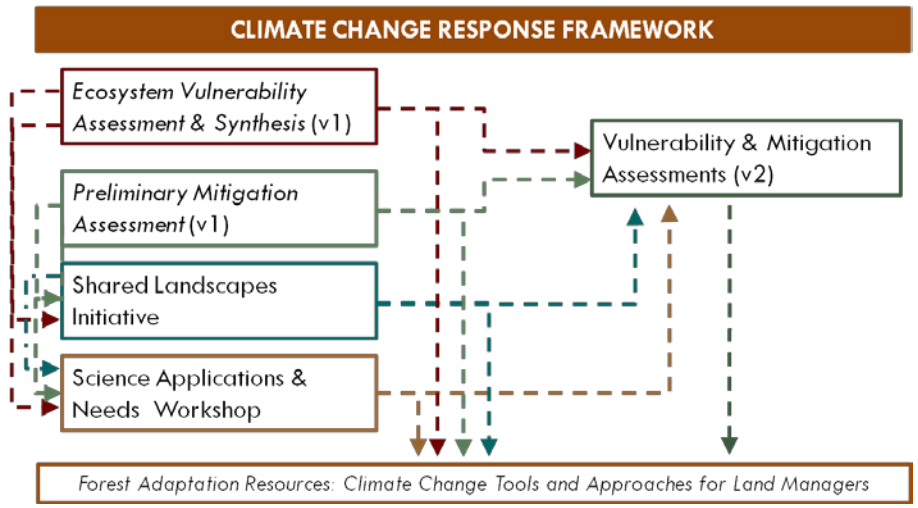
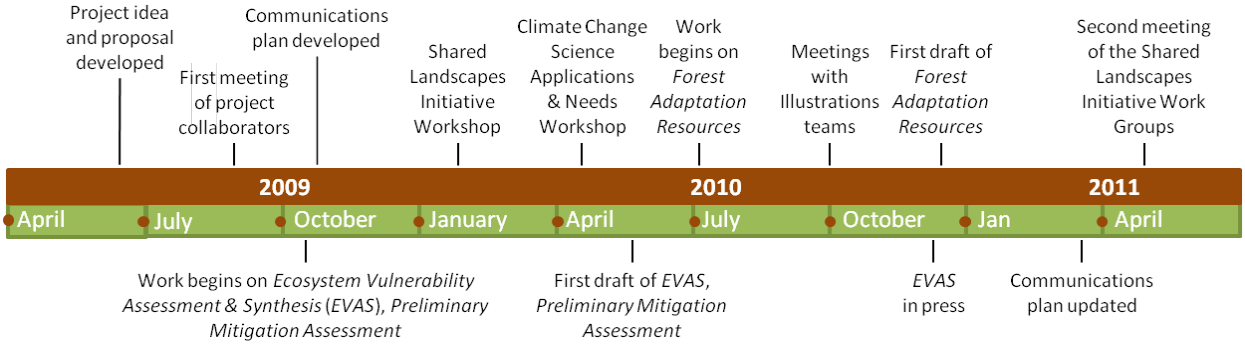


Figure 2. Components of the CCRFP; arrows show the relationships between components.

Organization and Timeline

The CCRFP began in June, 2009 when NIACS, the CNNF, R9, and other partners developed a proposal and project plan. The promise of several significant products in a short period of less than 2 years required project leaders to begin contacting potential collaborators for help with modeling and other information needs. Work began on the *EVAS* within a few months of defining the project, and over roughly the next year and a half, all of the major project components were completed.



With its many interrelated activities, the CCRFP began as a complex project that required commitment to communication and flexibility. The project staff was organized into multiple groups that worked on various aspects and deliverables of the project. Although there were some individuals with overlapping roles in multiple groups, each group had a defined role related to one or more aspects of the broader project:

- A **Steering Committee** was assembled to oversee and coordinate numerous aspects of the project. This committee included key project leads from NIACS, CNNF, NRS, USDA FS Region 9, Northeastern Area (State & Private Forestry), and the Great Lakes Forest Alliance. The committee had regularly scheduled phone calls (biweekly to monthly) to discuss project activities and progress.

- A **Writing Team,** also called the **Core Team,** was responsible for drafting and writing the *EVAS* and *FAR*. Six individuals formed the core of this group and worked at the intersection of science and management. Additional people were brought in as authors having expertise on a specific subject.

- A **Communications Team** identified several target audiences, developed key messages about the project, and produced communications plans for specific project activities as needed. This team included communications specialists from the CNNF as well as project collaborators from NIACS, NA, and other organizations.

- **Collaborating Scientists** were organized to produce and synthesize scientific information, and worked closely with the Writing Team in the development of the assessments and other documents. Collaborating scientists included members of the Climate Change Atlas modeling team, LANDIS-II modeling team, Wisconsin Department of Natural Resources, and WICCI's Climate Working Group. Contributions from many other researchers, experts, and scholars were sought out as needed.

- **Illustrations Teams** were comprised of interdisciplinary teams of managers from the CNNF who were asked to test the information and tools presented in the *FAR* document using real-world examples. These teams used the *EVAS* and *FAR* to examine climate change impacts and identify climate change adaptation strategies, approaches, and tactics that could help incorporate climate change into existing management objectives and activities.

Lessons Learned – Climate Change Response Framework Project

Organizational Lessons

- **The project purpose and scope should be defined early…** Having a coherent set of ideas helps draw people and skills into the project. At the same time, having a solid grasp of the scope of the project can provide a realistic appreciation of the resources required. Project partners were identified early on to help define the fundamental scope of the project, identify resources, and get things moving in the right direction. A well-defined purpose and limited scope will maintain focus on important project goals.

- **…but allow for refinement.** The project purpose and scope should be flexible enough to take advantage of new opportunities as collaborators join and resources change. In the initial planning

phase, the geographic area analyzed in the *EVAS* was expanded to take advantage of parallel research, established models, and new partners. Flexibility is a necessary characteristic of the CCRFP and allows it to evolve appropriately and create the best possible products.

- **It is important to identify a project coordinator to organize people and resources.** The coordinator plays a central role in the project, including organizing project components and timelines, coordinating collaborators and information, developing data, facilitating meeting and committee agendas, and creating supporting products such as meeting minutes, graphics, briefings, and reports. The coordinator of the CCRFP worked closely with the project leader in planning and monitoring progress of the project to ensure that project goals were met within the relatively short project timeframe. A designated project coordinator can initiate work and help manage inputs to the project.

