CLIMATE CHANGE IN THE CROWN OF THE CONTINENT: IDENTIFYING MULTI-JURISDICTIONAL STRATEGIES

WORKSHOP REPORTP

Overview

On December 1-3, 2008 the National Office of the Cooperative Ecosystem Studies Units (CESU) network hosted a workshop entitled *Climate Change in the Crown of the Continent: Identifying Multi-Jurisdictional Strategies*. This workshop was jointly planned and implemented by representatives from the National and Rocky Mountains CESUs, the National Park Service, the USGS, the USDA Forest Service, The University of Montana and Colorado State University. This workshop is the first in a series of workshops to help public land managers develop and implement climate change adaptation strategies for the lands they manage. The remaining two workshops are currently under development and focused on grassland and desert ecosystems. The primary goal of this workshop was to build capacity and improve coordination of climate change management and adaptation efforts among management agencies in the Crown of the Continent region. It was attended by approximately 50 people representing federal, state, and tribal land management agencies, environmental non-profits, and academic institutions from both Canada and the United States.

Background

Why the Crown of the Continent Ecosystem? The Crown of the Continent Ecosystem (CCE) encompasses the Rocky Mountain spine of Northwestern Montana in the United States and southern Alberta and British Columbia in Canada. It is one of the outstanding natural areas of the world and one of North America's largest ecologically intact areas. It contains the headwaters for three continental drainages; water flows from the CCE west into the Columbia, east into the Missouri, and north into the Saskatchewan emptying into the Pacific Ocean, Gulf of Mexico, and Hudson Bay, respectively. The area has high biodiversity resulting from the variety of terrain and climatic zones it contains. It has two major continental biomes and 4 major floristic provinces, ranging from mesic boreal forest to semi-arid grassland, inhabit the region with numerous plant communities and over 1,000 plant species, many of which exist at the limits of their biogeographic ranges.

It also contains a large number of protected natural areas managed by federal, state, and tribal governments. It is home to the world's first international peace park (Waterton-Glacier) which also is a UNESCO biosphere reserve and World Heritage Site.

The area has substantial jurisdictional complexity; it is bisected by an international boundary, includes multiple tribal lands, and is managed by multiple federal, state, and local management agencies. The CCE was chosen for the first in this series of climate change workshops because managers in this region have already established a forum for multi-jurisdictional management discussions and coordination: the Crown Managers Partnership (CMP). The CMP started in 2005 and includes representatives from over twenty agencies. The partnership seeks to build awareness of common CCE interests and

issues, shape relationships, and identify collaborative tasks for the future. In addition to providing a strong base for this workshop, the CMP provides a venue for building on the relationships and priority issues identified by workshop participants.

The Need for Climate Change Adaptation Management Strategies. Climate change will have significant impacts on the Crown of the Continent Ecosystem, and therefore, on land managers' goals and management strategies. Climate change is projected to affect a wide range of issues including landscape fragmentation /connectivity, invasive species, range shifts/migrations, altered hydrologic and disturbance regimes, and other factors. These affects will require major changes in how managers develop and implement management strategies and may require changes to management goals and priorities. Climate change will bring a highly uncertain and "no analog future" in which managers can no longer rely on lessons learned from past ecosystem dynamics and management approaches. As a result, managers will need new information and tools to help the lands they manage adapt to climate change.

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Workshop Goals

Land managers are increasingly aware that climate change will affect their lands and their management strategies. However, they often lack the tools needed to develop management strategies that will help the lands they manage adapt to climate-related changes. To meet the challenge of climate change an organizational evolution is necessary that fosters broad, systems-thinking approaches and landscape scale coordination among agencies that respond to potential biome shifts, species migration, and other transboundary issues. Therefore, this workshop was intended to empower managers with the skills, tools and resources necessary to become more proactive, adaptive, and collaborative in finding solutions for coping with climate change issues in this transboundary region. To help meet these needs, the initial goals for this workshop were to address three priority areas:

1. ***Focus on adaptation:*** though mitigating climate change is also important, the goal of this workshop was to help public and tribal land managers develop strategies to help the lands they manage adapt to climate change impacts.
2. ***Empower managers by providing useful tools:*** most land managers are already aware that climate change will affect their lands and often have a good sense of what some of the effects will be. However, many managers need specific information, skills, and tools to help them develop climate change adaptation management plans, which may have to be significantly different in both goals and actions from previous management initiatives.
3. ***Facilitate multi-jurisdictional management***: the effects of climate change in the CCE will cross jurisdictional boundaries, and many of the adaptation approaches will require cross-jurisdictional responses. Therefore, managers need to foster the development of multi-jurisdictional management approaches to climate change adaptation on public and tribal lands.

These goals were refined and developed throughout the planning process. The final workshop goals were the following:

- To build capacity to develop and improve coordination of climate change management and adaptation efforts among management agencies in the Crown of the Continent region
- Share expertise and science related to climate change and its effects in the Crown of the Continent region
- Identify key challenges and considerations for coordinating trans-boundary and multi-agency collaboration
- Provide a multidisciplinary, systems-based lens for integrated understanding and action regarding climate change effects on the landscape.
- Set the stage for continued collaboration in developing, implementing and sustaining climate change management strategies.

Workshop Planning Process

The planning of this workshop was collaborative and interdisciplinary. The planning team included representatives from two Universities (University of Montana and Colorado State University), the US Geological Survey, the USDA Forest Service, the US National Park Service, and the CESU network. Members of the planning team met in person three times during the year long planning process and had monthly planning conference calls. The primary planning tasks included developing the workshop goals and agenda, identifying and inviting participants, and planning the workshop location and logistics.

Developing the workshop goals. The workshop goals were developed based on the planning team's belief that managers want assistance in developing climate change management strategies and multi-jurisdictional management approaches. This need was recognized by planning team members who have worked extensively with land managers on climate change issues. The goals were also informed by a pre-workshop survey (described below), which confirmed managers' need for specific information and tools to develop climate change adaptation management strategies.

Developing the workshop agenda. The planning team developed the workshop agenda to provide a balance between sharing information and providing opportunities for the participants to think through and apply new information and skills in interactive, hands on sessions. The team identified three main areas of focus: climate change and ecosystem dynamics, human dimensions of climate change, and adaptation and planning strategies for cross-jurisdictional collaboration. The team decided it would be most effective to include a series of expert presentations followed by interactive group discussion and/or facilitated group activities in each focus area. Presenters were chosen to provide cutting edge and thought provoking information that would be relevant to CCE managers in each focus area. The group activities were developed based on planning team members' expertise in organizational learning and interactive workshop facilitation. Interactive exercises included a "situation mapping" activity in which participants worked through their mental models of the major ecosystem dynamics, actors, and issues of importance in the CCE and how these would be impacted by climate change. Participants also worked through sample management exercises to apply new systems thinking and adaptive

management tools presented in the workshop. A copy of the final workshop agenda including presenters, presentation topics, and group activities is in *Appendix A.*

Identifying and inviting participants. Land and resource managers were the primary focus of the workshop and made up the majority of participants. The planning team was advised by members of the Crown Managers Partnership to identify potential participants. Representatives from CCE management agencies, tribes, and environmental non-profits were asked to recommend ground level managers and planners who are on the front lines of developing and implementing climate change adaptation strategies for their home organizations. A list of participants is in *Appendix B.*

Surveying participants' current levels of knowledge and desired workshop outcomes. The planning team developed a survey to assist them in understanding the participants and tailoring the workshop to meet their knowledge level, management needs, and desired workshop outcomes. The survey included a range of structured and open-ended questions. It was implemented anonymously through an online survey tool. The results were shared with the planning team and workshop participants. A copy of the survey is in *Appendix C.*

