

Decision Support

- 
- Facilitate communication and information exchange
 - Promote research applications development
 - Synthesize and disseminate research results

A photograph of a forest fire. Tall, thin trees are silhouetted against a bright, hazy background of orange and yellow flames. The fire appears to be consuming the upper parts of the trees, creating a dramatic, vertical column of fire. The foreground shows dark, out-of-focus branches of evergreen trees.

Fire in the Crown Workshop: April 15, 2004
Supported by RM-CESU

Fire in the Crown Workshop

Objectives:

**Learn about the fires of 2003,
learn about fire ecology,
and discuss any issues or concerns.**

08/13/2003

Fire in the Crown Workshop

67 people attended:

Glacier park staff, concessionaires, park partners, and resource managers and scientists from Yellowstone NP, USGS, USFS, University of Montana, and the state of Montana.

08/25/2003



Presentations

Summary of 2003 fires
Assessment of 2003 fires
Regional to local fire history

Healthy Forest Initiative
Lessons learned from 1988 fires in Yellowstone
Effects of smoke on health

**Effects of fire on plants; T&E species; fire-dependent
birds; amphibians; and water quality & fish habitat**
Predictions for 2004 fire season

09/12/2003

Panels

**Air quality alerts and future actions
Lessons learned from 2003 fires and future strategies**



09/12/2003

Climate Friendly Parks: From Knowledge to Action

A joint EPA/NPS initiative

Workshop, December 9-10, 2003

Workshop Goals:

Educate park employees and partners about climate change and impacts to park resources

Demonstrate successes of existing environmentally sustainable programs

Provide tangible steps toward new activities to reduce GHG emission and model green practices to other parks, agencies, and the public.

Climate Friendly Parks: From Knowledge to Action

A joint EPA/NPS initiative

Proposed Action Items

Short Term:

- “Red bike” program for short trips between NPS buildings
- Car pooling/shuttle initiative for employees
- Convert diesel fleet to 100% biodiesel
- Recycling Program

Long Term:

- Shuttle service alternative for visitors
- “Green” design for future West side visitor’s center

Crown Managers Partnership Annual Forum

When: March 3-4, 2005

Where: Hampton Inn, Kalispell

What: Invasive Plants, Environmental, Economic,
and Social Challenges and Opportunities

