

**To: Concerned Friends
FM; Mike Clark
RE: Climate Change Options in the Rockies
DT: December 19, 2006**

Here are some thoughts about how we might respond to climate change issues in the Rockies. Any suggestions on edits or next steps will be greatly appreciated. Thanks.

A Rocky Mt. Reserve

How do we as citizens and communities respond to issues of climate change in the Northern Rockies? This may be the most important question facing our communities. The planet is changing and we have little choice but to do likewise if we wish to maintain healthy communities here in the Rockies.

Climate change now appears inevitable. So what are our choices and how do we best face them?

By the year 2030, community-based institutions and legal frameworks should be changed to ensure the viability and long-term sustainability of a rural land base in the Rockies. To be successful, our rural communities will provide habitat for native species and also deliver an acceptable economic base for residents and people who own land here and use it in a responsible manner.

Our current cultural, economic, social and political practices are not capable of adequately addressing the scale of climate change now being predicted by experts across the globe. The projected increases in surface temperature of the Earth over the next 25 years may be as much as two to four degrees F., the equivalent for the human body temperature of going from a normal temperature reading of roughly 98.6 F. to a fever rate of 102-3 degrees F. These are not normal times.

Faced with such changes, we need to think about a long-term vision for this region which includes processes to enable people to consciously create communities that are transformative and capable of responding to climate change across a large landscape.

Central to this effort is the creation of the Rocky Mountain Reserve, a designation for large working landscapes that seek healthy communities through using foresight, ingenuity, and protection of ecological functions. It should be based on operating principles that are broader and more comprehensive than the concepts of wilderness, national parks, or protected areas now driving much of the work in the region on both public and private lands.

The Rocky Mountain Reserve will be a collection of communities that recognize the special characteristics of this region. These successful communities will ensure a safe home or refuge for plants and animals that are in danger of extinction because of climate change. They will be built on a diverse range of economic enterprises that enhance the quality of rural life and that keep people engaged upon the land. To be effective, the Reserve must encompass both public and private lands and respect the legal and cultural differences between the two. At the same time, it must also create a collaborative basis for managing these lands, one that preserves the society's capacity to protect and to conserve a full range of native species while accommodating acceptable economic activities.

Below are thoughts on what might lie ahead for this region and how we might best respond to ensure that we can continue to co-exist with the full range of life forms that now inhabit the Northern Rockies.

The inevitability of large-scale drought, and the accompanying reality of water scarcity, underlies much of the impetus for what follows.

Within the context of climate change and creation of a viable Reserve, the Northern Rockies region offers unusual natural assets that deserve national attention and prioritization: 1) the existence of vast areas of wild country and largely intact, functioning ecosystems; 2) enormous variation in relief elevation and terrain; and 3) the headwaters of the three largest rivers in the Western United States.

In particular, the high, wide valleys of the Rockies provide unparalleled options for variations in temperature and therefore increase the range of climate conditions (even with aridity and youthful soils) than almost any place in the Lower 48 states other than the southern Appalachian Mountains.

Just as the concept of a national park evolved around Yellowstone because of its geology and wild spaces, we now need to apply similar concepts to the Northern Rockies as a unique concentration of assets that must be protected in response to the probabilities of widespread climatic shifts.

On a 25-year time span -- by roughly 2030-- what might we be seeking or facing within relevant watersheds?

*** Economic development strategies designed around place-based restoration, light industry, and agricultural practices that preserve and utilize soils and water in a high, semi-arid region.

*** Permanent protection of designated climate-driven refugia and landscapes to ensure preservation of ecological functions and native species habitat on public lands in North America.

*** Strong economic incentives and cultural mandates to support habitat protection and stream flow restoration for native species on private lands.

**** The institutional capacity to carry out scientific research in all relevant watersheds.

*** Alliances of landowners and resource users to provide a cultural, social and political base that ensures economic and political incentives for the Refuge across a broad landscape in the northern Rockies.

THE LAY OF THE LAND IN 2030

Here are some projections based on what we can anticipate right now in the areas where we have some expertise – the Lower 48 states.

By 2030, the human population in the Rockies will double or triple in relevant watersheds. In the short-term, responding to climate change is not a matter of dealing with human population growth. The key questions center upon choices about where to live and how to minimize our social and economic activities that contribute to global warming. In the Rockies, 95 percent of our population continues to live in small towns and surrounding suburbs, with only a small portion of the population living on ranches and farms.

Our communities are linked by new systems of transportation; by compacts and agreements built around watershed management; and by collaborative problem-solving approaches built around place-based economic development strategies.

Climate change is a fact of life by 2030, with surface temperatures increasing by 2-4 degrees F., bringing a shift in precipitation that shows less snow pack, more winter rain, less spring run-off, and dramatic shifts in the annual cycles of rivers in the Rockies. This is a conservative estimate of temperature increase, but reflects temperature change that is twice as rapid as has occurred on Earth in the past 100 years. Many experts are anticipating much larger increases. No matter the degree, we should expect dramatic population shifts and economic changes to occur within the US as people respond to these climatic forces.

As significant climatic changes occur due to global warming, the preservation of viable soil and the presence of ground water and surface water may become more important than the persistence of native species in their original ranges. Thus, tributary streams and wetlands become extremely crucial resources for water storage and as functional safe havens for a wide range of colonizing species that may be shifting ranges and habitat in order to survive. In such situations, management of landscapes for biodiversity and for preservation of ecological functions is the primary focus of rural public and private land managers. Subdivisions and economic enterprises are now sited in limited locations in order to preserve high-quality soils and to ensure the integrity of riparian corridors and migration processes.

The protection of riparian corridors in the Rockies is a key policy component in managing both public and private lands for wildlife habitat. The numbers of endangered and threatened species have increased dramatically and government policies now prioritize recovery and preservation of these species on both public and private lands. Specially designated ecological refuges or sanctuaries exist to ensure viability of key species.

Most rural landscapes in relevant watersheds are dominated by large-scale absentee owners, either by government or by private entities, especially in the headwaters. However, communities of truck farmers and ranchers exist throughout the

region and these producers work closely with scientists to restore and improve their landscapes and riparian corridors.

Federal land-based agencies now located within Interior and Agriculture have been reorganized around the following prioritized national concerns dealing with climate change: first, the production of high-quality fresh water on both public and private lands; second, the creation of food and fiber with an emphasis on locally-based production centers; thirdly, the preservation of bio-diversity on a landscape basis; and lastly, production of energy based on long-term sustainability and minimal disruption of the three previously mentioned resources. Each land-based agency has formal goals for addressing climate change, with an emphasis on integrating work with other agencies. These are centered on place-based goals and market-based incentives for landowners and residents of the Reserve lands and similar communities around the country.

Energy developments, particularly in fossil fuels, have doubled over their current rates but then peaked and are leveling off in the West, off-shore oil fields, and Appalachia. A strong policy emphasis on energy conservation, solar and wind investments, and alternative fuels has replaced the current emphasis on mining fossil fuels. However, most countries still depend on fossil fuels for key components of their energy and transportation grids.

Global monitoring via satellite and remote sensing devices of land and water resources for temperature, storms, precipitation, disease, and noxious species infiltration occurs routinely on a daily basis.

Carbon sequestration policies now provide a major incentive for private land owners to initiate and maintain cultivation of plants that enhance climatic policies. These activities are a major part of the agricultural economics within the Rockies and out on the plains. Parallel policies are in place to maximize the production of clean water and its regenerative functions in rural areas.

Rural spaces are seen as major reservoirs of natural resources and as viable centers of recreational and spiritual renewal for an urban/suburban population that values solitude, open spaces, and biodiversity. Food production in rural areas are built around areas with adequate rainfall and viable high-quality

agricultural soils. Lands containing marginal soils are used for climatic enhancements and the maintenance of biodiversity; these grasslands and forests are generally not cultivated annually. Reforestation and grasslands restoration are at the center of federal agricultural policies in the region.

Networks for food production, consisting of thousands of truck farms and ranches, exist throughout the Rockies. These are characterized by farmer-to-consumer contracts and community food cooperatives, with producers experimenting with ways to grow food and fiber in an increasingly arid landscape. Due to rising transportation costs and climatic variability, new approaches to food production emphasize the ability of local communities to be self-sufficient or to produce large amounts of foods from farms and ranches located as close as possible to consumers.

Energy supplies and energy use are closely linked to new modes of transportation that utilize mass transit, low impact transportation corridors, and highly efficient use of solar-power and electric vehicles. In the US and Canadian Rockies, recreational communities are tied together by a north-south rail system built to service resort communities and gateway towns for national parks and public lands.

Cultural conflicts continue to grow around the sustainable uses of these rural spaces and are complicated by the growth in the use of some forms of motorized recreation. Privacy and the capacity for solitude continue to be key values in the on-going debate about the use of rural areas.

Industrial tourism is both a major economic sector and a major public policy issue on Reserve lands as large numbers of tourists from throughout the world seek experiences they have learned about through television and the Internet.

New technologies provide the capacity to track individual units of a particular species or to monitor human use of motorized transport – in other words, governments now have the practical ability to oversee individual activities of humans and relevant wildlife in real time.

Creating The Reserve By The Year 2015

Accepting the scenario described above as an achievable goal, let us step back step back from the year 2030 and look at what

might be needed in order to meet our long-term goals in the Rockies over the next decade, what programmatic elements might we wish to have in place in order to create the Reserve and to shape policy debate and social and economic behavior of individuals and corporations?

The central goal of work in this era: a political alliance among people who see the future of the Rockies tied directly to functioning natural ecosystems that includes space and habitat for a full range of species, including native terrestrial and aquatic species and human populations.

Here are key components of a successful effort to be achieved by 2015:

*** The public strongly supports The Rocky Mountain Reserve or Refuge on both private and public lands, thereby assuring protection of a full range of native terrestrial and aquatic species

*** Formally designated ecologically-defined refuge boundaries exist that encompass both public and private lands and waters, with legal protections in place to assure long-term viability of these spaces.

