



CTUIR's First Foods Framework—Incorporating Traditional Knowledge and Science

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) hosted the third Great Northern LCC steering committee meeting in Pendleton, Oregon on April 13-14, 2011. Eric Quaempts, Director of the CTUIR Department of Natural Resources, and Carl Scheeler, CTUIR Wildlife Program Manager, both who are members on the GNLCC steering committee, arranged for the meeting at the [Tamástlikt Cultural Institute](#). The Tamástlikt Cultural Institute is a wonderful venue and houses a museum that provides an opportunity to learn about the traditions of CTUIR tribes: the Cayuse, Umatilla and Walla Walla.

Eric welcomed the steering committee with a presentation on the CTUIR “First Foods” framework and climate change. Below, Eric provides a summary of his presentation:

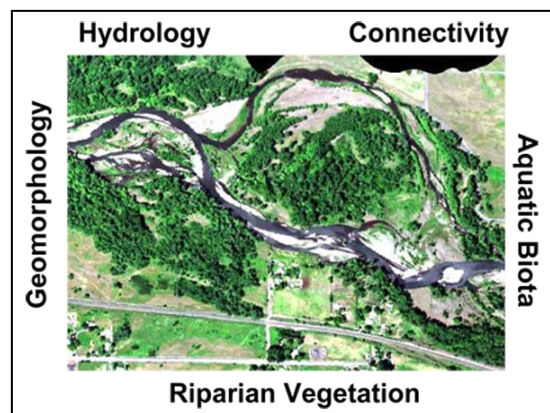
The CTUIR Department of Natural Resources has organized natural resource functions and goals through a focus on traditionally gathered resources identified by the Tribal community as “First Foods.” The cultural recognition of the First Foods order is evident in the ritualistic serving order of native species in a traditional meal. The serving ritual includes ecological grouping of foods (resources) as well as their geographic and temporal distributions.

The community places particular importance on the activities and interactions associated with gathering, preparation and serving of these foods. Further, these foods are religiously, physically, economically, culturally and socially important to the community and are largely not recognized outside of Tribal culture. Traditional culture and contemporary science reinforce the First Foods paradigm. Thus explicitly representing the relevance of the First Foods order in planning and

management efforts is an important step to ensure that the appropriate ecological products are returned to the Tribal community.

Climate change challenges us to forecast the potential distributions of habitats and species to ensure that they are available to the tribal public. In order to address the management of these foods, the CTUIR is developing several efforts: restoring ceded river tributaries consistent with a coherent future vision; proposing to identify, characterize, and acquire alluvial floodplain segments that demonstrate temperature resilience to climate change; assessing the distribution of plant foods to understand their requirements and inform future climate change assessments, First Foods policy development; and increasing and protecting Tribal member access to First Foods throughout the aboriginal use lands of the CTUIR.

More information about CTUIR’s First Foods framework can be found in the [Umatilla River Vision](#). The GNLCC extends their appreciation to CTUIR and Carl and Eric for hosting the meeting.



This graphic identifies the five key water quality management considerations that support CTUIR’s First Foods production. From *Umatilla River Vision*, K Jones et al., 2008.

LC MAP: The GNLCC Landscape Conservation Management and Analysis Portal

The path to effective collaboration over large geographic areas depends on successfully transcending boundaries – political, jurisdictional, disciplinary, social, and technical. GNLCC and partners are working to soften each of these boundaries while respecting the vision, mandates, and data security concerns of the broad array of LCC partners. GNLCC has developed a state-of-the-art geospatial data discovery, management, and analysis tool which supports inter-organization collaboration and coordination: The Landscape Conservation Management and Analysis Portal or LC MAP.

LC MAP combines modules built off DOI's open source-developed ScienceBase, which provides efficient data search, catalog and management tools, with the ArcGIS 10 spatial data editing, analysis, and modeling environment to provide a powerful, fully functional project management portal. Interaction with the spatial data employs a suite of web services allowing dispersed, inter-organizational teams to access and analyze common datasets in real-time and provides automated metadata and versioning functions to facilitate project progress, data documentation, and product development.

LC MAP is composed of three integrated modules: the Catalog (Fig. 1), Repository, and GIS Share, each of which provides specific yet complementary functions.

The Catalog is a robust data discovery tool capable of harvesting data from dozens of sources and efficiently distilling information about the data to inform users of its utilities and limitations. Search requests can be highly customized so users can quickly focus a search and access metadata that specifies each data piece. Once discovered, data can be moved to the Repository (if necessary) or accessed through the GIS Share.