Who: Invited Speakers

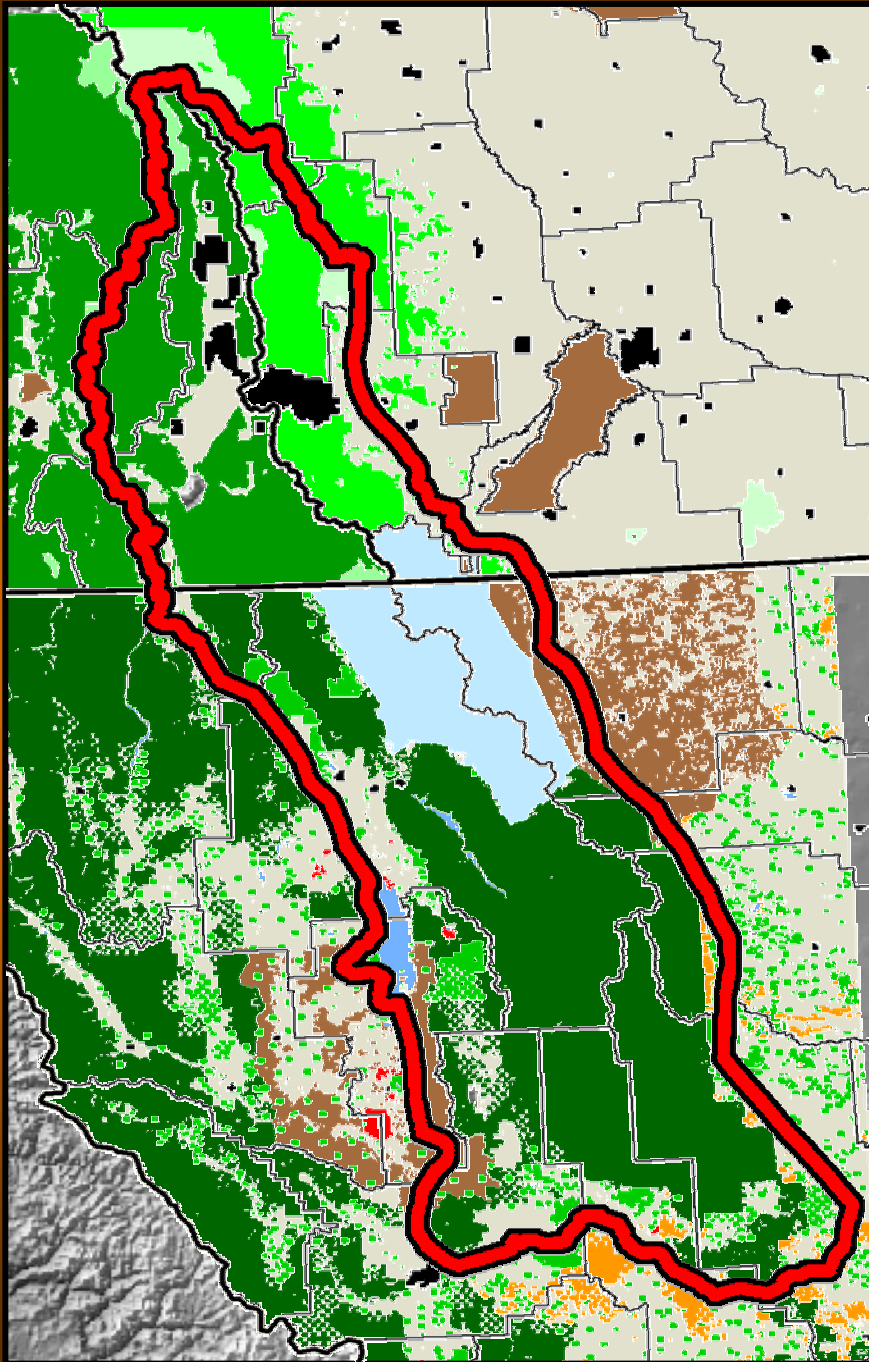
- Cyndi Smith – Waterton Lakes National Park
- Kelly Cooley – Pincher Creek
- Mike Alexander – Alberta Sustainable Resource Development
- Kevin Patterson – East Kootenay Invasive Plant Program
- Dawn LaFleur – Glacier National Park; Exotic Plant Management Team
- Linh Davis – Flathead National Forest; Botanist
- Jed Fisher – Flathead County Weed/Parks/Recreation
- Bruce Maxwell & Lisa Rew, Montana State University
- Don Gayton, Forest Research and extension Partnership, BC
- Maria Mantas, The Nature Conservancy



Crown Managers Partnership (CMP)

Recognizing the need to collaborate across jurisdictions, over 20 agencies with land management responsibility in the Crown came together to form the Crown Managers Partnership (CMP).





- First Nation / Tribal Lands
 - Parks Canada / U.S. National Parks Service
 - B.C. Ministry of Water, Land and Air Protection
 - Alberta Community Development
 - B.C. Ministry of Forests
 - United States Forest Service
 - Alberta Sustainable Resource Development
 - United States Fish and Wildlife
 - Montana DNRC (State Forests)
 - U.S. Bureau of Land Management
 - Private Land
 - Counties / MDs / Regional Districts
 - Cities / Towns / Villages
- Crown of the Continent**

Jurisdictional Complexity in the Crown of the Continent

Crown Managers Partnership (CMP)

... participants

- Alberta Agriculture, Food and Rural Development
- Alberta Environment
- Alberta Sustainable Resource Development, Fish and Wildlife Division & Land and Forest Division, Community Development
- Alberta Community Development, Parks and Protected Areas Division
- BC Forests, Cranbrook Forest District
- BC Sustainable Resource Management
- BC Ministry of Water, Land and Air Protection, Environmental Stewardship
- Blackfeet Tribal Council
- Flathead Basin Commission
- K'Tunaxa Kinbasket Tribal Council
- Montana Department of Fish Wildlife and Parks
- Montana Department of Natural Resources and Conservation
- Parks Canada, Waterton Lakes National Parks
- Salish-Kootenai Confederated Tribes
- U.S. Bureau of Indian Affairs
- U.S. Fish and Wildlife Service
- U.S. Forest Service, Flathead National Forest & Lewis and Clarke National Forest, Stillwater/Swan State Forest
- U.S. National Park Service, Glacier National Park
- U.S. Geological Survey