*** As a watershed-centered management framework, the public has insisted that in-stream flow policies are in place in each relevant state to protect an acceptable and sustainable hydrograph for selected rivers.

*** The private institutional capacity exists to scientifically monitor and legally defend currently existing populations of native species.

*** Permanent protection and guaranteed stream flows are in place for native species on private and public lands in relevant headwater streams.

*** Land owner incentives and awards programs are functioning for viable networks of landowners within each relevant river.

*** Strong partnerships of land owners and conservation groups are working collaboratively with key federal agencies and state agencies and cities on a long-term basis.

*** Federal policies are in place to secure long-term improvements for clean air and clean water within protected areas/roadless/wilderness areas/national parks.

*** Regional associations of guides and hunting and fishing lodges are operating within a political context to support and advance public policies for protecting stream flows and native species.

*** Working alliances of conservation groups and regional economic development agencies share common goals and assumptions about acceptable economic activities and population goals on a regional basis.

In The Year 2012

For the above changes to have any likelihood of reality in the Rockies, federal and state agencies, county commissions, scientific institutions, conservation groups, economic development agencies, and the general public will need to be engaged in an on-going dialogue about the need for cultural, economic and institutional changes in order to manage the impacts of climate change.

Crucial elements that must be immediately addressed to reach effective goals for 2012 include:

Regional public education campaigns are needed in each Rocky Mountain State. These will lay out the need for the Reserve as a concept and the economic, social and cultural benefits that would be created by special designations of land use and economic activity built around responding to the challenge of climate change.

The Reserve Network exists as an association of cities, counties, institutions and individuals who have formally endorsed the Reserve concept and are working together to create new incentives, jobs and investment opportunities for residents of the Reserve.

In-Stream flow legislation in each state provides new flexibility in using water rights to meet natural hydrographs on prioritized rivers and streams.

Public policies are in place to mandate the implementation of terrestrial and aquatic stewardship for public lands

management, with accompanying career incentives for agency leaders.

A Water Rights Data Base is annually updated in Rocky Mountain states, and is keyed to landownership and use on all prioritized streams. It shows water rights ownership, location of each diversion, and monthly measurements of stream flow tied to water allocations and changing land use patterns.

Water leasing programs are in operation in each state, with dedicated private and public funds to assure minimum in-stream flows on major watersheds and to manage shortages among existing water users.

Alliances exist with key cities in the Interior West who need access to surface waters to maintain viable public water supplies, with an emphasis on keeping these supplies in streams over long distances rather than placing the resource in pipelines and canals.

The legal capacity exists within the conservation community to monitor and influence dam operations by public agencies on public and private lands in the Rockies.

Alliances exist between irrigators and the conservation community ensuring adequate water flows for the Rocky Mountain Reserve. Public and private efforts are underway to explore new opportunities to diversify income for land and water rights owners who are willing to utilize conservation of water for new crops and land uses.

A regional landowner network is operating around sustainable use of water for food and natural resources, including management seminars and educational materials aimed at existing and potential landowners and their ranch managers and personnel.

An association of guides and fishing and hunting lodges, resorts, and dude ranches is politically active in each state to defend instream flows and state-based stream protection and restoration programs.

---Mike Clark
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To: Whit Fosburgh
FM: Mike Clark
RE: Wild Trout Forever, The Legacy Campaigns
DT: 6/21/06

Here is an initial attempt to respond to your 31 May memo on "making the case" to our board about the need for a new TU capital campaign. If I cover old ground, my apologies. If I go too far a-field, just consider it an attempt to graze in some new pastures and we'll see what seeds spring from the dropped debris piles.

We need to think about a long-term vision that both takes people's breath away when they hear it and that also helps them to conclude that the goal is viable and doable – that it would be exciting to be involved in campaigning for such a legacy venture.

In thinking about threats and opportunities that are relevant in creating a Legacy Campaign Fund, I found it useful (and easier) to project out for 25 years and to think about the context in which TU might find itself during that span of time. Most of the following is rooted in my western experience, so keep that bias in mind as you read this.

On a 25-year time span – let's talk 2030 for convenience – what might we be seeking or facing within the watersheds that are relevant for protecting wild trout?

1. Permanent protection, through designated aquatic refugia with natural streamflows, of wild trout habitat on public lands in North America
2. Strong economic incentives and cultural mandate supporting habitat protection and streamflow restoration on all wild and native trout waters on private lands
3. TU program arms operating in South America and Asia, particularly in Mongolia, Chile, Argentina and Japan, in wild trout waters
4. International membership base for TU on three continents (with special emphasis on developing a membership base among the rapidly growing middle class in India and China)
5. Global name recognition of TU as the premier water habitat protection group on three continents
6. A body of scientific literature documenting the status and protection of relevant species of native and wild trout
7. Institutional capacity at TU to carry out scientific research in all relevant watersheds
8. Global TU funding base consisting of membership support, major donor networks, private foundations providing multi-year funding, partnerships with various governmental entities in relevant countries, and collaborative contractual relationships with key compatible corporations.
9. A 40-year record of TU providing stream restoration projects on three continents, with scientific research showing recovery of habitat and species
10. A TU national budget of \$65 million per year with an income stream containing the following characteristics:
 - a. donors – 30 percent of income stream

- b. public funds from governments – 40 percent
 - c. membership dues and donations – 20 per cent
 - d. endowments covering major programs and projects – 10 percent.
- These figures assume a growth rate of 10 per cent per year for the organization and an operating budget of some \$65 million by 2030. Endowment, therefore, would need a base level of some \$120 million.

TU is recognized as one of a handful of NGOs in the world capable of dealing with water issues on a global basis.

THE LAY OF THE LAND IN 2030

Here are some crude projections based on what we can anticipate right now in the areas where we have some expertise – the Lower 48 states.

Human population has doubled or tripled in relevant watersheds.

Energy developments, particularly in fossil fuels, have doubled over their current rates but then peaked and are leveling off in both the West and Appalachia. Strong policy emphasis on energy conservation, solar and wind investments, and alternative fuels have replaced the current emphasis of mining fossil fuels. However, most countries still depend on fossil fuels for key components of their energy and transportation grids.

Climate change is a fact of daily life, with temperatures increasing by 4-6 degrees F., bringing a shift in precipitation that shows less snow pack, more winter rain, less spring run-off, and dramatic shifts in the annual cycles of all relevant rivers in the East and West.

The need for protection of riparian corridors is a key policy component in managing both public and private lands for wildlife habitat. The numbers of endangered and threatened species have increased dramatically and government policies now prioritize recovery and preservation of these species on both public and private lands.

Most rural landscapes in relevant watersheds where trout occur are dominated by large-scale absentee owners, either by government or by private entities.

Global monitoring via satellite and remote sensing devices of land and water resources for temperature, storms, precipitation, disease, and noxious species infiltration occurs routinely on a daily basis.

Carbon sequestration policies provide a major incentive for private land owners to initiate and maintain cultivation of plants that enhance climatic policies and parallel policies are in place to maximize the production of clean water in rural areas.

Rural spaces are seen as major reservoirs of natural resources and as viable centers of recreational and spiritual renewal for an urban/suburban population that values solitude, open spaces, and biodiversity. Food production in rural areas is built around areas with adequate rainfall and viable high-quality soils, with marginal soils being used for climatic enhancements and the maintenance of biodiversity, and are generally not disturbed or cultivated annually. Reforestation and grasslands restoration have a major emphasis in federal agricultural policies.

Cultural conflicts continue to grow around the sustainable uses of these rural spaces and are complicated by the growth in the use of motorized recreation, including the use of Personal Flight Vehicles (PFV) that allow individuals to move easily across landscapes without using roads. Privacy and the capacity for solitude become key values in the on-going debate about the use of rural areas.

Industrial tourism is both a major economic sector and a major public policy issue on lands with wild trout waters as large numbers of tourists from China and India began to trek around the world seeking experiences they have learned about through television and the Internet.

New technologies provide capacity to track individual units of a particular species or to monitor human use of motorized transport – in other words, governments have the ability to oversee individual activities of humans and relevant wildlife in real time.

By the Year 2015

Assuming there is some rough relevance to these projections, if we then step back from the year 2030 and look at what might be possible to meet our long-term goals over the next decade, what programmatic elements might we want to have in place as a vital institution trying to shape policy debate and social and economic behavior of individuals and corporations?

The central goal of work in this era: native trout populations are no longer in decline, restoration and expansion of their ranges are underway, and state fish and wildlife agencies are implementing policies which ensure the sustainability of wild trout populations in each prioritized state. Here are key components of a successful effort:

1. Riparian protection for key spawning and rearing corridors for native and wild trout in the Lower 48 states.
2. In-stream flow policies in place in each relevant state that protect an acceptable and sustainable hydrograph for selected rivers.
3. The capacity to scientifically monitor and legally defend currently existing populations of wild trout.
4. Permanent protection and guaranteed stream flows for salmonid refugia on private and public lands in relevant headwater streams.
5. Full implementation of research agenda derived from the CSI work, with targeted watersheds identified and restoration projects and protection strategies underway.

6. TU state councils thoroughly integrated into the work of national programs and serving as the lead components in dealing with state political leaders and legislatures.
7. Restoration components (Home Rivers, etc.) operating on all relevant rivers.
8. Land owner incentives and awards programs operating and viable networks of landowners in place on each relevant river.
9. Viable partnerships with key federal agencies and state agencies on a long-term basis.
10. Federal policies in place securing long-term improvements for clean air, clean water, and roadless/wilderness areas/national parks.
11. Regional associations of guides and fishing lodges operating within a political context to support and advance public policies for protecting stream flows and fish populations.

By the Year 2012

In-Stream flow legislation in each of the five WWP states providing new flexibility in using water rights to meet natural hydrographs on prioritized rivers and streams. Three states would have legal and programmatic capacity to lease water for instream flows to non-profits and state agencies.

Legacy Watersheds receive on-going attention from TU volunteers in every state.

