

4 Environmental Consequences



A grizzly bear roams a streamside in the Rocky Mountain Front.

This chapter assesses the environmental impacts expected to occur from the implementation of alternatives A or B, as described in chapter 2. Environmental impacts are analyzed by issues for each alternative and appear in the same order as discussed in chapter 2.

EFFECTS ON THE BIOLOGICAL ENVIRONMENT

This section describes the estimated effects on climate change, wildlife habitat, and water resources of carrying out alternatives A and B.

CLIMATE CHANGE

Climate change is the pre-eminent issue for conservation in future decades. Current trends in climate change are expected to affect high mountain ecotypes and lower elevation, snow-melt dependent watersheds, such as those found in the Front more acutely than some other landscape ecotypes.

Predictions regarding the specific effects of climate change in the Front are in the early stages. Empirical data indicates that during the 20th century, the region has grown warmer, and in some areas drier, especially east of the Continental Divide on the Rocky Mountain Front. Annual average temperature has increased 1–3 degrees over most of the region. This seemingly modest increase masks much larger

shifts in minimum winter temperatures (10°F) and shifts in maximum summer temperatures (7°F). In the 2007 Introduction to the Summary for Policy Makers Synthesis Report, the Intergovernmental Panel on Climate Change described that average air temperatures may raise by up to 6°C by the end of this century according to regionally downscaled models from the Pacific Northwest (USFWS 2009).

Changes in temperature and precipitation are expected to decrease snow pack and will affect stream flow and water quality throughout the Front. Warmer temperatures will result in more winter precipitation falling as rain rather than snow throughout much of the region particularly in mid-elevation basins where average winter temperatures are near freezing. This will result in

- Less winter snow accumulation;
- Higher winter streamflows;
- Earlier spring snowmelt;
- Earlier peak spring streamflow and lower summer streamflows in rivers that depend on snowmelt (USFWS 2009b).

As glaciers and alpine snow fields melt and winters warm in Montana, specialized habitat for fish and wildlife species is expected to diminish. Snow conditions that facilitate hunting success for forest carnivores, such as Canada lynx, are now changing due to winter warming (Stenseth 2004). High elevation forest plants such as whitebark pine, (an

important food source for grizzly bears) and other birds and mammals throughout the Crown of the Continent and Greater Yellowstone ecosystems (Kendall and Arno 1989) will also be negatively impacted by winter warming. Whitebark pine is susceptible to increased mortality as the incidence of drought, high elevation wildfire, and mountain pine beetle attacks, all associated with a warming climate increase (Hanna et al. 2009).

This warming may also have impacts on grizzly bears. Important food resources are expected to decline as warming causes an increase in whitebark pine blister rust, reducing the availability of the pine to bears. This may result in shifts in foraging elevations and a potential increase in grizzly bear conflict with humans and livestock.

According to Service Grizzly Bear Recovery Coordinator, Chris Servheen (University of Montana, Missoula, MT; personal interview in person, 11 June 2008), it is highly likely that grizzly bear delayed fall den entry dates and earlier spring-emergence dates will begin occurring on the Front as they have in the Greater Yellowstone area; a change which is related to climate change. This will also potentially increase their likelihood of human-caused mortality from increased encounters (Endangered Species Coalition 2009).

As late summer flows are affected by global warming, fewer rivers will be able to supply ample cold water required by some species. Some species distributions are expected to be interrupted by the heightened ambient air temperatures (Endangered Species Coalition 2009).

The impacts of climate change will extend beyond the boundaries of any single refuge or easement program and will require large-scale, landscape level solutions that extend throughout the CoCE. A goal of the proposed project area expansion is to build resilience in ecological systems and communities, so that, even as climate conditions change, the Front will continue to support its full range of native biodiversity and ecological processes. Building resilience includes maintaining intact, interconnected landscapes, and restoring fragmented or degraded habitats.

ADAPTATION, MITIGATION, AND ENGAGEMENT

The Service strategic response to climate change involves three core strategies: adaptation, mitigation, and engagement (USFWS 2009). Through adaptation, the impacts of climate change on wildlife can be reduced by conserving habitats expected to be resilient.