- **A complex project needs to match people's skills to project tasks.** Each person has their own unique set of skills, and making sure that a team member is maximizing the value of their input will increase the overall success and efficiency of the project. The number of people required to work on a component, and the approximate amount of time committed (i.e., half-time, full-time, etc.) can easily be underestimated. Although there were several different groups and committees shouldering various project responsibilities, several people were involved in multiple groups and performed a substantial amount of the work. Strategically assigning certain tasks to the right people can make efficient use of the team's available time and allow for other responsibilities.

- **Collaborators bring skills and resources, but also require more time.** Tasks can take two or three times longer than expected when working with complex groups. Collaborating with a large number of people will invariably reduce the availability of the whole group at any given time. As the number of collaborators grew, it took longer to set up meetings, collate reviews and comments, compile work, and finalize products. Being clear and forthright about the scope and deadlines can help determine the roles and levels of commitment of potential collaborators.

Communication and Collaboration Lessons

- **Multiple levels of communication are critical to keeping everyone informed.** Clear and regular communication with both internal and external audiences preserves and relates key messages and objectives. At the center of the project, the steering committee upheld a biweekly conference call to give updates, discuss the next steps forward, and maintain dialogue among project partners. Expanding communications beyond the steering committee and core writing team required extra effort as the project expanded. Different kinds of communication and messaging were needed to describe the project to external audiences with little to no familiarity with the project. Some of the products that were created could have been described in a more straight-forward manner to improve the ability of external audiences to understand the project. Considering and adapting to the communication and information needs of different audiences can streamline communication efforts in a complex project.

- **A clear communications plan directs key messages and information to appropriate audiences.** A detailed yet flexible communications plan identifies audiences, key messages, project milestones and timeframes, and major deliverables. While developing the plan, the communications team upheld weekly or biweekly phone calls to discuss what, how, and when to communicate key messages to certain audiences (i.e., internal partners, external partners, and the general public).

Communications plans were drafted for separate components of the project, including the assessments and workshops. It would have been useful to develop a comprehensive plan for the whole project at the beginning and allow for revisions as milestones were approached. A communication plan not only identifies audiences and key messages, but also opportunities to synchronize timing of messages to correspond to related project activities.

- **Interdisciplinary work requires a common language that is hard to develop.** Every agency and organization uses a specific vocabulary to describe their processes and products. To outside partners, this vocabulary may mean something else altogether, or may not emphasize any distinct process or product. The creation of a language to describe the processes and products of the CCRFP was shaped by vocabularies of partner agencies. Multiple reviews of products by scientists and various management specialists helped identify problematic "trigger words" and spurious contextualization. A common language between partners takes time to develop and must be continually revisited, but can ensure that products are viewed in the proper context.

- **Not every meeting requires a detailed agenda.** Nothing beats a good brainstorm. Brainstorming sessions help identify critical questions, create products, and explore alternative options. Several brainstorming sessions were captured efficiently using colored markers on flip charts and large sticky notes that were easily stored and shared with other partners. Some of the best solutions and ideas can be generated during these short and informal meetings.

- **Technology can greatly enhance efficiency and collaboration.** Different forms of technology can significantly increase the speed and ability to share information. Collaborative web sites (e.g., Google™ Sites and Windows Live™) provided solutions to sharing larger project files with many people, including literature recommended to the team, project presentations, communication documents, and useful graphics. Combinations of videoconferencing and teleconferencing equipment were also used throughout the project to communicate with partners and collaborators. A restricted website was used to distribute draft assessments to select audiences. During core team meetings, notes were taken on a laptop connected to a projector that allowed all group members to interact with the notes while reducing the need to transcribe notes after the meeting. Spending time to seek out new electronic methods of sharing and communication may save vast amounts of time over the course of the project.

Overarching Lessons

- **"You can't steer a bicycle unless it's moving[7]."** Climate change information and uncertainty can overwhelm both scientists and managers. It is critical to express a need to start somewhere using the best scientific information that is currently available. A useful way to do this is to help partners understand how their current projects and activities may be impacted by a range of climate change scenarios. Embracing scientific uncertainties in a frank manner, but also showing trends and trajectories, can shift the decision from "what if" to "how to."

- **The concept of uncertainty underlies most discussions whether people realize it or not.** There are both social uncertainties and scientific uncertainties that influence perceptions of climate change and the need to respond. The role of uncertainty in climate change science was a critical component

[7] Dr. David Cleaves is the Climate Change Advisor to the Chief of the Forest Service. Prior to his appointment, Dave served as Associate Deputy Chief of Research and Development for the Forest Service.

of every conversation and presentation. It was often quite helpful to describe clearly how scientists and the general public use the term "uncertainty" differently, and how this can lead to miscommunication. Understanding and addressing uncertainties is crucial in building credibility and maintaining proactive relationships with collaborators.

- **Social issues are integral to climate change adaptation.** Ecosystem adaptation is influenced by social and economic elements. The roles of society and human influence on the environment were incorporated into multiple products of the project, primarily through the Shared Landscapes Initiative and the adaptation workbook approach used to develop *FAR*. How and when to address social elements need to be considered within the scope and timeframe of the project.

- **Managers and scientists often have different world views.** This is both a strength and a challenge. A disconnect can exist between complex scientific products and the application of data to solve real-world problems. Dialogue between scientists and land managers during numerous workshops and meetings helped scientists gain an understanding of managers' on-the-ground information needs, and also provided managers with an understanding of the scope of the current science. It required both scientists and managers to be patient, remain open-minded, and view issues from the others' perspective. Individuals also served as liaisons with the task of explicitly linking scientists and managers. Collaboration between these two groups is sometimes challenging, but with patience and communication their different world views can ultimately result in richer interactions and products.

- **Defining adaptation and mitigation focuses communication.** Clearly defining and relating these concepts with every new group is an important first step in the ensuing dialogue about climate change responses. Confusion between adaptation and mitigation presented a significant challenge during workshop breakout sessions. Mitigation requires healthy and productive forests that are able to sequester carbon, and carbon sequestration is critical in reducing atmospheric carbon and addressing climate change. In *Forest Adaptation Resources*, mitigation was considered a management goal that could be met using adaptation tactics, rather than an adaptation tactic unto itself. Defining these terms and then further establishing parameters around adaption (ecological, temporal, and spatial) helped focus conversation. A key message is that adaptation and mitigation are different, but not mutually exclusive.