Workshop Implementation

The actual workshop was a great success. Perry Brown, Dean of the College of Forestry and Conservation and Interim Associate Provost for Graduate Education provided facilitation of the overall workshop. He also facilitated the panel and discussion for the Human Dimensions of climate change panel. The ecosystem dynamics panel and discussion was moderated by Kathy Tonnessen, NPS Research Coordinator for the Rocky Mountains CESU. The Adaptation & Planning Strategies for Cross-Agency Collaboration panel and group activities were facilitated by Jill Baron, Research Ecologist at the US Geological Survey and Linda Joyce, Research Leader and RPA Climate Change Specialist with the USDA Forest Service. The situation mapping activity was facilitated by Ashley Cobb, a graduate student working with Jes Thompson, an organizational learning specialist on the planning team from Colorado State University.

The Planning team met several times throughout the workshop to assess the participants' response to the workshop and adapt the workshop agenda as needed. These mid-workshop meetings allowed the workshop agenda to remain adaptive and flexible.

Complete notes from the workshop can be accessed on the Rocky Mountains CESU website at the following link:
http://www.cfc.umt.edu/CESU/NEWCESU/Assets/Partner%20Activities/FY09%20Activities/Climate%20Change%20Workshops/Climate_Change_Crown_of_the_Continent.htm

Lessons Learned

The planning team asked participants to complete an evaluation of the workshop. These evaluations were overall very positive. But, participants also provided some important feedback to improve future workshops. The planning team reviewed these evaluations

and discussed their own assessments of the workshop in a formal debrief call one week after the workshop. A copy of the evaluation form is in *Appendix D*.

Based on the team discussion and the evaluations, the team recommended the following for future workshops.

- The pre-workshop survey was a helpful tool for assessing the knowledge level of participants and their specific interests and needs. This should be continued for future workshops.
- Pre-workshop readings should be brief and/or include a brief overview of the key points from each longer reading. Pre-workshop readings should also include the results of the pre-workshop survey rather than including this as a presentation within the actual workshop
- The workshop should be more centrally focused on management adaptation strategies. It would be better to start the workshop with adaptation tools and present information on ecosystem dynamics and human dimensions in the context of developing management adaptation strategies. However, this restructuring will only be effective if the participants have an adequate base level of knowledge about climate change and climate change impacts on the lands they manage. The pre-workshop survey is a critical tool for assessing this level of knowledge and deciding on the agenda for future workshops.
- This restructuring will also allow for more interactive group activities and practice applications of management tools. Many of the participants requested that more time be devoted to this activity. It would be ideal to allow people to work through mini examples of scenario planning, adaptive management and other management tools presented in the workshop.
- The human dimensions information will have to be somewhat different for future locations. In the CCE tourism is a critical human use of the landscape. In the grasslands region, tourism may be less important while agriculture may be more important.
- It would be helpful to make the situation, or mental model mapping activity more focused on learning about interactions between ecosystem processes, human processes, and climate change effects. Some participants felt it was more of a team building exercise than a learning tool.
- Networking opportunities including meals together and break times were considered highly useful by the majority of participants. Future workshops should continue or expand these opportunities.

Appendix A: Workshop Agenda

CLIMATE CHANGE IN THE CROWN OF THE CONTINENT:

IDENTIFYING MULTI-JURISDICTIONAL STRATEGIES

December 1-3, 2008

Whitefish, Montana

WORKSHOP GOAL:
To build capacity and improve coordination of climate change management and adaptation efforts among management agencies in the Crown of the Continent region.

WORKSHOP OBJECTIVES:

- Share expertise and science related to climate change and its impacts in the Crown of the Continent region
- Identify key challenges and considerations for coordinating trans-boundary and multi-agency collaboration
- Provide a multidisciplinary, systems-based lens for integrated understanding and action regarding climate change impacts on the landscape.
- Set the stage for continued collaboration in developing, implementing and sustaining climate change management strategies.