A Wild Trout Forever public information campaign underway, utilizing media outlets and schools to advocate for the sustainable presence of wild trout programs in all five WWP states.

Home Rivers Projects operating on ten streams in the West and 20 streams in the Midwest and the East.

Good Samaritan Mine Reclamation Projects operating at ten abandoned mine sites in Western States.

Public policies in place mandating the implementation of aquatic stewardship for public lands management, with accompanying career incentives for agency leaders.

Water Rights Data Base annually updated in six western states, and keyed to landownership information data base on all prioritized streams.

Water leasing programs in operation in each of five WWP states, with a dedicated fund of \$5 million per year available to leverage other public and private monies to assure in-stream flows on major watersheds.

Alliances with key cities in the Interior West who need access to surface waters to maintain viable public water supplies, with an emphasis on keeping these supplies in streams rather than in pipelines and canals.

Legal capacity in-house to monitor and influence dam operations by public agencies and on public lands in the five WWP states.

Membership campaigns in each relevant interior Western state aimed at having three percent of all registered voters in each state enrolled as TU members. Professionally staffed state councils exist in each WWP state.

Landowner network operating around sustainable use of water for food and natural resources, including seminars and educational materials aimed at existing and potential landowners and their ranch managers and personnel.

A TU evaluation system in place provides a consistent and transparent process for evaluating each program area.

An association of fishing guides and fish lodges linked together and willing to be politically active in each state to defend instream flows and state-based stream protection and restoration programs.

Donor-based financial support system in each state capable of providing 30-50 percent of monies needed for TU national programs dealing with instream flow, aquatic stewardship implementation on public lands, and protection of wilderness, roadless areas and national parks.

Financial support exists from private foundations and donors for advocacy work, parallel expansion of public and private sources in place to underwrite restoration programs on prioritized rivers and private lands.

To: INTERESTED FRIENDS OF GREATER YELLOWSTONE

FM: Mike Clark

RE: Building the Ark

DT: February 20, 2013

This memo addresses challenges of building a "Greater Yellowstone Ark", a regional refuge for biodiversity within a 50-year span of work framed by climate change.

WHY THE CONCEPT OF AN ARK FOR GREATER YELLOWSTONE?

Looking across the Interior West and thinking ahead about what we know to be probable impacts of climate change, it is useful to develop a concept of triage – where are the most viable areas that give plants and animals options for survival and how do we ensure the protection of these spaces? In such an assessment, Greater Yellowstone stands out above most other large areas of public land concentration, including such areas as the wilderness core of central Idaho and the Crown of the Continent, which includes Glacier National Park, the Bob Marshall Wilderness and related wildlands, and the wild corridors of Canada extending northward.

In a time of predicted climate change, consider these key Greater Yellowstone factors:

Greater Yellowstone is the largest intact ecosystem in the Lower 48 states;

- * Almost 80 percent of the region is publicly owned by the federal government or states;
- * It contains the free-flowing headwaters of the three major western rivers and has four climatic zones converge within its boundaries (giving diverse precipitation patterns);
- * It may be the most biologically diverse place on any continent in the world due to the geyser basins, thermal features within Yellowstone Lake, and its large concentrations of mammals;
- * Its diverse terrain (mountains, plateaus, canyons and plains) gives many options for habitat for plants and animals;
- * Its name is known worldwide;
- * And it has a core of government agencies and NGOs dedicated to its existence.

Other assets come into play:

Greater Yellowstone is easily accessible to large numbers of people with over three million visitors each year;

It is a center for wildlands research and has a baseline of research data dating back over 100 years;

It is a wild land surrounded by a thin sea of people who are increasingly dependent on its public resources for economic stability;

Its brand assures a worldwide audience of people who care about its wellbeing.

These are not minor assets.

Yellowstone is one of the most studied places on Earth. As a result, the outpouring of new scientific information offers the potential to identify problems and to address negative trends far earlier here than in many other places around the world.

What Are The Most Important Forces Likely To Impact The Region?

Four key forces stand above all others as we think about the coming decades: 1) climate change impacts; 2) human population growth within GYE; 3) the short-term demand for the U.S. to become energy independent and to therefore use energy resources located on both public and private lands within the region; and 4) the probable shortage of water resources across the West.

Climate Shifts: Scientists predict that the Interior West will become dryer and hotter over the coming decades. Most evidence of surface temperatures show that the changes on Earth are outpacing all climate models as carbon levels continue to climb. Resulting drought and changes in rates and times of precipitation will likely have major impacts upon the agricultural sector and on the recreational sector, particularly with activities such as skiing, hunting and fishing. Resulting wildfires and hotter seasons may drive considerable numbers of people in the Southwest and coastal areas to look for safer, more viable climates.

Human Population Growth: Greater Yellowstone, with its diverse terrain, high quality of life, and natural assets such as public lands and wildlife, may become a magnet and a refuge for many people in the coming years. The region's human population has increased by over 85 percent since 1985 and this trend likely will continue despite the recent slow-down caused by economic downturns. Demographic experts and economists talk about "amenity migrants" and "urban and suburban refugees" as examples of people drawn to rural areas that offer beauty, solitude, relative stability, safety and open space. Our region has all of these assets - in abundance.

Energy Demands: The region's vast lands and natural resources contain pockets of fossil fuels and lands that are attractive to energy companies. Wind and solar

options are now being explored. Local, regional and national NGOs are anticipating major battles ahead as these resources are targeted by the energy industry. Our conservation community is poised to have a significant impact on policies dealing with all of these challenges.

Water Scarcity and Management: Thinking ahead to a time of drought and water scarcity, the region offers significant sources of water which are still untapped by urban and industrial consumers. An estimated 90 percent of the region's human use of water is utilized by agriculture – primarily to grow grass for livestock. These demands will change rapidly in the years ahead. And the three states' water management regimes are already inadequate and over-subscribed by irrigation users. As a conservation community, we need to pour more staff and thinking into this arena.

In short, the region faces massive change in a short period of time.

Four key questions arise for me when I reflect upon these forces: How do we protect the quality of life now enjoyed by the region's residents? How do we ensure an adequate degree of protection and sustenance of the region's public lands and wildlife? How do we create within the nation a level of public support for the protection of the unique world-class assets of Greater Yellowstone? How much time do we have to address these questions in a time of climate change?

We need to create a view of the future that gives us a positive long-term set of goals for the future. We should give the public a vibrant and positive vision for how Greater Yellowstone stands out as a world-class asset that needs special management policies over time.

We need to advance the idea of an Ark – of the Greater Yellowstone Ecosystem becoming an example around the world of how biodiversity and wild lands natural assets such as geothermal fields and large landscapes and riverine systems, can be managed and protected in a time of climate change.

Possible Next Steps in Building the Ark?

Once we have created the conceptual framework for building an Ark, we should consider new strategies such as the following:

1. A call for recognition of GYE as a world-class ecosystem protected by region-wide mandates that withdraw public lands from extractive industrial uses and that assures protection of habitat and species. The mandates should affect all federal agencies operating within Greater Yellowstone. This likely would need to occur through an Executive Order or congressional act for all relevant land management and scientific agencies.

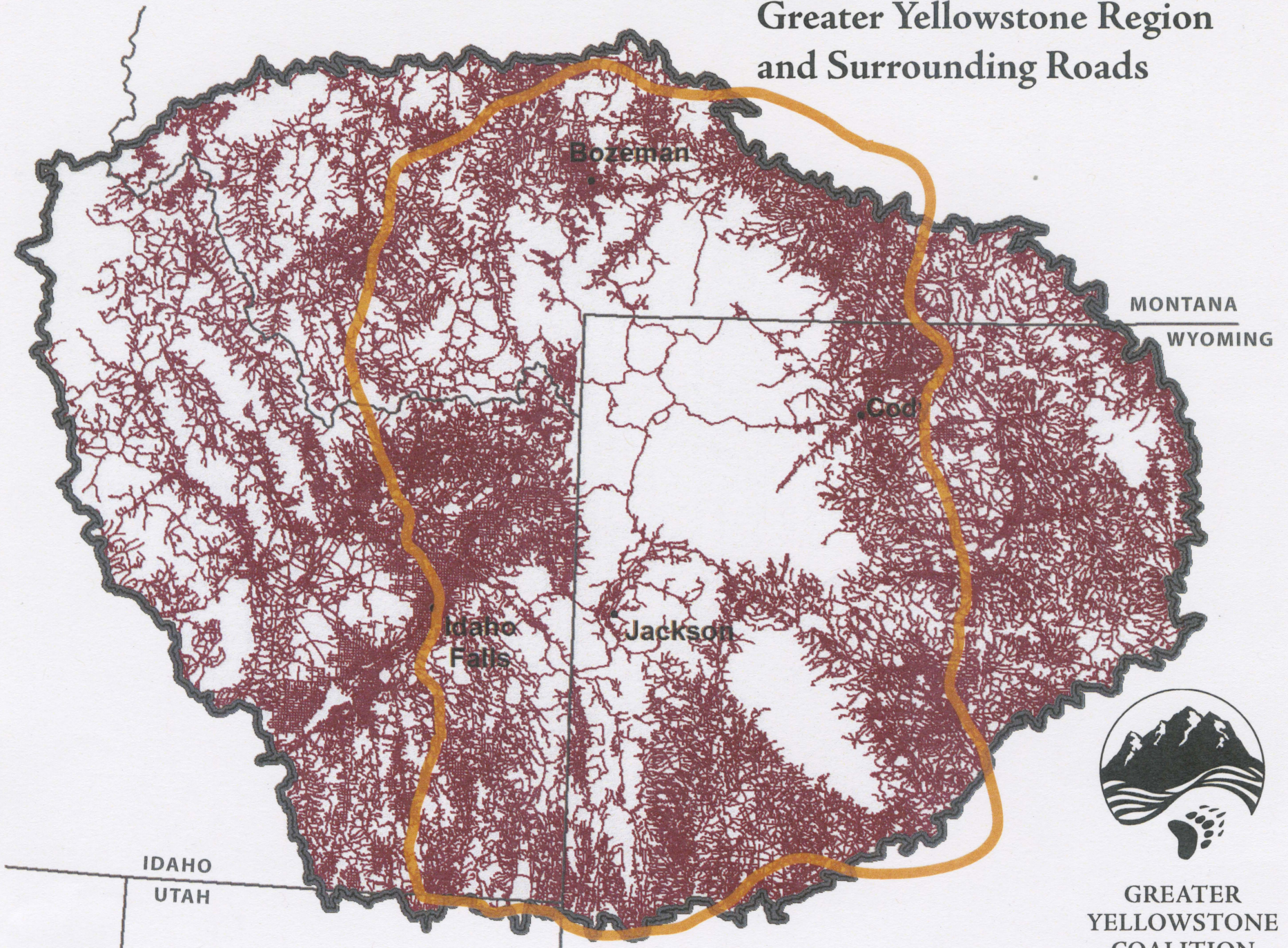
2. Consider creation of a new level of land protection for parts of Greater Yellowstone, one somewhere between the existing high restrictions of a national park or wilderness area and the current multiple-use system employed by the Forest Service and the extractive use methods used by the Bureau of Land Management. Such a level could grandfather-in some existing uses such as grazing, hunting, trapping, and certain recreational use, but limit other activities. Not all existing regional public lands would fall under these categories outside of the parks and wilderness areas, but the designation would extend across terrain that contains vital wildlife habitat and riparian areas. It would also include the public land and scientific agency capacity to work with regional private landowners to ensure that migratory patterns are preserved and vital winter range protected.