Increased landscape connectivity is one of the most effective methods to help wildlife adapt to climate change. Large landscapes, especially those within mountains, and the ability to move between them, provide the best chances for plant and animal species,

as well as ecosystems and ecological processes, to survive changing conditions. The ability to migrate to higher latitudes, higher elevations, or cooler exposures can make possible the successful adaptation of plants and animals. The Yellowstone to Yukon Ecosystem, which encompasses the Crown of the Continent Ecosystem, is the most intact mountain ecosystem remaining on Earth and is one of the world's few remaining areas with the geographic variety and biological diversity to accommodate the wide-scale adaptive responses that might allow whole populations of animals and plants to survive (Yellowstone to Yukon Conservative Initiative 2009).

One of the results of changing climates is the alteration of the habitats upon which wildlife depend. Wildlife will have to adapt to changes in habitat to survive. Protecting and linking contiguous blocks of unfragmented habitat will facilitate movement of wildlife responding to climate change.

Carbon sequestration forms one of the key elements of mitigation. The Rocky Mountain Front conservation easement program will protect large forested areas from subdivision. Forests are critically important in the efforts to remove CO₂ from the atmosphere and mitigate climate change. The CO₂ from the atmosphere is absorbed by trees through photosynthesis and stored as carbon in the tree trunk, branches, foliage, and roots, with oxygen as a byproduct. The organic matter in forest soils, such as the humus produced by the decomposition of dead plant material, also acts to store carbon.

Engagement involves cooperation, communication, and partnerships to address the conservation challenges presented by climate change (USFWS 2009). The proposed project is located in an area that is designated as a high priority for conservation and linkage protection by many of our partners including Montana Fish, Wildlife and Parks; The National Fish and Wildlife Foundation; The Nature Conservancy; and The Conservation Fund; and American Wildlands. Many of these organizations are involved in trans-boundary conservation, protecting and connecting habitat in the United States and Canada. Strong partnerships have already been developed to meet the challenges of climate change and wildlife resources.

Given the level of public and private partnerships focused on land protection within the Rocky Mountain Front, this landscape is arguably one of the most promising large-scale opportunities remaining in North America for species resiliency and adaptation in the face of climate change.

WILDLIFE HABITAT

The effects on wildlife habitat for alternatives A and B are described on the following page.

Alternative A

Although efforts by the Service's Partners for Fish and Wildlife (PFW) program and partners would continue to enhance habitat on some private lands, degradation of resources on many unprotected lands would continue. These potential impacts could result in the further decline of migratory birds, resident wildlife, and listed species.

Many acres of land would likely be developed for recreational home sites or isolated commercial uses, as economic forces change in the future. In recent years, subdivision and the demand for recreational property have been spilling over from western Montana, posing the greatest single threat to the Rocky Mountain Front. Lands adjacent to natural areas are choice home sites and are targeted for residential development. In particular, burgeoning subdivisions occur at the mouths of the Dearborn, Sun, and Teton River canyons and land prices have increased dramatically. Long-time family ranches are beginning to be sold and are commanding very high prices as recreational properties.

No action would result in the loss of opportunity to protect historically important upland and wetland habitats. Without the protection of private land with conservation easements, the future of wildlife habitat in the project area would be uncertain.

Habitat fragmentation is one the greatest impacts caused by rural subdivision and residential development. The Front has more than 700,000 privately owned acres, with the majority remaining in large ranch ownership. However, under state law, the subdivision process is not difficult—land may be split into lots of 160 acres or greater without local review or approval. Moreover, with no county zoning in place, small lot subdivisions are possible.

Private land subdivision results in smaller ownerships. Subsequent effects, including those listed below, would likely impact wildlife:

- fragmentation
- invasive plant infestations
- increased fencing, roads, and vehicle traffic
- loss of habitat and travel corridors for wildlife

In addition, these effects would bring increased human presence in the form of snowmobiles, predator-prey shifts, and sources of disturbance that can disrupt wildlife movement patterns and render habitat unusable.

