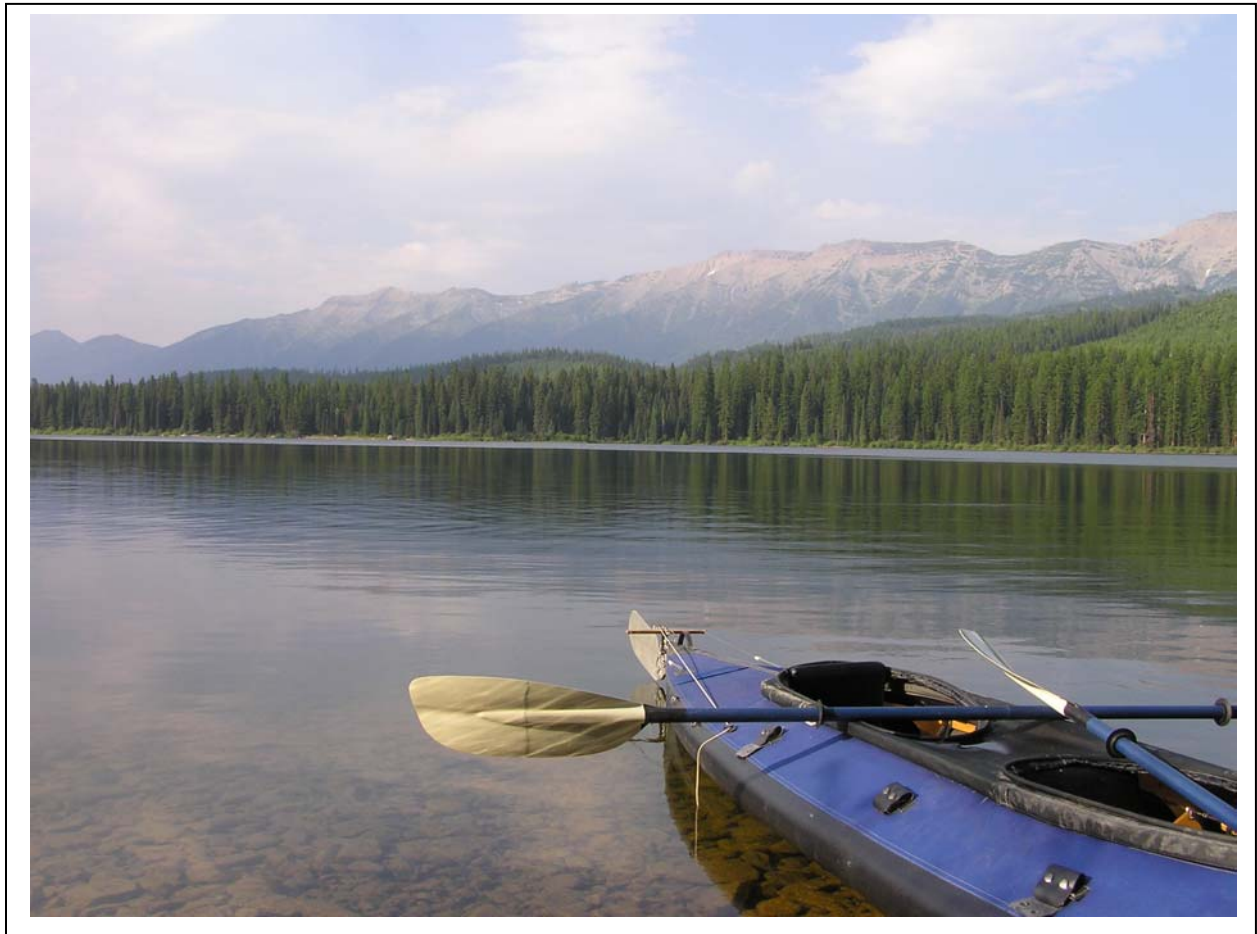


Clearwater Model Watershed Proposal



February 18, 2011

Clearwater  Resource
Council

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Acronym Key

BBCTU	Big Blackfoot Chapter of Trout Unlimited
BC:	Blackfoot Challenge
BCSP:	Blackfoot Clearwater Stewardship Project
CFMI:	Coordinated Forest Management Initiative
CFLRP:	Collaborative Forest Landscape Restoration Project
DARLOA:	Double Arrow Resort Land Owners Association
EMRI:	Ecosystem Management Research Institute
EOE:	Eye on the Environment
EPA:	Environmental Protection Agency
ESA:	Endangered Species Act
GIS:	Geographical Information System
HUC:	Hydrologic Unit Code
LRC	Lolo Restoration Committee
MCD:	Missoula Conservation District
MLP:	Montana Legacy Project
MT FWP	Montana Department of Fish Wildlife and Parks
MT DEQ	Montana Department of Environmental Quality
MT DNRC	Montana Department of Natural Resources and Conservation
NGO:	Non-Governmental Organization
PCT:	Plum Creek Timber Company
RMRC	Rocky Mountain Research Center
SEC:	Swan Ecosystem Center
SLCC:	Seeley Lake Community Council
SLCF:	Seeley Lake Community Foundation
SWCC:	Southwestern Crown of the Continent Collaborative
TNC:	The Nature Conservancy
TPL:	Trust for Public Lands
TU:	Trout Unlimited
U of M:	University of Montana
USFS:	United States Forest Service
WPG:	Watershed Planning Group

Introduction

The Clearwater Resource Council (CRC) is a local collaborative of talented and passionate professionals and citizens in Seeley Lake, Montana with a mission to initiate and coordinate efforts that will enhance, conserve, and protect the natural ecosystems and rural lifestyle of the Clearwater River Watershed of Montana for present and future generations. We recognize how critical the waters and aquatic resources of the Clearwater Valley are to the area's ecological values, quality living environment, economy, and rural lifestyle. Effective management of these resources is essential. CRC envisions a future for our Watershed that contains high quality water in our lakes and streams, productive tributary stream and riparian habitat networks that support resilient populations of bull trout, westslope cutthroat trout, western pearl shell mussels, and other native aquatic and terrestrial species dependent on them, and a local community that is engaged and supportive of watershed restoration efforts. CRC is the lead organization in the Clearwater Watershed for natural resource collaboration and accomplishes this through community discussion, educational efforts, collaborative planning, and cooperative monitoring, management and restoration activities. CRC emphasizes the need for a strong scientific foundation as a basis for sound decisions. With these priorities and needs, CRC is enthusiastic to engage in a long-term partnership with the Bonneville Environmental Foundation (BEF) in a Model Watershed project that could help address water quality, water dependent resources, and watershed integrity in the Clearwater Watershed.

CRC is very well positioned to make significant contributions to aquatic restoration through a Model Watershed project, and the current timing is excellent given a number of concurrent activities and programs that are being initiated. These activities have great potential especially if they can be effectively coordinated. The Clearwater Watershed is part of a new Collaborative Forest Landscape Restoration Program (CFLRP) of the U.S. Forest Service (USFS) that CRC helped organize and successfully propose for funding. This project, one of 10 selected in a nation-wide competition for funding starting in 2010, will provide up to \$4 million/yr available for the next 10 years to address fuels mitigation, fire management, terrestrial restoration, and aquatic restoration with an equal amount of non-CFLRP matching support for management and monitoring on USFS lands within the designated project area of the Clearwater/Blackfoot and Swan River Watersheds. The Montana Legacy Project (MLP), an unprecedented conservation effort that is placing 310,000 acres of former Plum Creek Timber Company lands in various conservation uses, recently acquired over 24,000 ac of lands within the Clearwater Watershed and is transferring these lands to USFS or Montana Fish Wildlife and Parks (MT FWP) ownership. These lands are of high conservation value as evidenced by MT FWP creating a new wildlife management area in the watershed (Marshall Creek Wildlife Management Area), but present many opportunities for restoration, especially for aquatic resources. America's Great

Outdoors program is being initiated, and highlights the Crown of the Continent (which includes the Clearwater Watershed) as a lead demonstration area for its programs. Other partners (e.g., Big Blackfoot Chapter of Trout Unlimited) are actively pursuing conservation projects in this important area. What is most needed is a coordinating group to provide collaborative planning, discussions, and implementation of needed restoration actions as well as keeping the local community aware of and engaged in these conservation programs.

CRC is very well positioned to be an organizer and facilitator of collaborative planning efforts, community involvement, educational outreach, monitoring, and cooperative project prioritization and fundraising. We can insure that a watershed perspective remains a primary focus in on-going terrestrial and aquatic ecosystem management programs. We have the capability within our membership and current collaboratives to help guide a watershed perspective that would assist in the integration of terrestrial and aquatic components, and reach out to the community to gain their insights, participation, and support. For these reasons, CRC can play a leadership role and be a catalyst for a watershed restoration focusing in the Clearwater Valley. A partnership with BEF will provide CRC the ability to conduct this coordinating role in an expanded long-term capacity and help maximize the effectiveness of the new funding opportunities for on-the-ground actions. In addition, a Model Watershed project could provide an opportunity to demonstrate a collaborative initiative that could be adapted in other watersheds.

This proposal describes how we intend to conduct a Model Watershed project in the Clearwater Watershed. We are able to provide substantial detail for the first 1-3 years of the project, and the work conducted during these initial phases will provide the information and planning needed to develop more specifics for the subsequent years of the project. We will work closely with BEF throughout the project to build an effective and continuing partnership to the benefit of both organizations.

The Clearwater Watershed

The Clearwater Watershed of northwestern Montana is located primarily in Missoula County with a small portion in Powell County. This Valley is located between the Mission Mountains to the west and the Swan Range (the western boundary of the Bob Marshall Wilderness Complex) to the east. The Clearwater is an ecologically significant area within the Northern Continental Divide Ecoregion, also known as the Crown of the Continent.

The Crown of the Continent is increasingly recognized for its unique qualities in the lower 48 states. Long (2001) wrote that:

“If you ask what is so special about the Crown of the Continent, be prepared to receive many different answers. A geologist may say it’s special for its ancient rocks and glacially carved mountains. A biologist may explain that the Crown of the Continent is special for its full theater of native wildlife, including rare species such as grizzly bear, wolf, and lynx, and more than a thousand species of plants. A tourist may marvel at its spectacular mountain scenery and wilderness solitude. A Blackfoot or Kootenai traditionalist may explain her connection to the land with an ancient story. A resident may explain that it is home and a place to work, live, and play within a spectacular setting. Others may applaud the Crown of the Continent’s pure air and water, free-flowing rivers, beautiful native fish, breathtaking bird migrations, or fascinating human history and vibrant current culture. All of these images are true, but none alone is complete..... The Crown of the Continent can be thought of as the headwaters of North America, as it includes a rare “triple divide,” a point where precipitation drains into three oceans: the Pacific, the Arctic, and the Atlantic”.

Ecological Context

The Clearwater Watershed is an important contributor to the overall integrity of the Crown of the Continent and surrounding regions. To the north, the Swan Valley is the headwaters to the Swan River, while to the south the Blackfoot Valley forms the southern boundary of the Crown. The status of terrestrial and aquatic ecosystems in the Clearwater is linked to these neighboring areas, and together they comprise what is now being called the *Southwestern Crown* of the Continent. While each watershed has its individual needs and challenges, watershed managers, community leaders and active citizens operating in each watershed recognize the importance of mutual support and collaborative efforts if the integrity of the Southwestern Crown is to be maintained.

The Clearwater River is one of four primary tributaries of the Blackfoot River, which in turn flows into the Clark Fork and then into the Columbia River. The Clearwater River has provided an important source of clean, cold water to the Blackfoot River and is an outstanding resource in its own right. In addition to its network of streams and rivers, the Clearwater Watershed supports a chain of natural lakes that are unique in the Clark Fork Basin in their ecological, recreational, and aesthetic values, and are central to the local and regional economies. The Clearwater Watershed supports a particularly important aquatic community in the region. The River and its tributary streams support some of the few remaining genetically pure populations of westslope cutthroat trout and populations of threatened bull trout. The six larger lakes support populations of lake migratory bull trout and westslope cutthroat trout that are unique in the upper Clark Fork River basin. Several streams in the watershed are considered critical spawning and early rearing habitats for these species. MT FWP has

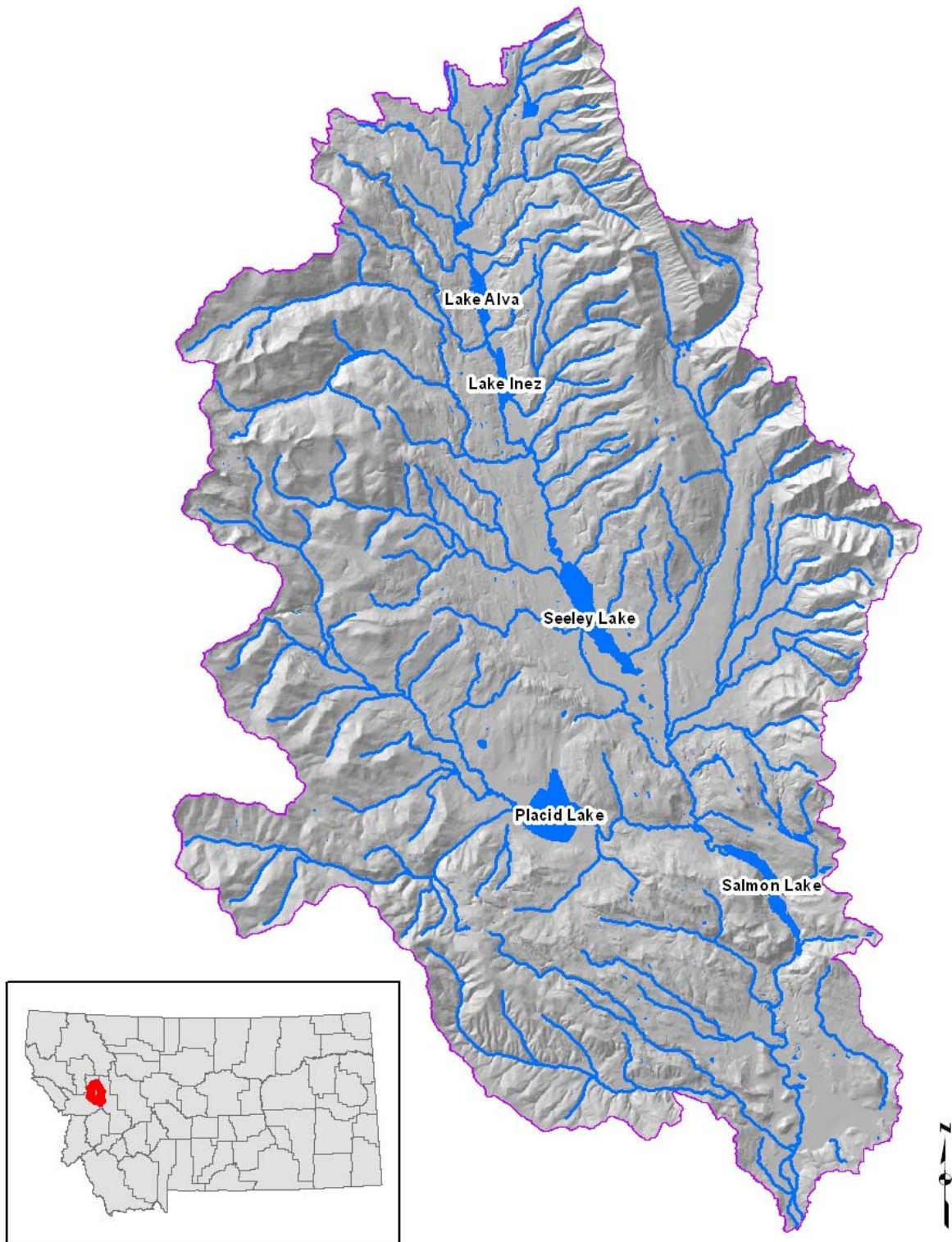


Figure 1. Shaded topographic map of the Clearwater watershed showing drainages and major lakes.

identified the West Fork of the Clearwater River, East Fork Clearwater River and Morrell Creek as "core" populations of bull trout, while the Fish and Wildlife Service has identified them as critical habitat for ESA recovery efforts. The status of these populations and their watersheds is an important concern. MT FWP data show that bull trout occurred in multiple other streams of the basin, but have declined or even disappeared in many. Maintenance and restoration of habitat is critical for bull trout and westslope cutthroat trout, but it will also benefit a diversity of native terrestrial species including grizzly and black bear, bald eagle, and others birds and small mammals that use riparian corridors as migration and foraging areas.