The Repository is a fully-functional data storage and management tool that facilitates and simplifies data access and restriction, metadata creation and editing, quality control, and publishing. The Repository is designed to store 'in-house' data generated by a user or community of users or as a 'parking spot' for data acquired off the Catalog. The Repository employs a sim-

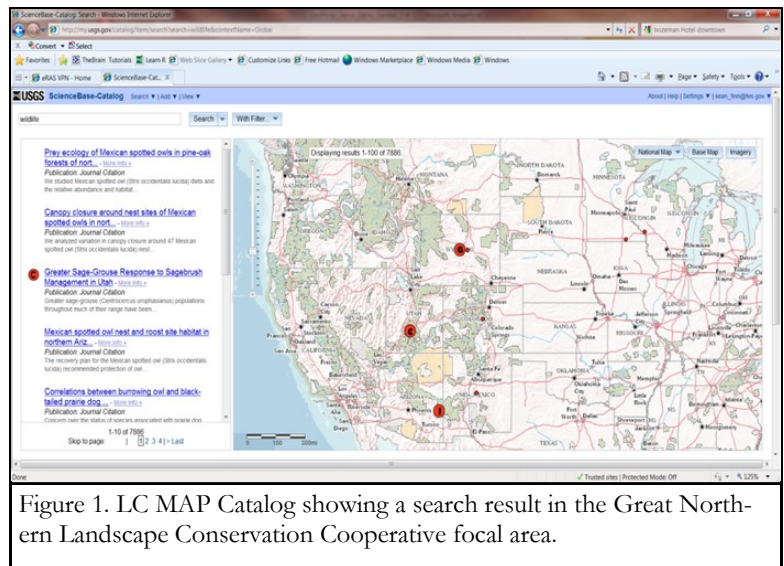


Figure 1. LC MAP Catalog showing a search result in the Great Northern Landscape Conservation Cooperative focal area.

ple yet effective file management system that allows a Project Manager to specify access rules for each community member and to track project progress. Metadata can easily be edited and reformatted to a number of documentation standards and, when ready, a given dataset can be moved to a publicly accessible folder and shared with a broader audience.

The GIS Share (Fig. 2) may be the most powerful tool of the three. It allows real-time GIS processing by a team of professionals working from dispersed locations. The GIS Share greatly reduces the need for an individual to store data on their desktop and eliminates version and lineage problems. The GIS Share is an instance of ESRI's ArcMap environment and comes with hundreds of predefined geospatial tools and models as well as access to a broad community of knowledge. To interface with LC MAP via the GIS Share, a user would call up ArcMap and access data using 'Add GIS Services.' In many cases our partners would be accessing data stored on the Repository; however, any data being delivered as a feature or coverage service—anywhere in the world—can be quickly ingested into the GIS Share. As edits or modifications are made, the Repository (supporting the GIS Share) automatically updates portions of the metadata, assigns a new version number, and stores the old and new data for easy identification

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and retrieval.

LC MAP supports a robust security infrastructure in front of all components giving project managers fine-tune controls over user-accessibility and data publication. Tradeoffs in design were focused on reaching the widest possible audience while relying on established, reliable platforms with in-place user support. Furthermore, LC MAP is designed with the kind of flexibility that allows custom tuning at the project through program level.

For more information view the LC MAP Webinar (<http://nrm-sc.usgs.gov/gnlcc/webinars/sfinn>) or contact GNLCC Science Coordinator, Sean Finn (Sean_Finn@fws.gov; (208) 426-2697) if you have questions or wish to acquire an LC MAP account.

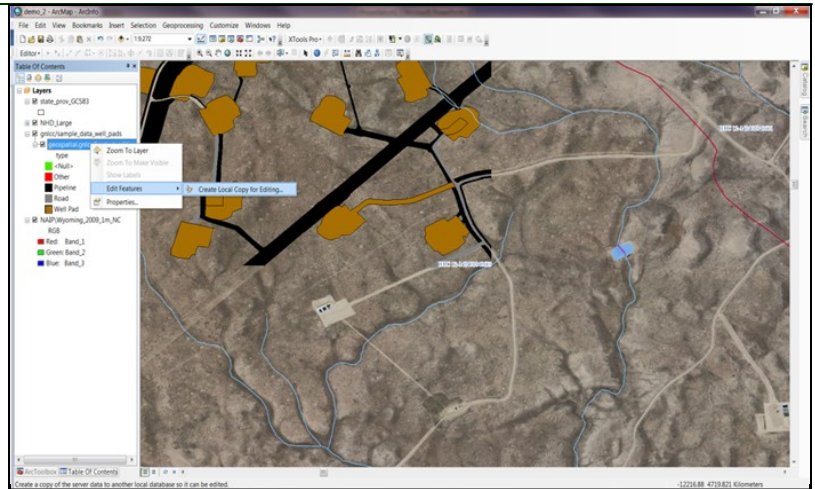


Figure 2. A look in at a GIS process employing GIS share. This graphic shows spatial data acquired via web services from two different data providers (USDA and the LC MAP Repository) and web-enabled functions (Edit Features) that allow real-time remote editing.