Loss of habitat and travel corridors for wolverine, Canada lynx, grizzly bear, gray wolf, and other species would likely have a negative impact on these species' populations along the Front. Research has shown that grizzly bears move between private lands along the Front, Glacier National Park, and the Lewis and Clark National Forest, all of which are part of the Northern Continental Divide Ecosystem

(USFWS 1987). These key geographic and biological linkages can be lost and wildlife populations isolated once an area is fragmented by subdivisions or other development.

Increased human settlement can also result in increased human-wildlife conflicts, as well as impacting actions to control important natural ecological events such as fire and seasonal floods.

Conversion of native prairie to cropland, especially within the eastern portion of the Front, has an effect on bird populations. In the fescue prairie region of Alberta, Canada, total passerine populations and diversity have decreased significantly as native rangeland has been converted to cereal grain production (Owens and Myers 1972). Overall, grassland bird populations are decreasing faster and over a larger area than any other avian species group, including Neotropical migrants (Knopf 1996).

Alternative B

Expanding the Rocky Mountain Front Conservation Area would provide for an increase in conservation protection on up to 125,000 acres of important habitat on private land. This program would help maintain the uniqueness of the Rocky Mountain Front and complement conservation efforts of the Montana Department of Fish, Wildlife and Parks (MFWP), TNC, Boone and Crockett Club, Montana Land Reliance, and other federal and state agencies.

The fact that the Front remains biologically and ecologically intact is a tribute to the area's ranchers and residents, who have long recognized what this unique and important landscape represents for ranching and wildlife. The project aims to ensure habitat for wildlife remains intact in perpetuity and, by doing so, strengthens the ranching heritage of the Rocky Mountain Front.

Conservation easements along the Rocky Mountain Front would help alleviate habitat fragmentation issues. Key biological linkages would facilitate wildlife movement and provide for wildlife habitat requirements. The potential for human-wildlife conflicts would be greatly reduced.

Compatible agricultural practices such as livestock grazing or haying would continue, while sodbusting (breaking of native rangeland) would be prohibited. Easements would maximize the connectivity with other protected grasslands and decrease the negative impacts of habitat fragmentation on grassland birds (Owens and Myers 1972).

WATER RESOURCES

The effects of alternatives A and B on water resources are described on the following page.

Alternative A

The prospect of residential development along the Front represents a potentially significant threat to the aquatic habitat. Sewage-derived nutrient additions to streams and lakes could have detrimental effects on the aquatic ecology (Wernick et al. 1998).

Housing developments can also result in additional wetland drainage, water diversion, and introduction of invasive species. Development could also change drainage patterns or rate of surface runoff, increasing soil erosion and non-point source pollution.

As demand for potable water increases for new subdivisions, water rights could be questioned and challenged to a greater extent in the future. Groundwater aquifers would receive more demand, resulting in potential degradation to the hydrology of some wetland areas.

Conversion of grasslands to cropland has been documented to increase sedimentation and pesticide runoff into wetlands. Tillage increases the sediment load into wetlands when compared to grasslands (Gleason and Euliss 1998, Kantrud et al. 1989), primarily due to wind erosion (NRCS 1992).

Alternative B

Water resources on 125,000 acres would be protected from increased non-point source pollution from residential subdivision, commercial development, and draining of wetlands, all of which are prohibited under the proposed easement program.

Compatible agricultural practices such as livestock grazing or haying would continue, while sodbusting would be prohibited. The landowner would continue to own and control water rights.

EFFECTS ON THE SOCIOECONOMIC ENVIRONMENT

This section describes the estimated effects of alternatives A and B on land ownership, land use, oil and gas exploration and development, wind energy development, public use, and economic impacts.

LANDOWNERSHIP AND LAND USE

The effects on land ownership and use are described below.

Alternative A

The resources studied by the Service for conservation easements along the Rocky Mountain Front would remain in private ownership with no restrictions. Ranching opportunities could be reduced

when landowners begin to split tracts into smaller lots.

Landowners that subdivide could increase their revenue by developing recreational home sites. With subdivision, tracts could potentially increase in value if there is a desire to cluster housing or to keep open space for future housing developments.