Social Context

The community of Seeley Lake is the largest town in the greater Blackfoot Watershed and is the primary population and economic center in the Clearwater Valley. Approximately 2,200 people reside year around and this number swells to around 4,000 in the summer months. Between 1990 and 2000, the population of full time residents grew 3%. The trend is similar to that in the rest of Missoula County and is slightly faster than the City of Missoula. As compared to the average of Missoula County, the age structure is skewed toward a higher percentage in the 40 to 70 year grouping and away from 20 to 40 year olds.

The economy of the watershed is diverse. The four largest employment categories (construction, manufacturing, retail trade, and accommodations and food service) in the region are all related either to providing services to residents and tourists or processing timber products. The largest single employer is Pyramid Mountain Lumber and the timber industry remains the largest employment sector. Timber harvest and production, while declining in importance, still play a central role in the region's economy. The construction industry is an important employer and includes those building new homes and businesses and remodeling existing structures. In 1999, Income levels were slightly lower for both men (\$31,000) and women (\$18,000) than the county averages (\$32,000 and \$22,000 respectively).

Land ownership patterns in the watershed reflect a mix of state, federal, and private lands (Figure 2). The amount of non-industrial private land in the Clearwater Watershed is relatively small (8% of the watershed) and is clustered around the town of Seeley Lake. While ranching dominates the private land uses in much of the rest of the larger Blackfoot watershed, the heavily forested Clearwater supports predominantly small residential properties embedded within substantial public lands and remaining industrial forest lands. The largest private landowner, Plum Creek Timber Company, has been divesting its lands throughout western Montana and especially in the Blackfoot watershed, but still owns approximately 55,000 acres of the Clearwater watershed (Table 1).

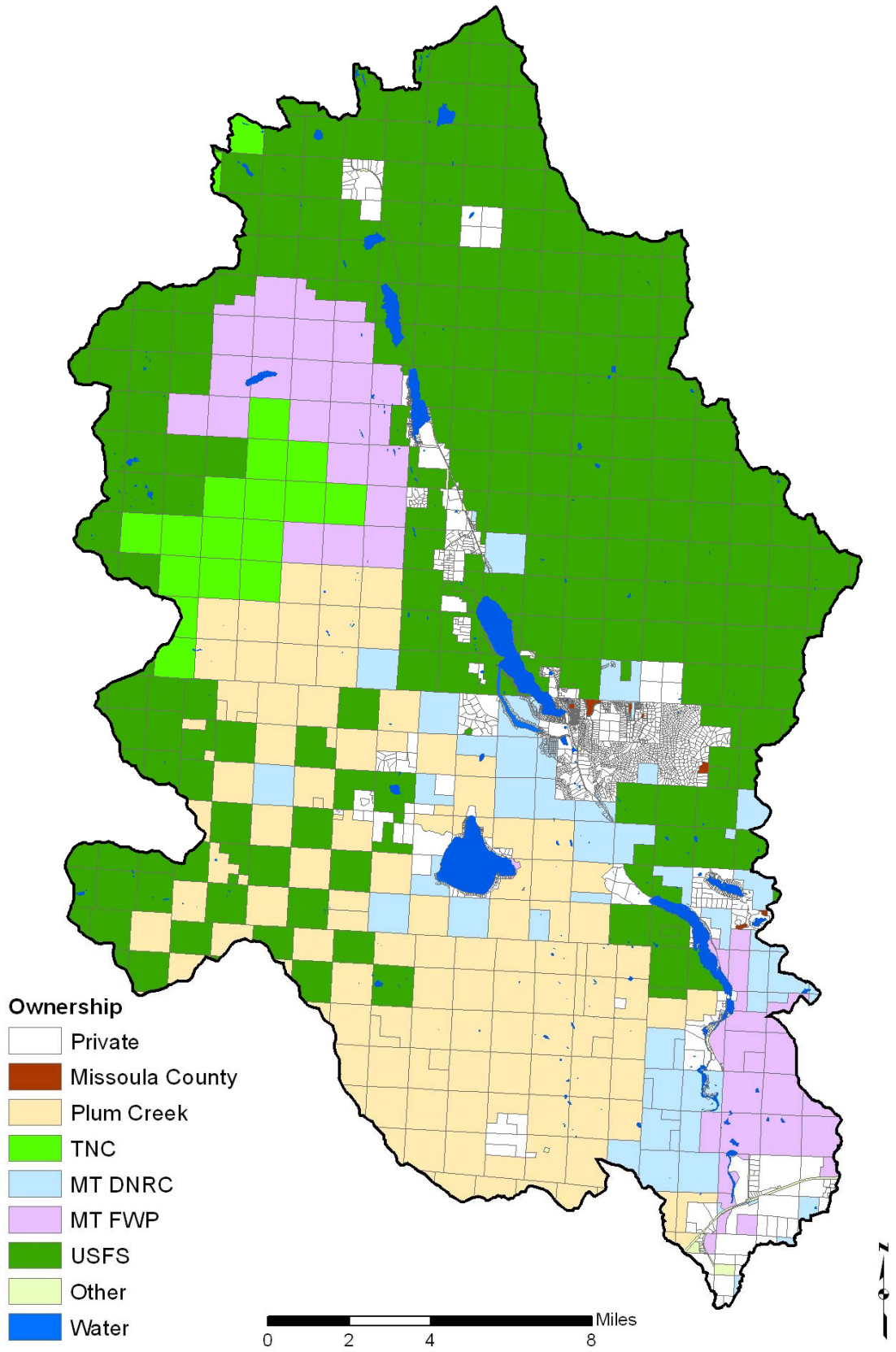


Figure 2. Ownership patterns in the Clearwater Watershed.

Table 1. Clearwater Watershed ownership patterns.

Ownership	Acres	Percent
USFS	121,137.92	48.78
Private- Plum Creek	55,237.70	22.24
Private	19,064.99	7.68
Private – TNC	10,524.91	4.24
MT FWP	21,118.59	8.50
MT DNRC	17,368.45	6.99
MT DOT	68.68	0.03
Missoula County	157.26	0.06
Water	3,024.81	1.22
Other	637.81	0.26
Total	248,341.13	100.00

Seeley Lake is also the largest unincorporated town in Montana. A Community Council advises the County Commissioners on land use and other community matters and eight boards oversee specific functions: water, sewer, hospital, refuse, parks, cemetery, fire and schools. Despite the fact that there is no central government structure, the town has been able to organize, deliberate and act, although not without debate. The fact that a comprehensive land-use plan has been drafted, debated in a public forum and approved and enacted is testament to the capability of the community to act on perceived opportunities and challenges. In addition to the Community Council and boards, there are 28 non-profit organizations, 8 churches and 12 land-owner associations; a considerable number relative to other towns of comparable size. The community of Seeley Lake obtains its water from Seeley Lake. There is concern about declining water quality in the lake both from an ecological standpoint as well as from the potential impacts to water supply, recreation, aesthetics, and the local economy. Local efforts are working toward a much needed sewer system to help combat declining water quality. However, information is lacking on the factors influencing water quality and lake conditions, and an even poorer understanding of what is known exists among most residents in the community. A sewer could have a significant economic impact on a limited part of the community resulting in considerable debate over the costs and benefits.

Clearwater Resource Council

The Clearwater Resource Council was formed in 2003 by a group of local citizens interested in a place-based organization focused on natural resource issues in the area. CRC works to initiate

and coordinate efforts that will enhance, conserve, and protect the natural ecosystems and rural lifestyle of the Clearwater River region of Montana for present and future generations.

The original goals of CRC were to:

- Build community capacity to resolve issues;
- Create opportunities for interaction among citizens, businesses and agencies;
- Build common ground by consensus process;
- Facilitate timely collection and dissemination of information;
- Enhance the understanding of cumulative effects of land management practices; and
- Develop and support responsible resource stewardship programs.

Through the Model Watershed project, we plan to accomplish many of these goals while expanding our capabilities in terms of active coordination of watershed restoration.

Past accomplishments and current projects:

Since its inception, CRC has worked on a variety of natural resource issues and needs. Among our accomplishments are the following:

Seeley Lake Fuels Mitigation Task Force. We guided creation of the Seeley Lake Fuels Mitigation Task Force in 2004. The Task Force provides coordination of fire suppression activities by agencies, fuel mitigation across ownership boundaries, and provides financial and technical assistance to private landowners for fuels reduction projects. To date, the Task Force has acquired over \$500,000 in grants that have been distributed to private landowners for fuel mitigation in the valley.

Land use planning. We completed and released a “Landscape Assessment” of the Clearwater Valley in 2005. This assessment, updated with refined aquatic information in 2008, provided the scientific background and the impetus for the Seeley Lake Community Council’s development of the Seeley Lake Regional Land Use Plan that was approved by the Missoula County Board of Commissioners in October 2010. The Plan specifies land use designations that are expected to be implemented through zoning that will guide future development in the watershed and help maintain key conservation values as well as working forests and lands accessible to the public for recreation.

Collaborative Forest Landscape Restoration Program (CFLRP). Working with our neighboring organizations the Blackfoot Challenge to the south and the Swan Ecosystem Center and Northwest Connections to the north, we initiated and developed the Southwestern Crown of the Continent Collaborative (SWCC) in partnership with the U.S. Forest Service (USFS). CFLRP, an offshoot of the Forest Lands Restoration Act that called for funding of landscape scale

collaborative projects by the USFS, was initiated in 2010. The SWCC prepared a proposal, and was one of 10 CFLRP projects in the nation selected for funding in 2010. The project, with a planned ten year duration, would provide funding to conduct work on USFS lands including fuels mitigation, terrestrial and watershed restoration, and multi-party monitoring. The SWCC, with CRC as a member, will guide the project's restoration actions and monitoring in the Swan, Clearwater, and Blackfoot valleys for the next ten years with anticipated annual appropriations of up to \$4 million. Several of our board members are actively engaged or leading planning efforts in the CFLRP.

Coordinated Forest Management Initiative (CFMI). CFMI was initiated by CRC in 2009 to assist in the coordination of vegetative management actions on forest lands in the watershed. A secondary purpose of the CFMI is to integrate vegetative management with other coordinated management efforts, especially the Watershed Planning Group (see below), Fuels Mitigation Task Force, and the CRC Weed Mitigation Task Force (see below). CFMI has been supported by the Seeley Lake Community Foundation and has built a diverse and inclusive collaborative group representing a broad spectrum of agencies, organizations, companies, and the local citizenry.

CRC support of the Montana Legacy Project (MLP). The MLP has transferred 310,000 acres of Plum Creek Timber Company land in western Montana to conservation purposes, primarily through completed or planned transfer of ownership to the USFS, MT DNRC, and MT FWP. We helped guide and support the selection of approximately 24,000 acres in the Clearwater Valley for inclusion in the MLP, and facilitated the involvement of the Seeley Lake community with the project.

CRC Weed Task Force. We formed the CRC Weed Mitigation Task Force in 2008 and worked with the Ecosystem Management Research Institute to develop a Coordinated Invasive Weed Management Strategy for the valley. The Strategy serves as a guiding vision for coordinated weed management across ownership boundaries. The Weed Task Force has acquired funding from the National Forest Foundation, MT Noxious Weed Trust Fund, Missoula County Resource Advisory Committee, Missoula County Weed District, Seeley Lake Community Foundation and other sources and used these funds to map weed locations or absence on over 600 miles of roads, trails, and transects in the valley since 2009, and is funding strategically located control of the weeds that have been mapped.

Adopt-A-Lake. In 2008, in response to State delisting (under 303d) of several lakes in Clearwater because of a "lack of credible data", we initiated the Adopt-A-Lake program to monitor the status of lakes in the Clearwater Valley. This program recruited over 25 volunteers

that sample water clarity and temperature on eight lakes in the valley throughout the summer, and has synthesized this information and reported it back to the community. The program serves as a source of information, but also as a forum for education of citizens about the linkage between our lakes and human activity in the watershed.

Clearwater Watershed Planning Group (WPG). With funding from the State Department of Environmental Quality (MT DEQ), we convened the WPG, which includes agencies, organizations, companies, and individuals with an interest in watershed planning within the Clearwater watershed. This group has focused on a synthesis of water quality issues and aquatic management and information needs in the watershed. Using funding obtained from DEQ, the WPG has also been working with the University of Montana to conduct a critical analysis of existing data for Seeley and Salmon Lakes.

Streamside Demonstration Projects. We have initiated demonstration restoration projects in collaboration with local schools and homeowners associations. One such project, a “riparian classroom” on Morrell Creek located next to the Seeley Lake High School, is involving local students in a hands-on restoration of degraded riparian terrace along an important bull trout stream. Another newly initiated project on Trail Creek will focus on streamside management in a commons area of the largest homeowners’ association in the watershed. Through these highly visible projects we hope to educate private landowners in the role and value of properly managed streamside areas.

Community education and information. Since the inception of CRC, we have sponsored over 50 public meetings on a range of conservation subjects, contributed numerous articles to the local newspaper, hosted field tours and workshops, and set up informational booths at local festivals and markets. For example, we write every fifth “Eye on the Environment” article that appears in the weekly local paper. We also maintain an active web site as a source of information on natural resource discussions and issues for our members and other interested parties: <http://www.crcmt.org/>.