GNLCC Funding Update and Analysis of Meta-Information Quarterly Progress Report

To support on-the-ground landscape conservation in the Northern Rocky Mountains and Columbia Plateau, the Great Northern LCC has committed over \$2.4 million in FY 2011 and 2010 to a range of partners and landscape partnerships for ecological research, information management, and outreach projects. These pro-

jects are aligned with the GNLCC's core mission, as defined by the Steering Committee. Provided below are the 2011 and 2010 supported projects and the first quarterly report for the analysis of meta-information, which summarizes the products derived from these projects and several capacity supported efforts.

FY 2011 Projects	FY 2010 Projects	Analysis of Meta-Information
<p>In June 2011, 12 projects were awarded funding. Five of the projects were funded in 2010 and are receiving second year funding. The projects address five themes: habitat connectivity, aquatic integrity, data integration, climate, partnerships, outreach and education.</p> <p>View FY 2011 Projects</p>	<p>In 2010, the first year of GNLCC funding, 12 projects received funding. The projects address three themes: habitat connectivity, aquatic integrity, and data integration.</p> <p>View 2010 Projects Overview</p>	<p>The analysis of meta-information serves as a reference and integration guide to the data, models, tools, and documents for GNLCC's conservation partners. This first quarterly report describes the products derived from the 2011 and 2010 supported projects.</p> <p>View Analysis of Meta-Information</p>

FY 2010 Funded Project Highlight—Mapping Current and Future Distributions of Greater Sage-Grouse: Conservation Planning for Climate Change

Steve Knick¹, Steve Hanser¹, and Kristine Preston²

The long-term loss and changes in sagebrush (*Artemisia* spp.) distribution predicted under the different scenarios for climate change are sobering. For every degree C increase in average temperature, approximately 12 percent of the land cover currently dominated by sagebrush would be replaced by exotic plants or other woody vegetation. Only 20 percent of the current distribution of sagebrush would remain under the most extreme predicted increase of 7 C. Most of the sagebrush within the Great Northern area would be lost. Sagebrush landscapes already are threatened by land use activities, fire, and conversion to exotic grasslands. Predicted losses due to climate change therefore create additional challenges for conservation of species, like the greater sage-grouse (*Centrocercus urophasianus*), that depend on sagebrush for food, nesting, and shelter from predators.

Greater sage-grouse were listed as a candidate species for protection under the Endangered Species Act in 2010 by the U.S. Fish and Wildlife Service. The data for population trends and habitat loss were sufficient to warrant full listing as an endangered species but immediate action was precluded because other species were considered to be a higher priority by the agency. However, ensuring that sage-grouse populations can be maintained into the future will require that current habitat losses can be stabilized and that we plan for the long-term changes due to climate change. Because sage-grouse are an umbrella species, conserving habitats that support sage-grouse will benefit many of the other wildlife species that also depend on sagebrush.