The community would lose open space and the aesthetics of the Front would diminish significantly. Subdivision and development would reduce hunting and wildlife observation opportunities and diminish revenue associated with these activities to local communities.

Alternative B

The expanded easement program would enhance the protection of trust resources through conservation of wildlife habitat and protection of land from surface disturbance or development.

The proposed action would affect location and distribution, but not rate or density, of human population growth. Ongoing, traditional agricultural uses such as livestock grazing would allow compatible ranching to continue. This alternative would maintain open space on a large landscape scale, thereby preserving the rural lifestyle of the area.

Preventing subdivision and development could decrease future tax revenues in a defined market area. However, open space could actually provide a net savings to local governments when compared to the revenues generated and costs of services associated with residential development (Haggerty, 1996).

Positive effects may occur from increased public wildlife viewing, fishing, and hunting opportunities. Open space also may enhance property values on adjoining lands as people begin to seek out undeveloped lands in the future.

The purchase of an easement would not result in a transfer of land title and, therefore, the property taxes paid by the landowner to the county are not affected. No changes to the tax base are anticipated. The land remains under private ownership.

The easement program would have no effect on tribal jurisdiction or tribal rights because it is outside of reservation land.

VALUE OF INTACT ECOSYSTEMS

Humans influence every ecosystem on earth, leading to impairment of natural ecosystem structure and function (MEA 2005). Converting native land to row-crop agriculture, suppressing fire, diverting water flow, increasing nutrient and toxic pollution, altering global precipitation patterns and gas concentration,

and homogenizing and lowering global biodiversity are a few of the ways humans have altered ecosystems. North American forests, savannas, and grasslands have experienced substantial losses, whereas woody savanna, shrubland, and desert areas have expanded because of desertification and woody expansion into grasslands (Wali et al. 2002), inevitably leading to changes in ecosystem function (Dodds et al. 2008).

The Montana Natural Heritage Program has rated the Front as one of the most significant natural landscapes in the state, a tribute to its intact ecological systems, expansive wetlands, and diverse native fauna and flora, including a concentration of rare species.

Alternative A

Under the no action alternative, the threat of habitat fragmentation will continue unabated. Landowners may continue to face economic pressures to subdivide their ranches. Tree encroachment and urban fragmentation will compress the project area, leaving fewer larger parcels of intact habitat.

Alternative B

Conserving native land cover is an important component of maintaining ecosystem structure and function. Under the proposed action, native forest habitats would remain intact, continuing to provide ecosystem goods and services to landowners and local communities. Ecosystem services include: soil erosion control, water supply, biodiversity, and carbon sequestration. Forested ecoregions (eastern temperate, western mountain, and west coast marine) have less than 5% of native area remaining. The proposed action would help protect valuable ecosystem services (see figure 4). Furthermore, it would prevent the prohibitively high cost of restoration.

OIL AND GAS EXPLORATION AND DEVELOPMENT—ALTERNATIVE A

Oil and gas development would continue to occur on private lands along the project area. Stipulations to protect the surface estate would be governed by existing state regulations.