Crown Managers Partnership (CMP)

... Steering Committee

In order to advance progress on the above priorities, the Forum struck a steering committee:

- Ian Dyson, Alberta Environment (Lethbridge, AB)
- Wayne Stetski, Ministry of Water, Land, Air Protection
- Brace Hayden/Leigh Welling, Glacier National Park (West Glacier, MT)
- Roy Doore, Bureau of Indian Affairs (Browning, MT)
- Mark Holston, Flathead Basin Commission (Kalispell, MT)
- Bill Dolan, Waterton Lakes National Park (Waterton Park, AB)
- Jimmie DeHerrera, Flathead National Forest (Hungry Horse, MT)
- Mike Quinn/Danah Duke, Miistakis Institute for the Rockies (Calgary, AB)
- Len Broberg, University of Montana
- Rich Moy, Montana Department of Natural Resources and Conservation



Fire Atlas

Glacier National Park

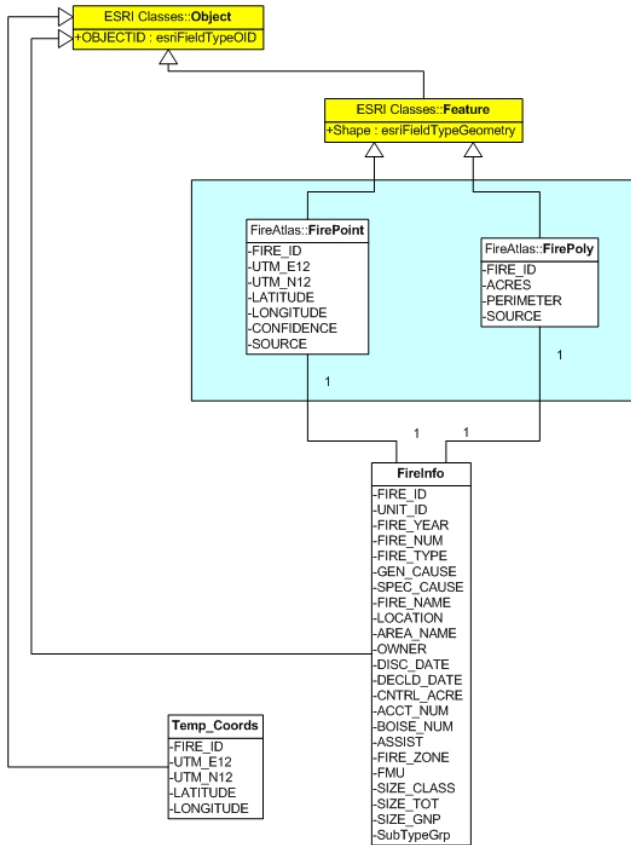


National Center 46.05030°N
123.00000°W
for Landscape Fire Analysis

Project Presentation
January 6, 2005

Fire Atlas GDB

- Incorporates fire points (ignition/report point), final fire perimeters, and attributes for each fire in one location.
- Eliminates data redundancy as attributes are stored in only one table.
- Reduces user input error by providing look-up tables with standard values.
- Provides a set of tools to help data entry.



Coded Value Domains

```

«CodedValueDomain»dConfidence
+FieldType = esriFieldTypeInteger
+MergePolicy = esriMPTDefaultValue
+SplitPolicy = esriSPTDefaultValue
+Most Confident = 1
+Good = 2
+Average = 3
+Poor = 4
-Least Confident = 5
  
```

```

«CodedValueDomain»dFMU
+FieldType = esriFieldTypeInteger
+MergePolicy = esriMPTDefaultValue
+SplitPolicy = esriSPTDefaultValue
+Developed Area = DEV
+Mixed Resource = MIX
+Wilderness/Resource = WLD
  
```

```

«CodedValueDomain»dMgmtZone
+FieldType = esriFieldTypeInteger
+MergePolicy = esriMPTDefaultValue
+SplitPolicy = esriSPTDefaultValue
+Zone A = A
+Zone B = B
+Zone C = C
  