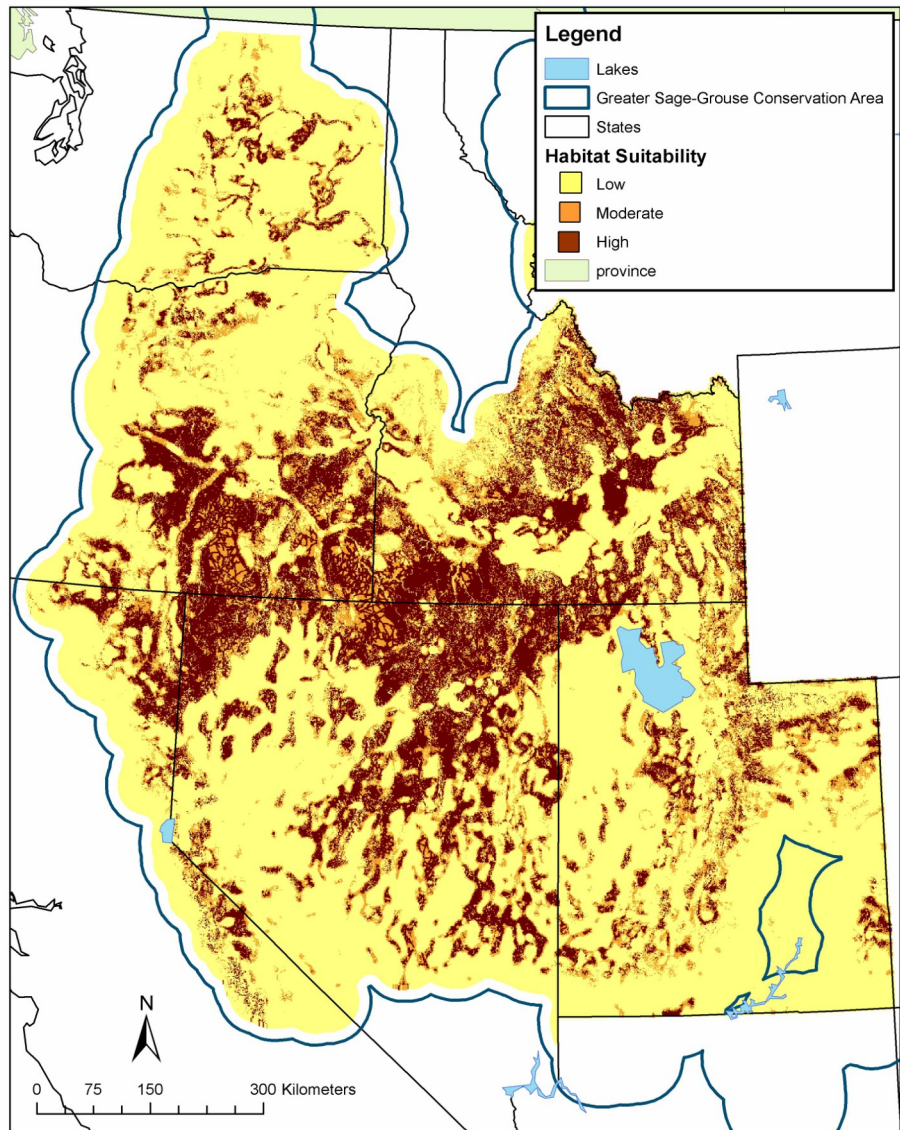


Figure 1. A preliminary map of landscapes in the Intermountain West that contain the minimum set of environmental characteristics required by sage-grouse. We caution that sage-grouse may not currently be using these locations due to other constraints on populations and dispersal movements even though the environmental requirements may be present.

Our study is developing the information needed for this conservation planning. The primary questions we are addressing are what characteristics of sagebrush landscapes are required to support sage-grouse, how well sage-grouse populations are interconnected across their range, and can sage-grouse track the predicted changes in sagebrush distribution even to new locations through movements by individual birds.

The answer to what habitats sage-grouse require is both simple and incredibly complex—just like the dynamics

of this ecosystem itself. Sage-grouse require sagebrush. Without sagebrush there are no sage-grouse. However, it is the characteristics of that sagebrush that are very important and not well understood. Sagebrush is distributed across the landscape in many variations. It can be a dominant feature across large expanses, like in many parts of Idaho and Oregon, or, it can be a minor component mixed in with agriculture and other habitats like in parts of Washington. Sage-grouse use some of these landscapes but not others and we often do not understand what characteristics create the difference. Our study is designed to identify the minimum array of sagebrush characteristics required to support sage-grouse populations by identifying the statistical relationship between a suite of environmental variables at locations where sage-grouse are present. Using this statistical relationship, we then can map the likelihood of any location in the landscape to have those same characteristics (Fig. 1). When applied to the entire sage-grouse distribution, we can produce a regional or range-wide map of places that can potentially support sage-grouse populations. Just because an area may have the minimum requirements for sage-grouse does not mean that sage-grouse currently are present. But it does mean that sage-grouse could potentially use that area in the future, provided other barriers do not prevent the necessary movement.

Our second objective, using funding provided by the U.S. Geological Survey, is to determine how far sage-grouse will travel across a landscape and what kinds of barriers limit their movements. Some understanding of sage-grouse movements already is known from radio-

telemetry studies. However, the key piece of evidence needed to understand population viability is how much exchange is occurring among breeding populations. We are using genetic markers contained in sage-grouse feathers collected at breeding locations to develop signatures for breeding populations. By comparing the relative similarity among genetic signatures, we can estimate how sage-grouse disperse across the landscape and to what degree individuals mix with neighboring populations. That information is important for understanding how populations are interconnected across the range-wide distribution of sage-grouse and what geographic features influence their movements.

