KEYSTONE
POLICY CENTER

Advisory Committee on Climate Change and Natural Resource Science

Meeting Summary

The Advisory Committee on Climate Change and Natural Resource Science (ACCCNRS or the Committee) met for the seventh time on April 19-20, 2016 at the Corporation for Enterprise Development in Washington, DC. See Appendix A for a list of Committee members who attended this meeting

Key Conclusions and Directions

The Committee:

- Welcomed the "network strategic plan" concept and agreed to work with NCCWSC on implementation. Initial members of a work group were identified [*Berrien Moore, Aimee Delach, Kimberly Hall, Lara Hansen, Jeff Peterson*]. NCCWSC will report back in July.
- Discussed "core functions" and "core products and services" for the network and CSCs, as well as key dimensions that should be considered in the planning process. Initial members of a work group were identified [*Paul Beier, Paul Wagner, Gary Morishima, Cliff Duke, Lara Hansen, Rachel Novak*].
- Requested a more substantial briefing from NCCWSC on implementation of the 2015 report to the Secretary. This will be in webinar format and is planned for July.
- Identified several key communications objectives/needs. These included:
    - Communication between the LCC Council and ACCCNRS.
    - Preparation for briefings associated with the presidential transition describing enterprise accomplishments, capabilities, and "value proposition". Initial members of a work group were identified [*Berrien Moore, Aimee Delach, Paul Wagner, Gary Morishima, Scott Rupp*
    - Outreach to the new DOI Secretary (after transition).
- Expressed interest in the potential for working within the USGCRP Adaptation Science process to achieve some of the recommend climate science planning outcomes identified in the 2015 report to the secretary.

Proceedings, Day One

Welcome and Opening Remarks

Robin O'Malley, Policy & Partnership Coordinator, NCCWSC and Designated Federal Official, ACCCNRS, opened the meeting, noting that the paperwork had successfully gone through for those starting and renewing terms on the Committee. Co-chair Bruce Stein, Associate Vice President, Conservation Science and Climate Adaptation, National Wildlife Federation, welcomed participants to the meeting and reviewed background for those who were new to ACCCNRS. He noted that in its first five years, the Committee assisted in the founding of the Climate Science Centers (CSCs); starting with this meeting, the Committee should reflect on what has worked well and decide where the system needs to change to best fill its niche in the crowded conservation landscape. Co-chair Olivia LeDee, Policy and Planning, Minnesota Department of Natural Resources, acknowledged the good work of the Committee to date, observing that the messages of co-production and stakeholder involvement have been heard across the network. Doug Beard, Chief, NCCWSC, noted that the administration is in support of the USGS climate change system, though the next appropriations bill will unlikely be passed until after November. Nevertheless, there may be bipartisan support for addressing climate impacts, centered on Florida coastal issues. Kevin Bryan (Keystone Policy Center) reviewed the meeting agenda and logistics.

External Review of Climate Science Centers (CSCs) – Briefing Paper #1
Doug Austen, Executive Director of the American Fisheries Society (AFS), presented results from five-year reviews of the CSC university hosts, which were occasioned by the need to re-compete host contracts. AFS partnered with the Cornell Human Dimensions Research Unit to conduct ad complete the reviews. Seven-person teams for each review were populated via a national level solicitation and included a USGS scientist as chair and the CSC director. The reviews used the ACCCNRS report as a template. Three initial observations have come out of the effort: 1) Each managing group has its own perspective, which strengthens the system, 2) Stakeholder advisory committees found it difficult to understand their role, which might have been clarified with better process, 3) The consortium structure and its placement within the university are important, as much of the science will take place nearby.