III. Climate Change Response Framework Project Components

Assessments

The first products to take shape were two assessments that synthesized current knowledge and research and informed the development of the other CCRFP components. The *Ecosystem Vulnerability Assessment and Synthesis* (*EVAS*)[8] was created to evaluate key ecosystem vulnerabilities in northern Wisconsin under a range of future climate uncertainty using existing models and information, as well as model results generated for the project. It includes a description of the contemporary landscape of northern Wisconsin, projected changes in climate at the end of the century, and potential changes in

[8] Swanston, C.; Janowiak, M.; Iverson, L.; Parker, L.; Mladenoff, D.J.; Brandt, L.; Butler, P.; St. Pierre, M.; Prasad, A.; Matthews, S.; Peters, M.; Higgins, D.; Dorland, A. 2011. **Ecosystem vulnerability assessment and synthesis: a report from the Climate Change Response Framework Project in northern Wisconsin**. Gen. Tech. Rep. NRS-82. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 142.

forest composition, as well as a synthesis of the implications of climate change on forest ecosystems in northern Wisconsin. The assessment drew upon and expanded existing scientific examinations of climate change in northern Wisconsin, such as future climate projections from WICCI. The assessment also used two distinct types of vegetation models to understand the potential impacts of climate change on the forests of northern Wisconsin. Although forests will likely experience numerous changes, these two models agreed that many of the boreal and northern species currently common in northern Wisconsin will likely decline or lose productivity under future climates.

A *Preliminary Mitigation Assessment* was also developed to consider the potential for and efficacy of different forest carbon mitigation options within CNNF and northern Wisconsin. It describes current carbon stocks and summarizes available information on how forest management, land use, and other changes could alter the amount of carbon stored in forests and wood products. A draft of the assessment has been completed, and scientists are currently working on a second version that will contain more detailed results on how carbon stocks may be altered in the future as a result of climate change and forest management.

Organization and Timeline

The two assessments were created by separate groups of authors working in approximately the same timeframe (Table 1). The biggest challenge in meeting the deadlines for this component was the large number of collaborators involved in authorship. Work on the *EVAS* was coordinated by the editors; the contemporary landscapes chapter was written while the two models were being run by their respective modeling teams. When modeling results became available, the core team, including modelers, met to discuss the model inputs, outputs, and implications of the results. This two-day meeting generated a large amount of information that the authors were able to synthesize in multiple ways into the final chapter to provide information on forest response to climate change. The *Preliminary Mitigation Assessment* was designed to synthesize a vast amount of information on the carbon budget in northern Wisconsin and additional information will be incorporated into the second version of the assessments.

Table 1. Major tasks and milestones of creating the assessments.

Timeframe	Task
Early-June, 2009	*EVAS* content outlined in proposal. Lead authors wrote and revised their respective sections and e-mailed them around to the remaining contributing authors to revise and comment on. Sections were combined into a single document, and edited for tone.
July 2009	Analysis area, purpose, and scope of both of the assessments were developed during the initial project meeting.
Mid-June, 2009 to early-November, 2009	Rough drafts of *EVAS* chapters completed.
Early-November, 2009 to late-February, 2010	First draft of *EVAS* chapters completed. Authors began a second draft, focusing on major concepts and implications.
Early-January, 2010	*EVAS* authors met for a two-day meeting to discuss model results and implications, with key points identified for inclusion in the 'Implications' section.
January 2010	First draft of *Preliminary Mitigation Assessment* completed.
Early-January, 2010 to early-April, 2010	Second draft of *EVAS* chapters completed. Authors began a final draft, focusing on clarity, language, and precision.
April 2010	Final draft of *Preliminary Mitigation Assessment* completed.
Early-April, 2010 to late-May, 2010	Final draft of *EVAS* completed.
Early-August, 2010 to mid-March 2011	Scientific and technical reviews of the *EVAS* completed; draft revised and corrected for publication.
Mid-March, 2011 to present	*EVAS* is submitted to the Government Printing Office for final layout.

Lessons Learned – Assessments

- **A short timeframe may limit the scope of the assessment.** The writing team decided in the beginning that some information, such as the vulnerability of non-forested ecosystems, could not be included in the *EVAS*. The first version of the *EVAS* includes the minimum amount of information necessary to assess vulnerabilities highly relevant to forest ecosystems. Both assessments were designed as "living documents" that can be expanded over time to incorporate newly available modeling data, relevant ecological components and processes, and more detailed economic and social connections. Limiting the scope of the assessments early allowed the team to recognize the importance of additional information while moving forward with specific components.

- **Under short deadlines, a synthesis of existing information is a critical first step.** The large and expanding body of research on climate change impacts and ecosystem responses provides a valuable base of information. Both of the assessments focused on northern Wisconsin and included large syntheses of existing knowledge as a way to summarize the current state of the science and provide context for new information. The *EVAS* synthesized information on the contemporary landscape, fundamental climate change science, and climate change impacts on forests. The *Preliminary Mitigation Assessment* included a synthesis of available carbon tools and literature, current carbon stocks, and the mitigation potential of forests. These syntheses communicated key knowledge to the readers of these documents and served as a launching point for generating new scientific information.

- **There is no need to "reinvent the wheel."** Efforts to obtain new data can be expanded from or complement existing research and data sources. Time is often limited and there is no need to spend it on creating redundant products. The *EVAS* team recognized that WICCI had already produced downscaled climate projections and also planned to create a statewide forest vulnerability assessment. A division of labor was coordinated so that the *EVAS* covering the northern counties would complement a WICCI vulnerability assessment in the southern counties. Coordinating with similar projects can save time and resources, improve quality of data, and provide new information to a network of potential future partners.

- **Agreement between multiple models strengthens results.** Using established models that vary in the way they work, and that use different inputs and variables can provide better insight into the direct and indirect causes of impacts. This approach may also enhance the credibility of the overall assessment with the proponents of both models. The *EVAS* includes the model results from the Climate Change Tree Atlas and LANDIS-II. The Climate Change Tree Atlas is a species distribution model that examines the features that contribute to a tree species' current habitat and then uses downscaled climate data to project where similar habitat conditions are likely to occur in the future. LANDIS-II is a process model that simulates the interactions of management, climate, and disturbance on forest biomass by incorporating basic relationships between projected climate data, species life history, dispersal, landscape patterns, and other factors. Despite differences in the way these models operate, there was agreement that many northern and boreal species at the southern edge of their range in northern Wisconsin will face significant decline; this agreement between distinct models enhances confidence in the projections.