Partnerships

CRC conducts some projects and activities on its own, but we recognize that success of watershed restoration depends on broad partnerships and coordination. CRC does not have the funding or capacity to accomplish more than small on-the-ground actions, but through partnerships, coordination, and leveraging of resources, tremendous benefits can be accomplished. The initiatives we described above provide a sense of the range of partnerships and collaborative initiatives that have been developed. In addition to our committees and relationships in the community we have active partnerships with the following agencies,

groups, and organizations. With **Federal agencies**, we are most active with the USFS, assisting the local Ranger District with outreach and interaction with the community as well as having a Master Participating Agreement with the Lolo National Forest. We have provided support and consultation for staff in the Regional Office as well, but our main interactions occur at the local level. The USFS is a partner in the Fuels and Weed Task Forces, the Coordinated Forest Management Initiative, the WPG, and is a partner and partial funder for the Morrell Creek demonstration project. We have convened community meetings to discuss USFS possible management directions- allowing for community discussion and input outside of a formal NEPA process. We coordinate weed mapping and control with the District to maximize efficiencies and effectiveness of efforts. We are also directly engaged in the CFLRP project, providing communication with the community, helping draft proposals, helping prioritize project actions, and assisting with and even leading elements of monitoring design and implementation. Two USFS employees currently serve on CRC's Board of Directors. One of our board members is retired from USFS research and retains strong ties with the Boise Aquatic Sciences Laboratory. CRC also has representation on the Montana Forest Restoration Committee, a consensus based, collaborative group formed in 2007 to help guide restoration of Montana's National Forests. Efforts are based in a series of ecological principles and restoration ecological function for terrestrial and aquatic systems. One of our board members sits on the Lolo Restoration Committee (LRC) providing an aquatic perspective for projects proposed on the Lolo National Forest.

CRC partners with a number of **State agencies**. We work most closely with MT FWP who cooperates with CRC on the WPG, CFMI, and the Weed Task Force. Biologists from the agency work closely with CRC staff, Board, and members on many of CRC's activities, and we provide assistance on field projects and outreach to the community. MT FWP was actively involved in CRC's land use planning efforts. MT FWP biologists have been on CRC's Board, but none are currently serving in that capacity. We also partner with MT Department of Natural Resources and Conservation (MT DNRC). MT DNRC is a partner in the Fuels and Weeds Task forces, the WPG, and the CFMI. MT DNRC foresters attend these meetings as well as other CRC community meetings. Montana Department of Environmental Quality (MT DEQ) is a partner in the WPG, and funded a 319 grant that supports the lake efforts with the University of Montana.

CRC is an active partner with **Local government**. The Missoula County Weed District is an active participant in the Weed Task Force, and a fiscal sponsor to CRC funding from the MT Noxious Weed Trust Fund as well as a funding contributor. Rural Initiatives, a county department created to help link the county to rural communities, is a participant on the WPG, Landscape Assessment, Land Use Planning, and other initiatives. CRC has frequent interactions with and is asked to provide input to the Sewer Board and local Seeley Lake Community

Council, the elected advisory board to the county commissioners. CRC has worked with the Missoula Conservation District (MCD) to do outreach and education regarding management and conservation of private stream-side lands. We've developed a collaborative demonstration project funded through the MCD.

CRC works closely with a number of **Non-government Organizations**. A close relationship exists with the Ecosystem Management Research Institute (EMRI) which has provided conservation planning assistance, GIS support, data analysis, and grant writing assistance to CRC. Because of the conflict of interest with the personnel involved, EMRI does not engage in any direct financial exchanges with CRC, but EMRI has obtained its own grants to provide support to various CRC projects. CRC partners with the Big Blackfoot Chapter of Trout Unlimited (BBCTU). BBCTU is a partner on the WPG, and has been supportive of other CRC meetings and initiatives such as the riparian demonstration projects.

The Blackfoot Challenge and CRC work together on a range of initiatives, and the Boards of both organizations exchange invitations, agendas, and minutes to Board and membership meetings. The Challenge is a partner on the WPG, and interacts closely with the Weed Task Force. CRC has provided assistance to the Challenge in setting up new Fuel Task Forces in other communities within the Blackfoot Watershed modeled after the Seeley Lake Fuels Mitigation Task Force. The Challenge is a partner in the CFLRP, and in the Southwest Crown Biomass Working Group that CRC is also a member. Each year, CRC, the Challenge, Swan Ecosystem Center and Northwest Connections plan a Southwest Crown Workshop on a current topic (e.g., biomass) and invite interested groups and individuals to attend. The Swan Ecosystem Center (SEC) and Northwest Connections are two organizations located in the Swan Valley to the north of the Clearwater Watershed. CRC collaborates with these two organizations, with SEC being a partner in the Fuels Task Force, and both groups working in CFLRP, the Southwest Crown Biomass Working Group, and the Southwest Crown workshops. CRC serves as a local facilitator and outreach partner for both the Nature Conservancy and Trust for Public Land, serving in this capacity for the Montana Legacy Project, and interacting with both TNC and TPL in conservation planning. TNC currently owns some of the MLP lands in the Clearwater Valley, and is working with the Weed Task Force to address weed control on some of these lands. The Seeley Lake Community Foundation is a local fund raising group that supports local community needs, education, cultural activities, and the environment. The Foundation has provided grants to CRC for development of the Landscape Assessment, support of the Weed Task Force, and lake monitoring. Recently, the Foundation identified CRC's CFMI as an important need, and selected this project as one of its leadership initiatives.

In addition, CRC is a partner in a **Local Cooperative Initiative**, the Blackfoot-Clearwater Stewardship Project (BCSP) that includes Pyramid Lumber, The Wilderness Society, Montana Wilderness Association, and others and is seeking to pass legislation to support local forest management, biomass development, and wilderness designations. The BCSP proposal was included as one of the three components of Senator Tester’s Forest Jobs and Recreation Act that was part of the Omnibus Bill that did not pass in the last Congress.

CRC partners with **Businesses**, working with Pyramid Mountain Lumber on biomass initiatives and with PCT on the WPG. PCT has also helped support the Adopt-A-Lake program by providing sampling equipment and has been loosely engaged with the Weed Task Force. PCT was actively engaged in Land Use Planning, but not in partnership with CRC.

CRC partners with local **Homeowner’s Associations**. The Double Arrow Ranch Landowners’ Association (DARLOA) and the Eagle Point Ranches Homeowners’ Association are partners in the Weed Task Force. DARLOA is also a partner in the Fuels Task Force, and helps sponsor an annual fuels mitigation meeting for the community. The new Trail Creek Demonstration Project is a partnership with DARLOA focusing on their community picnic area and “Homestead Cabin”.

CRC is a partner with **Universities**. We are currently contracting with the University of Montana as part of our analysis of the lakes. We have history of collaborative relationships with academic and support staff in several departments. In addition we have received analytical support and donations of materials and equipment from the University of Montana, University of California, Davis, and University of Wisconsin.

Finally, CRC partners with **Seeley Lake Schools**. CRC has worked with 7th-8th grade science teacher and the Seeley Lake Elementary School to develop the Morrell Creek riparian classroom, an ongoing project to engage students in riparian restoration and field based, experiential learning. CRC is a partner in two new initiatives along with the USFS, the Children’s Forest and Kids in the Woods. The Model Watershed project would fit well with these two programs.

Project Personnel

CRC has assembled a team that will oversee and conduct this proposed project. In addition, CRC will involve the members of the WPG and other interested parties in the project. The initial team for the BEF work includes Bruce Rieman, USFS scientist emeritus, Jon Haufler, Executive Director of the Ecosystem Management Research Institute, Ken Barber, Program Director of CRC, Bill Wall, President of Sustainability, Inc., Carol Evans with Sustainability Inc., and Lee

Boman, CRC's community outreach coordinator. Brief bios of these individuals are included in Appendix A.

Bruce Rieman will be the aquatic science lead on CRC's team. He will help coordinate and guide prioritization of watershed management actions, and will assist in design of the monitoring component. Jon Haufler is the science lead for terrestrial restoration and fuel mitigation initiatives, and will be coordinating the integration of aquatic and terrestrial restoration planning. As current president of CRC, he will also assist in coordination of planning and monitoring efforts with partnering agencies and organizations. Ken Barber, as CRC's Program Director, will be the primary project coordinator and will manage project committees, tasks, meetings, reporting, and other activities. Lee Boman will be responsible for leading the community outreach effort. He will be assisted in this by Carol Evans, and Ken Barber. Carol will particularly focus on outreach to local students. Bill Wall will assist with overall project coordination, outreach, and management.

The Model Watershed Project

Vision

Water quality and the integrity of streams, rivers, lakes and their associated biotic communities in the Clearwater watershed are essential elements to our mission. We envision a future for our Valley that has diverse, productive, tributary stream and riparian habitat networks that support resilient populations of bull trout, westslope cutthroat trout, western pearl shell mussels, and other native aquatic and terrestrial species dependent on those networks. We envision larger streams and rivers that maintain sufficient flows of high quality water to serve as effective connections for fish populations, riparian corridors for terrestrial species, and material supplies and export for the lakes. We also envision lakes in the Valley maintained with clean water in a near oligotrophic (low productivity, high clarity, well oxygenated cold water habitats) condition supporting viable populations of lake migratory bull trout and cutthroat trout, a diversity of other aquatic species, and high aesthetic values for recreation and tourism. Finally, we envision a community that is knowledgeable about its critical water and aquatic resources and that strongly supports conservation measures to maintain these resources for all their natural, economic and cultural values.

Our greatest current capacities are technical, but our opportunities are in our existing and potential links to the local and adjacent community, management agencies, and collaborating non-governmental organizations. Thus, we see our primary role in the Clearwater watershed as one of facilitation, coordination, education, and where needed, development of new capacity to accomplish meaningful conservation and restoration of terrestrial and aquatic natural

resources. We do not propose in this project to conduct large scale on-the-ground restoration activities, although we do see value in smaller scale demonstration activities such as the Morrell Creek project discussed above. This perspective could change over time, but with the capabilities of our partner agencies and other organization, we see our best contribution in coordination, demonstration, outreach and education, and technical scientific assistance. We have and will continue to focus on bringing our partners together to develop a common vision for restoration and conservation priorities; to engage, inform and build support among the broader community of citizens; and to develop critical information and capacity (both technical and social) for actions needed to move forward. Our work is based in four general principles: *a watershed scale perspective* that links activities and process across terrestrial and aquatic systems, across ownerships and across the broader time than even this project may encompass; *a collaboration among groups* including agencies, NGOs, local government, citizens, and schools; *an effective prioritization* that can guide available, and leverage additional, resources for actual restoration work; and a process of *monitoring to learn and adapt*.

Goals and Key Conservation Targets

Our primary goals are three -fold and inter-dependent. First is effective conservation and restoration of resilient native salmonid populations and the aquatic communities associated with these species. Second is effective conservation of diverse and resilient aquatic habitat networks that will support important ecological services regardless of whether native salmonids can persist given future conditions linked to climate change, non-native invasions and changing patterns of natural disturbance. Our final goal is to develop the capacity and commitment in the community of interested citizens and professionals to accomplish the first two and simultaneously maintain the natural resource values and ecological services of the watershed. The aquatic species, their habitats, and related values depend on a series of natural-cultural processes linking broader landscapes, populations, ecosystems and functions. For this reason the primary conservation targets we have identified are: 1) tributary streams and watersheds that represent critical spawning and rearing habitats and sources of water and material important downstream; 2) larger main stem tributaries and rivers that serve as migratory corridors and conduits for water and materials; and 3) the valley floor lakes that serve as key rearing and foraging habitats for migratory species and critical aesthetic and recreational resources in the community. The community of citizens in, and linked to, the Clearwater watershed define the values and potential conflicts in the management of terrestrial and aquatic resources and for that reason are considered as a 4th element in the supporting ecological system. We consider these systems and the challenges to conservation and restoration in turn.

Tributary streams and watersheds

The tributaries of the Clearwater watershed represent the spawning and early rearing habitat for resident and migratory forms of bull trout and westslope cutthroat trout. In concert with the associated watershed, riparian and wetland systems the tributary streams also represent the primary sources and storage of water, nutrients and organic materials that can directly influence the conditions in downstream rivers and lakes.

Existing and potential challenges to the integrity of these systems are varied. They include past effects of industrial scale forestry, riparian encroachment associated with roads and development of private property. They also include changing disturbance and hydrologic regimes linked to climate, and continuing management of forests to restore forest structure and mitigate fuels buildup in the wildland urban interface.

The Seeley Lake Ranger District of the Lolo National Forest has conducted a baseline analysis of watershed condition at the level of 6th code hydrologic units (HUCs). The analysis is based on indices of disruption or function linked to roads, road crossings, riparian shading from satellite imagery, and constraining landscape characteristics (slope, geology and soils). Road densities are “high” in much of the Clearwater watershed (Figure 3) and the Forest Service Bull Trout Level I Baseline considers most of the subwatersheds of the basin to be “functioning at risk” or “functioning at unacceptable risk” as a result of road related erosion, barriers to fish migration linked to stream crossings, reduced channel or habitat complexity because of reduced wood loading and elevated stream temperature through limited riparian shade. Roads and upland erosion are also believed to be a potential source of nutrients (as well as sediment), but data to consider nutrient influences in streams are virtually non-existent.

With proper maintenance, well designed roads may not represent a threat, but maintenance is expensive and often deferred. Road management could be a particularly important challenge on private residential lands and extensive private timber lands that have been transferred to public ownership in the last two years. Without long term maintenance, conditions could degrade.