```

```

«CodedValueDomain»dSizeClass
+FieldType = esriFieldTypeInteger
+MergePolicy = esriMPTDefaultValue
+SplitPolicy = esriSPTDefaultValue
+0 - 25 Acres = A
+0.26 - 9 Acres = B
+10 - 99 Acres = C
+100 - 299 Acres = D
+300 - 999 Acres = E
+1000 - 4999 Acres = F
-> 5000 Acres = G
  
```

```

«CodedValueDomain»dYesNo
+FieldType = esriFieldTypeInteger
+MergePolicy = esriMPTDefaultValue
+SplitPolicy = esriSPTDefaultValue
+Yes = YES
+No = NO
  
```

```

«CodedValueDomain»dAgency
+FieldType = esriFieldTypeInteger
+MergePolicy = esriMPTDefaultValue
+SplitPolicy = esriSPTDefaultValue
+BLM = BLM
+BLA = BLM
+GNP = GNP
-Other NPS = NPS
-FWS = FWS
-USFS = USFS
-Other Federal Agency = OTHER FED
-State = STATE
-Private = PRIVATE
-Other = OTHER
-Canada = CAN
  
```

```

«CodedValueDomain»dFireType
+FieldType = esriFieldTypeInteger
+MergePolicy = esriMPTDefaultValue
+SplitPolicy = esriSPTDefaultValue
+Assist = A
+False Alarm = F
+Mgmt Ignited Prescribed = M
-Natural Out = N
-Prescribed Natural = P
-Suppression = S
  
```

```

«CodedValueDomain»dGenCause
+FieldType = esriFieldTypeInteger
+MergePolicy = esriMPTDefaultValue
+SplitPolicy = esriSPTDefaultValue
+Human = H
+Lightning = L
+Unknown = U
  
```

```

«CodedValueDomain»
dAgency2
+FieldType = esriFieldTypeInteger
+MergePolicy = esriMPTDefaultValue
+SplitPolicy = esriSPTDefaultValue
+BLM = 1
+BLA = 2
+NPS = 3
+FWS = 4
+USFS = 5
+OTHER FED LAND = 6
+STATE = 7
+PRIVATE = 8
+OTHER = 9
  
```

```

«CodedValueDomain»dFireType2
+FieldType = esriFieldTypeInteger
+MergePolicy = esriMPTDefaultValue
+SplitPolicy = esriSPTDefaultValue
+Suppressed Fire = 1
+Natural Out = 2
+Support Action = 3
-Prescribed Fire = 4
-False Alarm = 5
  