- **Multiple forest classification types present both challenges and opportunities.** Both the available information sources and the document audience are critical considerations in choosing forest classification type. Although the *EVAS* generally used CNNF-defined forest types to describe forests,

other classification systems defined by the USFS Forest Inventory and Analysis (FIA) Program, the Wisconsin DNR, or other entities could have been used. In fact, FIA forest-type groups were used to describe forest composition across northern Wisconsin. A "crosswalk" between the forest type classifications enabled the authors to use both the fine-scale inventory data available from the CNNF and the coarse-scale data that was available for the whole region. While any number of classification systems may have strengths and weaknesses, it may be prudent to allow for varying resolution of data across the landscape, as long as it is framed within and comparable to the entire analysis area.

- **Complex documents depend heavily upon clear organization and purpose.** Additional effort is often needed to assist the reader in navigating and understanding large and complex documents. During the development of the *EVAS*, the authors considered how the document chapters and their context influenced the document as a whole. Rather than attribute individual chapters to different lead authors, all members of the writing team were listed as authors on the entire document. This signals the cohesiveness of the assessment and integration of all chapters. A preface and introduction were used to provide additional context and highlight the purpose and organization of the document. This clear articulation early in the assessment provides a quick orientation to the document and allows the reader to focus their attention on the content and information.

Shared Landscapes Initiative Workshop

The overarching goal of the Shared Landscapes Initiative (SLI) is to increase awareness of the potential effects of climate change on ecosystems, land management, and society, as well as the potential for landscape-level, cross-ownership response to climate change. This initiative was a fundamental component of the CCRFP, and its launch enhanced communication and collaboration across a broad spectrum of forest landowners, managers, and other stakeholders across northern Wisconsin.

Working with NA and CNNF, NIACS launched the Shared Landscapes Initiative by hosting a Shared Landscapes Workshop in Rhinelander, WI in February 2010. The two fundamental goals of the workshop were to (1) bring participants together to discuss the potential ecological and management pressures associated with climate change and potential social responses to these pressures; and (2) discuss how regional partnerships can be used to encourage both communication and effective ecosystem management in the face of climate change while meeting landowners' objectives and missions. More than 70 people attended the workshop. The workshop agenda (Appendix A) included an educational segment, a climate change discussion segment, and a partnership-building segment. The educational segments included presentations on climate projections, implications of climate change on forests of northern Wisconsin, and adaptation and mitigation concepts for forest management. The discussion segments encouraged participants to ask questions about the climate change presentations, voice concerns and perspectives, and describe their stewardship goals. The partnership-building segments helped develop ideas of partnership, potentially ranging from the sharing of information to coordinating landscape-level management plans.

The first day of the workshop focused primarily on providing regional climate change information and initiating conversation on possible cooperative approaches for responding to climate change. The second day of the workshop focused on building partnerships and the development of a Shared Landscapes Work Group. The broad goals of the Work Group are to formalize long-term partnerships and create a forum to continue dialogue supporting successful responses to climate change. The Work

Group currently includes over 30 organizations and individuals that represent federal, state, other public, tribal, and private interests, and is being facilitated by the Great Lakes Forest Alliance.

Organization and Timeline

A planning committee was formed to oversee the development of the SLI workshop (Table 2). In addition to the core team of planners, the planning committee employed a professional meeting planner and a meeting facilitator to ensure the proper development and execution of the workshop. Frequent phone meetings updated members of the planning committee on new developments and were important avenues to link broad workshop goals with an understanding of the audience. A meeting of planners and facilitators on the eve of the workshop was a valuable opportunity to review the agenda as a group and make last minute changes based on new information. The workshop was planned and executed in approximately eight months, and the Shared Landscapes Initiative is ongoing.

Table 2. Major tasks and milestones of planning the stakeholder workshop.

Timeframe	Task
July, 2009	Committee identified overall workshop goals and objectives; discussed length, location, size, dates, and participant pools.
August-September, 2009	Potential dates and locations identified; committee members individually came up with list of desired participants.
Early September, 2009	Weekly workshop planning call initiated.
Mid-September, 2009	Meeting location decided; first draft of agenda created for internal discussion.
Late-September, 2009	List of invited participants finalized; contact information gathered in an excel file for future mail merge, invitations created for mailing.
Late-September, 2009	Communications team developed key messages for use by all partners.
Mid-October, 2009	Invitations sent out with RSVP & registration details
Early-December, 2009	First draft agenda revised; working agenda created.
Early-December, 2009	Second round of invitations sent out with RSVP & registration details.
Early-January, 2010	Basic workshop agenda finalized (but designed with flexibility); logistic details decided; guest speakers confirmed; workshop materials developed.
Early- to late-January, 2010	Workshop reminder e-mailed to invitees, invitations followed by phone calls to clarify goals of the workshop and generate interest.
Mid-January to early-February, 2010	Confirmed participants interviewed to gauge climate change knowledge and perceptions.
February 23, 2010	Planning committee met to discuss the agenda and solidify the roles of the workshop facilitators, breakout session facilitators, note-takers, and floaters.
February 24-25, 2010	Workshop event occurred. SLI Work Groups were formed around climate change-related issues identified at the workshop.
Ongoing	SLI Work Groups continue to discuss opportunities and actions for incorporating climate change into forest management.

Lessons Learned – Shared Landscapes Initiative Workshop

- **Investing time and thought into invitations pays off in participation.** Invitations should be written and delivered in a way that generates interest, answers questions, and secures a diversity of perspectives at the workshop. The overall size of the SLI Workshop was increased substantially from original plans in order to attract a diversity of stakeholder groups, which ultimately improved the quality of discussions at the workshop. Invitation strategy and timing affected the response to invitations. Informally clearing proposed dates with a core group of critical participants, as well as

requesting information about potential conflicts, helped ensure participation of key individuals and groups. When multiple organizations are involved, it may be more effective to send invitations from the organization that will generate the most positive response from any given recipient. The appropriate recipient should also be identified; directors, chairs, and other leaders may not have been responsive to invitations which should have been sent or copied to their administrative assistants. Careful consideration of the desired size and audience of the workshop, sender and recipient of the invitation, and personalized follow-up invitations can help maximize workshop participation and success.

- **Workshop goals and objectives should be crystal clear.** Workshop goals and objectives are often met using probing questions during breakout sessions. These questions should be developed early, discussed, and refined to ensure that the questions appropriately shape discussions. A very detailed agenda with breakout questions was developed well before the workshop and was revised as participant needs and workshop goals became clearer. The planning committee and facilitators gathered for a pre-workshop session to prepare for their roles, re-examine goals, and refine breakout questions and other items in the agenda. Developing a precise vision of the objectives and exploring ways to meet them early in the planning process ensures their full development.