Road obliteration could be an important option to mitigate the need for continued maintenance, but the costs can be substantial. Management and restoration of roads and stream crossings is also challenged by the need for continued access to support recreation and forest management. The problems of road and upland management and restoration are compounded by relatively limited information. Existing conceptual models are only weakly supported because of limited data or analyses of stream conditions linking to riparian or upland management. The data that do exist are often incomplete and sometimes at odds. For

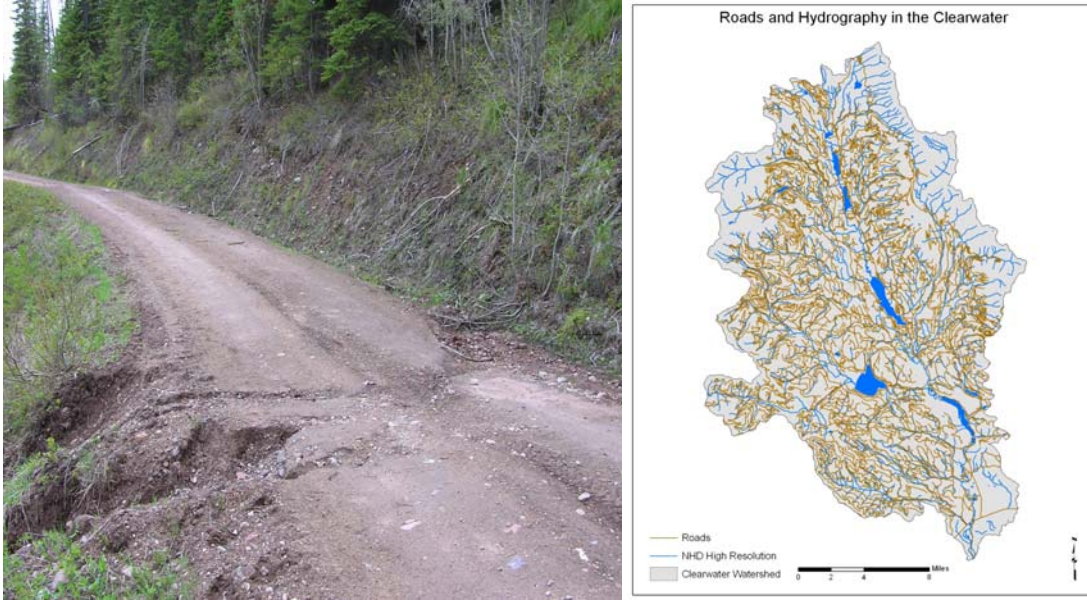


Figure 3. An eroding road segment on private land in the Clearwater Watershed (left) and mapped roads through the watershed (right). . High densities of roads and ineffective road maintenance or design can contribute to substantial erosion and delivery of sediments and nutrients to streams.

example, the recent Middle Blackfoot Nevada Creek TMDL (MT DEQ 2008) noted some sediment issues in five listed (303d) streams, but suggested that most are still supporting important uses. Sediment modeling has only been completed in those streams with very crude assumptions, while anecdotal information indicates that other streams may be in similar or worse condition. The result has been that restoration actions are controversial, often opportunistic rather than strategic, focused where funding or leverage for work exists, but not necessarily focused where they might be most effective or needed to conserve key habitats. Barriers to the upstream movement of migratory fish are commonly recognized as an important problem throughout the ranges of cutthroat trout and bull trout. Poorly functioning road culverts are the most common problem in the Clearwater watershed; most have been identified on Forest Service lands and a program of restoration has been initiated depending on funding for design and implementation. Downstream barriers exist in the form of unscreened water diversions that can entrain out-migrating adults and juveniles. Some have been resolved where cost effective solutions and land owner cooperation have been developed, but others remain to be explored.

Barriers can also provide some benefits. Non-native fishes occur throughout the Clearwater watershed, but the primary challenges associated with the tributary systems are brook trout and remnant rainbow trout. Brook trout are known to displace or replace westslope cutthroat trout populations and may also displace bull trout under some circumstances. Rainbow trout hybridize with cutthroat trout representing potential for “genomic” extinction. Typically,

invasions occur from downstream and managers often use intentional barriers to preempt them. The problem is that barriers also block migration of native species increasing local extinction risks associated with isolation. Fertile rainbow trout are no longer stocked in the Clearwater although existing hybridized populations could continue to disrupt the genetic integrity of remnant cutthroat stocks. Resolving tradeoffs between intentional isolation and potential invasions is a remaining challenge for barrier management.

Riparian and channel encroachment also has been a problem on private lands. Several important tributaries flow through subdivisions developed at relatively high densities and small lot sizes (1-5 ac.). Streamside landowners often prefer their homes and structures near or in the riparian area and commonly remove or alter vegetation to enhance views or access. Structures located in the flood plain or channel migration zone are vulnerable to bank erosion and channelization and bank armoring are common problems. Although riparian management laws exist, they are contentious and difficult to enforce. Many landowners are highly supportive of natural resource values, but simply unaware of the issues or the characteristics of healthy riparian systems.

Restoration of forest structure and composition and fuels mitigation have become dominant efforts in forest management over the last decade. This is in response to changing fire regimes and loss of ecological functions created by past fire suppression and intensive and selective timber harvest, climate change and an expanding wildland urban interface. Restoration of more diverse and functional forests and more natural fire regimes can be important to restoration or maintenance of stream systems, but aggressive management can also compound existing problems. Large, severe fires, for example, may threaten small isolated trout populations, but extensive ground disturbance and the roads needed to support forest management could as well. Both conflict and opportunity exist and the challenge is to find those in a way that can leverage simultaneous benefits and minimize regulatory “gridlock” (e.g., Rieman et al., 2010).

Desired conditions- The history of exploitive land use in the Clearwater watershed has left a legacy of watersheds, streams and habitats that are thought to be substantially altered from natural conditions. The Forest Service now considers all of the HUC 6 watersheds to be “functioning at risk” or “functioning at unacceptable risk” for persistence of species like bull trout. These classifications are based on general indices of watershed disruption. The desired condition at the end of this project is to have at least three key watersheds at or clearly trending toward a properly functioning condition. Further, the Forest Service conceptual model should be validated to provide a quantitative evaluation of desired watershed condition based on departure or convergence with reference conditions.

Main stem tributary streams and rivers

The main stem Clearwater River and lower reaches of the major tributary systems serve as migratory corridors for bull trout, westslope cutthroat trout and other fishes (Figure 4). The main stem Clearwater and lower West Fork Clearwater and Marshall Creek support remnant populations of western pearl shell mussel. The associated riparian areas are also important migratory corridors and feeding areas for grizzly bears, bald and golden eagles and other terrestrial species.



Figure 4. A pair of large, lake migratory bull trout spawning in a tributary of the Clearwater Watershed.

The condition of the riparian areas and the timing and amount of water moving through the Clearwater stream and lake network has a primary influence on a variety of ecological processes and human uses. The timing and volume of flow influences the connectivity of stream and lake habitats used by migratory fishes. The volume of runoff and water elevation in wetlands will directly influence the export of dissolved organic carbon and nutrients and control the flushing or turnover time of lakes, lake productivity and eutrophication.

Control of lake surface area with outlet dams and surface and ground water development have occurred in the watershed, but the relative significance of water lost to evaporation and human uses is unknown. The watershed is currently closed to surface water development, but further development of groundwater for single family domestic use is not restricted. Current controversy over water regulation could force any further development away from community water systems to individual residential systems potentially reducing the efficiency in water use. The town of Seeley Lake is seeking expansion of its water supply and continued growth is possible if not likely throughout the valley. In low water years very low flows in many streams

have constrained or eliminated access to migratory fishes because of stream drying and extreme temperatures. The anticipation of reduced snow pack and earlier runoff, increased warming and evapo-transpiration, and greater variability in overall precipitation with climate change could substantially aggravate water availability (Figure 5). An important challenge is simply understanding existing surface and ground water supply (e.g., where does most originate, where is it stored?), the relative influence/significance of existing development, and the relative vulnerability of critical resource values and locations to further urban development.

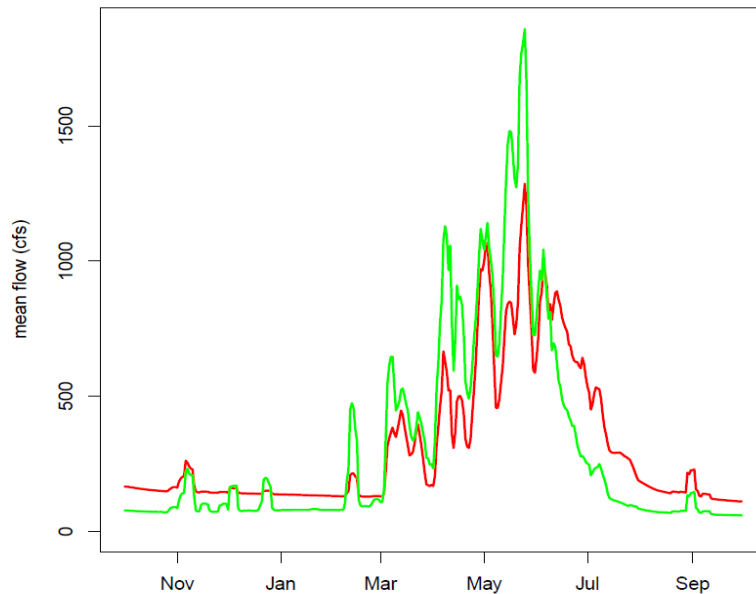


Figure 5. Predictions of 20 year mean stream flows for a single HUC 6 in the Clearwater watershed for recent history and those anticipated from downscaled climate projections in the future. Predictions are based on the work outlined in Wenger et al., 2010. Note the substantial changes anticipated in timing of summer low flow conditions.

Riparian encroachment has occurred on private lands adjacent to main stem tributaries as well as smaller streams. Larger streams are also important for recreational access and depending on the stream, used for floating, swimming and even water skiing. Bank erosion associated with wave wash and heavy access points are noticeable and could further contribute to degraded ecological conditions in the river habitats. Finding a balance between recreational use, in-stream and community uses of water, and the other ecological services provided by main stem tributaries and rivers will be a challenge.

Desired conditions- Main stem riparian areas, channels and flows have been altered by human development and conditions exist, at times, that are unsuitable as salmonid habitats and migratory corridors. There is little information to characterize more natural conditions so the departure is not clear to either specialists or the public. The desired condition is broad

recognition of the need to maintain flows and riparian conditions for fish and wildlife and an appropriate baseline of flow and existing water development that can be used to justify efficient water use, and reasonable limits to development.

Lakes

The Clearwater watershed includes five major (> 250 acre) lakes, several between 50 and 250 acres and many smaller lakes, ponds and wetlands (see Figure 1). The lakes are extremely important natural resources for the local communities, the region, and the State of Montana. Fisheries, wildlife, recreation and aesthetic values are central to tourism, local lifestyles, and the local and regional economy. The lakes support subadult and adult rearing and refuge for populations of migratory bull trout and westslope cutthroat trout, loons, and other wildlife that are rare outside of the encompassing Blackfoot and Upper Clark Fork River basins. Seeley Lake serves as the primary water source for the town of Seeley Lake. The maintenance of the unique values, economic vitality and beauty of the Clearwater Watershed depends in an important part on the quality and character of these waters. The potential for "cultural eutrophication," or increasing productivity related to human development, is an overarching challenge. As lakes become more productive (more eutrophic), water clarity or transparency declines, the potential for nuisance algae blooms increases, and oxygen and cold water habitat for salmonids declines. In general, many of the natural resource values and aesthetic qualities decline as well.

Current information indicates the larger lakes (> 100 ha) in the watershed range from oligotrophic to mesotrophic (Rieman et al., 2010). The US EPA (1977) estimated that phosphorous loading to Seeley Lake exceeded "permissible" levels for eutrophication, but were less than "dangerous" levels. Estimates attributed most of the phosphorous and nitrogen loading to three tributaries (Clearwater River, Deer Creek and Seeley Creek) and to septic systems in the area. The current levels of loading from tributaries, septic systems and other sources are unknown. The West Fork Clearwater River remains 303 d listed for contact recreation and nutrients, but recent samples are limited and probably are not adequate to reconsider loading rates from any tributary (MT DEQ 2008). At the same time development has continued around the lakes and concern regarding failing or inadequate septic systems was expressed in the preliminary engineering report for the Seeley Lake Sewer District. Well sampling conducted by the local Sewer District confirm that groundwater near Seeley is heavily contaminated with nitrate-nitrite N, chlorides and e-coli bacteria. Recent work in the lakes indicates that nitrate-nitrite N levels are more commonly exceeding detection limits there as well. All lakes have shown at least some seasonal oxygen deficits (Rieman et al., 2010). Those are most pronounced in the south end of Seeley Lake and the southern-most basin of Salmon Lake (Figure 6). Anoxia of sediments could result in important internal nutrient loading that would not be evident in traditional loading calculations (e.g., Carpenter 2003). Reduced stream

flows during recent drought years and lower flows anticipated with reduced snow pack and earlier runoff attributed to changing climate could reduce flushing and exacerbate internal nutrient loading as well.

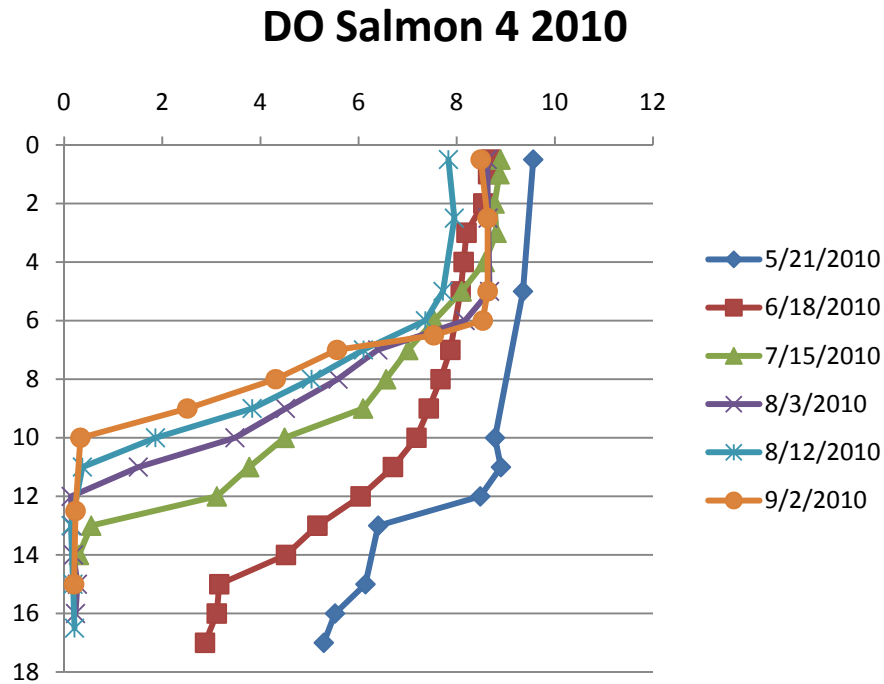


Figure 6. Dissolved oxygen concentrations (mg/L on the horizontal axis) by depth (meters on the vertical axis) and date for a site on the south end of Salmon Lake in 2010.

Dissolved oxygen declines steadily from ice off in the spring through the period of summer and fall stratification. The anoxic waters deep in the lake will probably exclude habitat use for any coldwater species. The town of Seeley Lake is the largest community without a sewer in Montana, and although the Sewer District has been in place for 18 years, funding and community support for implementation have yet to emerge. Controversy has been tied to uncertainty about pollution and its influence on the lakes and the cost a sewer would impose on low income families.

In response to our own concerns, confusion with MT DEQ listing and delisting, and the controversy in the community, the Clearwater Resource Council launched the Adopt-A-Lake monitoring program in 2008. The intent was to educate ourselves and the community about the lakes, begin to develop new information, and broaden the discussion. We also obtained funding for limited, but more refined nutrient and oxygen sampling (see figure 6) and synthesis of available information through the University of Montana, and donations of equipment and analyses from the Flathead Lake Biological Station, University of California and University of

Wisconsin. The discussion has begun, but the challenges of resolving the extent of human vs. natural influences on lake conditions and building community support for long term solutions remain.