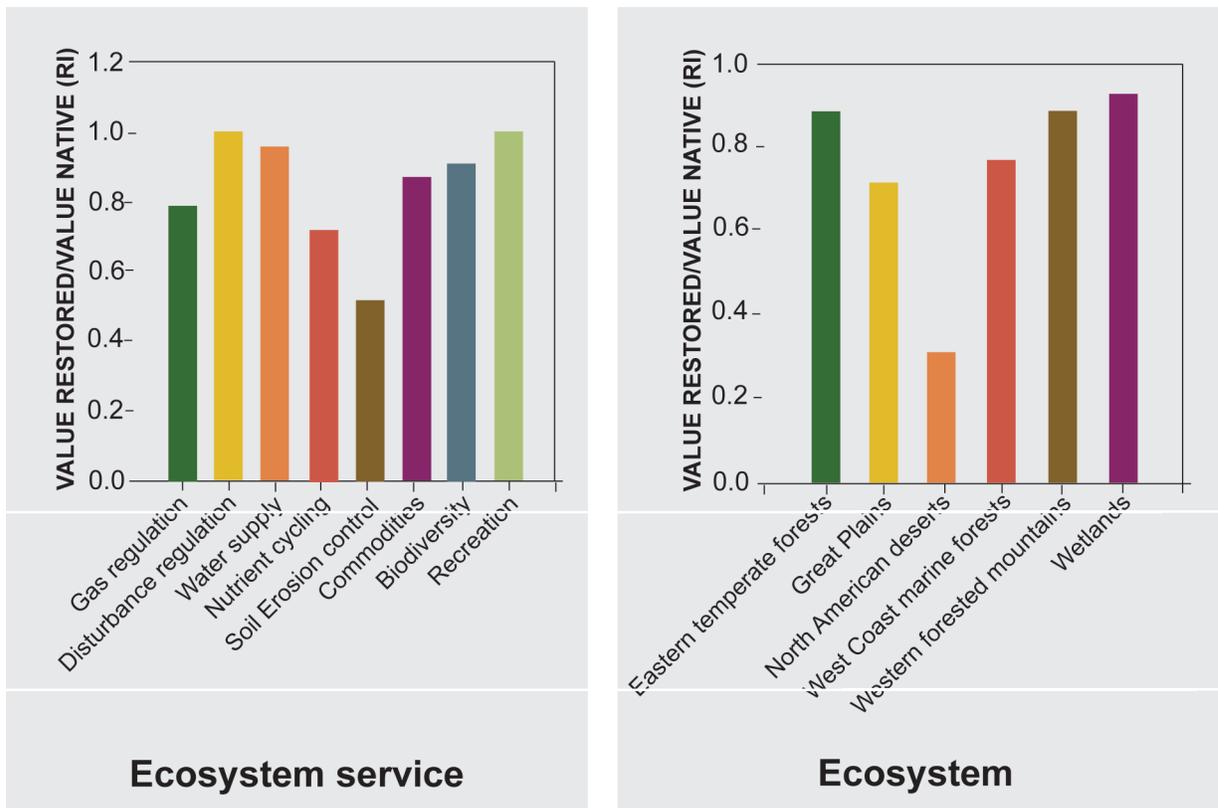


Figure 4. Relative native and restored benefits of ecosystem goods and services. The relative value, RI, is determined as the ratio of estimated benefits derived from native and restored acreages per year.

(Source: Dodds et al. 2008)

OIL AND GAS EXPLORATION AND DEVELOPMENT—ALTERNATIVE B

The proposed easement program would not preclude oil and gas exploration or development on private land. Typically, conservation easements do not affect subsurface estates (oil and gas deposits) because the Service only acquires rights associated with surface ownership. In many places where the subsurface estate has been severed from surface ownership, including those in the Rocky Mountain Front, the landowner does not own the subsurface rights; this means that the easement that the Service acquires from the landowner is junior to the subsurface rights.

In instances where a landowner owns both the surface and the subsurface estate, the Service would treat oil and gas development as a permitted use and provide for such development in the easement document. Easements would contain reasonable surface stipulations for such actions as revegetation of disturbed areas, access, and site reclamation.

Easements would not be acquired on federal lands where the Bureau of Land Management (BLM) administers the oil and gas leasing program. The BLM program is concentrated on public lands, whereas the Service's conservation easements are concentrated on private lands.

WIND ENERGY DEVELOPMENT—ALTERNATIVE A

The new interest in wind development has heightened the very real threat of accelerated fragmentation along the Front. Under the no action alternative wind speculators would be unencumbered to move across the landscape tying up large tracts of lands through wind leases for future wind farm development projects. In addition to the negative impacts of fragmentation due to the development of roads, turbine pads, collection lines, and transmission lines, the project area would be susceptible to increased exposure of noxious weed infestations.

WIND ENERGY DEVELOPMENT—ALTERNATIVE B

Conservation easements purchased from willing sellers on private land would not allow for the development of commercial wind resources on those lands. The easement program would enhance the protection of an intact ecosystem through conservation of wildlife habitat and protection from surface disturbance or development of wind energy infrastructure while providing some financial compensation to landowners through the sale of the easements.