- **Identifying perceptions about climate change was useful in planning the agenda.** A meeting planner worked with the workshop committee to conduct participant interviews well in advance of finalizing the workshop agenda. During these interviews, confirmed workshop participants were asked open-ended questions about their motivations for attending the workshop, support they received from their offices, their understanding of climate change topics, and how they foresaw climate change impacting job performance. Many participants expressed feeling overwhelmed by existing information on global climate change and desired relevant regional information. During the workshop, a series of plenary talks summarized the interviewee perspectives and presented the newest downscaled climate change data and information on projected local impacts. By understanding the audience's attitudes, motivations, and expectations, the planning committee can better develop methods to achieve workshop goals.

- **Early identification of a meeting planner enhances workshop effectiveness.** A meeting planner coordinates early activities to gather background information for the planning committee on participant perspectives, needs and expectations. As part of the process of developing this workshop, a professional planner worked with the planning committee to analyze important relationships between stakeholders and their perspectives on climate change, information which the planning committee later incorporated into all workshop activities. This early focus engaged participants and engendered trust, which in some cases directly resulted in them gaining support from their organizations to attend. The information flow between participants and the planning committee is instrumental to planning a workshop that provides maximum benefits to both the stakeholders and the hosts.

- **An experienced workshop facilitator will foster a positive group dynamic.** The facilitator is the critical link between the workshop goals and the workshop participants during the workshop. The facilitator guides, explains, cajoles, and *listens*. If the facilitator and the planner are not the same person, they should communicate closely during the planning process. The SLI Workshop was a success largely due to the facilitator's management skills, especially the flexibility in making last minute changes in the agenda as a means to meet workshop goals. The facilitator managed the atmosphere and mood of the workshop, managed time spent on breakout activities, and

encouraged positive group discussions. The ability of an effective facilitator to marshal the energy and creativity of a working group is invaluable in hosting a stakeholder workshop.

- **A work group defined by its participants is more likely to maintain long-lasting dialogue.** A goal of the workshop was to create the SLI Work Group that would continue to address several focus areas identified at the workshop. There was a delicate balance in providing enough direction to form the work group while also allowing the group to define itself. Expectations of the SLI Work Group members were discussed only after the group itself had defined its purpose and focus. Waiting until the very end of the workshop to solicit membership allowed maximum time for participants to consider membership and probably encouraged greater participation. An excellent summary at the closing remarks emphasized that the work group would continue to evolve as it worked to address the impacts of climate change across the landscape. A working group is sustained by a shared sense of purpose among its members.

- **The stakeholder workshop informs the science workshop.** Stakeholder feedback informs scientific discussions. Initially, it was unclear which of the two workshops would be held first. The ultimate decision was to hold the SLI Workshop before the Climate Change Science Applications and Needs Workshop because it would help establish social expectations of land management and climate response. Additionally, comments from land managers during the SLI Workshop provided insights into needs for application of existing information, as well as new research. Participants of the Science Applications and Needs Workshop strongly expressed the importance of the social aspects of climate change adaptation and mitigation. Having the Shared Landscapes Initiative in progress increases credibility of the overall project and strongly influences the tone and direction of the second workshop.

Science Applications and Needs Workshop

Working with the CNNF, NRS, and Eastern Region, NIACS hosted 58 regional and national experts in forest science and forest resource management for a two-day workshop in Madison, WI in April 2010. The goals of the Science Applications and Needs Workshop were to 1) identify near-term management approaches that can enhance the ability of ecosystems in northern Wisconsin to cope with climate change; 2) address how National Forests and other lands can be used to test new approaches; and 3) consider monitoring needs related to measuring both the effects of climate change on ecosystem function and composition and the effectiveness of adaptation and mitigation efforts. Prior to the workshop, participants were asked to become familiar with the *Preliminary Mitigation Assessment,* the *Ecosystem Vulnerability Assessment and Synthesis*, and a summary of the SLI Workshop outcomes. Participants were also asked to read and consider breakout session questions prior to the workshop (Appendix B).

The first day of the workshop focused on presentations and discussion about ecosystems and land use in northern Wisconsin, potential ecosystem responses to climate change, and associated adaptation strategies. A series of plenary talks early in the conference agenda set the context and identified the challenges people face due to climate change in northern Wisconsin. These presentations were followed by breakout sessions to discuss both how to apply current knowledge and what additional research or data are needed. Participants were encouraged to emphasize ways to use existing science to support decisions about adaptation in northern Wisconsin. The second day of the workshop focused on the viability of greenhouse gas mitigation efforts, monitoring ecosystems, adaptation efforts, and experimental trials.

The workshop also launched the Climate Change Science Roundtable, which has a goal to increase cooperation between the research and forest management communities in order to help facilitate research activities and technology transfer related to climate change in northern Wisconsin. A meeting of the Climate Change Science Roundtable occurred the morning after the workshop and consisted of 20 members.

Organization and Timeline

A planning committee was formed to oversee the development of the science workshop (Table 3). Execution of the workshop relied on the planning committee for note-taking and general meeting facilitation. The core team also enlisted the leadership of participants to facilitate breakout sessions. Phone meetings kept the planning committee updated and informed on meeting goals, agenda development, and meeting logistics. Breakout session facilitators were briefed on their responsibilities in a teleconference. Unlike the stakeholder workshop, no in-person meeting was held immediately before the workshop. The workshop was planned and executed in approximately 8 months and the science roundtable is ongoing.

Table 3. Major tasks and milestones of planning the Science Applications and Needs Workshop.

Timeframe	Task
July, 2009	Committee identified overall workshop goals and objectives; discussed length, location, size, dates, and types of participants.
August-September, 2009	Potential dates and locations identified; committee members individually came up with list of desired participants.
October, 2009	Committee members approved a list of participants and roundtable members. Location, dates, and length of workshop finalized; venue and hotel block reserved.
November, 2009	Participant list finalized; preliminary agenda created; speakers and potential breakout session leads identified.
December, 2009	Invitations and preliminary agenda sent out to all invitees via email.
January, 2010	Speakers confirmed; workshop planner identified.
February, 2010	RSVP deadline; breakout session facilitators chosen from confirmed guests.
March, 2010	Invited speakers briefed on logistics and agenda during a conference call; catering, room setup, and agenda finalized.
April, 2010	Venue information, background materials, and final agenda distributed; roundtable purpose, goals, membership and meeting structure solidified; breakout session structure and breakout questions developed.
April 27-29, 2010	Meeting occurred; roundtable established.
May, 2010	Presentations and agenda posted online; leadership briefed on workshop outcomes; e-mail listserv for roundtable created.