WORKSHOP SCHEDULE:

Monday, December 1	
5:00 – 5:30 pm	**Workshop Opening:** Welcome & Introductions Goals & Objectives of Workshop Agenda & Logistics Led by: Perry Brown, University of Montana
5:30 – 6:30	Montana Trout and Drought: Montana climate change impacts on national PBS Newshour Keynote Address: Climate Change Impacts in the Crown of the Continent Speaker: Steve Running, Professor/ Director Numerical Terradynamic Simulation Group, University of Montana, IPCC Assessment Report Co-Author

6:30 – 7:30	Welcome dinner
Tuesday, December 2	
8:30 – 8:45	Welcome & Plan for the Day Led by: Perry Brown, University of Montana
8:45 – 9:45	**Panel 1: Climate Change & Ecosystem Dynamics** Led by: Kathy Tonnessen, National Park Service, Rocky Mountains CESU Panelists: • *Climate Change in the Crown of the Continent Ecosystem, What do we have to worry about and what do we still need to know?:* Dan Fagre, Research Ecologist, US Geological Survey, Northern Rocky Mountain Science Center • *Forests and Fire: Role of Climate Change, Natural Disturbance and Timber Management*, Bob Keane, Research Ecologist, USDA Forest Service, Rocky Mountain Research Station, Missoula Fire Sciences Laboratory • *Wildlife Responses to Climate Change: Adapt, Move, or Die*. Scott Mills, Professor of Wildlife Population Ecology, College of Forestry and Conservation, University of Montana
9:45- 10:30	Group Discussion of Climate Change and Ecosystem Dynamics Led by: Kathy Tonnessen
10:30 – 10:45	Break
10:45 – 12:00	**Situation Mapping Activity:** In small groups develop "mental model maps" of inter-relationships between climate change impacts, ecosystems dynamics, management priorities, management processes, and key stakeholders Led by: Ashley Cobb, Colorado State University Small Group Facilitators: Perry Brown, Ali Dimond, Ashley Cobb, & Lisa Gerloff
12:00 – 1:00	Lunch (provided)

1:00 – 2:00	**Panel 2: Human Dimensions of Climate Change** Led by: Perry Brown, University of Montana Panelists: • *How Climate Change Risk Perceptions Influence Responses to Climate Change Adaptation,* Sammy Zahran, Professor of Sociology, Colorado State University • *Resident Responses to Climate Change and Ecological Change in the Northern Rockies: Implications for Management Adaptation Strategies and Interventions,* Laurie Yung, Assistant Professor, College of Forestry and Conservation and Director Wilderness Institute, University of Montana • *Impacts of Climate Change on Recreation and Tourism in the Northern Rockies,* Alison Dimond, PhD Student College of Forestry and Conservation, University of Montana
2:00 – 2:45	Discussion of Human Dimensions Led by: Perry Brown • Presenters will provide questions to start discussion
2:45 – 3:00	Break
3:00 – 4:00	Strategies Part I: Discussion of concerns and challenges based on pre-workshop surveys Led by: Perry Brown & Ali Dimond, University of Montana
4:00-5:00	Wrap-up Discussion Led by: Perry Brown, University of Montana Discussion Points: • How did the presentations help to inform and focus the situation maps? • What information presented today will be useful for your agency and organizational decision-making? • Insights from posters? • Plan for the next day.
5:00 – 7:00 pm	Wine & Cheese Reception and Poster Session Led by: Leigh Welling and Kathy Tonnessen

Wednesday, December 3	
8:00 – 8:15	Welcome Led by: Perry Brown, University of Montana
8:15 – 9:15	Panel 3: Adaptation & Planning Strategies for Cross-Agency Collaboration Led by: Jill Baron & Linda Joyce Panelists: • *Thinking Differently: adaptation options for public lands managers*, Jill Baron, Research Ecologist, US Geological Survey and Colorado State University • *Scenario Planning: A Tool for Managing Resources in an Era of Uncertainty*, Leigh Welling, Climate Change Coordinator, National Park Service • *Adaptation and Natural Resource Management Strategies*, Linda Joyce, Research Leader and RPA Climate Change Specialist USFS Rocky Mountain Research Station • *The Status of Protected Areas and Climate Change Adaptation in Canada*, Chris Lemieux, Research Associate, Parks Research Forum of Ontario and Canadian Council on Ecological Areas
9:15 – 10:30	Discussion Adaptation Strategies Part I: Led by Linda Joyce • Adaptation actions currently in action, being planned or being considered
10:30 – 10:45	Break