The proposed action would affect only lands on which the Service has acquired a conservation easement. Location and distribution, and sales by willing sellers of wind energy development on adjacent

lands without Service conservation easements would not be restricted by the Service. Ongoing, traditional agricultural uses such as livestock grazing would allow compatible ranching to continue. This alternative would maintain open space on a large landscape scale, thereby preserving the rural lifestyle of the area.

PUBLIC USE—ALTERNATIVE A

Landowners would continue to manage public use.

PUBLIC USE—ALTERNATIVE B

Conservation easements purchased on private tracts would not change the landowner's right to manage public access to their property.

Under the expanded easement program private landowners would continue to retain full control over their property rights, including allowing or restricting hunting and fishing on their lands. This is different from the MFWP's block management program, where participating landowners are paid to provide hunter access to their private lands.

ECONOMIC IMPACTS—ALTERNATIVE A

Under alternative A, the no-action alternative, economic impacts will remain at current levels.

There are currently 4.3 full-time equivalent (FTE) employees at the Rocky Mountain Front CA whose total wages amounted to \$151,875, or an average of approximately \$35,000 per employee. Assuming employees spend 79 percent of their earnings locally, the existing annual economic impacts related to the employment at Rocky Mountain Front CA is \$119,981.

According to Service staff, operating expenditures are \$3,076 annually. When combined with employment related economic impacts, the annual baseline economic activity associated with the existing Rocky Mountain Front CA is \$123,057.

ECONOMIC IMPACTS—ALTERNATIVE B

Under alternative B, increases in employment, annual operating expenditures, and easement purchases would contribute to the economic activity that the Benton Lake National Wildlife Refuge Complex generates in the study area. The socioeconomic impact of visitor expenditure is not included in this analysis, as historical public visitor data at conservation areas is not available and visitor increases due to public awareness of conservation activities is difficult to quantify.

According to Service staff, new employment associated with Rocky Mountain Front CA alternative B will increase by 1.67 FTEs to a total

of 6 FTEs. New employee salaries total \$91,518, or an average of \$54,911 per new employee. Assuming employees spend 79 percent of their earnings locally, the direct socioeconomic impacts of increased employment at Rocky Mountain Front CA is \$72,299 annually.

Alternative B would add approximately \$29,365 in operating expenditures associated with landowner management, employee training, and travel expenses. These funds are spent on local goods and services and therefore directly impact the economy in the study area.

The direct economic impacts of easement acquisitions are more difficult to attribute to the study area as it is less obvious where landowners may spend this income. In the Rocky Mountain Front CA, easements are worth an estimated \$48,875,000. Table 1, presents a summary of annual operating costs and salaries associated with alternative B.

Table 1. Summary of annual operating costs and salaries associated with alternative B.

	<i>Current Impacts</i>	<i>Alternative B Impacts</i>
Salaries	\$119,981	\$192,280
Operations	\$ 3,076	\$ 32,441
Total Impacts	\$123,057	\$224,721
Increase above baseline		\$101,664

As shown above, the total direct economic impacts related to the Rocky Mountain Front CA under management alternative B are estimated at \$224,721, an increase of \$101,664 above baseline impacts.

UNAVOIDABLE ADVERSE IMPACTS

Any adverse effects that may be unavoidable while carrying out alternatives A and B are described on the following page.

ALTERNATIVE A

The adverse impacts of degradation and habitat fragmentation would be expected to be more widespread and prevalent in the project area.

ALTERNATIVE B

No direct or indirect unavoidable adverse impacts to the environment would result from the selection of alternative B. The expanded easement program would not result in unavoidable adverse impacts on the physical or biological environment. The expansion of the conservation area boundary would not, by itself, affect any aspect of land ownership or values.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Any commitments of resources that may be irreversible or irretrievable as a result of carrying out alternatives A and B are described below.

ALTERNATIVE A

There would be no additional commitment of resources by the Service if no action is taken.