Our last objective is to map the future distribution of sagebrush landscapes as predicted under various climate-change scenarios. Using our information about the minimum set of sagebrush characteristics required by sage-grouse coupled with an understanding of what geographic barriers limit movements, we can estimate the ability of current sage-grouse populations to track changes in sagebrush. We then can identify populations most at risk because they are limited either by loss of sagebrush within their current range or by an inability to move to new regions. Alternatively, we can focus our limited resources on those populations that are most interconnected with other sage-grouse and are able to move in response to the changing distribution of sagebrush.

Sagebrush communities are one of the most imperiled ecosystems despite their widespread distribution. The current trajectory of loss and fragmentation of sagebrush habitats coupled with the negative long-term influence driven by climate change create one of the most significant environmental challenges in North America. Sage-grouse are the most visible of the wildlife species that depend on this habitat. Understanding what sage-grouse require and how those habitat features might shift due to climate change will help to develop the conservation plans and actions to ensure that future generations will be able to experience this remarkable bird and its habitats.

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²Center for Conservation Biology, University of California, Riverside, 1303C Webber Hall, Riverside, CA 92521



Photo courtesy of Bryan Bedrosian, Craighead Beringia South

New GNLCC Online Resources

Resource Directory

To enhance communications and information exchange on landscape-level conservation efforts, the GNLCC has developed an online Resource Directory containing descriptions of landscape initiatives and organizations that conduct conservation work within the Great Northern area. The Resource Directory is a work in progress and currently contains two sections: 1) Landscape Initiatives—projects and partnerships that contribute to landscape conservation, and 2) Organizations—initial list represents organizations on the GNLCC Steering Committee.

In the upcoming months, the Resource Directory will include a geospatial database and long-term monitoring efforts within the Great Northern area. The Resource Directory is currently hosted by the Greater Yellowstone Science Learning Center but will be integrated into the GNLCC website. We welcome your suggestions and ideas. Please [contact us](#) if you would like your organization or landscape initiative added to the resource directory. [Visit the Resource Directory](#)

Inventory of Summary Documents on Climate Change Science

In an effort to provide natural resource managers with synopses of climate change science applicable to the

The screenshot shows the website for the Greater Yellowstone Science Learning Center. The header includes the text 'Greater Yellowstone Science Learning Center' and 'CONNECTING PARKS, SCIENCE, AND PEOPLE'. Below the header is a search bar. The main content area is titled 'Great Northern Landscape Conservation Cooperative's Resource Directory'. It features a navigation menu on the left with categories like 'Topics', 'Park Unit', 'Get Involved', and 'Products'. The main content area is divided into two columns: 'Landscape Initiatives' and 'Organizations'. The 'Landscape Initiatives' section describes projects and partnerships, while the 'Organizations' section describes programs of government agencies, tribes, and nonprofits. A 'Purpose' section explains the directory's goal to enhance communication and information exchange. A 'Future Plans' section mentions the integration of a geospatial database and long-term monitoring efforts. At the bottom, there is a link to 'Visit the Great Northern LCC website'.

Great Northern area, the GNLCC has compiled an initial list of summary documents. These documents are fact sheets, booklets, and other formats that summarize lengthy and comprehensive reports and publications. If you know of other summary documents on climate change science that would be of value to managers, please [send us](#) the document's reference information and we'll add it to our spreadsheet. [View the Inventory of Summary Documents on Climate Change Science](#)

Washington's Arid Lands Initiative: Partners Working on Shared Conservation Priorities