Committee members observed that the CSC system has changed since the report was written, providing a less than solid foundation upon which to build the reviews. Also, the reviews may have best considered each CSC as a whole, rather than focusing on the university partner, to better capture the interaction between the university and its federal partners. One member asked how the lessons learned from the reviews would translate into improvement for the CSC network. Mr. Austen responded that the review process itself will communicate lessons to each CSC, that reports of the reviews will be communicated to NCCWSC (National Climate Change and Wildlife Science Center) and ACCCNRS, that Cornell will use the reports to evaluate the effectiveness of the science advisory groups, and that the joint ventures would also be able to use the reports.

Update on Re-Competition of University Agreements to Host CSCs – Briefing Paper #2
Robin O'Malley reported on the progress made towards re-competing the university host contracts for the CSCs. The procurement office has allowed the agency to extend the contracts past the 5-year deadline to allow for deliberate decision making. To start this process, an on-site briefing was conducted by USGS with each of the teams after they had been reviewed. Five primary lessons were learned in the reviews:

- The universities need to feel increased institutional ownership of the CSC as a strategic enterprise that they can build on rather than just another funding source.
- The CSCs need more ecological expertise to help them select the signals to use to evaluate climate change.
- Students hired to do the work need a strong interaction with their CSC to align them with CSC priorities.
- CSCs need improved administrative support to work with the USGS procurement process.
- The contracts for new host universities need to have more well defined outcomes to direct the work and a clearer role for the principal investigator (PI).

The RFP (request for proposals) is scheduled to be released in May, followed by a 75-day application window, selection in September, agreements executable in December, and an effective date in April.

Committee members asked clarifying questions, to which Mr. O'Malley responded in the following ways.

- ACCCNRS has been asked to aid in this process by updating and finalizing a strategic plan including both science and implementation recommendations for the CSCs.
- This RFP has a stipulation requiring sufficient communication capacity. The review teams found that the success of communications varies widely between CSCs and was the most successful where communication personnel were present in addition to scientists.

- The funding for the proposed Midwest CSC has been requested of the administration and is therefore still uncertain. The funding decisions for different CSCs will be made according to the perceived best value for the Department of the Interior and will not necessarily be equal across the board.

Update on Interior Department Inspector General's Activities – Briefing Paper #3
Doug Beard presented a report on the most recent audit of the CSCs by the Office of the Inspector General (OIG). The scope of the audit includes not only agency activities but also the management of government awards by university departments. In general, the OIG let us know that the findings of the audit were fairly minor, though the report itself can read somewhat more alarmingly. Eight of the nine recommendations are for the office that issues government contract warrants, some of are already being addressed. The recommendation that applied to the agency's direct relation with the CSCs is the provision of formal grant training, which USGS has now implemented. The OIG has now commenced a less formal review of potential overlap between the CSC and LCC (Landscape Conservation Cooperative) networks to ensure there is not undue redundancy between the two. There is significant communication between the two systems, for which USGS has received positive feedback.

Committee members discussed the update with USGS staff, coming to the following conclusions.

- The National Academy of Sciences review recommended being more purposeful about telling the story of coordination between the CSCs and LCCs. It might help to have a formal affirmation of this fact, worded in a way that can be understood from outside the government.
- The RFP for host universities will be more specific than last time, with tighter language that specifies that winning the bid is a prerequisite for receiving further funding.
- The development of authorizing legislation for this program would ease the contracting process by tailoring it to the network's needs.

Update on Implementation of 2015 ACCCNRS Report to the Secretary - Briefing Paper #4
Robin O'Malley updated the Committee on actions undertaken by USGS in fulfillment of the recommendations in its report. One change in approach is increased support of actionable science and its measurement. Some CSC plans are approaching five years old and need to be redeveloped with additional stakeholder input. A survey developed by Cornell identified the enterprise's key responsibility as delivering science to those who need it. This process is not easy to measure, since identifying the audience that needs the science can be difficult. Co-development of science may need to be better defined with key process characteristics to aid in measuring its progress. Another change in focus has been to increase stakeholder engagement in major budget initiatives. The ecological drought activity was designed with the help of such engagement. The Arctic work is tied into the work initially developed by LCCs that is embedded with land managers. A contract on the compilation of fire management knowledge, which began between the government and academic partners, solicited input from land managers on the most important questions to tackle next. In response to the Committee's desire to address tribal needs, the USGS is in the selection process for BIA-funded tribal climate liaisons.