Lessons Learned – Science Applications and Needs Workshop

- **Breakout session questions help shape the outcomes of a workshop.** Workshop goals and objectives are often met using probing questions during breakout sessions. Questions should be developed early, discussed, and refined to ensure that they appropriately shape discussions. Breakout questions were developed late in the planning process, which created challenges in conceptualizing the purpose and outcomes of each breakout session. Developing a precise vision of the workshop objectives and exploring ways to meet them early in the planning process allows a clear definition of the desired outcomes to fully develop.

- **A larger workshop may limit the ability to gather specific information.** Workshops are a great avenue for building partnerships and trust, learning new information, and communicating. It may be

more challenging, however, to generate pertinent information during larger workshops. This workshop was an excellent way to reach out to the scientific community and gather their ideas and perspectives, but ultimately much of the information was difficult to integrate directly into the project. Other approaches, such as a small meeting of less than 15 people, may have fostered more focused discussions and generated responses with greater relevance. The level of detail that is desired from workshop outcomes may dictate the size and structure of a workshop.

- **Breakout session facilitators are integral to breakout group success.** Facilitators maintain group focus on session objectives as well as contribute to creative discussion. Certain workshop participants were asked in advance to serve as breakout session facilitators. More comprehensive meetings with these facilitators prior to the workshop would have provided them with better guidance regarding their role and the focus of the breakout session. During the workshop, a "floater" assisted facilitators by moving between breakout groups to gauge group progress, share ideas among groups, and monitor discussions with respect to overall workshop goals. The use of small-group facilitators during breakout sessions can be a valuable way to keep information flowing and achieve both breakout and workshop objectives.

Forest Adaptation Resources: Climate Change Tools & Approaches for Land Managers

The final document from the project, *Forest Adaptation Resources: Climate Change Tools & Approaches for Land Managers* (*FAR*), incorporates information from all other aspects of the project, including the assessments, Shared Landscapes Initiative, and discussions between scientists and managers about the integration of research and management in the context of climate change. *FAR* also provides a "menu" of strategies and approaches to better adapt ecosystems to a changing climate, and lays out a process for incorporating climate change considerations into land management.

Four inter-related chapters of this document summarize the activities to date under the CCRFP as well as provide resources to help incorporate climate change considerations into management decisions and devise management tactics that can be used to respond to climate change.

- ***Chapter 1: Response Framework Overview*** describes the overall process of the CCRFP, summarizes the project components and subsequent outcomes, and provides a background for later chapters. Lessons learned from this chapter are reflected in the CCRFP Lessons Learned section.

- ***Chapter 2: Adaptation Strategies and Approaches*** synthesizes a wide range of reports and peer-reviewed publications on climate change adaptation, and provides a "menu" of adaptation actions that are relevant to northern Wisconsin. Expert feedback was used to further refine the existing literature and provide insights regarding how the actions relate to twelve different forest types.

- ***Chapter 3: Adaptation Workbook*** outlines a process for adding climate change and forest response information into forest management considerations. It relies on the experience and expertise of natural resource professionals and is meant to complement other forms of management planning and decision-making. It uses a workbook approach to provide step-by-step instructions for land managers to explore broad adaptation strategies and approaches and tailor them into on-the-ground management tactics that help forests adapt to climate change.

- ***Chapter 4: Illustrations*** demonstrates how the Adaptation Strategies and Approaches and the Adaptation Workbook chapters can be used together to develop adaptation tactics. Two illustrations of real-world management issues provide examples to managers completing the Adaptation Workbook and demonstrate how climate change considerations can be incorporated into land management.

Organization and Timeline

The core team wrote this document in approximately eight months, and the document is now being reviewed (Table 4). Amongst the many challenges in this complex project, the greatest challenge was working within a short timeframe.

Table 4. Major tasks and milestones in the creation of *Forest Adaptation Resources*.

Timeframe	Task
Mid-May, 2010	A collaborative website was created for sharing literature and resources on framework processes and adaptation with the core group.
Early-June, 2010	Brainstorming sessions were held. An outline of the **Adaptation Workbook** was drafted to help guide the direction of the group meeting in mid-June.
Mid-June, 2010	Core team met for a 3-day discussion of the **Adaptation Workbook**, and to establish tasks, & timelines. A first draft of the workbook began.
Late-June to early-July, 2010	First draft of **Strategies and Approaches** chapter began; adaptation actions applicable to northern WI were synthesized from existing literature.
Mid-July, 2010	Core team reviewed the first draft of **Strategies and Approaches**. Survey questions were developed to guide 'expert' reviewers to consider how the chapter may be applicable in a specific forest type.
Late-July, 2010	Invitations to experts were e-mailed; included were introductory materials, the **Strategies and Approaches** chapter, and a link to the online survey.
Late-July, 2010	**Illustrations** were planned. Authors discussed how to assemble two interdisciplinary teams of forest managers to test chapters of *FAR* .
Late-July to early August, 2010	Experts reviewed the **Strategies and Approaches** for their applicability and usefulness in a given forest type in northern Wisconsin.
Late-July, 2010	Survey responses for the **Strategies and Approaches** chapter were downloaded and collated in preparation for an in-person meeting.
Mid-August, 2010	The core team held a teleconference with **Illustrations** teams to discuss both a project and program example, began identifying project areas.
Early-August, 2010	Core team met to discuss **Strategies and Approaches** survey responses; responses were used to revise the chapter.
Early-September, 2010	**Illustrations** teams met with the authors for a shared overview of the Adaptation Workbook; teams completed steps 1-3.
Mid-September, 2010	**Illustrations** second meetings held. Teams met separately for one day each and completed steps 4-5 of the Adaptation Workbook.
Late -September, 2010	**Illustrations** teams met for two days each to complete the workbook and to provide feedback on the process, time commitment, and other issues.
Mid-September to late-October, 2010	**Adaptation Workbook** revised. **Strategies and Approaches** revised.
Early-October, 2010	Feedback from the **Illustrations** meetings was used to refine and improve the **Adapatation Workbook** for efficiency and usefulness.
Mid-October, 2010	First draft of **Illustrations** chapter was completed with a focus on key highlights and useful notes for future users.
Early-November, 2010	Internal audiences were updated on progress of the *FAR* .
Mid-November, 2010	The *FAR* document was presented to the CNNF Forest Supervisor for review.
Mid-November, 2010 to present	Multiple levels of document review began; reviewer comments were collected and collated; revisions are in progress.