```

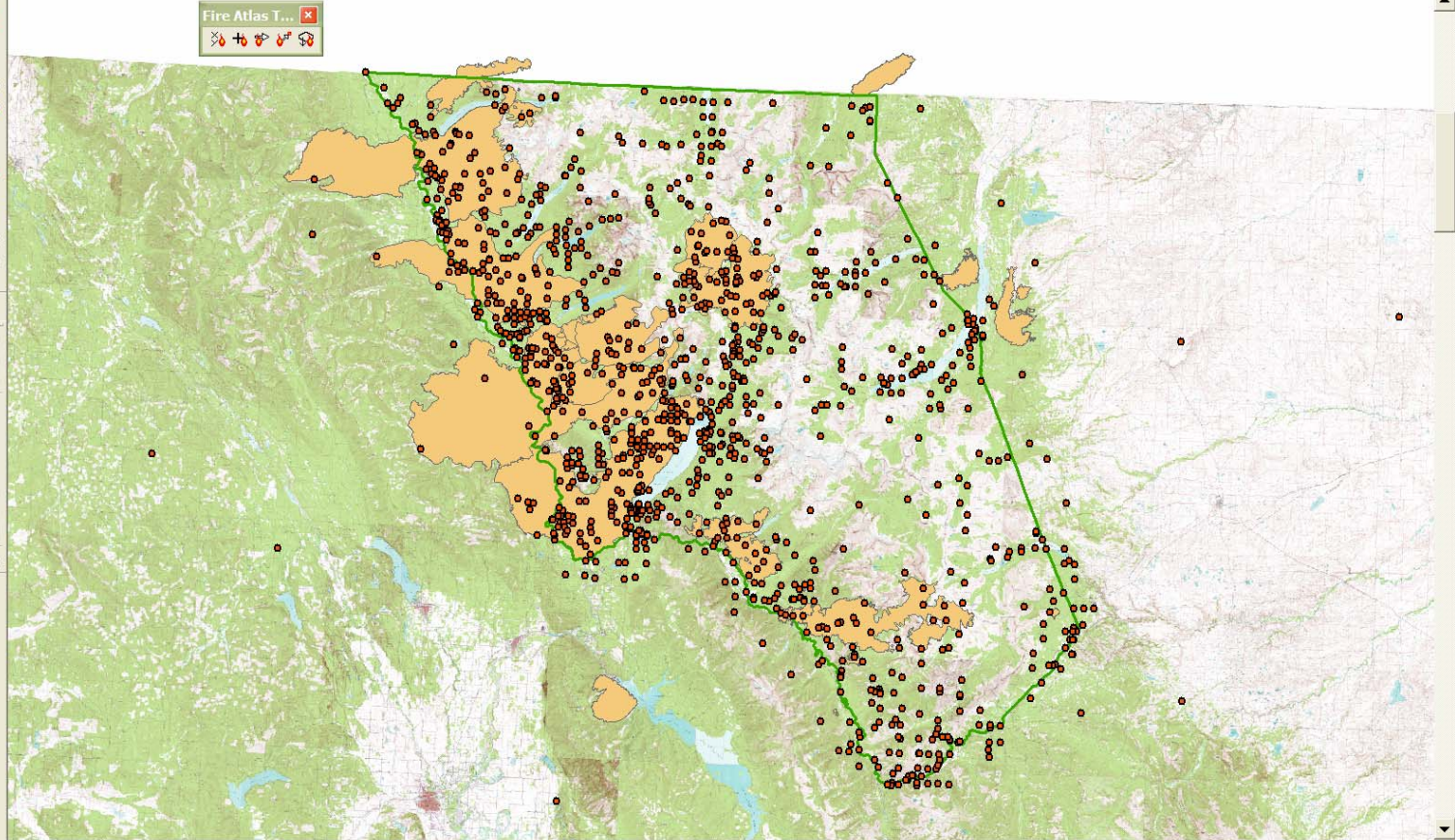
```

«CodedValueDomain»
dGenCause2
+FieldType = esriFieldTypeInteger
+MergePolicy = esriMPTDefaultValue
+SplitPolicy = esriSPTDefaultValue
+Natural = 1
+Campfire = 2
+Smoking = 3
+Debris Burning = 4
+Incendary = 5
+Equipment Use = 6
+Railroads = 7
+Children = 8
+Miscellaneous = 9
  
```

```

«CodedValueDomain»dSpecCause2
+FieldType = esriFieldTypeInteger
+MergePolicy = esriMPTDefaultValue
+SplitPolicy = esriSPTDefaultValue
+Lightning = 1
+Aircraft = 2
+Burning Vehicle = 3
-Exhaust = 4
-Exhaust - Other Equipment = 5
-Logging Line = 6
-Brakes = 7
-Cooking/Warming Fire = 8
-Warming Fire = 9
-Smoking = 10
-Trash Burning = 11
-Burning Dump = 12
-Field Burning = 13
-Land Clearing = 14
-Slash Burning = 15
-Right-of-way Burning = 16
-Resource Management Burning = 17
-Grudge Fire = 18
-Pyromania = 19
-Smoking Out Bees or Game = 20
-Insect or Snake Control = 21
-Job Hunting = 22
-Blasting = 23
-Burning Building = 24
-Power Line = 25
-Fireworks = 26
-Playing with Matches = 27
-Repelling Predators = 28
-House or Stove Flue Sparks = 29
-Other (unknown) = 30
-Volcanic = 31
-Other (known) = 32
  
```


- Layers
 - Fire Point
 - Boundary
 - Fire Polygon
 - raster_svc
 - cities_04_high_res
 - drg24
 - orthophoto
 - hillshade



Outreach and Education



Saving the Grizzly, One Hair at a Time

By John Shier



A production of
the Science and
Natural History
Filmmaking
Program

Montana State
University

Kate Kendall, USGS Bear DNA study to understand the populations and trend for Grizzlies in the Northern Continental Divide Ecosystem

Exotic plants: mapping and eradication



Resource Bulletins

Crown of the Continent Research Learning Center

Resource Bulletin

Fire and Invasive Weeds

Taking Advantage of Disturbance

It is often stated that forest and grass fires can help invasive weeds take hold in an area. But why is this so? Any kind of disturbance can create an ideal environment for invasive plants, for several reasons. The most obvious is that they have less competition. The native plants have been impacted by the fire and there can be empty spaces available for colonization. Also, fires release nutrients into the environment that encourage new plant growth. These factors are reasons why fire creates a healthy environment for any plant growth. Then why are weeds especially favored?