Mary Ratnaswamy, Director of the Northeast CSC, presented an update of her Center as a case study. Staff includes one project manager funded by the base CSC agreement and others funded by USGS and the University of Massachusetts. The Consortium is comprised of four land grant universities, a tribal college, and research institutions. The Stakeholder Advisory Committee is about to revisit the science themes. Ongoing projects include a comparison of State Wildlife Action Plans, coupled with advice on how to incorporate climate change considerations. The Massachusetts Wildlife Climate Action Tool is an

online mapping tool, currently limited to Massachusetts. Acadia National Park scenario planning was targeted at cultural resources. The partnership between the CSC and land managers involved a lot of complexity and took a substantial amount of time.

The Committee discussed the updates with the presenters, developing the following ideas.

- A number of scientists worked with postdocs to select information for display in the Massachusetts Wildlife Climate Action Tool. The selected layers are qualified with descriptions of their relative merits.
- The Northeast CSC has ten Consortium PIs. One reason the CSC had capacity to respond to the Acadia request, even though it approaches the level of direct technical assistance, is because one of those PIs was willing to do so.

A Committee member requested that the USGS staff develop a written status report on the progress made by the agency in responding to the recommendations in the ACCCNRS report. Agency members committed to doing so.

NCCWSC /CSC Strategic Directions - Briefing Papers #5 and #6

Doug Beard presented on the development of strategic plans for the CSCs. This planning is being prioritized partly in response to a recent NRC (National Research Council) review of the LLCs and partly due to the current CSC plan being out of date. The NRC review emphasized the need for solid metrics related directly to goals. The major question at the national level is what should be the relationship between individual CSCs and the national enterprise, which should demonstrate emergent properties as an overarching entity. Another question is what role ACCCNRS should play in this national planning process.

Committee members asked clarifying questions, arriving at the following conclusions.

- Federal staff and partners will work on the national level plan in the coming year, and each individual CSC's plan will be reconfigured after the contact re-compete for university hosts is complete for each.
- The planning will need to identify separately how the network would allocate its existing budgetary resources and what actions it would prioritize if given additional resources.

Committee members offered comments, including the following.

- The initial strategic plan spent more time on the "how" of operational principles than on the "what" of specific actions/programs. The new plan needs to contain more products than process, which can be difficult when the product is in part a process.
- This plan should coordinate with the U.S. Fish and Wildlife Service (FWS) Climate Adaptation Strategy and other similar plans to identify definite, discrete roles for the CSCs.

Paul Beier, Regents' Professor, School of Forestry, Northern Arizona University, presented a flow chart emphasizing parallel tracks of effort for CSCs. One track produces vulnerability assessments, and the other develops adaptation strategies. The majority of effort to date has focused on vulnerability assessments, which deviates from the mandate of the Secretarial order that created the CSCs to address adaptation. Paul asked the Committee how they would have the enterprise prioritize CSC efforts, given this model.

Robin O'Malley presented some framing ideas for the strategic planning process, including the idea of several key *dimensions,* or spectrums of possible activity, for which conscious choices about where to invest or not might be considered as part of the CSC/NCCWSC strategic planning process. This presentation echoed Mr. Beier's and was based in part on the Anthros discussions described below.

Committee members discussed the question, including the following comments.

- It is very important for the network to get past the assessment phase.
- The feds, the states, and non-profits often retreat into separate corners to plan implementation strategies. This would benefit from being done together and in the open.
- The existing climate models each have special uses. It would help managers to know which models are most relevant to their situation.
- The biggest gap between assessment and implementation is often funding. In considering where to conduct science, it may be best to consider where the funding for change might come from.
- Adaptation success is not a purely scientific question and is therefore not easy to measure progress on. For example, the issue of changing species mixes, when all are local, can be tough to resolve.
- Focusing regionally may miss the big issues that the federal government is the only organization large enough to address, for example carbon storage nationwide.
- The scope of the CSC niche is limited to science development and delivery. Other groups are focused more on implementation.