Lessons Learned- *Forest Adaptation Resources* document

- **Reducing complexity increases likelihood of use**. There are already a vast number of complexities associated with managing natural resources; adding climate change as another management consideration will increase the number of issues and relationships that managers juggle. *FAR* built upon the earlier components of the project to provide resources and tools to help land managers respond to climate change. To the extent possible, existing information and concepts were compiled, evaluated, and synthesized to provide a product more applicable and salient to managers. By making complex information accessible, it is more likely to be integrated into management activities.

- **Where complexity remains, direction and context is essential.** The inherent complexity of responding to climate change ultimately means that there are limitations on the extent to which information can be simplified. Although *FAR* simplified and synthesized a substantial amount of information, it remained a formidable document. During its development, the authors considered how the individual document chapters and their relationships influenced the document as a whole. Information on the purpose, context, and organization of the document were conveyed to readers through the use of a preface and introduction, as well as a variety of boxes, captions, and other elements to assist the reader. Providing cues to direct the reader to important information frees the reader to use the tools for their intended purpose.

- **User feedback is critical during development.** Product design should reflect the needs of the end-user. Throughout the project, numerous stakeholders were consulted to understand the needs of managers for responding to climate change. This was particularly important in the development of *FAR* where several tools were being developed to specifically meet these needs. Ideas and suggestions from previous components of the project were used to inform the direction of *FAR* in its early stages. Later, the Adaptation Strategies and Approaches and the Adaptation Workbook chapters were used by two Illustrations teams (interdisciplinary teams of managers from the CNNF). The results of these teams' efforts are presented in the final chapter. Furthermore, feedback from these teams was used to refine the Adaptation Strategies and Approaches and the Adaptation Workbook chapters. The testing of tools in real-world applications made the *FAR* a better overall product in regard to its intended use.

- **Multiple levels of review help to ensure the quality of a document.** Similar to the testing of the *FAR* chapters described above, multiple levels of review were used to improve *FAR* itself. The first level of review occurred within the writing team; members provided comments and revisions on all parts of the document. Later, the opportunity to review was made available to internal groups, including the project steering committee, selected CNNF resource managers, and the Illustrations team members. Each group indentified issues not immediately apparent to the other groups. Further review from the broader group of project collaborators, members of the Science Roundtable, and three peer reviewers is planned for document publication. Each level of review creates an opportunity to improve the text as well as vet the information and ideas contained in the document.

- **A prototype of the desired product will guide expert reviewers.** The experience and expertise of forest management professionals can be harnessed most effectively if they know exactly what is being asked of them. The authors solicited expert reviews of a list of adaptation options, strategies, and approaches that had been synthesized from both peer-reviewed and gray

literature. Reviewers were asked to gauge the likely efficacy of various approaches within a given forest type, and identify management considerations specific to those types. Although appropriate instructions and background information were provided, the nature of the reviewers' responses often did not match the authors' expectations. Providing an example of the desired product to expert reviewers would have helped define the nature of their input, resulting in more useable adaptation information.

- **There are no "one size fits all" approaches for responding to climate change.** The ways in which managers choose to respond to climate change will depend heavily upon management objectives, site conditions, potential vulnerabilities to climate change, and many other factors. The *FAR* authors intentionally avoided providing specific direction or recommendations to land managers and instead provided a process that allowed managers to consider climate change in relation to other land management needs and constraints. This was done through the use of interrelated chapters that can also be used as independent tools. The Adaptation Strategies and Approaches chapter emphasizes a "menu" of approaches that managers can draw from to address climate change impacts in a given forest type. The Adaptation Workbook lays out a process for managers to consider climate change vulnerabilities and translate the selected approaches into management activities. Providing flexible tools that engage the professional experience and judgment of managers will help ensure that adaptation actions are well-suited to the situation at hand.

- **Near-term adaptation activities may be consistent with existing plans.** Some adaptation approaches and tactics may not be in agreement with current protocols, management plans, or other guidelines, and near-term use of these approaches may not be viable. Other approaches and tactics may differ only slightly from current activities, and fall well within existing management plans and direction. The Illustrations teams that tested the tools in the *FAR* document in real-world situations were able to identify a number of actions whose implementation would be consistent with their forest policies and plans, and would begin to adapt forest ecosystems to expected future conditions. Many short-term adaptation activities are not radical departures from ongoing management and may help keep future adaptation options open.

IV. Concluding Remarks

The Climate Change Response Framework Project in northern Wisconsin is ongoing. The next major phase is to work with landowners and managers, directly and through the Shared Landscape Initiative, to integrate the tools and information into their decision-making processes and management activities. This will present new challenges, inspire new lessons, and likely occasion the revisiting of "learned" lessons. Even as the work progresses to the next phase in northern Wisconsin, it begins anew in other states. As before, National Forests have agreed to serve as focal points and test cases in applying the Framework in the manner that best suits their needs and those of their partners. This document is intended to benefit these new projects as participants consider the required effort, impact on work plans, and general commitment involved in the type of approach pursued in northern Wisconsin. Additionally, other similar efforts around the country may benefit from lessons learned through this work.

A running theme through the lessons in this document involves managing collaboration and communication. Collaboration is at the core of any success that can be claimed by this project, and the solid partnerships formed through the project are themselves a success. That said, collaboration can be time consuming and frustrating; it requires patience and an open mind. Ultimately, successful collaboration requires real commitment. Perhaps the biggest lesson, and one continually re-learned with each scheduling of yet-another-meeting, is that all the "extra" effort is worthwhile and all the products are stronger.

Finally, this document has maintained a positive tone focused on how to get things done. Although it doesn't dwell on failures, there were many small failures that led to the lessons described herein. Groups have various ways of responding to setbacks, deadlines, and associated pressures. The importance of trust, positivity, and a sense of adventure in dealing with these things cannot be overestimated, although these group dynamics are difficult to describe in a compact lesson. Nonetheless, they were inherent in the willingness of the group to tackle each Framework component and were fundamental in maintaining the confidence and support of Forest Service and partners' leadership.

A northern Wisconsin landscape (photo courtesy of Linda Parker, CNNF)

V. Appendices

APPENDIX 1. Agenda for the Shared Landscapes Initiative Workshop.

Shared Landscapes Initiative Workshop

February 24-25, 2010 ▪ Rhinelander, WI

This workshop aims to increase awareness and discussion of the potential ecological and land management pressures associated with climate change in northern Wisconsin. The first day of the meeting will focus on providing information on climate change and ecosystem vulnerabilities in the region. The workshop will also initiate conversation on possible cooperative approaches for responding to climate change, incorporating a variety of stewardship goals and management objectives.

This discussion will be continued on the second day of the meeting, with the goal of creating a Shared Landscapes Initiative Working Group to provide a forum to continue conversations for the successful response to climate change challenges.