Desired conditions- The lakes of the valley are vulnerable to the effects of past and continuing development. Lack of information has fueled debate about the condition of the lakes and divided the community over potential solutions. The desired condition is broad recognition in the community of the linkages between human development, land use and lake condition. That recognition will lead to significant positive steps to reduce existing nutrient loading associated with Seeley and Salmon lakes and effectively guide or mitigate future development that could influence any of the lakes.

Human Community of the Clearwater Valley

Much of the human population is clustered around the 5 larger lakes (Alva, Inez, Placid Seeley, Salmon, the central business district of the town of Seeley Lake, and the Double Arrow development. Based on the amount of public land in the watershed as well as guidance for future development contained in the recently approved regional land use plan, the distribution of population centers is not likely to measurably change in the years ahead.

There are a considerable number of local organizations such as landowner associations, recreational use associations, the Chamber of Commerce representing businesses, boards and other associations (Church based, Lion's, etc.). The Seeley Lake Community Council is the locally elected advisory group to the County Commissioners, the governing body for Seeley Lake. In addition, various elected boards (sewer, water, refuse, hospital, cemetery, fire) are responsible for these respective services. Given the unincorporated structure of Seeley Lake government, a key requirement is allowing the SLCC and boards and ad hoc groups of concerned citizens to continue to be effective in addressing issues impacting the community.

The recent recession has placed stress on residents in terms of reduced property values and fewer jobs; particularly in the construction trade and services tied to tourism. The issues of the sewer system and concerns for air quality are important not only based on the impact on the resource, but also the capacity to affect the economy. Many residents living within the proposed sewer district have lower incomes and the costs of implementation could be overwhelming. At the same time development of high density-low income housing and a more diverse economic base supported by new businesses development anticipated in the current land use plan is impossible without completion of the sewer. Finding mechanisms to defray costs for new infrastructure to the entire community that may benefit rather than just those within the immediate impact zone is a central challenge in the near term.

Desired conditions- Since 2003, CRC has been effective in providing data, perspective, on-the-ground project funding to address natural resource issues affecting the community and coordination activities among and between various agencies. CRC needs to have the capacity to sustain and expand our role as the primary coordinating body representing the community in the Clearwater Watershed on natural resources issues. By the end of the 3rd year of the project, CRC will develop a sustainable source of funds to maintain a fiscally strong organization.

To engage a greater number of groups or constituents, CRC will focus on creating a dialog with groups that heretofore have not been successfully engaged. CRC will also support outdoor recreational activities, thoughtful land-use and new development that are consistent with resource stewardship objectives but also have the capacity to create economic growth and jobs. By the end of the project, CRC will have connections to most key groups in the Community and have created a dialog based on mutual respect.

CRC has been successful in obtaining funds to address issues of water quality, fuel mitigation and weed mapping and control. These efforts will continue, but additional focus will be placed on education in both the schools and through visible community demonstration projects. By the end of the project, CRC will have created important learning programs in both the elementary school and high school and supported and maintained important demonstration projects.

Overview of Challenges and Opportunities

In October 2010, the Missoula County Commissioners approved a comprehensive land-use plan for the Clearwater Watershed that, among other things, provided guidance on where and what kinds of development are appropriate. While this plan was developed and approved in an open public forum that was conducted for over 2 years, some opponents remain unconvinced that this plan is in the best economic interest of the Community. A severe 2007 wildfire hurt the economy at the height of the summer tourist season and with the subsequent years of deep recession economic challenges have hit various segments of the community hard, making resolution of key resource issues (such as the sewer) more challenging.

Data indicating trends in groundwater quality and lake nutrient loading are incomplete, the means of engaging the community regarding the implications of these data, as a whole, are not well developed. While periodicals and monthly meeting forums have been used successfully in the past to provide information and perspective, there is a need to reach a wider cross section of the community with other means.

CRC has played a pivotal role in providing scientific perspective, acquiring and presenting data, and facilitating discussions related to natural resource issues. Not unlike many other watershed NGOs, CRC has suffered financially from the most recent recession as grant money (historically the primary source of CRC capacity financing) became less available. The scientific and coordination work undertaken to date has been primarily the result of efforts of very active Board of Directors and volunteers rather than paid staff. While the Board of Directors remains engaged in continuing this “volunteer-centric” implementation, we have reached a stage in the organization maturation process where additional staff is required. To increase the staffing levels in order to be effective in its coordination function, CRC must become more financially sustainable with available resources commensurate with project work load.

The CFLRP and MLP present very important and timely opportunities. The CFLRP project, if fully funded, would provide up to \$4 million a year for fuels mitigation, terrestrial and aquatic restoration, fish and wildlife habitat improvement, and monitoring in the Southwestern Crown project area, matched by an equal amount of USFS or other funds. How these funds will be spent is being advised by the SWCC and the Lolo Restoration Committee. CRC has been playing an active role in these projects, with both staff and board members serving on the steering committee, prioritization committee, and monitoring committee. CRC is well positioned to help link the BEF Model Watershed Project with CFLRP activities in the Clearwater watershed, but needs the support and stability of the Model Watershed project to remain as engaged as needed to achieve maximum results. The MLP is moving sizable areas of land (> 24,000 acres) from industrial forestry to state and federal ownership. These lands are now secure in terms of their long term conservation status, but considerable restoration work is needed, particularly from an aquatics perspective.

Conceptual Model

The overview of supporting systems in the Clearwater watershed outlines what we consider the primary challenges for aquatic conservation and restoration. We have chosen to recognize challenges rather than “threats” because of the negative connotation implied by the latter. This is not a trivial point in a community that is both dependent on, and leery of, the resolution of “environmental” issues. By focusing on “challenges” we hope to avoid the implication that human development and uses are *the problem* that might be solved by simply stopping any further human activity. Humans define the natural resource values through their uses and must also work to sustain them. We believe the discussion and debate can be more productive if we define the inherent tradeoffs with open terms although we continually struggle to do that. Table 2 summarizes the challenges, stresses and the contributing factors or mechanisms influencing each of the supporting systems outlined above.

Table 2. Challenges, stresses and contributing factors associated with the conservation and restoration of aquatic natural resource values in the Clearwater Basin, MT.

Challenges	Related Species or Supporting Systems	Stresses	Contributing Factors
Non-native species (present and potential)	<ul style="list-style-type: none"> • Native Salmonids • Lakes • Main-stem Rivers • Steams/ Watersheds • Community 	<p>Native Salmonids</p> <ul style="list-style-type: none"> • Non-native interactions (predation, hybridization, competition, etc.) 	<ul style="list-style-type: none"> • Community desire to fish for non-native species
Private riparian management	<ul style="list-style-type: none"> • Lakes • Main-stem Rivers • Steams/ Watersheds 	<p>Main-stem Rivers</p> <ul style="list-style-type: none"> • Increased temperature • Lack of cover <p>Streams / watersheds</p> <ul style="list-style-type: none"> • Elevated temperature • Reduced cover and habitat complexity (LWD) 	<ul style="list-style-type: none"> • Incomplete knowledge of aquatic values and threats • Past regulatory efforts (county)
Subdivision development	<ul style="list-style-type: none"> • Lakes • Main-stem Rivers • Steams/ Watersheds 	<p>Lakes</p> <ul style="list-style-type: none"> • Temperature / oxygen suitability • Lake eutrophication <p>Main-stem Rivers</p> <ul style="list-style-type: none"> • Decreased flow • Increased temperature • Lack of cover • Elevated nutrients <p>Streams / Watersheds</p> <ul style="list-style-type: none"> • Excessive sediment delivery • Elevated nutrients • Reduced flow • Reduced cover and habitat complexity • Invasive species 	<ul style="list-style-type: none"> • Incomplete knowledge of aquatic values and threats
Existing, failing, new septic systems	<ul style="list-style-type: none"> • Lakes • Main-stem Rivers 	<p>Lakes</p> <ul style="list-style-type: none"> • Temperature / oxygen suitability • Lake eutrophication <p>Main-stem Rivers</p> <ul style="list-style-type: none"> • Elevated nutrients 	<ul style="list-style-type: none"> • Divided community on sewer system • Nutrient sources unknown • Perceived costs
Climate change	<ul style="list-style-type: none"> • Lakes • Main-stem Rivers • Steams/ Watersheds 	<p>Lakes</p> <ul style="list-style-type: none"> • Temperature / oxygen suitability • Lake eutrophication <p>Main-stem Rivers</p> <ul style="list-style-type: none"> • Increased temperature <p>Streams / Watersheds</p> <ul style="list-style-type: none"> • Reduced flow • Elevated temperature 	

Challenges	Related Species or Supporting Systems	Stresses	Contributing Factors
Surface and ground water development	<ul style="list-style-type: none"> • Lakes • Main-stem Rivers 	<p>Lakes</p> <ul style="list-style-type: none"> • Temperature / oxygen suitability • Lake eutrophication <p>Main-stem Rivers</p> <ul style="list-style-type: none"> • Decreased flow • Increased temperature 	<ul style="list-style-type: none"> • Unknown capacity for further demand and development • Growing community demand for water
Roads and road crossings	<ul style="list-style-type: none"> • Lakes • Main-stem Rivers • Steams/ Watersheds 	<p>Lakes</p> <ul style="list-style-type: none"> • Lake eutrophication <p>Main-stem Rivers</p> <p>Streams / Watersheds</p> <ul style="list-style-type: none"> • Excessive sediment delivery • Elevated nutrients 	<ul style="list-style-type: none"> • Recreational access demand • Random management • Mixed ownership and limited coordination
Wildfire	<ul style="list-style-type: none"> • Steams/ Watersheds 	<p>Streams / Watersheds</p> <ul style="list-style-type: none"> • Excessive sediment delivery • Elevated nutrients 	
Timber harvest, forest restoration, and fuels management	<ul style="list-style-type: none"> • Steams/ Watersheds 	<p>Streams / Watersheds</p> <ul style="list-style-type: none"> • Excessive sediment delivery • Elevated nutrients 	
Barriers	<ul style="list-style-type: none"> • Main-stem Rivers • Steams/ Watersheds 	<p>Native Salmonids</p> <ul style="list-style-type: none"> • Lack of connectivity (life history diversity, gene flow, and demographic support) • Extent of local network 	
	<ul style="list-style-type: none"> • Community 		<ul style="list-style-type: none"> • Lack of available information • Lack of effective communication/education • Lack of effective means for stakeholder engagement (share and negotiate solutions) • Differing value systems • Lack of interest/concern/value for natural resources • Economic conditions

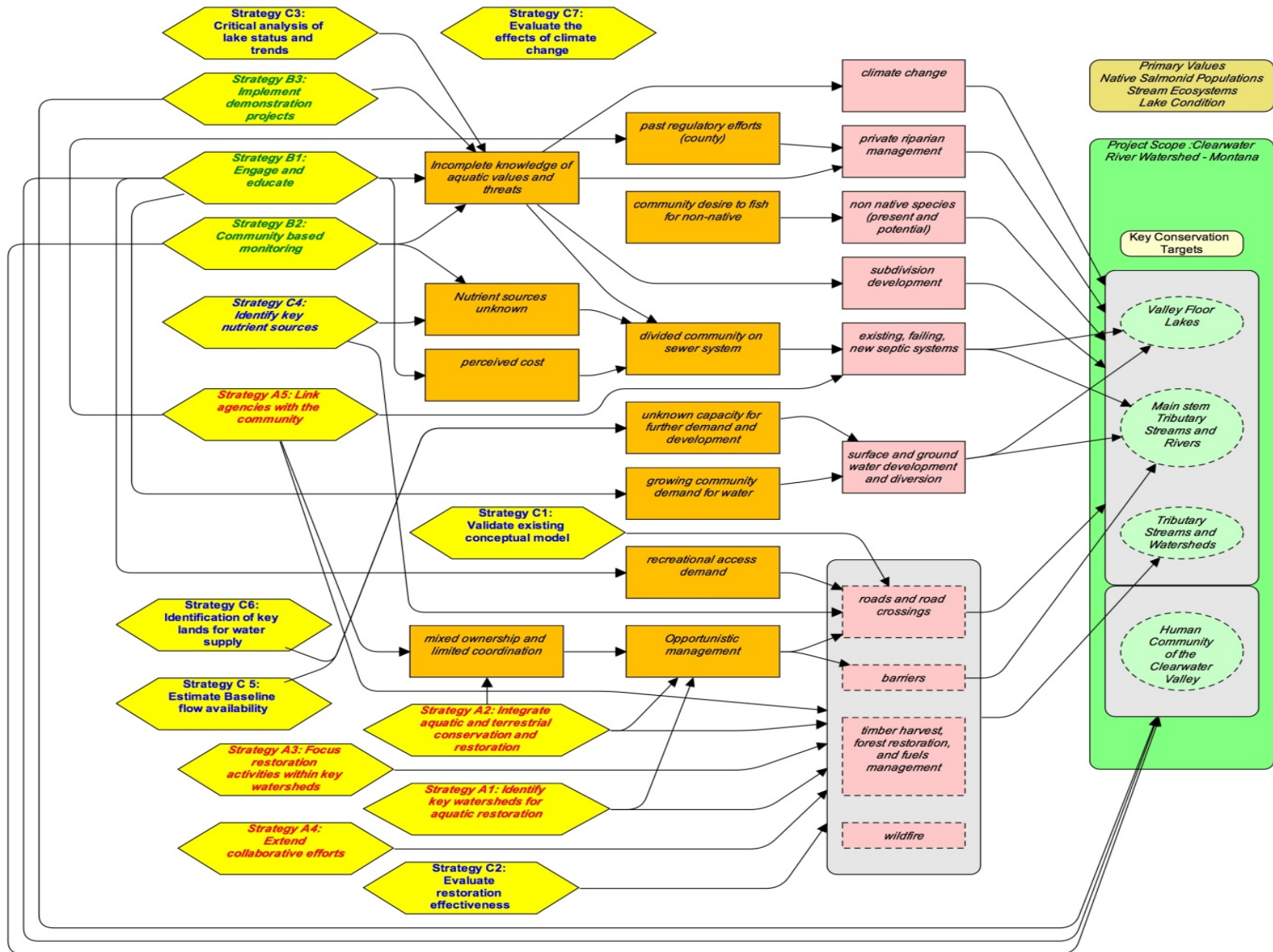


Figure 7. A conceptual model that begins to articulate linkages between contributing factors, challenges, and stresses was developed over the course of several days to help guide consideration and discussion of the strategies for moving forward.

Strategies

We have identified 15 strategies as important steps toward accomplishment of our vision and goals. These are grouped in three overarching but complimentary efforts: (A) *Agency, NGO and Landowner Outreach and Coordination*; (B) *Community Outreach and Education*; and (C) *Monitoring and Development of Critical Information*.