Bruce Stein introduced a Committee discussion on what should be the core functions of the CSCs and the enterprise as a whole. The Southwest CSC engaged Anthros Consulting in strategic planning/future mapping process, out of which came five potential scenarios, or "end points", for the CSC. These are entitled a) Big Science, b) Convener, c) Co-production, d) Climate Navigator (concierge for climate information), and e) Crisis Response. These were not intended to be mutually exclusive, rather options in a portfolio of services with relative allocations of resources between them.

The Committee discussed whether some mix of these scenarios appropriately characterized the core functions of the CSC network. Comments included the following.

- Synthesis of science should be added as a core function category.
- Leadership should be an aspect of convening.
- The definitions for each scenario offer useful storylines within a timeline that includes changing allocations between them.
- These scenarios were developed in a way that is inconsistent with how this group is presently trying to use them.
- Crisis response should not be viewed as a core function.

Caroline Enquist (Deputy Director, Southwest CSC) described the process that the Southwest CSC used in developing and ranking the scenarios, which included a series of interviews and stakeholder workshops. After the scenarios had been developed from interviews, each CSC stakeholder presented briefly on their relative importance. From these presentations, it became evident that co-production was very important, the convener role came in second, and big science came in third. Though the climate navigator scenario did not receive many votes, partners agreed on the usefulness of this function..

Robin O'Malley clarified that this Committee conversation would be the first stage of the strategic planning process, giving it initial direction.

Julie Shapiro introduced an initial ranking exercise in which Committee members would vote for those activities they thought should be allocated resources in the next five years for potential CSC/enterprise functions. She clarified that this should be seen as a general read on the inclinations of the room and not as a formal vote. A write-in category was also provided for additional functional roles to be identified and prioritized by the Committee.

Committee members voted for the categories, with the following results

A. 37 - Co-development of science
B. 23 - Communication, collaboration, and leadership in science development
C. 20 - Synthesis of science
D. 19 - Translation of science, technical assistance, and decision support
E. 16 - Evaluation of science
F. 9 - Capacity building, including training
G. 8 - Development of new science
H. 5 - Integration across decision makers

Bruce introduced a quiet brainstorming exercise, in which Committee members listed the three substantive topics relevant to CSCs that were most important to them. He added that the topics would be categorized to identify patterns and trends. Committee members read aloud their topics. For a full grouped list, see Appendix B.

Public Comment
Davia Palmeri (Association of Fish and Wildlife Agencies): One of the big issues that John O'Leary (State Wildlife Action Plan Coordinator, Massachusetts Division of Fisheries & Wildlife) has focused on is understanding the adaptive capacity of species. This topic should stay on the list.

DAY 2

Bruce Stein reopened the meeting and noted the success of the focus area survey on Day 1. Julie Shapiro (Keystone Policy Center) reviewed the Day Two agenda.

National Climate Assessment Presentation
Doug Beard led a discussion on the National Climate Assessment (NCA), which is required by law and produced by the U.S. Global Change Research Program. The first NCA was released with fanfare; the second was more forced and slimmer; the third was thorough and involved an advisory committee and very large number of collaborators. Now the fourth NCA is being planned. An interagency committee will write the report, with reduced role for the federal advisory committe. This report will likely be smaller than the most recent Assessment, with an emphasis on effects at the regional scale.

Committee members discussed the NCA with USGS staff, developing the following ideas.

- The drafting group should keep the bulk of the third report, updating only what needs to be updated and submitting sections to topical experts.
- Sea level rise is a topic for which the science is developing rapidly.