Agenda

February 24th:

8:00 Registration and Coffee

9:00 Welcome, Introductions
Goals of Workshop
- *Chris Swanston, Northern Institute of Applied Climate Science*
- *Patricia Butler, Northern Institute of Applied Climate Science*
- *Tony Erba, Chequamegon-Nicolet National Forest*

9:45 **Climate Change in Northern Wisconsin**
- *Michael Notaro, Univerisity of Wisconsin – Madison*

10:30 Break

11:00 **Forest Response to Climate Change**
- *Chris Swanston, Northern Institute of Applied Climate Science*

12:00 Lunch

1:00 **Adaptation and Mitigation Concepts for Northern Forests**
- *Maria Janowiak, Northern Institute of Applied Climate Science*

1:45 Small Group Breakout

3:30 Break

4:00 Discussion of Breakout

4:45 Closing Comments

5:00 Adjourn

Evening Thinking:

Please take some time to consider the following questions for the Working Group discussions on February 25th:

1) As you reflect back on the presentations and working sessions, what would you most value working on during the second day? How do you want to focus your interests?

2) What will it take to keep you involved in future efforts of the Shared Landscape Initiative?

February 25th (optional):

8:00 Coffee

8:45 Welcome, Recap of Day 1, Overview of Day 2

9:15 Share Ideas from Evening Thinking to Identify Themes for Breakout Sessions

10:30 Breakout Sessions

12:00 Working Lunch

1:00 Breakout Sessions (continued)

1:45 Breakout Group Reporting

3:00 Moving Forward, Closing Comments

3:30 Adjourn

This workshop is part of the Climate Change Response Framework project being co-led by the Chequamegon-Nicolet National Forest, the USDA Forest Service, and the Northern Institute of Applied Climate Science.
http://www.nrs.fs.fed.us/niacs/climate/northwoods/sli/

APPENDIX 2. Agenda for the Science Applications and Needs Workshop.

Science Applications and Needs Workshop

April 27-28, 2010 ▪ Monona Terrace ▪ Madison, WI

Objectives: *Identify management approaches that can enhance the ability of ecosystems in northern Wisconsin to cope with climate change and address how we might use National Forests and other lands to test new approaches.*

April 27th

8:00 Registration and Coffee

9:00 **Introductory Remarks and Workshop Objectives**
Chris Swanston, Director, Northern Institute of Applied Carbon Science/Research Ecologist, USDA Forest Service

9:20 **Welcome**
David Cleaves, Climate Change Advisor to the Chief, USDA Forest Service

9:30 **Forest Management in a Changing Climate**
Kent Connaughton, Regional Forester, USDA Forest Service Eastern Region
Thomas Schmidt, Assistant Director, USDA Forest Service Northern Research Station

10:00 **Climate Change Projections for Wisconsin**
Michael Notaro, Associate Scientist, Center for Climatic Research, University of Wisconsin-Madison

10:30 Break

11:00 **Regional Impacts of Climate Change on Forests**
Louis Iverson, Research Ecologist, USDA Forest Service

11:30 **Climate Change, Management, and Disturbance in Northern Wisconsin Forests**
David Mladenoff, Professor, University of Wisconsin-Madison

12:00 Lunch

1:00 **Climate Change, Adaptation and Resource Management**
Linda Joyce, Research Ecologist, USDA Forest Service

1:30 **Breakout Session 1: Science Applications and Needs for Adaptation**

Facilitators: Avery Dorland, WI DNR (QR, "yellow"); Steve McNulty, USDA Forest Service (KLOP, "red"); Linda Nagel, Michigan Tech (MN, "green")

Breakout Session Questions:

1. How can our current knowledge be applied to adaptation strategies on the Chequamegon-Nicolet National Forest (CNNF) and the surrounding landscape?
2. What additional research activities on the CNNF would help us fill in our current gaps in understanding that impede progress in adaptation?

2:30 Break

3:00 **Breakout Session 1 (continued)**

4:00 **Breakout Session 1 Report-Out and Synthesis**

5:00 **Adjourn for Day**

This workshop is part of the Climate Change Response Framework project being co-led by the Northern Institute of Applied Carbon Science, the Chequamegon-Nicolet National Forest, and the USDA Forest Service.
http://www.nrs.fs.fed.us/niacs/climate/Wisconsin/science_needs/

Science Applications and Needs Workshop

April 27-28, 2010 ▪ Monona Terrace ▪ Madison, WI

April 28th

8:00 Recap of Day 1

8:15 **Forest Carbon Sequestration and Mitigation**
Richard Birdsey, Project Leader, Climate, Fire, and Carbon Cycle Sciences, USDA Forest Service

8:45 **Breakout Session 2: Science Applications and Needs for Mitigation**

Facilitators: Ankur Desai, UW-Madison (MN, "green"); Sarah Hines, USDA Forest Service (KLOP, "red"); Tia Nelson, WI Board of Commissioners of Public Lands (QR, "yellow")

Breakout Session Questions:
1. How can our current knowledge be applied to forest carbon sequestration and greenhouse gas mitigation on the CNNF and the surrounding landscape?
2. What research activities could be carried out on the CNNF to help us fill in our current gaps in scientific understanding that impede progress in mitigating greenhouse gas emissions?

9:45 Break

10:15 **Breakout Session 2 (continued)**

10:45 **Breakout Session 2 Report-Out and Synthesis**

11:30 Lunch

12:30 **Monitoring Applications and Needs**
David Cleland, National Program Manager for Vegetation Ecology, USDA Forest Service

1:00 **Breakout Session 3: Monitoring Applications and Needs**

Facilitators: Knute Nadelhoffer, U-M, Ann Arbor (MN, "green"); Greg Nowacki, USDA Forest Service (KLOP,"red"); Brian Palik, USDA Forest Service (QR,"yellow")

Breakout Session Questions:
1. What indicators are currently be monitored on the CNNF and the surrounding landscape, and how can these efforts be applied to adaptation and mitigation efforts?
2. How can we increase monitoring efforts for high-importance indicators of climate change impacts on the CNNF?

2:30 Break

3:00 **Breakout Session 3 Report-Out and Synthesis**

4:00 **Closing Remarks**

4:30 **Workshop Adjourns**

This workshop is part of the Climate Change Response Framework project being co-led by the Northern Institute of Applied Carbon Science, the Chequamegon-Nicolet National Forest, and the USDA Forest Service.
http://www.nrs.fs.fed.us/niacs/climate/Wisconsin/science_needs/