Agency, NGO and Major Landowner Outreach and Coordination-

The focus of our strategies is not to do on the ground restoration, but to guide available and future funding and leverage additional funding to be applied in the most effective ways possible. By developing working relationships and critical information we intend to build the capacity and momentum for effective watershed conservation and restoration that will last well beyond the time frame of this project. Because most of the current resources and technical capacity exist in, or are linked to, federal and state agencies, NGOs and major landowners in or adjacent to the Clearwater watershed, creating a common vision and effective working relationships is critical.

Our primary, initial strategy is to complete a watershed planning process to ***identify key watersheds for aquatic restoration*** (Strategy A1). This effort will build on the existing WPG with representation from the USFS, MT FWP, Plum Creek Timber, Blackfoot Challenge, BBCTU, MT DEQ, MT DNRC and Missoula County. We will explore schemes for prioritization based on ecological values defined by native species and known or suspected causes of watershed disruption. For example, Figures 8-10 depict current information on bull trout and westslope cutthroat trout distributions and status in the Clearwater watershed, an index of watershed disruption, and a combined ranking of small watershed priorities based on the integration of this information. This prototype was developed by the existing working group, but further work is needed to refine the metrics and gain support of all the partners. We will refine the basic information (fish distribution and status and watershed disruption), working with the Forest Service and MT FWP biologists. We will refine the prioritization logic in collaboration with all members of the watershed planning group.

Because forest and fuels management can both benefit and disrupt watershed process and aquatic systems, integration of both perspectives is important to recognize potential conflict and opportunity (Rieman et al., 2010). A second strategy, then, is to ***integrate aquatic and terrestrial conservation and restoration*** (Strategy A2). Working with the Ecosystem Management Research Institute, we have begun development of an integrated restoration approach at the request of Forest Service staff and the Collaborative Forest Landscape

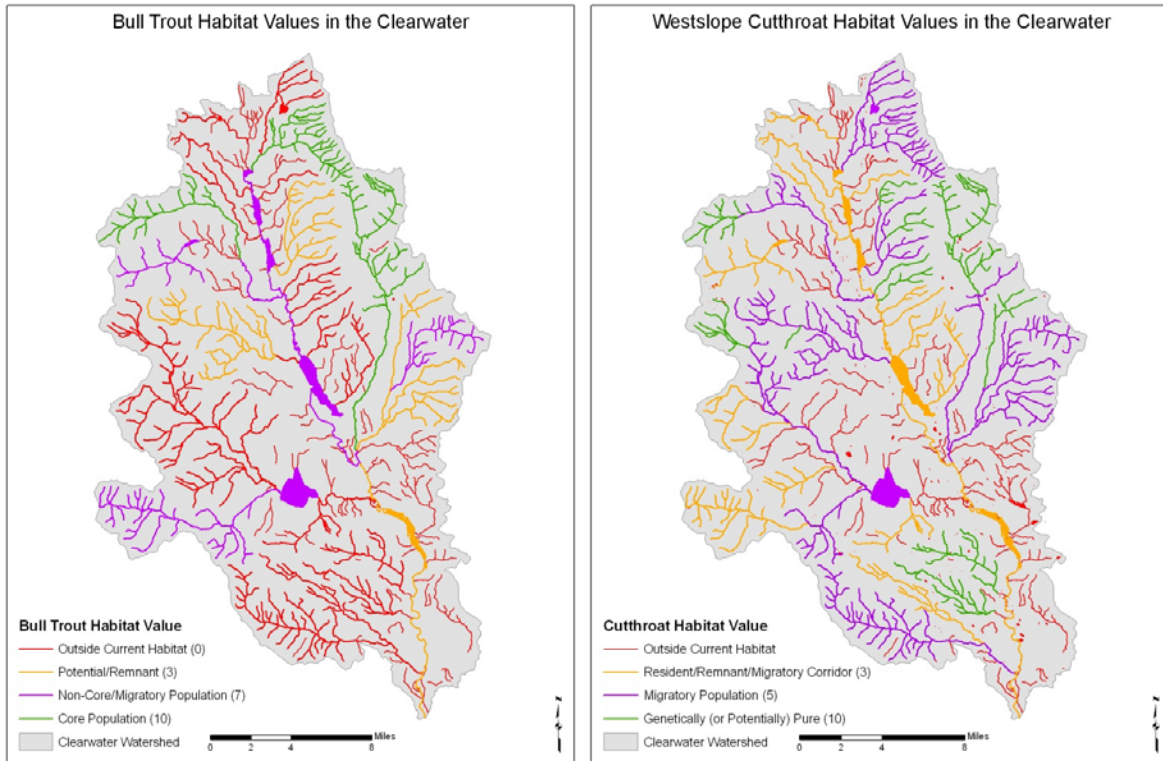


Figure 8. Ecological values associated with the distribution and status of bull trout (left) and westslope cutthroat trout (right) populations in streams and lakes of the Clearwater Watershed

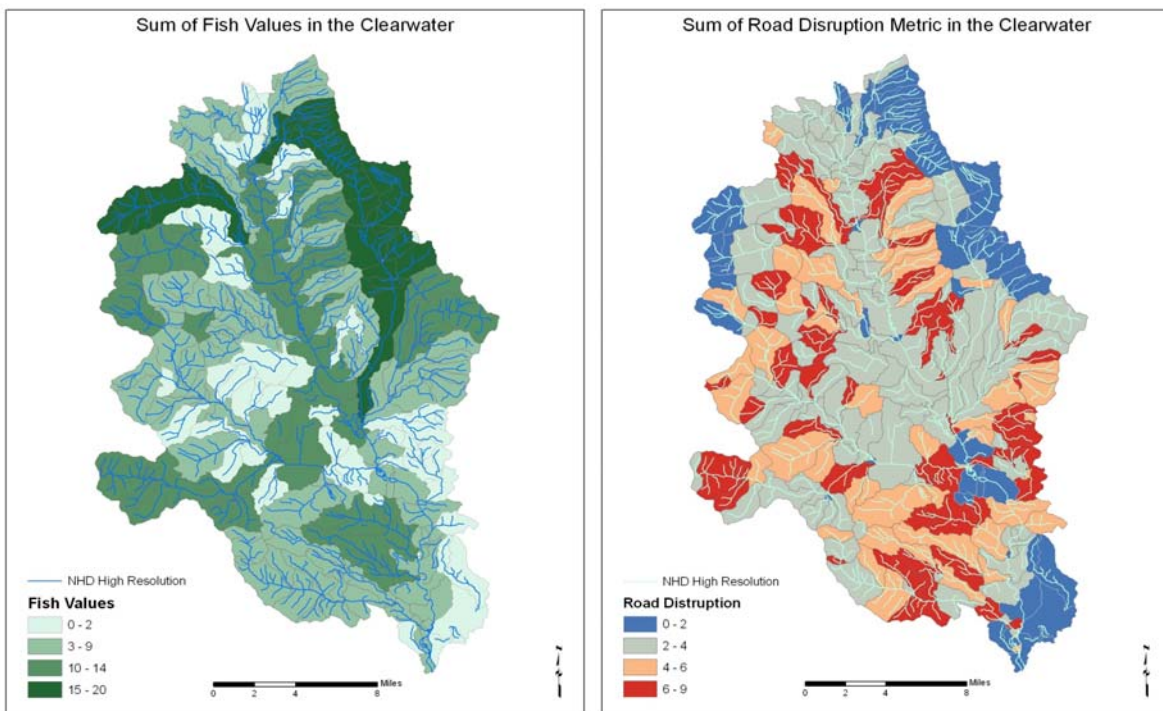


Figure 9. Total ecological value associated with native fishes (left) and index of watershed disruption (right) linked to roads, in the Clearwater Watershed

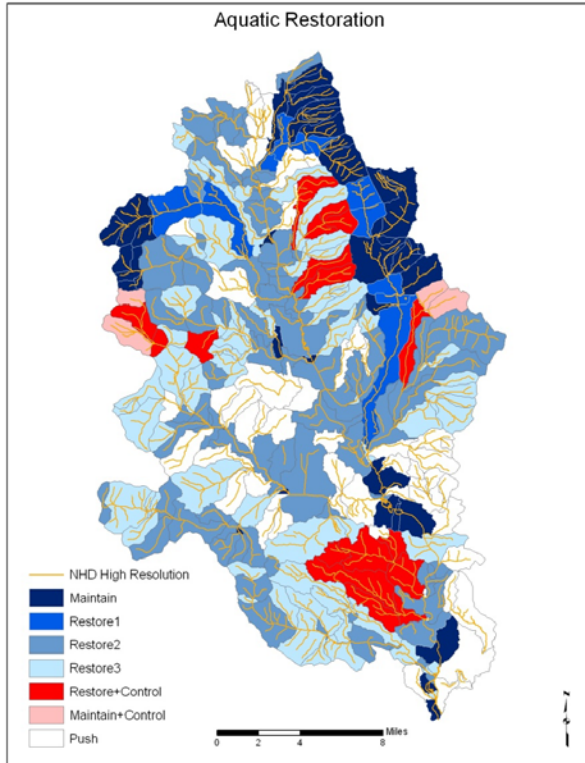


Figure 10. Prototype of aquatic restoration priorities in the Clearwater Watershed based on the integration of aquatic values and watershed disruption. The suggested strategy is to maintain what works, building from strengths, and focusing restoration where it can provide the greatest benefits for the least cost. This effort needs to be refined and extended by working with the partners in the Clearwater Watershed Planning Group.

Restoration Project. The broader perspectives of key watersheds and terrestrial/aquatic integration can help guide the broad planning for restoration, but specific sites and actions depend on local knowledge or refined analysis. Initially we will work with members of the agency staff and the watershed planning group and the Lolo Restoration committee to identify and refine specific on-the-ground treatments in the key watersheds, but in many cases the local information is limited and assessments of watershed condition and process have not been developed. We will help prioritize the needed work and also explore new technologies and analytical methods such as the Rocky Mountain Research Station Geomorphic Roads Analysis and Inventory Process (GRAIP) and NetMAP (Benda et al., 2007) as potential tools to more efficiently **focus restoration activities within key watersheds (Strategy A3)**. We anticipate considerable effort here also will be focused on restoration of fish passage barriers, but there is some debate about which are most important to remove or harden to preempt invasion. Those decisions could be informed through structured decision models such as those outlined by Peterson et al., 2008.

The Clearwater Watershed is the central system connecting other parts of the Southern Crown Landscape, it is also part of Blackfoot River watershed and shares strong ties with the community in the Swan watershed. The social, political, analytical, and technical restoration capacities of the NGOs vary among these watersheds, but are largely complimentary. The Big Blackfoot Chapter of Trout Unlimited for example, has an extensive relationship with funding sources and technical design consultants focused on stream and riparian restoration. We do not want to develop a similar capacity, but rather to focus their capacity on issues and opportunities in the Clearwater watershed. Our approach to prioritization of aquatic restoration and integration with terrestrial management has drawn interest and support from the larger collaborative effort through CFLRP. We will **extend our collaborative efforts**

(Strategy A4) to support the agencies and groups represented in the surrounding watersheds and to leverage greater capacities and restoration resources in the Clearwater. Much of the effort in this broad group of strategies will be directly relevant to tributary streams and watersheds, but there is a critical need to influence issues directly relevant to the lakes. Current and emerging information from our ongoing work indicate that the lakes are stressed and that groundwater contamination and nutrient loading from failing septic systems may be important causes. Proposed development of a sewer has been controversial and the debate has not been informed with objective information. We will work with the local sewer district to develop and interpret information that can better inform the discussion and provide a foundation for funding and development. Across all the issues that can be addressed through collaboration and coordination with our agency and NGO partners, communication and engagement with the public is important. Although each of our partners works with public outreach, CRC has played an important role **linking agencies with the community** (Strategy A5). We will continue those efforts by sponsoring public meetings and forums on the key issues outlined above.

Community Outreach

Knowledge, support and participation of the community in the Clearwater are important to any hope of long term success in natural resource conservation and restoration. Although most citizens clearly value the natural systems and ecological services associated with the timber industry, tourism, fishing, hunting and recreation, and natural beauty defining the quality and standard of living in a rural setting, there are difficult and often conflicting choices to be made. The community has been divided over issues such as water quality and a sewer, land use planning and personal property rights, or recreational access and restoration of watershed process through road closure. Often the debate is poorly informed and differing values can be poorly represented. In some cases citizens who probably support conservation of natural resource values are poorly informed or not participating.

Our core strategy is to **engage and educate** (Strategy B1) ourselves and the community on key issues to gain participation in important in natural resource and land use management in the Clearwater watershed. This strategy is central to the mission of the Clearwater Resource Council, but the efforts outlined here will be focused on the issues related to aquatic ecosystems. A weakness of CRC in the past has been aboard with great technical strengths, but with limited capacity in public engagement. One key step we have already initiated is to strengthen our capacity by expanding our board, staff, and active volunteers with people who are skilled at community engagement and outreach, and that can identify and engage key players in the community. We will continue and expand traditional methods of communication through informational meetings, discussion forums and articles in the local paper, but we will

do so in a more strategic manner than in the past. An important objective in the near term will be to develop a public outreach strategy to be implemented and refined through the life of the project.



Figure 11. A volunteer collecting water transparency measurements as part of the CRC Adopt-A-Lake community based monitoring program.

Considerable work in the social sciences relevant to natural resource management shows that public support depends on personal values which can be strongly influenced by knowledge and personal experience. Although values are often based on childhood learning and experience, those values continue to develop and change through life. “Experiential learning”, where people engage directly with natural systems through field work, restoration projects or other similar activities can be among the most effective means of expanding the values associated with natural systems. Our strategy of **community based monitoring** (Strategy B2) builds on this concept. In 2007, in response to growing concern about the status of our lakes, we initiated our Adopt-A-Lake monitoring program that has engaged more than 25 volunteers (Figure 11) and generated

additional support for work on the lakes and important supporting systems. That work has begun to inform the sewer discussion and helped focus the current WPG as well.

Although our effort has generated important information (Rieman et al., 2009), we believe the greater value has been in the community engagement and discussion. Coordinating an effort like this takes considerable time, energy and some funding. We will focus on shoring up the lake effort early in this project, but hope to extend this model to other metrics and supporting ecological systems as we can engage volunteers with skills, interest and time to coordinate new work. We could develop new programs around stream and river flows, stream temperatures, benthic communities (e.g., western pearl shell mussels), lake oxygen deficits, and nutrient sources. Other efforts might emerge as well, but what and where we focus will depend, in a large part, on the interests and capacity of those we can engage.