- The regional assessment component seems like a prime opportunity for the USDA Climate Hubs, the LCCs, the CSCs, and NOAA's RISAs to coordinate and demonstrate their worth.
- Mitigation and adaptation could benefit from a stronger assessment this time.
- It might be helpful to reference the other climate assessments being published to identify a clear purpose and niche for the NCA.

Committee members disagreed on the degree to which the collective CSCs and National Center enterprise should contribute to the NCA. Some believed a leadership role would be out of scope, while others expressed that is would fulfill their purpose in reporting on climate change.

Administrative Transition Discussion
Olivia LeDee observed that it would be wise to prepare for the administration change in November. She recommended that Committee members communicate the value of the network and continue to offer guidance. A letter from ACCCNRS may communicate the value added, and identifying core functions can aid the USGS in responding to budgetary changes.

Committee members discussed actions to take to ease the transition, including the following ideas.

- Climate change efforts may be riskier than others and will require careful messaging to the next administration.
- A joint letter from the LCC Council and ACCCNRS would demonstrate the breadth of stakeholders engaged and the separate, complementary nature of the two networks. USGS may come to ACCCNRS members for quotes to demonstrate its multi-stakeholder value.
- A strategic plan that assumes a bold budget might communicate value, even if the budget is not likely to be funded in full.
- Given that ACCCNRS is chartered by the Secretary of the Interior, it will be this Committee's job to advise the incoming Secretary.
- The new Secretary could dissolve the CSC network. It may help to seek enabling legislation for the enterprise.
- Communications materials need to succinctly and persuasively demonstrate what CSCs have done for the nation, with language that can be used when it comes time for the agency to brief the administration.

The USGS staff agreed to draft communication documents, which would be reviewed by a subcommittee of ACCCNRS and approved by the full Committee.

Strategic Planning (continued from Day 1)
Robin O'Malley reviewed the progress of the Committee in advising the strategic planning effort, adding that both the identified core functions and the sorted focal areas would provide useful frameworks for organization and investment. From these materials, the need to evaluate adaptation strategies came across as a clear priority. The remainder of the functions need to be prioritized to assist in budgeting for core products and services and in developing the CSC brand.

He summarized the action items collected so far.

- USGS will deliver a full briefing on the agency's progress in implementing the Committee's 2015 report.

- One or multiple subcommittees of ACCCNRS will continue to refine the focal areas and categories, clarify the core functions of CSCs, and contribute to the strategic plan. The full Committee will then review the results of subcommittee drafting.

He also noted that an upcoming Adaptation Science Interagency Work Group, comprised of a number of ACCCNRS agency members.

Committee members discussed the focal areas, core functions, and strategic planning process, including the following ideas.

- The 2015 report contains ideas about functions and focal areas that should be brought forward to inform this process.
- Several of the functions will require a better definition of the brand of the enterprise, the development of compelling case statement materials that outline its value proposition. This action will need to happen quickly.
- The interagency adaptation meeting may not be a good forum for adaptation recommendations due to the diversity of agency interests present, including those that do not focus on natural resources.
- The Secretarial order authorizing the CSCs came from actions originating in the Bush presidency, which would indicate bipartisan support for the enterprise.
- A program evaluation framework was developed for the CSCs, but a comparable method does not exist for NCCWSC or for the enterprise as a whole. If a network could be identified of those who stand to benefit from national scale information, then members could be surveyed to evaluate the success of the program.

Julie Shapiro summarized the action items discussed.

- A USGS briefing to ACCCNRS on the Committee's report will be scheduled for June or July.
- USGS will develop a process for developing a strategic plan by July.
- A Strategic Plan Subcommittee of ACCCNRS will work with USGS in drafting the plan.
- ACCCNRS volunteers will draft communications language making a case for the CSC network.
- A mechanism for communicating between ACCCNRS and the LCC Council will be determined at the upcoming Council meeting.
- The ACCCNRS role in the proposed interagency climate science meeting is still unclear.
- Based on the clear and present need for strategic planning guidance, a proposal for the Committee to take on a climate projections decision maker document seems operational for the role of this Committee.