10:45-12:00	Discussion of Adaptation Strategies Part II:
	Led by Jill Baron
	• Small Group Discussions:
	  • Groups will be formed based on current, planned, and considered adaptation strategies identified in Part I
	  • Discuss adaptation strategies, develop at least one cross agency management idea, discuss action steps to implement other adaptation strategies
	• Full Group Discussion
	  • Report out on small group discussions

12:00 – 1:00	Lunch (provided)

1:00 – 2:30	Strategies Part II: Led by: Perry Brown, University of Montana Small Group Facilitators: Perry Brown, Ali Dimond, Ashley Cobb, & Lisa Gerloff • Revisit Situation Maps to integrate ecosystem impacts, human dimensions, and potential adaptation strategies in small groups • Participants will work in break-out sessions to coordinate ideas and develop preliminary strategies • Small Group Reports – groups each have 15 minutes to present their plan to the larger group.
2:30 – 3:00	Conclusions and Wrap Up Led by: Perry Brown, University of Montana

Appendix B: Workshop Participants List

Climate Change and the Crown of the Continent: Multi-Jurisdictional Strategies Workshop
Participant List

Organization	Participant	Title	Email
Alberta Sustainable Resource Development	Mike Undershultz	Forest Health Ecologist	mike.undershultz@gov.ab.ca
Alberta Sustainable Resource Development	John Stadt	Forest Ecologist	john.stadt@gov.ab.ca
Blood Tribe Land Management Department	Elliot Fox	Director	efox@btlands.com
Blood Tribe Land management Department	Kansie Fox	Resource Management Technician	kfox@btlands.com
British Columbia, Ministry of Environment	Al Soobotin	Ecosystem Section Head	Al.Soobotin@gov.bc.ca
British Columbia, Ministry of Forest and Range	Bruce Ross	BC Timber Sales	bruce.ross@gov.bc.ca
Colorado State University	Ashley Cobb	Graduate Student	
Colorado State University	Sammy Zahran	Professor of Sociology	sammy.zahran@colostate.edu
Confederated Salish and Kootenai Tribes	Tony Harwood	Forester	tonyh@cskt.org
Confederated Salish and Kootenai Tribes	Eric Shallock	Forester	ericS@cskt.org
Confederated Salish and Kootenai Tribes	Jim Roessler	Forester	jimr@cskt.org
Glacier National Park	Jack Potter	Chief of Science and Resource Management	jack_potter@nps.gov
Glacier National Park	Chris Downs	Fishery Biologist	Chris_Downs@nps.gov
Glacier National Park	Tara Carolin	Ecologist	tara_carolin@nps.gov
Glacier National Park	John Waller	Wildlife Biologist	john_waller@nps.gov
MT Department of Natural Resources and Conservation	Susan Cottingham		scottingham@mt.gov
MT Department of Natural Resources and Conservation	Julia Altemus		JAltemus@mt.gov
MT Department of Natural Resources and Conservation	Rich Moy	Water Management Bureau Chief	rmoy@mt.gov
MT Fish, Wildlife, and Parks	Trevor Felch	Fishery Biologist	tseich@mt.gov
National Cooperative Ecosystems Studies Unit Network	Tom Fish	National Coordinator, Washington, DC	tom_fish@nps.gov
National Park Service, Natural Resource Program Center	Leigh Welling	Climate Change Coordinator, Fort Collins	leigh_welling@nps.gov
National Park Service, RM-CESU	Kathy Tonnessen	Reseach Coordinator	kathy.tonnessen@cfc.umt.edu
National Parks Conservation Association	Steve Thompson	Senior Program Manager	sthompson@NPCA.org
National Parks Conservation Association/ SOS	Gloria Flora	CEO Sustainable Obtainable Solutions	ask_us@s-o-solutions.org