Invasive weeds have an unfair advantage. Many weeds will increase production of seed after a fire. This depends heavily on the intensity of the fire, and the hotter the blaze the more seeds the invasive weeds will produce. Some weeds also reproduce from their roots. If the deep roots of weed species were already present before a fire and are undamaged, the plants will begin to grow again almost immediately, without even the need for seed production. In addition, since none of the natural predators of an invasive would be present in its new environment, it does not have the stresses that native plants will have while trying to become reestablished.

If invasive plants manage to become established before the native plants have a chance to grow, they can take over the entire area. And the more established the weeds are allowed to become, the more difficult they are to get rid of at a later date.



A St. Johnswort infestation.

Fire Fighting Carriers

While weeds have several advantages over natural plants after a fire, this is heightened by aid from the people trying to control a fire. Often, fires take place in areas previously uncontaminated by invasive weeds. However, fire fighters can bring seeds from invasive plants into these areas on their clothing, boots, vehicles, and equipment. Once fire is out, the ground is perfectly primed to receive these seeds.

When fires occur in places that already have a population of invasive weeds, there is most likely a viable seed bed. And as stated earlier, some invasives can sprout again from their

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U.S. Department of the Interior



Resource Bulletin

Climate Change and the Water

Water Towers of the World

Glacier National Park is famous for the glaciers that carved its landscape. What many people don't realize is that these giant marvels of snow and ice are not just beautiful, but extremely useful as well, for several different functions. And they are disappearing, slowly but surely, due to global warming.

Glaciers worldwide are melting due to changes in climate. Glacier National Park has already lost a large percentage of its glaciers, and those that are left are much smaller than they used to be. If the glaciers vanish, there will be implications in every country and community. Glaciers have often been termed "water towers of the world"; more than 50% of the world's drinking water supply comes from glacial melt. Glaciers not only supply water to their local communities, but all over the world, and therefore have a worldwide importance.

If the glaciers are lost, this crucial supply of fresh water will be lost as well. It would be virtually impossible to find another source to replace more than half the world's current drinking water supply. Yet, at the present rate of global warming, it is predicted that all of the glaciers in Glacier National Park will be gone by the year 2030. The rest of the world's glaciers would not be far behind. In some areas of the world, glacial meltwater is such an important source of fresh water that many people could soon be in danger from a shortage of water. In addition, melting glaciers may cause serious problems with flooding, as great quantities of water that have been locked up

Interpretive Resource Bulletin Series

stream's expenditures may also be necessary to reduce the risk of invasive weed infestations. Although fire crews most likely do not have invasive weeds first in their minds, a rare-



Sperry Glacier, shown in the very back of the picture including Avalanche Lake. In the cirque below the

in ice are suddenly released into the world's rivers, lakes and oceans.

Stream Regulators

Besides providing a dependable water source glaciers are vital within their local ecosystems. Once again, this is because of the summer meltwater the glaciers produce. Every summer, once it becomes warm enough to begin melting the snowpack, a rush of water comes down from mountain glaciers to join streams and rivers in Glacier National Park. Thus, for the rest of the warm season, streams are augmented by a constant flow from the melting glaciers.

Global warming, however, will change this

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Resource Bulletin

Biodiversity

An Amazing Array

Glacier National Park is widely renowned for its incredible biological diversity. Biodiversity is the sum total of the flora and fauna in a region that make up complex, interconnected ecosystems. While many protected places have lost much of the biodiversity they once supported, Glacier has a relatively intact ecology. And in fact, Glacier had an unusual variety of species to start with, due to the park's unique location and circumstances.