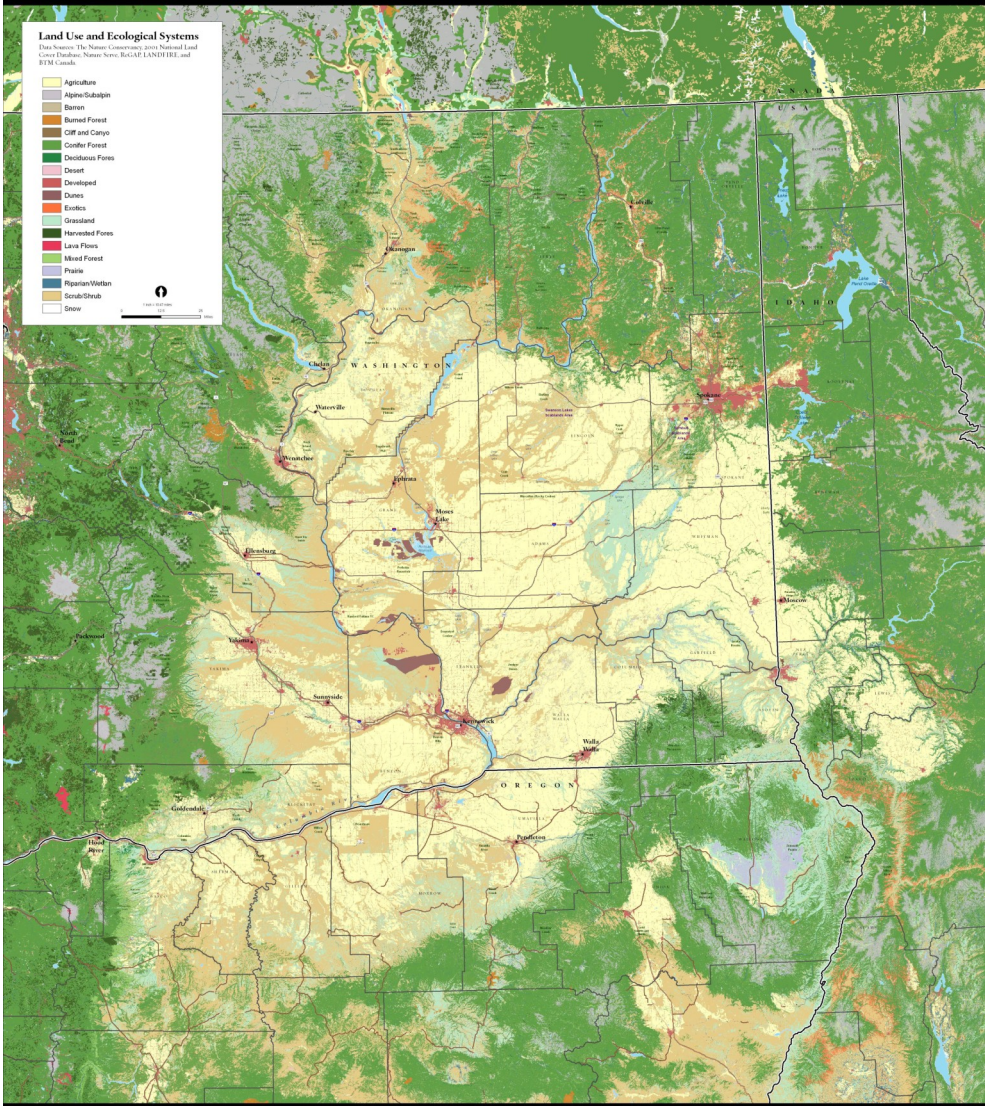
The vast, arid landscapes of the Inland Northwest seldom receive the recognition they deserve. However, ecologists, land managers, and farmers and ranchers who work the land know the value of ecosystems and species these landscapes harbor. To help these arid land ecosystems persist across 15 million acres in eastern Washington, the Washington Arid Lands Initiative (ALI), a partnership of NGOs, federal and state government agencies, Tribes and private interests is working to develop and cooperatively implement a coordinated conservation strategy. The strategy, based on shared priorities, aims to achieve healthy and resilient arid landscapes that support these valuable ecosystems and species and the liveli-

hoods of local communities.

The ALI is following an Open Standards process (CAP; www.conservationmeasures.org), convening stakeholders and experts in three large workshops and two technical sessions to help develop its conservation strategy. As a first step, the process facilitated partners reaching agreement on eight biological priorities. These biological priorities are: shrub steppe and dry grasslands; depressional wetlands; riverine systems; dunes; transitional woodlands; cliffs, talus and caves; burrowing animals; and grouse.

The ALI partners then synthesized current knowledge on the status of these biological priorities,

Washington Arid Lands *Land Cover*



The current boundaries of the Arid Lands Initiative includes all arid lands within Washington state borders, focusing on the Columbia Plateau plus the shrub steppe and grasslands within the Okanogan Valley and East Cascades.

factors that are impacting them, and socioeconomic and political context in the area. Based on this foundation, the group agreed on seven priority strategies focused on protection, restoration, climate change, development, energy, agriculture, and grazing.