3. Launch national public education campaigns (probably over several decades) to build a level of public support and buy-in by regional residents and by citizens living in other parts of the country who come here for a variety of purposes. Without buy-in by the region's existing communities, the long-term viability of the ecosystem will be fundamentally compromised. Without broad national public support any large-scale proposal will be politically unviable.

These are not ideas that can be floated without political impact and without regard for the likely flashbacks of opponents who would see such ideas as dangerous to the status quo. We should not disregard the lessons learned from the political firestorm created in the 90s by the federal "vision" document which called for significant changes in land management in the region.

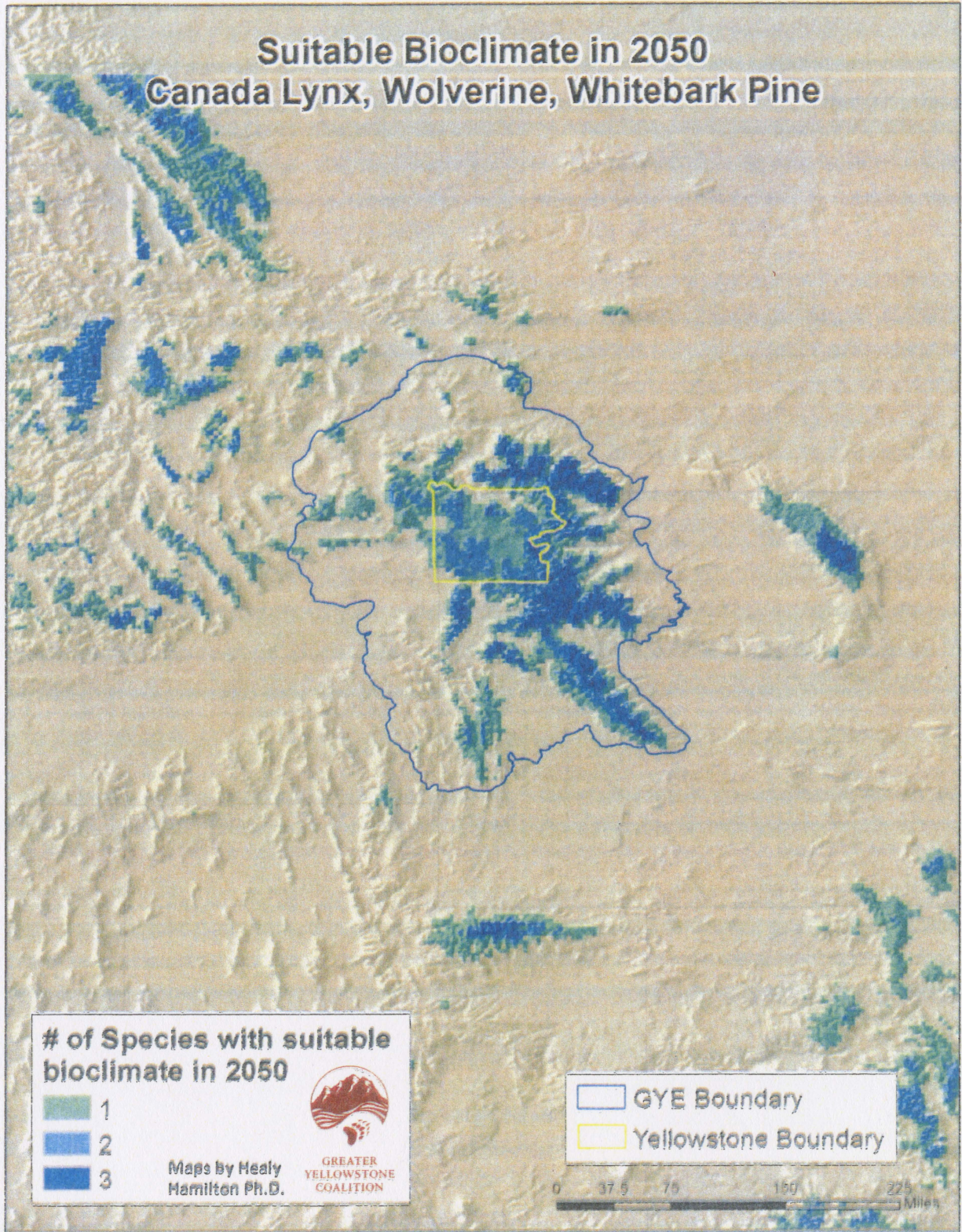
But I believe it is time to engage in an examination of these ideas – and the concept of building the Greater Yellowstone Ark in the years ahead.

Greater Yellowstone Region and Surrounding Roads



GREATER
YELLOWSTONE
COALITION

Suitable Bioclimate in 2050 Canada Lynx, Wolverine, Whitebark Pine



FINAL: FEBRUARY 13, 2013

To: GYC Board

FM: Mike Clark

RE: Thoughts on Future Priorities –Building the Ark

DT: January 13, 2013

At our March board meeting we will set aside some time to discuss “big picture” strategies and goals for GYC looking at current and future work with a long-term perspective.

This memo addresses challenges of building a “Greater Yellowstone Ark”, a regional refuge for biodiversity within a 50-year span of work framed by climate change.

What follows are my reflections on this challenge and some conclusions that result from ongoing talks with many of our founders and current supporters who have followed our work for several years. These talks are continuing. I will report on them during the March board discussions.

WHY THE CONCEPT OF AN ARK FOR GREATER YELLOWSTONE?

Looking across the Interior West and thinking ahead about what we know to be probable impacts of climate change, it is useful to develop a concept of triage – where are the most viable areas that give plants and animals options for survival and how do we ensure the protection of these spaces? In such an assessment, Greater Yellowstone stands out above most other large areas of public land concentration, including such areas as the wilderness core of central Idaho and the Crown of the Continent, which includes Glacier National Park, the Bob Marshall Wilderness and related wildlands, and the wild corridors of Canada extending northward.

In a time of predicted climate change, consider these key Greater Yellowstone factors:

Greater Yellowstone is the largest intact ecosystem in the Lower 48 states;

* Almost 80 percent of the region is publicly owned by the federal government or states;

* It contains the free-flowing headwaters of the three major western rivers and has four climatic zones converge within its boundaries (giving diverse precipitation patterns);

* It may be the most biologically diverse place on any continent in the world due to the geyser basins, thermal features within Yellowstone Lake, and its large concentrations of mammals;

* Its diverse terrain (mountains, plateaus, canyons and plains) gives many options for habitat for plants and animals;

* Its name is known worldwide;

* And it has a core of government agencies and NGOs dedicated to its existence.

Other assets come into play:

Greater Yellowstone is easily accessible to large numbers of people with over three million visitors each year;

It is a center for wildlands research and has a baseline of research data dating back over 100 years;

It is a wild land surrounded by a thin sea of people who are increasingly dependent on its public resources for economic stability;

Its brand assures a worldwide audience of people who care about its wellbeing.

These are not minor assets.

What Are Key Lessons Learned From Our 30 Years of Work?

Over a period of 30 years GYC has learned how to create and implement public education campaigns that have led to significant changes in people's attitudes toward resolving complex public policy issues and conflicts in Greater Yellowstone. These efforts have often taken ten years or more to complete.

Perhaps the most important advancement for GYC has been the successful effort to educate people about the concept of an intact ecosystem. Another would be the New World Mine battle, which defended the integrity of Yellowstone Park and the Abasaroka-Beartooth Wilderness areas from industrial degradation. A third would be the various efforts to consolidate public land ownership and to improve protections for national forests throughout the region – our efforts to pass the Tester forest bill, to protect the Absaroka-Beartooth Front and to protect the Gallatin Range are current illustrations of our work. Another would be the successful effort to protect the Snake River headwaters as a Wild & Scenic region. Battles over wildlife such as grizzlies and wolves are ongoing – they are never-ending features of our programs and they ebb and flow depending upon the political controversies of the moment.

In all of these efforts we have worked to improve the quality of life of the region's communities and to protect the unique world-class natural assets of GYE such as the intact large landscapes and the free-roaming wildlife.

But the political context within which we operate is changing fast. More and more conservation groups have established offices within the region and each of them has taken on a piece of what we historically have done. The competition for financial resources and retaining professional staff has never been greater. Long-standing political alliances are shifting – as has been evident in dealing with the sporting community in the battles over wolves and the upcoming battles over federal and state management and range of the grizzly bear. And the federal role and presence in our region is likely to shift due to federal budget cuts of land management and scientific agencies.