Our third strategy is to **implement demonstration projects** (*Strategy B3*). Habitat restoration projects on a scale that will alter ecological conditions of the Clearwater Watershed in a measurable way are well beyond the scope of this strategy. Our goals are to guide, and leverage the resources and capacity that can be important at the necessary scales. Some critical habitats on lower elevation main-stem and tributary streams are on small parcels (e.g. 1 to 10 acres) of private land. This represents an important restoration challenge where no single landowner influencing a large area can be effectively engaged at one time. As a result, the agencies have struggled to make progress either in education, restoration or regulation of riparian encroachment and disruption on private land in the Clearwater. We have outlined two, small scale restoration projects that will help by making riparian issues and information visible in the community. Our hope is that students and land owners will begin to educate and encourage each other. One project is in collaboration with local schools, a second is in the commons area of the largest subdivision in the valley. Both projects will engage students and community members in restoration work and will provide interpretive materials on site. Neither project will directly influence more than a single reach of stream, but both will be used by many in the community. Both have attracted considerable interest and additional funding and materials. We have considered other similar projects where riparian or shoreline issues are highly visible (e.g., local golf course and lake shores) and will move forward with these pending the results of our initial efforts and our capacity to leverage additional interest and funding.

Monitoring and Critical Information Gaps

Planning and implementation of effective restoration in the Clearwater watershed is constrained by a lack of detailed knowledge of existing conditions in the tributary streams, main stem rivers, and lakes. It is also limited by data that are inadequate to evaluate the conceptual models linking perceived sources of disruption with the conditions in habitats or populations. Our community-based monitoring efforts can begin to fill some gaps related to lake conditions, but we also hope to focus other resources on the technical issues directly linking any evaluation of restoration and long-term system responses.

We know, for example, that salmonid populations have declined in many streams and where the currently productive or potentially productive spawning and rearing habitats are located. We do not have extensive information on the conditions of those streams or habitats that can serve as a baseline for restoration or confirm a link between land management and habitat condition. Forest Service specialists have developed conceptual models of stream function and indices of disruption based on watershed process, but those models have not been validated with information that links watershed and habitat conditions. Extensive agency restoration based on the conceptual model without validation or effective monitoring to guide adaptation of those efforts could waste time and money. Expanding restoration and monitoring efforts

linked to the Collaborative Forest Landscape Restoration Project represents an opportunity to develop more effective validation and effectiveness monitoring. CRC has played, and can continue to play a central role in the design and implementation of CFLRP monitoring efforts. We anticipate a framework of monitoring designed around the existing PacFish-InFish-Biological Opinion (PIBO; Al-Chokhachy et al., 2010) monitoring program and will work with the CFLRP planning group to encourage that or alternative methods implemented effectively across the SWCC and Clearwater watershed to **validate the existing conceptual model (Strategy C1)**, and to develop an appropriate baseline to **evaluate restoration effectiveness (Strategy C2)**.

We know that our lakes are showing signs of stress typically associated with eutrophication; upland and riparian management and failing septic systems are potentially important, but their absolute or relative significance is unknown. In 2009 we obtained funding from MT DEQ to conduct a **critical analysis of lake status and trends (Strategy C3)** based on existing data. We have subcontracted with the University of Montana for this work, but have provided considerable technical and logistical support for the effort. We will continue that work to completion in the next year.

There is little question that septic pollution needs to be resolved because relevant groundwater standards are being violated. But whether a sewer system will be adequate to maintain the conditions of the lakes is unknown. The lack of “conclusive” evidence regarding human impacts has contributed to debate about the sewer and any regulation of upland, riparian and lakeshore properties. Some believe that past industrial forestry in the watershed is to blame while others have focused on growing development. In 1977 the US EPA conducted a relatively simple nutrient loading study on Seeley Lake as part of the National Eutrophication Survey and partitioned upland and septic sources. We hope to replicate and potentially expand that study to **identify key nutrient sources (Strategy C4)** that exist now and to provide a baseline for periodic monitoring that will be needed to determine the effectiveness of any restoration or regulation. We believe the basic study can be replicated with relatively limited logistical and financial resources, but expansion to resolve other potential sources may be more complex and expensive. Our initial efforts will focus on design and exploration of options and potential funding needs.

Ground water development appears extensive (Figure 12), but the relative significance of that development on actual surface flow is unknown. It may be possible to make relatively simple **estimates of baseline flow availability (Strategy C5)** to understand the relative significance of existing and future development. We will explore the feasibility of simple, first approximations with Montana scientists working on these systems to see if this is an important issue to pursue.

Information like this will be key to guide any efforts to develop alternative water rights and water use efficiencies in the future.

Climate change has and will continue to interact with human development to influence and constrain the ecological conditions and changes in the Clearwater watershed. We anticipate declining snow packs and summer flows (see Figure 5) that can aggravate eutrophication in lakes and flow and temperature conditions in the main stem migratory corridors.

Maintenance or restoration of natural storage in the watershed could be key to mitigate those effects. Mapping key source and storage areas for water and the anticipated effects of forest or riparian management and disturbance will be refined as downscaled climate models continue to improve (Isaak et al., 2010; Wenger et al., 2010). That information could be used to help focus forest restoration and fuels mitigation in the future, and Forest Service Research efforts are beginning to consider this need. We do not anticipate a significant effort focused on the

identification of key lands for water supply (Strategy C6) in the Clearwater in the short term, but we will continue to track the development of methods and evaluate their potential. We can also encourage other scientists to use the Clearwater watershed as a demonstration area for emerging tools. We will also monitor the status of streams and lakes in the watershed, and **evaluate the effects of climate change (Strategy C7)** to see how changes occur relative to predicted changes.

Implementation

Our proposal anticipates CRC's efforts focusing on three strategic areas: A) agency, NGO and landowner coordination and collaboration; B) community outreach; and C) monitoring and development of critical information. This section begins to describe the objectives or steps that will be needed to implement those strategies. We anticipate the first 1-3 years of the project will focus on extending and refining existing efforts with the idea that the planning, coordination, information gathering, and initial outreach activities during this time will help

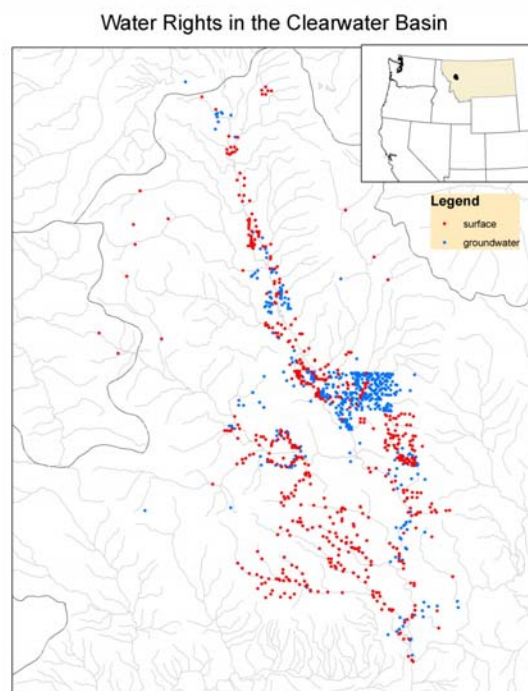


Figure 12. Map of the point of use for surface and groundwater water rights in the Clearwater Watershed.

firm up more specific actions for later years. Much of the work outlined here will require further consideration and development of capacity within CRC. Part of the effort in our first year is to initiate important steps, but also to refine a work plan for subsequent efforts. The detail associated with each strategy reflects our current level of understanding and development. We have included steps that are in progress and can be moved forward within the next year. Strategies that have limited development will be an important focus for planning and refinement in the future.

A key focus for CRC will be capacity building. The organization is transitioning from a condition whereby volunteers (primarily, but not exclusively, Board Members) directed and implemented the work of the organization. This practice, while consistent with the take-charge volunteer spirit of the Seeley Lake community, resulted in an organization that was recognized primarily for its advances to science and resource conservation initiatives which is consistent with the expertise and preferences of the engaged volunteers. The community outreach and fund raising components were less developed and we realize that additional focus on these activities is essential to move CRC to the next level in organizational development.

The partnership with BEF will allow CRC to focus longer term and approach other foundations for capacity funds. In addition, a major effort will be undertaken to communicate broadly within the community to enhance local support, both financial and for project implementation. CRC derives a considerably smaller percentage of its operating budget from local sources than neighboring watershed groups. Similarly the broad-based communication effort will have a secondary benefit of making more residents aware of CRC's past accomplishments and future objectives.

A. Agency, NGO and Landowner Coordination and Collaboration

CRC is well positioned to coordinate with agencies and the community in the Clearwater Watershed. As indicated previously, CRC is an active participant in the CFLRP and Lolo Restoration project. With the overlap of CRC board and EMRI personnel, we are positioned to provide substantive coordination and input to project prioritization for CRLPR actions. The existing WPG is also an important part of collaboration that CRC has already initiated. The collaboration with the BEF project will allow these efforts to be furthered with both CRC staff and board member involvement.

A1. Identify Key Watersheds

Because of the opportunities represented by the ongoing CFLRP, the Lolo Restoration Committee, and our existing watershed planning group, we intend to move this strategy forward early in the project. Key steps in our implementation are as follows:

1. Work with collaborators in the WPG and available information to gain agreement on the priorities of subwatersheds or collections of smaller watersheds as priorities for restoration.
 - a. Refine the information base with USFS and MTFWP
 - b. Review and revise the model for prioritization with the larger WPG and gain consensus for implementation within the Clearwater.
 - c. Document methodology and results with a formal report and share widely with DEQ, Lolo Restoration committee, CFLRP, and others.
2. Work with EMRI and collaborators in the CFLRP to gain support through the broader initiative. Work to establish restoration priorities via LRC and funded through CFLRP in these key watersheds.
3. Present the results of these efforts to the community via the outreach plan outlined below.
4. Work with Forest Biologists throughout the region to refine and extend efforts like these to other systems as feasible and interest develops.

A2. Focus Restoration within Key Watersheds

Agency biologists have identified some specific restoration needs in the Clearwater, especially those associated with culvert barriers and road segments that impinge directly on stream channels. In some cases they are far more general simply noting that road densities are very high and riparian cover low in some areas. Those projects are widely scattered throughout the basin. If we reach consensus on key watersheds it will be important to identify and focus restoration actions in locations that can move those watershed toward more productive conditions as quickly as feasible.

1. Work with agency biologists to identify known or logical restoration needs within each key watershed.
 - a. Obtain road crossing and road segment inventories from Legacy Lands
 - b. Working sessions to summarize other known restoration needs or identify likely ones based on GIS roads analysis
 - c. Field tours and collaborative assessment with agency biologists
2. Explore application of higher resolution analytical methods such as GRAIP, NetMAP or other analysis tools
 - a. Work with other scientists and labs to learn/generate capacity and encourage application in the Clearwater
 - b. Encourage CFLRP and Lolo Restoration Committee (LRC) to explore methods for prioritization and model based monitoring
 - c. Work with other groups such as BBCTU or National TU to collaborate and leverage support for demonstrations in the Clearwater or adjacent systems

- d. Implement limited pilot projects for proof of concept with existing funding if needed for initial steps
3. Implement restoration actions
 - a. Work with all partners and the LRC to coordinate activities and accomplish priority treatments
 - b. Seek additional partners such as BBCTU to apply specific treatments on private lands or sites not resolved through CFLRP or other sources of agency funding.

A3. Integrate Terrestrial and Aquatic Efforts

As part of the finer scale analysis of the priority small watersheds, potential fuel mitigation or terrestrial restoration activities can be evaluated simultaneously. This analysis should be conducted with agency managers, so that the integration of terrestrial and aquatic management will be carefully considered, along with the planned timing of any treatments. CRC board members, working cooperatively with EMRI, the CFLRP project, and MT FWP will be involved in collaborative planning of fuel mitigation and terrestrial and aquatic restoration treatments for 2013-2020. The interaction and integration of terrestrial and aquatic management needs will be considered in this planning process.

A4. Extend Collaborative Efforts

The first three strategies are focused on tributary streams and small watersheds on public lands. Addressing needs of lakes and small parcels of private land within the watershed will require a different approach and different partners. One of the greatest needs is the sewer system. CRC is already recognized as a source for water quality information.

1. Work with sewer board and other local and county entities and staff to interpret and discuss existing information on ground water contamination and lake condition
 - a. Regularly attend sewer board meetings to explain issues and advocate for solutions; participate in discussions with the County to explore alternative funding mechanisms.
 - b. Consult with U of M Flathead Biological Station and others to refine the lake story based on knowledge from surrounding systems
 - c. Public meetings, EOE articles, and other efforts to gain support in the broader community for a Water Quality district.
2. Work with partners to develop or support initiatives to implement and gain community support for streamside protection rules.
 - a. CRC will encourage the Seeley Lake Community Council to hold local discussions on the importance of proper stream side management, and will assist with providing information for these discussions. Using a locally-led

process, recommendations for addressing streamside protection could then be made to the County for possible adoption.

- b. CRC can conduct community meetings and prepare EOE articles to increase community awareness of the needs for proper streamside management.
 - c. Work with surrounding organizations
3. CRC will build on existing working relationships with neighboring watershed groups and other local NGOs. There are efforts in place to share information on funding opportunities particularly where landscape level grants are available that could be jointly applied for and administered. Other efforts include sharing best practices and potentially staff resources for project administration.

A5. Linking Agencies with the Community

This step differs from Community Outreach and education below, in that it specifically identifies a role that CRC can play in support of its agency partners, especially the USFS. The bureaucracy of the USFS does not allow it to effectively have open discussions with the community. Its normal mode of operation is to develop internal plans, present these to the community through scoping, and then prepare an EIS that considers various alternatives including the desired plan. This process places the community in a reactive mode to USFS proposals, with little opportunity for considering modifications and alternatives other than through the structured process.

As CRC develops relationships with stakeholder groups (recreation, timber and stewardship contractors, etc.) we will provide public forums for the exchange of ideas or sponsor training programs that will benefit both the agency and the stakeholder community. An example is working with other NGO partners to sponsor contractor workshops for those seeking CFLRP agreements and contracts. Another is working with the public and recreational organizations like the snowmobile and ATV clubs, and sporting groups to explore and understand the potential conflict and sensitivity on issues linked to road restoration and access.

B. Community Outreach

CRC is currently engaged in a number of community outreach and education programs, discussed above, but much more potential exists. With the BEF project, we propose to expand these efforts focusing on aquatic resources. An initial step is to develop a more detailed outreach and education plan. We propose to do this during the first year of the project, utilizing BEF assistance and resources. The plan will expand on the actions identified below.

B1. Engage and Educate: Community Outreach and Participation

1. Public meetings: Facilitate either the sharing of information to include the widest possible audience or sponsoring a public forum for important resource issues facing the community.
2. EOE: Relate the article's subject matter to timely issues.
3. Primary and Secondary Education: Continue to facilitate the discussions towards the formation of a local education council that would link the local elementary and high schools to the resource community. CRC is facilitating the current discussion towards the creation of natural resources focused education program in local schools

B2. Community-based Monitoring

Our Adopt-A-Lake program has been very successful in engaging volunteers in lake sampling as well as making the community more aware of water quality concerns. As our workload and efforts have expanded, our capacity to manage this program has slipped. New support can be used to strengthen oversight, coordination and training of volunteers. We will refocus initial efforts here and expand with related programs focused on more refined metrics (Oxygen deficits, nutrients) as experience, capacity and a volunteer workforce develop.