With this agreement on the strategies the ALI will focus on, the group has moved on to the next phase, focused on two main steps. First and foremost, reaching out to land owners, land use decision makers, and other stakeholders to engage in the process of making the strategies actionable—what exactly

needs to be done to achieve combined biological and land use objectives, and who is best placed to do it? And second, synthesizing mapped information on where and in what condition the biological priorities are, and how different areas contribute to biological and land use objectives, to identify where to implement these actions first. Once these two steps are completed, the ALI partners will shift focus to coordinating implementation of these actions.

The ALI has an ambitious vision of what can be achieved in eastern Washington's arid lands. It will take new approaches and strong collaboration to make it happen. Having access to the right data and information to help partners make decisions is another critical ingredient for success. Because of this, the ALI will be participating in the Great Northern LCC's new Sage Steppe Partnership Forum, which will support information exchange, networking, and discussions of research findings that can help inform

management decisions.

For more information:

Washington Arid Lands Initiative: Chuck Warner, The Nature Conservancy, cwarner@TNC.ORG

Great Northern LCC Sage Steppe Partnership Forum: Sean Finn, GNLCC Science Coordinator, Sean_Finn@fws.gov

GNLCC Partners Begin Process of Developing Strategic Conservation Framework

The Great Northern Landscape Conservation Cooperative does not think small. In fact, a challenge of large landscape initiatives like this is defining an appropriate scope of activities that effectively span the complexity of the geography, issues, and many partners involved. To provide this scope and direction, we are developing a “strategic conservation framework” to identify priorities and strategies that make the most sense for this landscape and provide the greatest value to all the partners involved. Over the next six months to a year, the GNLCC partners will be asked to participate in defining the scope and direction.

Here are some of the ways the GNLCC partnership is moving the process forward:

Partner Forums

There are many effective initiatives and partnerships in the region already—GNLCC partners want to be supported as a network of regional landscape activities towards common large landscape outcomes through regional program alignment. Partner Forums are an engagement of conservation practitioners and partnerships that share landscape conservation challenges in an eco-geographic context. There are three main eco-geographical focus areas—Sage-steppe, Rocky Mountains, and the Columbia Basin—around which to organize discussions.

Field-level managers, scientists, and key conservation constituents will identify priority conservation information or scientific needs for effective landscape conservation. These needs will be the basis for the strategic framework and annual priorities. Partner Forums also provide input and feedback on utility and application of landscape science, tools, and information.

Basically, Partner Forums engage the existing partnership network—a more diverse and directly knowledgeable constituent—to ensure the GNLCC is relevant, effective, and working on the right issues. The GNLCC will get conversations rolling with the partnership network through Partner Forums. Please contact us if you would like to be involved.

A Collective Vision

Vision is what drives ambitious action. A collective landscape vision helps us understand what we want to achieve as a conservation community and how we see this landscape in the future. By looking at what we do in common, the GNLCC Steering Committee is defining this vision.

Setting Priorities

Ultimately, the GNLCC is looking for the right investment to help move partners along towards the collective landscape vision. Together, managers, scientists, and other experts in the region can consider how to narrow the field and focus on the right steps, whether that be conceptual models, shared science, or aligning programs. Through the GNLCC, we can participate in a thoughtful, transparent, and rigorous process to determine which of our common priorities can help us identify and track progress towards our mutual landscape goals. The effort will be led by Nina Chambers, a regional landscape planner and facilitation expert, Gary Tabor, an authority on large landscape conservation in this region, and Craig Groves, a renowned conservation planner at The Nature Conservancy.

This is an important step towards working together in an economically and ecologically important landscape. We are looking forward to your engagement and input throughout this process. We hope you will join Partner Forums and attend our webinars to learn more, connect with other interesting and dedicated people, and share your thoughts with us.

Nina Chambers and Gary Tabor are co-leading the strategic conservation framework process working closely with GNLCC staff and partners. To share your ideas or suggestions, contact Nina at nchambers@bresnan.net or Gary at wildcatalyst@gmail.com.

Workshop Provides Science and New Tools to Address Climate Change in Aquatic Ecosystems

A two-day workshop sponsored by the USFS Rocky Mountain Research Station, USGS, Trout Unlimited, and the Great Northern LCC on February 28–March 1, 2011, provided management professionals and scientists with a forum for demonstrating the integration of scientific results with new analysis tools for managing aquatic ecosystems under climate change scenarios. In addition to the 60 workshop participants representing 16 different natural resource agencies and organizations that were present in Boise, Idaho, more than 400 people across the United States and Canada viewed the presentations in real time via webcast. Workshop objectives were to: 1) share current information regarding the effects of climate change on aquatic ecosystems; 2) present analysis tools that could assist managers in addressing climate change; and 3) discuss management implications of climate change, the utility of existing tools, and future information and analysis needs.