Committee members commented on ways to operationalize the action items, offering the following comments.

- Organizing and prioritizing the focal areas for the purpose of strategic planning sounds like the Committee's true work.
- To further develop the focal area list, the Committee needs a full list of focal areas from the CSCs' strategic plans.
- It may be a good role of NCCWRS to develop resources consolidated from those developed at the CSCs.
- There should be more coordination between this planning process and the FWS climate change strategic plan.

Julie populated the following subgroups with ACCCNRS volunteers

- Strategic Planning – Berrien Moore, Aimee Delach, Kimberly Hall, Lara Hansen, Jeff Peterson
- Focal Areas/Core Functions – Paul Beier, Paul Wagner, Gary Morishima, Cliff Duke, Lara Hansen, Rachel Novak
- Outreach and marketing of enterprise accomplishments, capabilities, value proposition – Robin O' Malley to establish; subcommittee to include Berrien Moore, Aimee Delach, Paul Wagner, Gary Morishima, Scott Rupp

Committee members asked clarifying questions about the resources available to ACCCNRS and received the following responses.

- The Committee will meet two times per year from now on, as opposed to four, with fewer work groups. As well, the Committee will meet more often by conference call.
- The goal is to use resources at about half the rate as in the previous iteration of this Committee.

Public Comment
The opportunity for public comment was offered but not accepted by any of those present.

Closing Remarks
Olivia encouraged patience and resolve in working with the newly comprised Committee. A lot of time and energy was spent on the Committee's report. The work being performed now should be seen as implementing the report rather than departing from it. Committee members should seek out its co-chairs to field questions and ideas.

Bruce Stein thanked the Committee for its engagement at the meeting. Coming out if it, there is a new understanding that the network needs to shift from vulnerability assessment to the development of adaptation strategies. This signals a shift from "how" to "what" in the committee's advice to the CSCs and NCCCWSC. More than before, this meeting addressed the role of the enterprise as a whole. The next steps will help to clarify what this all means and communicate it to key audiences. He expressed his hope that the Committee members also managed to have a bit of fun.

Robin O'Malley thanked the facilitation and support team and both new and old members of ACCCNRS for a great meeting. He expressed three points: 1) The Committee is shifting from giving advice to co-producing work with USGS, 2) The Committee is starting to crack the nut of science priorities, 3) The focal areas and core functions identified will be useful for strategic planning, and 4) USGS appreciates the Committee's appreciation of the risks being faced in the administrative transition.

Doug Beard thanked Keystone for keeping everyone on time. He thanked Bruce Stein and Olivia LeDee for their leadership and the rest of the Committee members for their time and patience. He observed that strategic planning does not yet seem well organized because USGS is planning to use the Committee's ideas from this meeting to form the process.

Adjourn

Appendix A
Participant List

COMMITTEE MEMBERS

DAVID BEHAR
Co-chair, Climate Program Director, San Francisco Public Utilities Commission/Water Utility Climate Alliance

PAUL BEIER
Regents' Professor, School of Forestry, Northern Arizona University, and Past President, Society for Conservation Biology

AIMEE DELACH
Senior Policy Analyst, Landscape Conservation & Climate Change Department
Defenders of Wildlife

JOHN DENNIS
Deputy Chief Scientist
Natural Resource Stewardship & Science
National Park Service

THOMAS DRISCOLL
Government Relations Representative
National Farmers Union

CLIFFORD DUKE
Director of Science Programs
Ecological Society of America

PETER FRUMHOFF
Director of Science and Policy
Union of Concerned Scientists

LARA HANSEN
Founder, Chief Scientist, and Executive Director
EcoAdapt

EDIE SONNE HALL
Manager, Environmental Affairs, Sustainable Forests and Products, Weyerhaeuser Company
National Alliance of Forest Owners