Simultaneously, the emerging science about what is happening in the region is telling us that we need to think further ahead and to project our goals and objectives over a longer period of time. This is particularly true in regard to the new and ominous predictions that are emerging about the long-term impacts of a changing climate in the region.

Do We Have the Right Strategies and Programs?

Yellowstone is one of the most studied places on Earth. As a result, the outpouring of new scientific information offers the potential to identify problems and to address negative trends far earlier here than in many other places around the world.

Last week I spent some time with John Varley, the former head of research for Yellowstone Park for almost two decades as he directed the YNP Center For Resources, the arm that oversaw all scientific research within the park. I posed for him one key question: What do we most need to do to protect Greater Yellowstone in a time of climate change?

Without hesitation, he responded:

- * Protect the integrity of the geysers – the geothermal resources – they contain the most diverse collection of species on dry land on the face of the earth;
- * Protect the ability of large mammals (prey and predators) to migrate across large landscapes;
- * Protect the winter range within the region – most of which is located on lower elevation private lands;
- * Protect the migration corridors that allow movement from Greater Yellowstone to other wild areas in the West.

His conclusions are highly relevant and valuable. And somewhat reassuring, for three of these are inherent within our current program plan. But we agreed that climate change impacts are shifting all assumptions and that we need to talk about

our work in a different context. John is probably the most respected senior scientist in the region. And his conclusions, while scientifically based, assume that the answers to these concerns are based on culture and politics primarily. We'll come back to this point later on.

Historically we have thought of land protection policies and mitigation projects as a means of ensuring the integrity of the ecosystem – minimize extractive industry impacts, slow down the tendency of people to “love” the region to death, protect the ability of large mammals to migrate across large landscapes. Primary direct threats have included human population growth, industrial activities such as mining and logging, energy development, the impacts of industrial tourism and the sprawl of subdivisions and the resulting fragmentation of private lands within the region.

What is most striking about our current situation is that the nature of the major threats has shifted dramatically. Industrial-scale threats such as mining and logging now are no longer seen as major challenges. Yes, we still have critical issues with phosphate mining in eastern Idaho, but even there the companies are responding to a new reality created by GYC's persistent challenge to their political dominance and their ability to ignore common sense and federal and state law. The logging industry is no longer a significant political or economic force in GYE. On public lands, motorized use and inappropriate recreational activities have taken the place of logging and mining as threats to the integrity of these lands. This reflects an enormous change in the political and cultural realities of managing the ecosystem.

In reality, the defensive political and cultural sheath built over 30 years by GYC and our allies now extends effectively across the public lands of Greater Yellowstone.

We have the ability to stop most big bad ideas that once threatened the integrity of the ecosystem. In addition, the combination of highly protected places – the national park boundaries and wilderness areas – provide a coherent core for long-term protection. If successful, our ongoing land protection campaigns for the Absaroka-Beartooth Front, the Gallatin Range, and the Tester forest bill will address many of the existing gaps for the lands around Yellowstone Park. We are encouraged by progress in these three campaigns. Obviously, much more work needs to be done.

What Are The Most Important Forces Likely To Impact the Region?

Four key forces stand above all others as we think about the coming decades: 1) climate change impacts; 2) human population growth within GYE; 3) the short-term demand for the U.S. to become energy independent and to therefore use energy resources located on both public and private lands within the region; and 4) the probable shortage of water resources across the West.

Climate scientists predict that the Interior West will become dryer and hotter over the coming decades. Most evidence of surface temperatures show that the changes on Earth are outpacing all climate models as carbon levels continue to climb.

But the political context within which we operate is changing fast. More and more conservation groups have established offices within the region and each of them has taken on a piece of what we historically have done. The competition for financial resources and retaining professional staff has never been greater. Long-standing political alliances are shifting – as has been evident in dealing with the sporting community in the battles over wolves and the upcoming battles over federal and state management and range of the grizzly bear. And the federal role and presence in our region is likely to shift due to federal budget cuts of land management and scientific agencies.

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Resulting drought and changes in rates and times of precipitation will likely have major impacts upon the agricultural sector and on the recreational sector, particularly with activities such as skiing, hunting and fishing. Resulting wildfires and hotter seasons may drive considerable numbers of people in the Southwest and coastal areas to look for safer, more viable climates.

Greater Yellowstone, with its diverse terrain, high quality of life, and natural assets such as public lands and wildlife, may become a magnet and a refuge for many people in the coming years. The region's human population has increased by over 85 percent since 1985 and this trend likely will continue despite the recent slowdown caused by economic downturns. Demographic experts and economists talk about "amenity migrants" and "urban and suburban refugees" as examples of people drawn to rural areas that offer beauty, solitude, relative stability, safety and open space. Our region has all of these assets – in abundance.

The region's vast lands and natural resources contain pockets of fossil fuels and uranium ores that are attractive to energy companies. Wind and solar options are now being explored. Local, regional and national NGOs are anticipating major battles ahead as these resources are targeted by the energy industry. Our conservation community is poised to have a significant impact on policies dealing with all of these challenges.

Thinking ahead to a time of drought and water scarcity, the region offers significant sources of water which are still untapped by urban and industrial consumers. An estimated 90 percent of the region's human use of water is utilized by agriculture – primarily to grow grass for livestock. These demands will change rapidly in the years ahead. And the three states' water management regimes are already inadequate and over-subscribed by irrigation users. Our community does not yet have the resources or the expertise to address this topic.

In short, the region faces massive change in a short period of time.

Four key questions arise for me when I reflect upon these forces: How do we protect the quality of life now enjoyed by the region's residents? How do we ensure an adequate degree of protection and sustenance of the region's public lands and wildlife? How do we create within the nation a level of public support for the protection of the unique world-class assets of Greater Yellowstone? How much time do we have to address these questions in a time of climate change?

As noted early when talking about John Varley's recommendations, these questions are best answered by addressing cultural and political forces, not necessarily by accumulating more scientific facts or research – although the new information will help everyone make more informed choices. As an institution working for social change, we will succeed in affecting these questions by creating clear long-term goals that are dramatic and visionary – and then we can create short-term campaigns and programs to achieve these larger goals.

As I look at our current GYC work, we are operating several key campaigns dealing with a multitude of issues across the ecosystem. But we don't have a single flagship issue that stands as a symbol of all that we do. Or one that quickly translates into a story line that is dramatic and overwhelming in its immediacy and in its long-term impact.

We need to create one that gives us a positive long-term set of goals for the future. We should give the public a vibrant and positive vision for how Greater Yellowstone stands out as a world-class asset that needs special management policies over time.

We need to advance the idea of an Ark – of the Greater Yellowstone Ecosystem becoming an example around the world of how biodiversity and wild lands natural assets such as geothermal fields and large landscapes, can be managed and protected in a time of climate change.

Possible Next Steps in Building the Ark?

Once we have created the conceptual framework for building an Ark, we should consider new strategies such as the following:

1. A call for recognition of GYE as a world-class ecosystem protected by region-wide mandates that withdraw public lands from extractive industrial uses and that assures protection of habitat and species. The mandates would affect all federal agencies operating within Greater Yellowstone. This likely would need to occur through an Executive Order or congressional act for all relevant land management and scientific agencies.
2. Consider creation of a new level of land protection for parts of Greater Yellowstone, one somewhere between the existing high restrictions of a national park or wilderness area and the current multiple-use system employed by the Forest Service and the extractive use methods used by the Bureau of Land Management. Such a level could grandfather-in some existing uses such as grazing, hunting, trapping, and certain recreational use, but limit other activities. Not all existing regional public lands would fall under these categories outside of the parks and wilderness areas, but the designation would extend across terrain that contains vital wildlife habitat and riparian areas. It would also include the public land and scientific agency capacity to work with regional private landowners to ensure that migratory patterns are preserved and vital winter range protected.
3. Launch national public education campaigns (probably over several decades) to build a level of public support and buy-in by regional residents and by citizens living in other parts of the country who come here for a variety of purposes. Without buy-in by the region's existing communities, the long-term viability of the ecosystem will

be fundamentally compromised. Without broad national public support any large-scale proposal will be politically unviable.

These are not ideas that can be floated without political impact and without regard for the likely flashbacks of opponents who would see such ideas as dangerous to the status quo. We should not disregard the lessons learned from the political firestorm created in the 90s by the federal "vision" document which called for significant changes in land management in the region.

But I believe it is time to engage in an examination of these ideas – and the concept of building the Greater Yellowstone Ark in the years ahead.

Please come to the board meeting prepared to engage in a dialogue on these issues.

If I had one book for you to examine before the meeting, I would recommend the large format, amazingly complex compendium called The Atlas of Yellowstone recently published by a consortium of academic centers and edited by Marcus, Meacham, Rodman and Steingisser, University of California Press, 2012. It's worth the price and the weight.

Let me know if you wish additional material or information. We look forward to seeing you at the March board meeting here in Bozeman.

To: Concerned Friends
FM; Mike Clark
RE: Climate Change Options in the Rockies
DT: December 19, 2006

Here are some thoughts about how we might respond to climate change issues in the Rockies. Any suggestions on edits or next steps will be greatly appreciated. Thanks.

A Rocky Mt. Reserve

How do we as citizens and communities respond to issues of climate change in the Northern Rockies? This may be the most important question facing our communities. The planet is changing and we have little choice but to do likewise if we wish to maintain healthy communities here in the Rockies.

Climate change now appears inevitable. So what are our choices and how do we best face them?

By the year 2030, community-based institutions and legal frameworks should be changed to ensure the viability and long-term sustainability of a rural land base in the Rockies. To be successful, our rural communities will provide habitat for native species and also deliver an acceptable economic base for residents and people who own land here and use it in a responsible manner.

Our current cultural, economic, social and political practices are not capable of adequately addressing the scale of climate change now being predicted by experts across the globe. The projected increases in surface temperature of the Earth over the next 25 years may be as much as two to four degrees F., the equivalent for the human body temperature of going from a normal temperature reading of roughly 98.6 F. to a fever rate of 102-3 degrees F. These are not normal times.