ALTERNATIVE B

There would not be any irreversible or irretrievable commitments of resources associated with expanding the conservation easement program, as lands will only be acquired as funding is available. Once easements are acquired, irreversible and irretrievable commitments of funds to protect these lands (such as expenditure for fuel and staff for monitoring) would exist.

SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

This section describes the short-term effects versus long-term production from the expected actions in alternatives A and B.

ALTERNATIVE A

Ranches may be sold to developers for short-term gains, which would have a negative impact on the long-term biological productivity of the area.

Over the long-term, the costs to counties to sustain development in rural areas could be significant (see the Landownership and Land Use section on page 18).

Wind energy and oil and gas development would provide short-term income gains, but would have a long-term adverse impact on the ecosystem of the Front from subsequent effects of habitat fragmentation.

ALTERNATIVE B

The proposed conservation easement program would maintain the long term biological productivity of the grassland, riparian, forest and tundra ecosystems, including increased protection of endangered and threatened species and maintenance of biological diversity by preserving a large intact functioning system.

The nation would gain the protection of species for future generations of Americans. The public would

gain long term opportunities for wildlife-dependent recreational activities from the continued presence of wildlife in the Front.



USFWS

McCown's longspur.

CUMULATIVE IMPACTS

This section describes the cumulative impacts that may result from the combination of expected actions in alternatives A or B, together with other biological and socioeconomic conditions, events, and developments.

ALTERNATIVE A

Current Service program work such as Partners for Fish and Wildlife would continue along the Rocky Mountain Front. The Service would continue to work cooperatively with landowners to voluntarily improve habitat on private land.

ALTERNATIVE B

The proposed easement program would have long term positive impacts on wildlife habitat and result in the long term conservation of migratory birds, threatened and endangered species, native plants, and the overall biological diversity of the Rocky Mountain Front.

Within the CoCE, areas that were not suitable for homesteading and settlement were designated as federal lands. Settlers selected the milder and fertile valleys. These areas are currently under the greatest developmental pressure. Because of these threats and pressures, the Service has defined three project areas within the CoCE to concentrate strategic acquisition to (1) maintain biological diversity related to wildlife values, (2) link together existing protected areas, (3) preserve existing wildlife corridors, and (4) protect the large, intact, functioning ecosystem, while maintaining the rural character and agricultural lifestyle of western Montana.

Funding would come primarily from the Land and Water Conservation Fund and potential conservation partners. Table 2 shows the proposed acquisition acreage, type of acquisition tool, focal species, and key partners for each of the three project areas; Blackfoot Valley, Rocky Mountain Front, and Swan Valley.

Table 2. Summary of the project proposal for the Crown of the Continent ecosystem.

<i>Project Area</i>	<i>Proposed Project Area</i>	<i>Potential New Acreage</i>	<i>Type of Acquisition Tool</i>	<i>Focal Species</i>	<i>Key Partners</i>
Blackfoot Valley Wildlife Management Area Expansion	Expand existing area from 165,000 acres to 824,024 acres	80,000 acres	Conservation easement	Grizzly bear, Canada lynx, bull trout, westslope cutthroat trout, migratory birds	Private landowners, The Blackfoot Challenge, The Nature Conservancy, Trout Unlimited
Rocky Mountain Front Conservation Area Expansion	Expand existing area from 527,000 acres to 918,000 acres	125,000 acres	Conservation easement	Grizzly bear, migratory birds, long-billed curlew, Sprague's pipit, McCown's longspur	Private landowners, The Nature Conservancy, The Conservation Fund, Richard King Mellon Foundation
Swan Valley Conservation Area	New proposed area of 187,400 acres	11,000 acres	Conservation easement and limited fee-title (less than 1,000 acres)	Grizzly bear, Canada lynx, bull trout, migratory birds: Lewis' woodpecker, black tern, trumpeter swan, olive-sided flycatcher	Private landowners, The Nature Conservancy, Trust for Public Lands, Swan Valley Ecosystem Center, Plum Creek Timber Company, Vital Ground, Trout Unlimited, Northwest Connections