KIMBERLY HALL
Great Lakes Climate Change Ecologist
The Nature Conservancy

LYNN HELBRECHT
Climate Change Coordinator
Western Association of Fish and Wildlife Agencies

DAVID INOUYE
Professor Emeritus
University of Maryland

RANDY JOHNSON
National Lead, USDA Climate Hubs
USDA Forest Service

BRIAN KERNOHAN
Director, Policy and Environmental Advocacy, Hancock Natural Resource Group
National Alliance of Forest Owners

OLIVIA LEDEE (Committee Co-Chair)
Policy and Planning
Midwestern Association of Fish and Wildlife Agencies

BERRIEN MOORE, III
Vice President, Weather and Climate and Director, National Weather Center
University of Oklahoma

GARY MORISHIMA
Technical Advisor to the Chairman
Quinault Nation

RACHAEL NOVAK
Climate Science Coordinator
Bureau of Indian Affairs

DOUG PARSONS

ROBERT PIETROWSKY
Director, Institute for Water Resources
U.S. Army Corps of Engineers

JEFFREY PETERSON
Senior Policy Advisor, Office of Water
U.S. Environmental Protection Agency

BILL REEVES
Chief of Biodiversity
Tennessee Wildlife Resources Agency
Southeastern Association of Fish and Wildlife Agencies

SCOTT RUPP
Interim Deputy Director, International Arctic Research Center and University Director, DOI Alaska Climate Science Center
University of Alaska

RAY SAUVAJOT
Natural Resource Program Chief, Pacific West Division
National Park Service

LYNN SCARLETT (via phone)
Managing Director, Public Policy
The Nature Conservancy

CAITLIN SIMPSON
Program Manager, CSI/RISA Program
National Oceanic and Atmospheric Administration

PAUL SOUZA
Assistant Director for Science Applications
U.S. Fish and Wildlife Service

BRUCE STEIN (Committee Co-Chair)
Associate Vice President, Conservation Science and Climate Adaptation
National Wildlife Federation

PAUL WAGNER
Senior Environmental Scientist
U.S. Army Corps of Engineers

BEN WIGLEY
Manager, Sustainable Forestry Research Program
National Council for Air and Stream Improvement

USGS STAFF

DOUGLAS BEARD
Chief, NCCWSC

SHAWN CARTER
Senior Scientist, NCCWSC

JANET CUSHING
Deputy Chief, NCCWSC

KRISTEN DONAHUE
Research Associate, NCCWSC

EMILY FORT
Data and Information Manager, NCCWSC

ROBIN O'MALLEY
Policy & Partnership Coordinator, NCCWSC and Designated Federal Official, ACCCNRS

HOLLY PADGETT
Communications & Program Analyst, NCCWSC

MARY RATNASWAMY
Director, Northeast Climate Science Center

KEYSTONE POLICY CENTER STAFF

BRIANNA BRUMBAUGH
Program Coordinator

KEVIN BRYAN
Senior Policy Director

JONATHAN GEURTS
Policy Facilitator

JULIE SHAPIRO
Senior Policy Director

Appendix B

Focal Areas Identified in Day 1 Activity

Fundamental physical science and climate modeling

- Precipitation change
- Change in ecosystem role of microflora and minifauna
- Plasticity of ecosystem services in the wake of change
- Integrating climate with ecological and mgmt modelling
- Change in biological relations between terrestrial and aquatic systems
- Climate scenario data/data development synthesis - best practices for use of info

Impact and Vulnerability Assessments

- Lake systems, changes in fish communities
- Stream systems - macroinvertebrates
- Deer, moose, and elk
- Understanding natural processes being impacted
- Change in vegetation to inform scenario building
- Focus on climate impacts modeling studies - wildfire, cryosphere, biogeochemistry
- Climate stressor vs other stressors - evaluate the relative effect
- Impacts, present and future climate on critical habitats
- Synthesis of CC impacts on key resources
- Adaptive capacity - links between past exposure, future vulnerability
- Evaluating which enduring features (combinations of topographic and soil variables) are primary drivers of species diversity & complementarity under today's climate (with the idea that these will also be drivers of biodiversity under climate change).