Both days of the workshop provided ample opportunities for questions, discussions, and application of new information through hands-on activities. On Day 1, seven research presentations were given as a primer on predicted and observed climate change effects on stream ecosystems. Afterward, small working groups were tasked with prioritizing management actions to maximize the long-term persistence of bull trout populations within the 6,900 km² Boise River watershed located in central Idaho. To assist this prioritization exercise, working groups were given a range of GIS spatial data (e.g., bull trout population locations, fire risks, invasive species, fish barriers) and only historical climate information (e.g., downscaled stream temperature, hydrology). Each working group developed and presented the rationale

WORKSHOP COMPONENTS

Research Results

Climate Change in the West
Hydrologic Response
Wildfire & Vegetation Response
Channel Morphology & Scour Regimes
Changing Flow Regimes
Stream Thermal Response
Fish Population Response

Tools

Integrating Climate Change Effects with Management
NetMap Watershed DSS
Bayesian Belief Networks
Spatially Explicit Climate Data

Planning Exercises

Group discussions and presentations on prioritizing bull trout populations and management actions with historical data and predicted climate change effects

Participant Assessment

Feedback on the utility of workshop research information, tools, and planning exercises for managing aquatic resources under a changing climate

for their selected management actions and fielded questions from the larger group.

On Day 2, a different set of speakers presented tools for integrating complex spatial data and climate change effects with management, and an overview was given of a recently completed climate-aquatics vulnerability assessment for the Sawtooth National Forest (Idaho). The same small working groups were given spatially explicit climate projections on future stream temperatures and hydrologic patterns and asked to reassess their prioritization choices for bull trout populations from Day 1. This exercise formed the basis for a lively discussion for the remainder of the day. Although no concrete decisions were made on prioritization efforts for the bull trout populations used in the exercise, participants generally agreed on the potential utility of combining spatially explicit climate projections with decision support tools in providing a more robust approach for developing management actions. At the day's end, participants were provided with a platform to assess how the workshop information and tools will help them to meet the challenges of managing aquatic resources under a changing climate.

Recordings and PDFs of the speakers' presentations are available on the [workshop website](#). Visit the new [Climate-Aquatics Blog](#) for discussions on the latest research and management tools for addressing climate change effects on aquatic ecosystems.



GREAT NORTHERN LANDSCAPE CONSERVATION COOPERATIVE

Volume 1, Issue 3

Summer 2011

What's Happening and New?

GNLCC Calendar

Webinars

August 31st - Anne Kennedy, USDA-ARS
 September 28th - Greg McDermid, University of Calgary
 October - TBD
 November 16th - Josh Lawler, University of Washington
 December 14th - Rob Dielh and Rick Sojda, USGS

Workshops

September 7-8, 2011. GNLCC Federal Natural Resource Managers' Workshop.

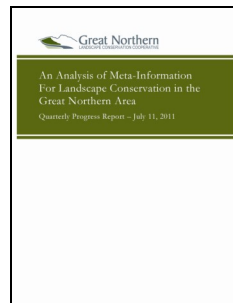
Steering Committee Meetings

September 1, 2011. Conference Call 9:30am MT/ 8:30am PT.

September 20-21, 2011. Fall 2011 Meeting.

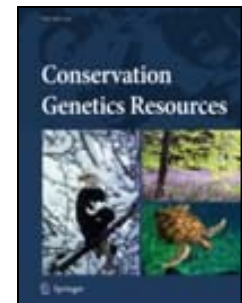
Visit our Web site for more info

Click on the thumbnail images of the report to view or download them.



An Analysis of Meta-Information For Landscape Conservation in the Great Northern Area. Quarterly Progress Report – July 11, 2011

Click on the thumbnail images of the report to view or download them.



Landguth, E. L. C. C. Muhlfeld and G. Luikart. 2011. CDFISH: an individual-based, spatially explicit, landscape genetics simulator for aquatic species in complex riverscapes. Conservation Genetics Resources. DOI: 10.1007/s12686-011-9492-6.

How to get involved

- Contact a Steering Committee member from your organization.
- Contact a member of the GNLCC Staff or Advisory Team.
- Submit items for the Fall newsletter by email to Leslie Allen. Deadline is Oct. 1.
- Present your GNLCC sponsored project at a Webinar. Contact Suzanna Soileau for more information.

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