Faced with such changes, we need to think about a long-term vision for this region which includes processes to enable people to consciously create communities that are transformative and capable of responding to climate change across a large landscape.

Central to this effort is the creation of the Rocky Mountain Reserve, a designation for large working landscapes that seek healthy communities through using foresight, ingenuity, and protection of ecological functions. It should

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be based on operating principles that are broader and more comprehensive than the concepts of wilderness, national parks, or protected areas now driving much of the work in the region on both public and private lands.

The Rocky Mountain Reserve will be a collection of communities that recognize the special characteristics of this region. These successful communities will ensure a safe home or refuge for plants and animals that are in danger of extinction because of climate change. They will be built on a diverse range of economic enterprises that enhance the quality of rural life and that keep people engaged upon the land. To be effective, the Reserve must encompass both public and private lands and respect the legal and cultural differences between the two. At the same time, it must also create a collaborative basis for managing these lands, one that preserves the society's capacity to protect and to conserve a full range of native species while accommodating acceptable economic activities.

Below are thoughts on what might lie ahead for this region and how we might best respond to ensure that we can continue to co-exist with the full range of life forms that now inhabit the Northern Rockies.

The inevitability of large-scale drought, and the accompanying reality of water scarcity, underlies much of the impetus for what follows.

Within the context of climate change and creation of a viable Reserve, the Northern Rockies region offers unusual natural assets that deserve national attention and prioritization: 1) the existence of vast areas of wild country and largely intact, functioning ecosystems; 2) enormous variation in relief elevation and terrain; and 3) the headwaters of the three largest rivers in the Western United States.

In particular, the high, wide valleys of the Rockies provide unparalleled options for variations in temperature and therefore increase the range of climate conditions (even with aridity and youthful soils) than almost any place in the Lower 48 states other than the southern Appalachian Mountains.

Just as the concept of a national park evolved around Yellowstone because of its geology and wild spaces, we now need to apply similar concepts to the Northern Rockies as a

unique concentration of assets that must be protected in response to the probabilities of widespread climatic shifts.

On a 25-year time span — by roughly 2030-- what might we be seeking or facing within relevant watersheds?

*** Economic development strategies designed around place-based restoration, light industry, and agricultural practices that preserve and utilize soils and water in a high, semi-arid region.

*** Permanent protection of designated climate-driven refugia and landscapes to ensure preservation of ecological functions and native species habitat on public lands in North America.

*** Strong economic incentives and cultural mandates to support habitat protection and stream flow restoration for native species on private lands.

**** The institutional capacity to carry out scientific research in all relevant watersheds.

*** Alliances of landowners and resource users to provide a cultural, social and political base that ensures economic and political incentives for the Refuge across a broad landscape in the northern Rockies.

THE LAY OF THE LAND IN 2030

Here are some projections based on what we can anticipate right now in the areas where we have some expertise – the Lower 48 states.

By 2030, the human population in the Rockies will double or triple in relevant watersheds. In the short-term, responding to climate change is not a matter of dealing with human population growth. The key questions center upon choices about where to live and how to minimize our social and economic activities that contribute to global warming. In the Rockies, 95 percent of our population continues to live in small towns and surrounding suburbs, with only a small portion of the population living on ranches and farms.

Our communities are linked by new systems of transportation; by compacts and agreements built around watershed management; and by collaborative problem-solving approaches built around place-based economic development strategies.

Climate change is a fact of life by 2030, with surface temperatures increasing by 2-4 degrees F., bringing a shift in precipitation that shows less snow pack, more winter rain, less spring run-off, and dramatic shifts in the annual cycles of rivers in the Rockies. This is a conservative estimate of temperature increase, but reflects temperature change that is twice as rapid as has occurred on Earth in the past 100 years. Many experts are anticipating much larger increases. No matter the degree, we should expect dramatic population shifts and economic changes to occur within the US as people respond to these climatic forces.

As significant climatic changes occur due to global warming, the preservation of viable soil and the presence of ground water and surface water may become more important than the persistence of native species in their original ranges. Thus, tributary streams and wetlands become extremely crucial resources for water storage and as functional safe havens for a wide range of colonizing species that may be shifting ranges and habitat in order to survive. In such situations, management of landscapes for biodiversity and for preservation of ecological functions is the primary focus of rural public and private land managers. Subdivisions and economic enterprises are now sited in limited locations in order to preserve high-quality soils and to ensure the integrity of riparian corridors and migration processes.

The protection of riparian corridors in the Rockies is a key policy component in managing both public and private lands for wildlife habitat. The numbers of endangered and threatened species have increased dramatically and government policies now prioritize recovery and preservation of these species on both public and private lands. Specially designated ecological refuges or sanctuaries exist to ensure viability of key species.

Most rural landscapes in relevant watersheds are dominated by large-scale absentee owners, either by government or by private entities, especially in the headwaters. However, communities of truck farmers and ranchers exist throughout the region and these producers work closely with scientists to restore and improve their landscapes and riparian corridors.

Federal land-based agencies now located within Interior and Agriculture have been reorganized around the following

prioritized national concerns dealing with climate change: first, the production of high-quality fresh water on both public and private lands; second, the creation of food and fiber with an emphasis on locally-based production centers; thirdly, the preservation of bio-diversity on a landscape basis; and lastly, production of energy based on long-term sustainability and minimal disruption of the three previously mentioned resources. Each land-based agency has formal goals for addressing climate change, with an emphasis on integrating work with other agencies. These are centered on place-based goals and market-based incentives for landowners and residents of the Reserve lands and similar communities around the country.

Energy developments, particularly in fossil fuels, have doubled over their current rates but then peaked and are leveling off in the West, off-shore oil fields, and Appalachia. A strong policy emphasis on energy conservation, solar and wind investments, and alternative fuels has replaced the current emphasis on mining fossil fuels. However, most countries still depend on fossil fuels for key components of their energy and transportation grids.

Global monitoring via satellite and remote sensing devices of land and water resources for temperature, storms, precipitation, disease, and noxious species infiltration occurs routinely on a daily basis.

Carbon sequestration policies now provide a major incentive for private land owners to initiate and maintain cultivation of plants that enhance climatic policies. These activities are a major part of the agricultural economics within the Rockies and out on the plains. Parallel policies are in place to maximize the production of clean water and its regenerative functions in rural areas.

Rural spaces are seen as major reservoirs of natural resources and as viable centers of recreational and spiritual renewal for an urban/suburban population that values solitude, open spaces, and biodiversity. Food production in rural areas are built around areas with adequate rainfall and viable high-quality agricultural soils. Lands containing marginal soils are used for climatic enhancements and the maintenance of biodiversity; these grasslands and forests are generally not cultivated annually. Reforestation and grasslands restoration are at the center of federal agricultural policies in the region.

Networks for food production, consisting of thousands of truck farms and ranches, exist throughout the Rockies. These are characterized by farmer-to-consumer contracts and community food cooperatives, with producers experimenting with ways to grow food and fiber in an increasingly arid landscape. Due to rising transportation costs and climatic variability, new approaches to food production emphasize the ability of local communities to be self-sufficient or to produce large amounts of foods from farms and ranches located as close as possible to consumers.

Energy supplies and energy use are closely linked to new modes of transportation that utilize mass transit, low impact transportation corridors, and highly efficient use of solar-power and electric vehicles. In the US and Canadian Rockies, recreational communities are tied together by a north-south rail system built to service resort communities and gateway towns for national parks and public lands.

Cultural conflicts continue to grow around the sustainable uses of these rural spaces and are complicated by the growth in the use of some forms of motorized recreation. Privacy and the capacity for solitude continue to be key values in the on-going debate about the use of rural areas.

Industrial tourism is both a major economic sector and a major public policy issue on Reserve lands as large numbers of tourists from throughout the world seek experiences they have learned about through television and the Internet.

New technologies provide the capacity to track individual units of a particular species or to monitor human use of motorized transport – in other words, governments now have the practical ability to oversee individual activities of humans and relevant wildlife in real time.

Creating The Reserve By The Year 2015

Accepting the scenario described above as an achievable goal, let us step back step back from the year 2030 and look at what might be needed in order to meet our long-term goals in the Rockies over the next decade, what programmatic elements might we wish to have in place in order to create the Reserve and to shape policy debate and social and economic behavior of individuals and corporations?

The central goal of work in this era: a political alliance among people who see the future of the Rockies tied directly to functioning natural ecosystems that includes space and habitat for a full range of species, including native terrestrial and aquatic species and human populations.

Here are key components of a successful effort to be achieved by 2015:

*** The public strongly supports The Rocky Mountain Reserve or Refuge on both private and public lands, thereby assuring protection of a full range of native terrestrial and aquatic species

*** Formally designated ecologically-defined refuge boundaries exist that encompass both public and private lands and waters, with legal protections in place to assure long-term viability of these spaces.

*** Supporting a watershed-centered management framework, the public has insisted that in-stream flow policies are in place in each relevant state to protect an acceptable and sustainable hydrograph for selected rivers.

*** The private institutional capacity exists to scientifically monitor and legally defend currently existing populations of native species.

*** Permanent protection and guaranteed stream flows are in place for native species on private and public lands in relevant headwater streams.

*** Land owner incentives and awards programs are functioning for viable networks of landowners within each relevant river.

*** Strong partnerships of land owners and conservation groups are working collaboratively with key federal agencies and state agencies and cities on a long-term basis.

*** Federal policies are in place to secure long-term improvements for clean air and clean water within protected areas/roadless/wilderness areas/national parks.

*** Regional associations of guides and hunting and fishing lodges are operating within a political context to support and

advance public policies for protecting stream flows and native species.

*** Working alliances of conservation groups and regional economic development agencies share common goals and assumptions about acceptable economic activities and population goals on a regional basis.

In The Year 2012

For the above changes to have any likelihood of reality in the Rockies, federal and state agencies, county commissions, scientific institutions, conservation groups, economic development agencies, and the general public will need to be engaged in an on-going dialogue about the need for cultural, economic and institutional changes in order to manage the impacts of climate change.