Integration of human elements for impact/vulnerability assessments

- Impacts to ecological systems from human responses to CC
- Work with agencies on cultural resources
- Natural/built environment integrated planning - how does the interaction between the two exacerbate/ameliorate CC impacts

Adaptation

Carbon storage

- Connecting adaptation and mitigation related to carbon storage
- Co-produced management strategies for enhancing carbon storage
- Understand impacts of CC on carbon storage on US lands, implications for emissions

Cultural dimensions

- Connecting traditional knowledge and western science
- How can we capture traditional eco knowledge as a baseline
- Water - economic, social, natural integrator

Invasives and species distributions

- Invasive species vs northward migration of plants
- Invasive species vs species realignment from CC

- Refugia and how to optimize operations management
- Identifying critical habitat for endangered species
- Maintaining ecosystem services in face of changing species distributions

Connectivity

- Co-production to design wildlife corridors robust to climate change
- Manage across systems and landscapes - trans-boundary
- Testing estimates of connectivity, spatial models
- Understand climate refugia and connectivity
- Adaptation processes versus solutions - planning
- Science and co-development on adaptation planning
- Co-production of strategies and principles for managing the hydrological cycle
- Co-developed input to major planning processes - tribal, state, national
- Specificity on adaptation processes - practical guidance for near and far term strategies
- Synthesis of knowledge about adaptation strategies and tools
- Improved understanding of how current mgmt practices can be integrated into mitigation strategies
- Decision processes for selecting among adaptation options
- Tools or methods to help managers with adaptation practices - long-lived ecosystems
- Develop adaptation strategies that account for the multiple threats to species
- Adaptation to rapid effects of CC
- Effective habitat restoration under CC
- What are the limits to adaptation 100 years in the future?
- Optimizing genetic diversity for revegetation projects (again in context of a particular decision)
- Adaptation projections staggered to different climate projections - adaptation vs mitigation cost benefit analysis
- Green infrastructure - measure impact
- Midwest - integration of effects of forest conservation on water quality
- Accounting for uncertainty and externalities - risks and benefits.

Monitoring/Evaluation

Adaptation strategies evaluation

- Adaptation efficacy, monitoring metrics
- Identifying adaptation metrics - best practices
- Effectiveness of adaptation processes
- Adaptation efficacy, monitoring metrics
- Identifying adaptation metrics - best practices
- Effectiveness of adaptation processes
- Metrics of adaptation success
- Methods for assessing the effectiveness of adaptation practices
- Analyzing adaptation options and lessons learned
- Comparing adaptation strategies with respect to cost and sensitivity to uncertainty (no general answer, so best done as a co-pro project in context of a particular decision)
- Novel ways to detect environmental baselines - regional monitoring networks

- Tipping points - the ability to tell the difference between interim readjustments and ecologically significant collapse
- Landscape scale monitoring and evaluation - integration of data, actions, and strategies of individual decision makers

Communication/Outreach and Co-Production processes

- Expand citizen science - combining it with scientific expertise
- Citizen science - educating the consumer
- Clear accessible public information on CC
- Case studies of co-production of actionable science, with special attention to the process, relationships, and dynamics of the partnerships, as well as action-oriented outcomes (or failure to generate such outcomes)
- Barriers to participation in boundary activities on the part of employees of major universities (e.g. academics) – an examination, with solutions proposed to support development of boundary organizations.
- Connecting science to non-fed partners
- Co-production of action plans to focus on private sector landowners to deal with drought – communication
- Examine and quantify the market for climate information on the part of "decision makers" and analysis of the gap, if any between that demand and supply.
- Input and involvement in partner efforts to develop adaptation strategies, CC, other info