National Wildlife Fedaration	Sterling Miller	Senior Wildlife Biologist	MillerS@nwf.org
Parks Research Forum of Ontario	Chris Lemieux	Research Associate	clemieu@uwaterloo.ca
Public Policy Research Institute/ University of Montana	Daisy Patterson	Associate	daisypatterson@gmail.com
The Nature Conservancy	Dave Hanna		dhanna@tnc.org
University of Montana, College of Forestry and Conservation	Perry Brown	Dean	perry.brown@umontana.edu
University of Montana, College of Forestry and Conservation	Steve Running	Professor/Director, Numerical Terradynamic Simulation Group	steven.running@umontana.edu
University of Montana, College of Forestry and Conservation	Scott Mills	Professor of Wildlife Population Ecology	lscott.mills@umontana.edu
University of Montana, College of Forestry and Conservation	Laurie Yung	Assistant Professor	laurie.yung@umontana.edu
University of Montana, College of Forestry and Conservation	Alison Dimond	Graduate Student	alison.dimond@umontana.edu
University of Montana, RM-CESU	Lisa Gerloff	Executive Coordinator	lisa.gerloff@umontana.edu
US Fish and Wildlife Service	Lowell Whitney	Fish and Wildlife Biologist	lowell_whitney@fws.gov
USFS - Flathead National Forest	Cathy Barbuelitos	Forest Supervisor	cbarbouletos@fs.fed.us
USFS - Lewis and Clark National Forest	Tina Lanier	District Ranger	tclanier@fs.fed.us
USFS- Flalthead National Forest	Jimmy DeHerrarra	District Ranger, Hungry Horse/Glacier View Ranger Districts	jdeherrera@fs.fed.us
USFS - Lolo National Forest	Tim Love	Lolo National Forest	tlove@fs.fed.us
USFS - IREMCG	Jim Morrison	Research Associate	jfmorrison@fs.fed.us
USFS- Rocky Mountain Research Station	Linda Joyce	Research Leader and RPA Climate Change Specialist	ljoyce@fs.fed.us
USFS- Rocky Mountain Research Station	Bob Keane	Research Ecologist, Fire Lab, Missoula	rkeane@fs.fed.us
USFS-Rocky Mountain Research Station	Rachel Loehman	Climate Change Communications	rloehman@fs.fed.us
USGS-Fort Collins Science Center	Jill Baron	Research Ecologist	jill@nrel.colostate.edu
USGS-Northern Rocky Mountain Science Center	Clint Muhlfeld	Fishery Biologist	cmuhlfeld@usgs.gov
USGS-Northern Rocky Mountain Science Center	Dan Fagre	Research Ecologist	dan_fagre@usgs.gov
Waterton Lakes National Park	Rod Blair	Field Unit Superintendent	rod.blair@pc.gc.ca
Waterton Lakes National Park	Bill Dolan	Resource Conservation Manager	bill.dolan@pc.gc.ca
Waterton Lakes National Park	Barb Johnston	Ecosystem Scientist	barb.johnston@pc.gc.ca
Waterton Lakes National Park	Cyndi Smith	Ecosystem Scientist	Cyndi.smith@pc.gc.ca
Wildsight	Megan Walsh		megan@wildsight.com
Yellowston to Yukon	Gary Tabor	Director, Center for large landscape conservation	wildcatalyst@gmail.com

Appendix C: Pre-Workshop Survey

Climate Change and Public Lands Management
Pre-Workshop Survey

Sponsored by
University of Montana
Colorado State University

Thank you for your interest in the Climate Change and Public Lands Management workshop. This survey will ask you about climate change and your thoughts about managing public lands in the face of climate change. We will use the responses to this survey to tailor the workshop to best meet your interests and needs. There are no right or wrong answers; we are interested in your opinions and thoughts. All responses will be confidential.