Glacier straddles the continental divide, the Rocky Mountains providing much of the unbelievable landscape of the park. Climate and ecosystems are extremely different on either side of this immense boundary, allowing Glacier to encompass a wider diversity. The western side of the continental divide generally experiences maritime conditions, while the eastern side experiences continental conditions. The west side is usually wetter and warmer than the east side of the park, and thus different ecosystems are favored on each side of the mountains. In addition, the mountains themselves provide various microclimates by supplying different elevations and complex geography, creating a mosaic of communities. The result is an intricate assortment of environments, from the lush spruce forests of the west side to the alpine meadows of Logan Pass and the bunchgrass prairies of the east side.

While Glacier provides a refuge for many animals who find suitable homes within the park's various habitats, the park alone would not be enough to protect them. Many species, such as the bears, deer and wolves, have



Mule deer browse in a meadow in front of a mountainous background.

Treasured and Protected

This amazing biodiversity is one of the reasons that Glacier was made into a national park to begin with. George Bird Grinnell and other early explorers recognized the value of this unique area, and believed it deserved to be protected. This feeling continues today, which is why Glacier still attracts millions of visitors every year. Glacier National Park was named a Biosphere Reserve in 1976, recognizing it as special and worthy of further attention in the associated research projects. Waterton Glacier International Peace Park, Native American reservations, and land protected by several state, provincial and national agencies, including wilderness areas. The native animals therefore have sufficient safe habitat to survive. In fact, the only two large animals missing from Glacier are the bison and the caribou.

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Bull Trout: THE LAST OF THE LAST...

The Case for Restoring Bull Trout in Glacier National Park...

And a Framework to Do It

- **white paper**
- **brochure**



International Environmental Change Workshop on the Cryosphere July 7-11, 2003



Zach Smith, Tufts University

Conservation Across Boundaries

Enhancing Wildlife Conservation Through Science Education

June 12-25, 2004



Lisa Flowers, Boone & Crockett Club

Science for the Public

Waterton-Glacier Science Conference

Lake McDonald Lodge, August 12, 2004

Grizzly Bear DNA Studies in Glacier National Park, *Kate Kendall*

Telemetry Studies of Lake Trout in Lake McDonald, *Andy Dux*

Native Plant Nursery and Vegetation Restoration in Glacier National Park, *Joyce Lapp*

Global Change and Glacial Melting in Glacier National Park, *Dan Fagre*

Amphibian Research in Glacier National Park, *Steve Corn*

Fire History in Glacier National Park, *Steve Barrett*

Invasive Weed Management in Glacier National Park, *Dawn LaFleur*

Wolverine Studies in Glacier National Park
Rick Yates

Bighorn Sheep Research in Glacier National Park
Kim Keating

Effects of Transportation Developments on Grizzly Bears in Glacier National Park
John Waller

Climate-Related Tree Ring Studies in Glacier National Park, *Greg Pederson*

Long-Toed Salamander Survival in Fish and Fishless Ponds in Waterton Lakes National Park, *Kim Pearson*

Spider Diversity in Southwestern Alberta
John Hancock

Native Ecosystems Management in Glacier National Park: the Last 10,000 Years
Barney Reeves

Civilian Public Service Camp #55, *Dave Walter*

Inventory of the Northern Leopard Frog in Waterton Lakes National Park, *Mike Taylor*