Crucial elements that must be immediately addressed to reach effective goals for 2012 include:

Regional public education campaigns are needed in each Rocky Mountain State. These will lay out the need for the Reserve as a concept and the economic, social and cultural benefits that would be created by special designations of land use and economic activity built around responding to the challenge of climate change.

The Reserve Network exists as an association of cities, counties, institutions and individuals who have formally endorsed the Reserve concept and are working together to create new incentives, jobs and investment opportunities for residents of the Reserve.

In-Stream flow legislation in each state provides new flexibility in using water rights to meet natural hydrographs on prioritized rivers and streams.

Public policies are in place to mandate the implementation of terrestrial and aquatic stewardship for public lands management, with accompanying career incentives for agency leaders.

A Water Rights Data Base is annually updated in Rocky Mountain states, and is keyed to landownership and use on all prioritized streams. It shows water rights ownership, location

of each diversion, and monthly measurements of stream flow tied to water allocations and changing land use patterns.

Water leasing programs are in operation in each state, with dedicated private and public funds to assure minimum in-stream flows on major watersheds and to manage shortages among existing water users.

Alliances exist with key cities in the Interior West who need access to surface waters to maintain viable public water supplies, with an emphasis on keeping these supplies in streams over long distances rather than placing the resource in pipelines and canals.

The legal capacity exists within the conservation community to monitor and influence dam operations by public agencies on public and private lands in the Rockies.

Alliances exist between irrigators and the conservation community ensuring adequate water flows for the Rocky Mountain Reserve. Public and private efforts are underway to explore new opportunities to diversify income for land and water rights owners who are willing to utilize conservation of water for new crops and land uses.

A regional landowner network is operating around sustainable use of water for food and natural resources, including management seminars and educational materials aimed at existing and potential landowners and their ranch managers and personnel.

An association of guides and fishing and hunting lodges, resorts, and dude ranches is politically active in each state to defend instream flows and state-based stream protection and restoration programs.

---Mike Clark
Mclark@tu.org
406-581-5748

7 years old

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Next on floor?

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Below are thoughts on what might lie ahead for this region and how we might best respond to ensure that we can continue to co-exist with the full range of life forms that now inhabit the Northern Rockies.

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New Time span 2015-2050

② *** Economic development strategies designed around place-based restoration, light industry, and agricultural practices that preserve and utilize soils and water in a high, semi-arid region.

③ *** Permanent protection of designated climate-driven refugia and landscapes to ensure preservation of ecological functions and native species habitat on public lands in North America.

① *** Strong economic incentives and cultural mandates to support habitat protection and stream flow restoration for native species on private lands.

**** The institutional capacity to carry out scientific research in all relevant watersheds.

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THE LAY OF THE LAND IN 2030

Here are some projections based on what we can anticipate right now in the areas where we have some expertise – the Lower 48 states.

By 2030, the human population in the Rockies will double or triple in relevant watersheds. In the short-term, responding to climate change is not a matter of dealing with human population growth. *to general (& source?)* The key questions center upon choices about where to live and how to minimize our social and economic activities that contribute to global warming. In the Rockies, 95 percent of our population continues to live in small towns and surrounding suburbs, with only a small portion of the population living on ranches and farms.

What's the percent here?

Our communities are linked by new systems of transportation; by compacts and agreements built around watershed management; and by collaborative problem-solving approaches built around place-based economic development strategies.

Relevant ^{to footnotes}

of climate change forecasts anticipated

(where?) Climate change is a fact of life by 2030, with surface temperatures increasing by 2-4 degrees F., bringing a shift in precipitation that shows less snow pack, more winter rain, less spring run-off, and dramatic shifts in the annual cycles of rivers in the Rockies. This is a conservative estimate of temperature increase, but reflects temperature change that is twice as rapid as has occurred on Earth in the past 100 years. Many experts are anticipating much larger increases. No matter the degree, we should expect dramatic population shifts and economic changes to occur within the US as people respond to these climatic forces.

Transition in context here?

are there all "shoulds"?

As significant climatic changes occur due to global warming, the preservation of viable soil and the presence of ground water and surface water may become more important than the persistence of native species in their original ranges. Thus, tributary streams and wetlands become extremely crucial resources for water storage and as functional safe havens for a wide range of colonizing species that may be shifting ranges and habitat in order to survive. In such situations, management of landscapes for biodiversity and for preservation of ecological functions is the primary focus of rural public and private land managers. Subdivisions and economic enterprises are now sited in limited locations in order to preserve high-quality soils and to ensure the integrity of riparian corridors and migration processes.

"is" or "should be"

The protection of riparian corridors in the Rockies is a key policy component in managing both public and private lands for wildlife habitat. The numbers of endangered and threatened species have increased dramatically and government policies now prioritize recovery and preservation of these species on both public and private lands. Specially designated ecological refuges or sanctuaries exist to ensure viability of key species.

exist or should exist

Most rural landscapes in relevant watersheds are dominated by large-scale absentee owners, either by ^{Public} government or by private entities, especially in the headwaters. However, communities of truck farmers and ranchers exist throughout the region and these producers work closely with scientists to restore and improve their landscapes and riparian corridors.

must work?

the requirements?

Federal land-based agencies now located within Interior and Agriculture have been reorganized around the following

prioritized national concerns dealing with climate change: first, the production of high-quality fresh water on both public and private lands; second, the creation of food and fiber with an emphasis on locally-based production centers; thirdly, the preservation of bio-diversity on a landscape basis; and lastly, production of energy based on long-term sustainability and minimal disruption of the three previously mentioned resources. Each land-based agency has formal goals for addressing climate change, with an emphasis on integrating work with other agencies. These are centered on place-based goals and market-based incentives for landowners and residents of the Reserve lands and similar communities around the country.

separate + unclear



Fourth

The first three? or what resources

Energy developments, particularly in fossil fuels, have doubled over their current rates but then peaked and are leveling off in the West, off-shore oil fields, and Appalachia. A strong policy emphasis on energy conservation, solar and wind investments, and alternative fuels has replaced the current emphasis on mining fossil fuels. However, most countries still depend on fossil fuels for key components of their energy and transportation grids.

Reference
Coal, oil exports from USA

Global monitoring via satellite and remote sensing devices of land and water resources for temperature, storms, precipitation, disease, and noxious species infiltration occurs routinely on a daily basis.

Carbon sequestration policies now provide a major incentive for private land owners to initiate and maintain cultivation of plants that enhance climatic policies. These activities are a major part of the agricultural economics within the Rockies and out on the plains. Parallel policies are in place to maximize the production of clean water and its regenerative functions in rural areas.

Rural spaces are seen as major reservoirs of natural resources and as viable centers of recreational and spiritual renewal for an urban/suburban population that values solitude, open spaces, and biodiversity. Food production in rural areas are built around areas with adequate rainfall and viable high-quality agricultural soils. Lands containing marginal soils are used for climatic enhancements and the maintenance of biodiversity. These grasslands and forests are generally not cultivated annually. Reforestation and grasslands restoration are at the center of federal agricultural policies in the region.

Networks for food production, consisting of thousands of truck farms and ranches, exist throughout the Rockies. These are characterized by farmer-to-consumer contracts and community food cooperatives, with producers experimenting with ways to grow food and fiber in an increasingly arid landscape. Due to rising transportation costs and climatic variability, new approaches to food production emphasize the ability of local communities to be self-sufficient or to produce large amounts of foods from farms and ranches located as close as possible to consumers.

Energy supplies and energy use are closely linked to new modes of transportation that utilize mass transit, low impact transportation corridors, and highly efficient use of solar-power and electric vehicles. In the US and Canadian Rockies, recreational communities are tied together by a north-south rail system built to service resort communities and gateway towns for national parks and public lands.

Cultural conflicts continue to grow around the sustainable uses of these rural spaces and are complicated by the growth in the use of some forms of motorized recreation. Privacy and the capacity for solitude continue to be key values in the on-going debate about the use of rural areas.

*need
Better term*

Industrial tourism is both a major economic sector and a major public policy issue on Reserve lands as large numbers of tourists from throughout the world seek experiences they have learned about through television and the Internet.

New technologies provide the capacity to track individual units of a particular species or to monitor human use of motorized transport – in other words, governments now have the practical ability to oversee individual activities of humans and relevant wildlife in real time.

Creating The Reserve By The Year 2015 *By Urban*

desirable
7. Accepting the scenario described above as an achievable goal, let us *back up* ~~step back~~ *back up* step back from the year 2030 and *consider* look at what might be needed *in order* to meet our long-term goals in the Rockies over the next decade, what programmatic elements might we wish to have in place in order to create the Reserve and to shape policy debate and social and economic behavior of individuals and corporations?

The central goal of work in this era: a political alliance among people who see the future of the Rockies tied directly to functioning natural ecosystems that includes space and habitat for a full range of species, including native terrestrial and aquatic species and human populations.

What about economy?

Here are key components of a successful effort to be achieved by 2015:

*** The public strongly supports The Rocky Mountain Reserve or Refuge on both private and public lands, thereby assuring protection of a full range of native terrestrial and aquatic species

*** Formally designated ecologically-defined refuge boundaries exist that encompass both public and private lands and waters, with legal protections in place to assure long-term viability of these spaces.

*** Supporting a watershed-centered management framework, the public has insisted that in-stream flow policies are in place in each relevant state to protect an acceptable and sustainable hydrograph for selected rivers.

*** The private institutional capacity exists to scientifically monitor and legally defend currently existing populations of native species.

*** Permanent protection and guaranteed stream flows are in place for native species on private and public lands in relevant headwater streams.

*** Land owner incentives and awards programs are functioning for viable networks of landowners within each relevant river.

*** Strong partnerships of land owners and conservation groups are working collaboratively with key federal agencies and state agencies and cities on a long-term basis.

*** Federal policies are in place to secure long-term improvements for clean air and clean water within protected areas/roadless/wilderness areas/national parks.