1. Approximately how long has climate change been on your radar screen as an issue that may impact the lands you manage? _____

2. Approximately how long have you considered climate change an issue that requires management action? _____

3. Please indicate which statement best describes your current beliefs about climate change (select only one)

   - ❑ I do not believe that climate change will occur, so we don't need to be concerned about it.
   - ❑ I believe that minimal climate change will occur and its impacts will be so small that it is not worth worrying about.
   - ❑ I believe that climate change will occur and that we should be moderately concerned about it.
   - ❑ I believe that climate change will occur and that we should be very concerned about it.
   - ❑ I believe that climate change is occurring and that we should be very concerned about it.

4. What are the primary impacts of climate change that you think are likely to occur in the area you manage?

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5. Will climate change affect your ability to achieve priority management goals?
   - ❑ Yes
   - ❑ No

6. If you answered yes to #5, which management goals do you think will be impacted by climate change and how do you think they will be impacted?

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7. Please indicate the extent to which you agree that you are well informed about the following climate change issues:

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Unsure	Slightly Agree	Moderately Agree	Strongly Agree
Atmospheric processes related to climate change	1	2	3	4	5	6	7
Impacts or consequences of climate change	1	2	3	4	5	6	7
Human responses to climate change impacts (adaptation)	1	2	3	4	5	6	7
Strategies to reduce or slow climate change (mitigation)	1	2	3	4	5	6	7

8. Research is being done on many climate change issues. Please indicate what new information would strengthen your (or your agency's) ability to develop management plans to address climate change?

	No More Information Needed	←				**Need Much More** Information →	
Information on climate or atmospheric processes	1	2	3	4	5	6	7
Computer modeling of the climate system	1	2	3	4	5	6	7
Detecting climate change (e.g. temperature trends)	1	2	3	4	5	6	7
Consequences of changes in temperature, rainfall, etc.	1	2	3	4	5	6	7
Social, industrial & economic impacts	1	2	3	4	5	6	7
Strategies for human response (adapting) to climate change impacts	1	2	3	4	5	6	7

Strategies for slowing (mitigating) climate change	1	2	3	4	5	6	7
Impacts on Natural Resources:							
Water	1	2	3	4	5	6	7
Vegetation	1	2	3	4	5	6	7
Wildlife	1	2	3	4	5	6	7
Fish	1	2	3	4	5	6	7
Recreation	1	2	3	4	5	6	7

9. Please indicate the ability you and your organization have to develop and implement management strategies that will help the lands you manage adapt to impacts of climate change:

	None	A little	Unsure	Some	A lot
Your ability, in your current position, to help the lands you manage adapt to impacts of climate change	1	2	3	4	5
Your organization's ability to help the lands it manages adapt to impacts of climate change	1	2	3	4	5

10. Please indicate the degree to which the following factors create difficulties for effectively managing protected areas in the face of climate change?

	Not An Important Factor ←						→ A Very Important Factor
Overshadowing by competing issues (e.g. other management priorities)	1	2	3	4	5	6	7
Lack of money to deal with climate change adaptation and/or mitigation	1	2	3	4	5	6	7
Lack of knowledge about the local impacts of climate change	1	2	3	4	5	6	7
Lack of knowledge about management strategies to address climate change	1	2	3	4	5	6	7
Low public science literacy	1	2	3	4	5	6	7
Credibility of climate change projections	1	2	3	4	5	6	7
Uncertainty in climate change projections	1	2	3	4	5	6	7
Difficulties of managing ecosystems across jurisdictional boundaries	1	2	3	4	5	6	7