1. Continue the Adopt-A-Lake volunteer monitoring
 - a. Prepare and share the annual report
 - b. Find new volunteers
 - c. Engage existing and new volunteers with a newsletter or other communications
 - d. Coordinate training
 - e. QA/QC through periodic visits and blind validation per the sampling plan.
 - f. Coordinate/manage data transfer, storage, entry and summary
2. Continue Oxygen sampling on Seeley and Salmon lakes and extend to others as capacity develops.
 - a. Complete estimates of O₂ deficits with U of M for Seeley and Salmon as a baseline and comparison with other systems
 - b. . Extend sampling to other lakes as capacity and interest develop Engage and support volunteers to work with a CRC lead or summer staff
3. Replicate nutrient sampling first conducted in 2010
4. Aquatic invasive species
 - a. Work with MT FWP to develop protocols
 - b. Work with Homeowners Associations on major lakes and coordinate volunteers
5. Explore and Develop Additional opportunities

- a. Stream/lake temperature monitoring
 - i. Build on RMRS regional climate network
 - ii. Initiate sites with school projects
- b. Flow monitoring
 - i. Volunteer monitoring of main stem and major tributary gauges already established by MT FWP for existing flow reservations
 - ii. Complete rating Curves
- c. Western pearl shell mussel monitoring
 - i. Explore with MT Heritage Program and MT FWP
- d. Other opportunities will be explored

B3. Demonstration Projects

Our Morrell Creek Outdoor Classroom is a relatively small project affecting a few hundred feet of riparian terrace, but it has been very successful in engaging students, community volunteers, and others. We have initiated a partnership with the Double Arrow Ranch Land Owners' Association on the Trail Creek "Commons". We intend to maintain an active partnership with both projects and expand those as support and funding can be developed.

1. Morrell Creek Outdoor classroom
 - a. Seek additional funding through Community Foundation and other sources
 - b. Provide weed control through CRC Weeds Task Force
 - c. Collaborate on interpretive signing
 - d. Work with Forest Service Kids in the Woods to support other potential uses.
2. Trail Creek
 - a. Coordinate outreach to Double Arrow Landowners Association and the broader community
 - b. Coordinate volunteers with DARLOA to help with fencing, planting and long term maintenance
 - c. Coordinate site acquisition of plant materials, site preparation, and planting with restoration specialist
 - d. Develop interpretive signs in collaboration with Morrell Creek School project.
3. Develop Collaborative Interest and Funding for Other projects
 - a. Double Arrow Golf Resort channelized stream
 - b. Double Arrow irrigation diversion

C. Monitoring and Critical Information Gaps

Monitoring of ecological responses to aquatic restoration treatments typically requires substantial efforts if significant changes are to be documented. The best way to achieve such monitoring is through collaborative efforts of agencies and organizations where funding and

other resources can be shared and directed (If fully funded, CRLPR could provide \$4 million/year for work in the Southwestern Crown area.) The SWCC has targeted 10% of available funds for monitoring.) In addition to monitoring there are important limitations in our understanding of the watershed. Roads and their associated influences are assumed to be a primary impact, but that hasn't been validated with any empirical evidence in the Clearwater watershed. Similarly, anthropogenic inputs of nutrients are assumed to be a significant factor for the status of our lakes, but little empirical data exist on the sources and effects of such inputs. Targeted research efforts should provide some insights to this question, and should help identify the needed management actions. While CRC does not anticipate expending substantial funds from the BEF project on research projects, some key questions may be addressed when that can be done with limited funding directly or used to leverage other support.

C1. Validate the existing forest-aquatic conceptual model

Much of the restoration planned under CFLRP is based on a conceptual model linking watershed disruption to habitat and fish populations that is poorly validated. We have engaged with our collaborators ways to resolve this and take advantage of new resources.

1. Continue with CFLRP monitoring design and implementation focusing on established PIBO networks and protocols or other in- channel metrics that may be suitable
 - a. Sponsor a workshop with Forest Hydrologists and others to consider design issues
 - b. Support preliminary analysis to consider power and guide design
2. Support an annual workshop with partners to review monitoring results and consider refinements

C2. Evaluate CFLRP and other restoration effectiveness in key watersheds

Effectiveness monitoring is a primary focus of CFLRP funding, but the absolute level and continuity of funding is uncertain. There is a critical need to provide a design that can be efficient and flexible.

1. Continue with CFLRP monitoring design and implementation as outlined above to explore site level process vs. stream level habitat monitoring alternatives
2. Incorporate or extend volunteer monitoring as useful and relevant
3. Develop funding for focused monitoring needed to fill gaps not possible with CFLRP

C3. Critical Analysis of Lake Status

Working collaboratively with the University of Montana, CRC is administering a project that will be completed in the first year of this project.

1. Summary of any lake trends and limitations from all available data

2. Evaluation of relative loading from potential nutrient sources (e.g. revisit the EPA loading model)

C4. Identify key nutrient sources

One key question concerns nutrient sources to the lakes. While additional investigation of the feasibility of this project is needed, it is a good example of a project that might be pursued directly. We may be able to leverage BEF funding with some analytical support sampling through collaborators and volunteers.

1. Work with U of M or others to design a project to replicate EPA studies
2. Seek necessary funding, volunteer and analytical support

C5. Estimate baseline flow availability

Detailed surface water-groundwater studies can be difficult and expensive, but relatively simple analyses might provide a first approximation of the relative significance of existing or foreseeable extraction.

1. Explore possibilities for useful analysis with groundwater experts from Montana Bureau of Mines
2. Collaborate with others (e.g. Clark Fork Coalition, Blackfoot Challenge) to leverage a first approximation analysis if feasible.
3. If needed begin evaluation of flow maintenance alternatives through water leases, transfer of water rights, water reuse linked to the sewer.

C6. Identify key lands for water supply

Initial restoration actions are likely to be focused on areas supporting critical habitats. But management, restoration and climate change can also influence the timing and availability of water in the basin. This is likely to become a critical area of interest as climate change becomes more apparent, and Forest Service and other research efforts are beginning to consider the implications. We will lead the discussion and consider how and whether it should be incorporated into the restoration planning process that evolves through time.

C7. Evaluate the effects of climate change

Climate change presents a significant threat to aquatic resources in the Clearwater Watershed, especially populations of bull trout and cutthroat trout. The specific impacts of climate change on aquatic resources have been projected, but will need monitoring to validate. In addition, as climate change progresses, new management needs and opportunities may arise. CRC will keep climate change as an important consideration in management, and will assist where possible to coordinate research and monitoring efforts to document changes and evaluate possible responses.

Transition and Building Capacity

As stated above, CRC is transitioning from a volunteer “science driven” organization toward one that balances broad-based community representation with the resource focused coordination role that is the basis for past success. This shift in scope will require a number of organizational changes both structural and financial. While the need to “mature” as an organization is well supported, the plan to achieve this goal has yet to be created. CRC will embark on a planning process commencing in 2011 to outline the steps toward achieving a sustainable organization capable of meeting the objectives of this proposal. We will need to draw on the expertise of others, such as other watershed groups (e.g., The Friends of the Teton River) in formulating the plan.

Compile and Synthesize Project Findings

CRC will compile and synthesis the findings of this project. This will take several forms. The watershed monitoring and adaptive management designs will provide data concerning the aquatic ecosystems and fish populations of interest. These data will be analyzed using appropriate methodologies, and reported annually to the SWCC monitoring workshop, in summary reports to BEF, and made available on the CRC website. Results will be reported to the community through public meetings and summary articles.

A second set of findings will be an assessment of the effectiveness of the community outreach and education program. The SWCC plans to conduct an evaluation of the attitudes of local communities towards the CFLRP fuel and restoration treatments, information that CRC will be able to utilize as applicable to Seeley Lake. A key component to outreach implementation plan will be effectiveness metrics. Given our current lack of experience in outreach effectiveness metrics, we will draw heavily on procedures used by other watershed group and where documented best practices are available. Another measure of success will be the receptivity of the community (as indicated by a reduction in negative input) for the sewer system as that process moves forward. These will likely be more qualitative evaluations than quantitative, but they will be a gauge of the effectiveness of our outreach and education programs, and will be reported in summary documents.

A final synthesis of findings will relate to our efforts at coordination and collaboration. These are the critical aspects of this project, as without the support and involvement of our partners, our effectiveness in achieving on-the-ground changes will be very limited. We will be consistently evaluating the effectiveness of our collaborative efforts, and our abilities to bring agencies, other organizations, and citizen participants along in a collaborative relationship. We will conduct annual reviews of our effectiveness, and identify what we have found have been our successes and the reasons why these were achieved, and any failures and what led to them.

While this is again a qualitative monitoring program, it should provide useful insights to other collaborative initiatives that may be facing similar challenges.

Communicate to Project Sponsors, Professional Audiences, and Others

During the first year, we will be developing a more detailed plan for aquatic restoration in the Clearwater watershed, in cooperation with our partners and the broader CFLRP project. We will prepare a write-up of this plan that will articulate the agreements that have been reached on the key watersheds, the more detailed analyses to be conducted in these watersheds, and the prioritization of treatments that has occurred. It will also describe our more detailed plan for community outreach and education. Finally, it will provide more detail on our monitoring design and implementation. This plan will be updated in the second year as finer scale analyses of key watersheds are completed, and will be evaluated and adjusted each year thereafter as new information or data become available.

We will prepare an annual report that will be made available to all of the project partners. The annual report will summarize activities, collected data, results of analyses, any identified adjustments to project plans that have emerged, and plans for the next year. As mentioned, we also plan to report to the annual workshop of the SWCC.

We will endeavor to present relevant findings to professional audiences. We will look for opportunities to present findings on our collaborative efforts, monitoring results, community outreach programs, or other topics to other interested parties, as feasible.

An opportunity presented by the partnership with BEF is the ability to learn from other similar BEF projects, and in turn, to share our findings with others. We anticipate sending a few members of our staff, board, or volunteers to visit with one or more similar BEF projects to learn from their experiences, if such a visitation can be arranged. We would also be interested in any sort of meeting that BEF might organize where representatives from on-going projects could get together to share findings, challenges, and plans. Finally, we would welcome the opportunity to host visits from any other projects once we have established a solid project framework in the Clearwater Watershed.

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Appendix A. Bios of key project personnel:

Bruce Rieman is an Emeritus Scientist with the USFS Rocky Mountain Research Station in Boise, ID. He retired in 2007 and relocated to Seeley Lake. He has 37 years experience in research, management, and research program administration dealing with fishes, fisheries, and conservation biology. His work has extended throughout much of the Interior Columbia River Basin but has also influenced aquatic natural resource management across the interior west. He is particularly interested in further work synthesizing existing knowledge and theory to facilitate more effective applications in natural resource management in general and the conservation management of native fishes in particular. He holds a B.S. in zoology, M.S. in fisheries management, and Ph.D. in forestry, wildlife, and range sciences, all from the University of Idaho.

Jonathan Haufler is the Executive Director of the Ecosystem Management Research Institute (EMRI) in Seeley Lake, a position he has held for the past 11 years. EMRI focuses on ecosystem-based management, cumulative impact assessments, and biodiversity conservation at the landscape level. Jon's background includes 13 years on the faculty of Michigan State University where he developed and taught courses in wildlife ecology and ecosystem-based management, and 7 years as manager of Wildlife and Ecology Programs for Boise Cascade Corporation. He has an extensive background in the ecology of wildlife, forests, and rangelands. He holds a B.S. in wildlife management from the University of New Hampshire, M.S. in wildlife management from Virginia Tech, and Ph.D. in wildlife ecology from Colorado State University.

Ken Barber, CRC's Program Director, began his career in the US Peace Corps in Africa as a Fisheries and Wildlife Volunteer tied to the Smithsonian/Peace Corps Environmental Program and later as Associate Director of Natural Resources Programs in fisheries, forestry and wood (fuel) conservation. He had a 15 year career in Forest Products Sales and Marketing with Boise Cascade Corporation and managed a small electronics company involved in telemetry from 2005 to 2010. In addition he has served the Idaho Fish and Game as a Reservist Biologist from 2000 to 2009. He holds B.S. and M.S. in Wildlife Ecology from Michigan State University and an MBA from Purdue University.

Lee Boman, Community Outreach Coordinator, spent 37 years with JC Penney where he held various Marketing and Management positions including Department Manager, General Merchandising Manager, District Special Events Manager, District Merchandiser, Regional Sales and Promotional Manager, and Store Manager. He also taught Marketing at Olympus High School in Salt Lake City. Lee has received many distinguished awards for volunteer service including: distinguished Volunteer of the Year by United Way in 2003 and Rotarian of the Year

by Columbia Center Rotary in 2004. He was Board Chair of the Tri City Regional Chamber of commerce in 2006 and President of the Columbia Center Rotary Club in 2007. He was President of the Blue Mountain Council, Boy Scouts of America from 2007 to 2009. Lee served on boards for United Way and Tri-Cities Visitor and Convention Bureau. He represented community interests on the Finance and Audit Committee of Kennewick General Hospital. Lee holds a degree in Marketing and a Teaching Certificate from Utah State.

Carol Evans with Sustainability, Inc. has extensive experience in Conservation Education. She has held several positions in higher education teaching ecology and biology courses and has conducted teacher workshops using Project WILD and Project Learning Tree programs. In addition, she created outdoor classroom guides as well as coordinated local school programs focusing on natural resources. Carol worked as a county forester in northern Virginia which gave her knowledge of working with landowners. She sits on the board of directors for the Montana Natural Resources Youth Camp. In addition, Carol currently serves on the Seeley Lake Community Council. She has a bachelor's degree in English and an M.S. degree in Zoology from Louisiana Tech University and M.S. in Forestry from Stephen F. Austin State University.

Bill Wall is currently President and owner of Sustainability, Inc. a small consulting firm in Seeley Lake, MT that focuses on developing sustainable biomass energy systems for communities as well as support for international wildlife and ecosystem conservation programs. He has 33 years of experience in wildlife management, research, ecosystem management and supporting policy development nationally and internationally. His experience includes 15 years as a wildlife and policy manager in the US forest products industry working for International Paper and Potlatch Corp. He then became the director of conservation programs for Safari Club International Foundation based in Washington, DC, where he developed the concept of Conservation Hunting programs for hunted species integrated with community based natural resource management programs in five southern African Countries as well as in four Central Asian countries. He currently works primarily in Alaska with Native Communities and in Russia with the All Russian Scientific Research Institute for Nature Conservation. Bill serves on the Board of the Ecosystem Management Research Institute and is the US Chair of the North American Sustainable Use Specialist Group of IUCN. He has a B.S. and M.S. degrees from Louisiana Tech University in Wildlife Management and Zoology respectively and a PhD in Forest Ecology and Management from Stephen F. Austin State University.