*** Regional associations of guides and hunting and fishing lodges are operating within a political context to support and

hmm

advance public policies for protecting stream flows and native species.

*** Working alliances of conservation groups and regional economic development agencies share common goals and assumptions about acceptable economic activities and population goals on a regional basis.

In The Year 2012

For the above changes to have any likelihood of reality in the Rockies, federal and state agencies, county commissions, scientific institutions, conservation groups, economic development agencies, and the general public will need to be engaged in an on-going dialogue about the need for cultural, economic and institutional changes in order to manage the impacts of climate change.

Crucial elements that must be immediately addressed to reach effective goals for 2012 include:

Regional public education campaigns are needed in each Rocky Mountain State. These will lay out the need for the Reserve as a concept and the economic, social and cultural benefits that would be created by special designations of land use and economic activity built around responding to the challenge of climate change.

The Reserve Network exists as an association of cities, counties, institutions and individuals who have formally endorsed the Reserve concept and are working together to create new incentives, jobs and investment opportunities for residents of the Reserve.

In-Stream flow legislation in each state provides new flexibility in using water rights to meet natural hydrographs on prioritized rivers and streams.

Public policies are in place to mandate the implementation of terrestrial and aquatic stewardship for public lands management, with accompanying career incentives for agency leaders.

A Water Rights Data Base is annually updated in Rocky Mountain states, and is keyed to landownership and use on all prioritized streams. It shows water rights ownership, location

*Re-order to put less-
consequential
elements first*

of each diversion, and monthly measurements of stream flow tied to water allocations and changing land use patterns.

Water leasing programs are in operation in each state, with dedicated private and public funds to assure minimum in-stream flows on major watersheds and to manage shortages among existing water users.

Alliances exist with key cities in the Interior West who need access to surface waters to maintain viable public water supplies, with an emphasis on keeping these supplies in streams over long distances rather than placing the resource in pipelines and canals.

The legal capacity exists within the conservation community to monitor and influence dam operations by public agencies on public and private lands in the Rockies.

Alliances exist between irrigators and the conservation community ensuring adequate water flows for the Rocky Mountain Reserve. Public and private efforts are underway to explore new opportunities to diversify income for land and water rights owners who are willing to utilize conservation of water for new crops and land uses.

A regional landowner network is operating around sustainable use of water for food and natural resources, including management seminars and educational materials aimed at existing and potential landowners and their ranch managers and personnel.

An association of guides and fishing and hunting lodges, resorts, and dude ranches is politically active in each state to defend instream flows and state-based stream protection and restoration programs.

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Is there a better way to state how we achieve these outcomes

Can we make the "Reserve" an outcome of all these good deeds with ^{out} mentioning a Reserve entity explicitly - it tend to think the term "Reserve" will be a red flag for many

Ranchland Dynamics II: Ranch Ownership Change and the Resilience of Social and Ecological Systems in the Greater Yellowstone Ecosystem

The working private landscapes of the Greater Yellowstone Ecosystem comprise a core element of the largest intact ecosystem in the Lower 48 states and contain some of the most vital winter habitat for the world-famous mammal herds that migrate annually between summer habitat in the public-owned highlands and winter habitat in the primarily privately-owned lower river valleys. Despite the importance of these lower lands to the integrity of the ecosystem, relatively little is known about how the private lands are faring as the nation continues to recover from recession.

2003?
The most exhaustive study of private land ownership and use in the GYE took place a decade ago and found that nearly one-fourth of the region's ranchland had changed hands in the period from 1990 to 2001 - the most rapid exchange of land ownership since the Homestead Acts took effect at the turn of the 19th Century.

who? l.s. need an updated study to...
We propose to revisit and expand this inquiry into ranchland dynamics to evaluate ranch ownership change since 2001 using the same authors and methodology as the prior study.

When complete, the study will provide an unprecedented 20-year look at the ownership and management of GYE's private lands and should address key conservation concerns for NGOs and public agencies that work on ecosystem integrity and habitat preservation.

~~Known as~~ one of only a dozen intact large landscape ecosystems remaining in the world, the Greater Yellowstone Ecosystem covers roughly 18 million acres of land in Montana, Idaho and Wyoming. Approximately 75 percent of the region is in public ownership, including national forests, parks, wildlife refuges and BLM lands.

of what?
The need to evaluate outcomes of ranchland ownership trends in the GYE today is prompted by several developments. Most importantly, the region continues to experience amenity-driven growth and appears poised for a post-recession surge in in-migration and related land-use change. At the same time, the importance of private land stewardship to ecological integrity in the region has only grown in the face of possible climate change threats to habitat for native species, including both fish and terrestrial wildlife.

A decade has passed since the first major inquiry into the rate and change of ranch land ownership change in the Greater Yellowstone Ecosystem. That research, sponsored by Yellowstone Heritage and executed by Colorado University-Boulder's Center of the American West, documented unprecedented transfers of large ranch properties during the period 1990-2001. During this period nearly one quarter of

the GYE's large ranch properties changed hands, with high amenity areas experiencing particularly dramatic turnover. For example, nearly half of the private ranch acreage in Sublette County, Wyoming changed hands, and many of the sales involved the transfer of traditional family-owned and operated cattle ranches to non-resident, amenity-oriented buyers.

The original study looked at agricultural land in ten counties, including some 7,822,300 acres of private land, most of which were in large acreages of 400 acres or more.

The study of ownership change from 1990-2001 suggested that there were mixed implications of this transition for conservation: many new owners were in a position to relax the intensity of grazing and farming activities, some new owners had a new range of expertise and priorities with regard to the use and management of their ranch properties; other new owners with no previous history of lands management were dependent on prior owners and managers for agricultural expertise.

Beyond the benefits for restoration associated with new investments in restoration and habitat observable on many properties, the researchers noted several concerns: 1) potential instability of the new ownership regime, 2) loss of long-established local access to hunting, fishing, and recreational areas, 3) impacts to remaining traditional ranching practices such as sharing equipment and neighbors jointly conducting haying operations and barn-raising, and participation in local agricultural institutions and cultural activities, and 4) a resistance by some new owners to encumbrances (such as easements) that might diminish resale value of ranch properties for investors who were primarily holding the land for relatively quick financial returns.

Given that the national expansion of wealth that fueled ranch ownership change in the 1990s continued into the 2000s, it is now time to inquire into the trajectory and impact of three decades of large-scale ownership transition. Have these forces better shaped the region's ability to adapt to ongoing and emerging land and water use pressures, particularly when seen in conjunction with the increasing pressures of climate change? Have new agricultural or management tools emerged as a result of investments by non-traditional owners into large landscapes? Are new practices emerging that should be promoted throughout the region with other private landowners? Is there increased potential for private land owners to integrate their plans and operations into comparable plans or practices by adjacent public lands managers?

This analysis has strategic value for conservation engagement with private land ownership and stewardship in three core areas:

1. Habitat fragmentation, particularly the protection of critical winter habitat for migratory ungulates;

*Should
all of them
w/ go to
mored up
to present
FF?*

2. Changing uses and values for water – from wetlands to river systems, changes in how water is used and valued for reshaping the West;
3. Maintenance of social capital in systems that link urban and rural residents of the Greater Yellowstone Ecosystem.

Of course, one cannot consider the three points above without integrating climate change factors into the analysis.

Specifically, we will look at the same ten counties covered in the prior report and we will investigate the following questions:

- What is the volume of ranch and agricultural land sales in 10 Montana and Wyoming GYE counties, 2002-2013? Combining this data with the previous study will provide an unprecedented view of land ownership in the GYE over a full human generation time span.
- What are emerging patterns in the management approach and character of new owners who bought the land as an amenity rather than as a means of consolidating existing ownership into larger ranches, or investors who were holding lands for long-term appreciation? Is the ownership rapidly changing hands, leading to management uncertainty or abuse of resources?
- What measurable land use, water use and resource management outcomes are associated with new landowners in the GYE in the following areas?
 - Acres protected in conservation easements—resulting impacts on habitat fragmentation, aquatic conditions (i.e. water temps and quality)
 - Wildlife habitat enhancement activities (\$s spent and/or units improved) – resulting impacts on habitat, aquatic conditions, etc.
 - Use of land (season, number of livestock, etc.) of public lands grazing permits – resulting impacts on habitat, aquatic conditions, etc.
 - Use of water (consumptive and non-consumptive, including water rights ownership and administration) – resulting impacts, etc.
 - Changes in hunting, fishing, and public lands access
 - Water rights ownership and administration
 - Revenue-generating activities (private guide leases, guest ranching, oil and gas leasing, etc.).

Addressing these questions should give NGO leaders and public officials new tools for fully assessing the impacts of changing patterns of land and water ownership and should provide new insights and options for creating effective policies and best practices for managing public and private lands in the GYE.

Step 1

Mike Clark will host a one-day workshop of an initial steering committee to refine questions and approaches for Ranchland Dynamics II. Members of the original research team will present the results of the 1990-2001 study. Key regional experts will be asked to share brief presentations outlining the critical private land, water, and wildlife trends shaping their strategies and activities. Facilitated discussion among the assembled group will focus on refining a final research plan.

Co-conveners with Clark will include: Robert Keith of Beartooth Capital and the original researchers, Dr. Julia Haggery and Dr. Hannah Gosnell, both of whom are college professors working with graduate students who may be the appropriate researchers to complete the land study .

Invitees could include the following (none have been approached yet):

Kurt Ault, MT FWP

Hank Fischer, NWF

Laura Ziemer, TU

Andy Rahn

Mike Finley, Turner

Michael Scott, Hewlett

Others to be determined

A County Commissioner?

Step 2

The results of the one-day workshop discussion will form the basis for a final research plan and will be turned into a series of proposals and budgets for submission to potential individual funders and private foundations. Outreach to key NGO leaders and agency official will begin to obtain more feedback on research needs and goals for the study.

Step 3

Once funded, the research will begin immediately, with time lines and goals established as needed.

*Maybe not at the workshop, but asked about
on opinion on the proposal.*