Lack of urgency about climate change as a management issue	1	2	3	4	5	6	7
Beliefs that the climate cannot be affected by humans	1	2	3	4	5	6	7
Climate impacts lack local relevance	1	2	3	4	5	6	7
Polarization of messages	1	2	3	4	5	6	7
Belief that individuals cannot make a difference on an issue as large as climate change	1	2	3	4	5	6	7
Beliefs that warming is not a bad thing	1	2	3	4	5	6	7
Belief that there is plenty of time to address the impacts of climate change because it is happening slowly	1	2	3	4	5	6	7
Other:							

11. Please indicate the degree to which you agree with the following statements about your organization:

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Unsure	Slightly Agree	Moderately Agree	Strongly Agree
My organization *has a responsibility* to manage climate change impacts on public lands	1	2	3	4	5	6	7
My organization *has the ability and resources* to manage climate change impacts on public lands	1	2	3	4	5	6	7
My organization *needs assistance* developing management plans to address climate change impacts	1	2	3	4	5	6	7
My organization *is making organizational and operational changes* because of climate change	1	2	3	4	5	6	7
I have the authority to develop and implement climate change management plans	1	2	3	4	5	6	7

12. Climate change is a difficult management issue. What specific information would help you effectively manage your area in the face of climate change?

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13. What specific actions do you or your organization plan to undertake or are undertaking to help the lands you manage adapt to climate change?

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14. To what extent are you working with neighboring land management organizations to manage climate change impacts on shared ecosystems?

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15. What information and tools would you like to take home from this workshop that will help you manage climate change impacts in the future?

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Thank you very much for your participation in this survey.

Please return your completed survey to Alison Dimond at The University of Montana. A stamped pre- addressed envelope has been provided. Or, you can email your digitally completed survey to Alison.dimond@grizmail.umt.edu.

Appendix D: Post-Workshop Evaluation
Climate Change in the Crown of the Continent: Multi Jurisdictional Strategies Workshop Evaluation

We greatly appreciate your feedback! We will use your evaluations to improve future workshops to be held in different ecosystems.

Please rate the following workshop elements based on how informative they were. If completing digitally, you can highlight your rating in a different color, bold it, or otherwise highlight it.
How much new information did you learn from each session?

Session	Not new	A little new	Some New	Mostly new	All new
Opening session featuring Steve Running	1	2	3	4	5
Panel 1: Climate change and ecosystem dynamics	1	2	3	4	5
Situation mapping activity	1	2	3	4	5
Panel 2: Human dimensions of climate change	1	2	3	4	5
Pre-survey workshop discussion	1	2	3	4	5
Poster Session	1	2	3	4	5
Panel 3: Adaptation and planning strategies for cross-agency collaboration	1	2	3	4	5
Adaptation strategy development small group exercise	1	2	3	4	5
Networking opportunities/ group meals	1	2	3	4	5

Please rate the following workshop elements based on how useful they will be to your future management. If completing digitally, you can highlight your rating in a different color, bold it, or otherwise highlight it.
Will information you gained in each session help you develop management strategies to adapt to climate change?

Session	Not at all	A little	Unsure	Some	A lot
Opening session featuring Steve Running	1	2	3	4	5
Panel 1: Climate change and ecosystem dynamics	1	2	3	4	5
Situation mapping activity	1	2	3	4	5
Panel 2: Human dimensions of climate change	1	2	3	4	5
Pre-survey workshop discussion	1	2	3	4	5
Day 1 wrap up discussion	1	2	3	4	5
Poster Session	1	2	3	4	5
Panel 3: Adaptation and planning strategies for cross-agency collaboration	1	2	3	4	5
Adaptation strategy development small group exercise	1	2	3	4	5
Day 2 wrap up discussion: benefits and incentives for cross-jurisdictional work	1	2	3	4	5
Networking opportunities/ group meals	1	2	3	4	5

Were any sessions/activities or individual presentations particularly informative?

Were any sessions/activities or individual presentations particularly helpful for your ability to develop climate change adaptation management strategies?

Do you have any suggestions for improving the workshop over all and/or improving any particular session/activity or presentation?