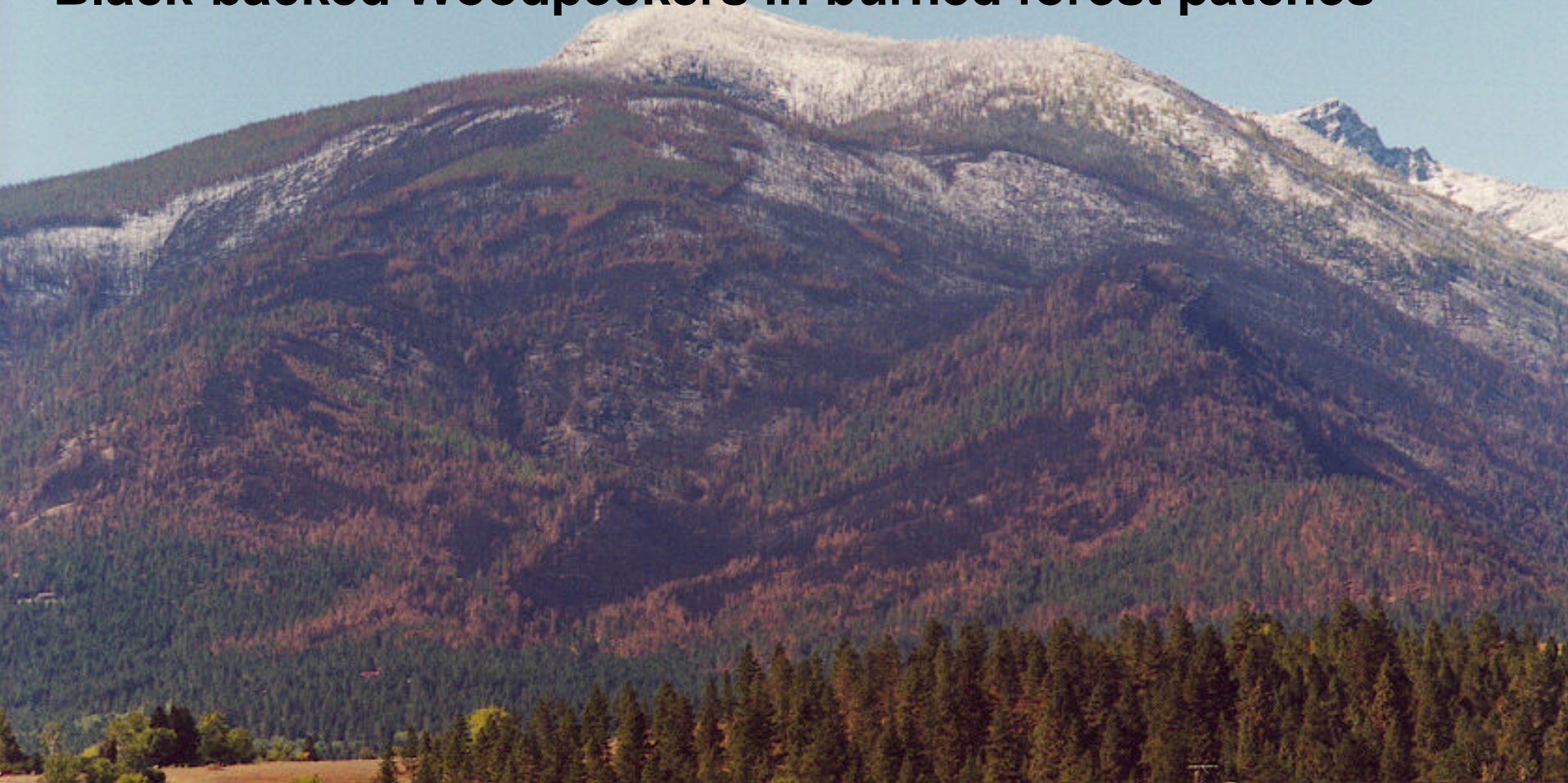
Native Elk-Thistle and a Biocontrol Beetle, *Peter Achuff*

Craftsmanship, Landscape, and Beauty: Glacier's Going-to-the-Sun Road, *Mark Hufstetler*

Native Grassland Studies in Glacier National Park
Tara Carolin

Joint Fire Science Project:

Understanding the influence of local and landscape conditions on the occurrence and abundance of Black-backed Woodpeckers in burned forest patches



Education: \$30,000 in Glacier NP; \$30,000 in Lolo NF



Educational projects on fire ecology and birds:

New self-guided trail (Rocky Point)

Birder trail (Trout Lake)

Notebook about fire ecology for interpreters

Synthesized information on website

Auto interpretive route?

Citizen science project on Common Loons

Research need: **health of Common Loons in Glacier**

Potential volunteers: **local birders**

Needed tool: **video on identification of Common Loons**

Focus: **sample 15 lakes on Glacier Loon Day**



Citizen science project on invasive non-native plants

Research need: **mapping weeds in Glacier backcountry**

Potential volunteers: **backcountry hikers**

Needed tool: **identification brochure for invasive plants**

Focus: **Spotted Knapweed, St. Johnswort, Oxeye Daisy, Yellow Toadflax, and Houndstongue**



A series of interactive web pages on the cultural and natural history of Glacier NP



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