

areas with threetip sagebrush where sage-grouse populations may exist.

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Landscape Scale Conservation and Science Based Land Management Program in the Greater Great Rift Region

Mary Tess O'Sullivan

Lava Lake Foundation for Science & Conservation P.O. Box 2249, Hailey, ID 83333, 208/788-1710
tess@lavalake.net

Michael S. Stevens

Lava Lake Land & Livestock, L.L.C., P.O. Box 2249, Hailey, ID 83333, 208/788-1710 mike@lavalake.net

Alan R. Sands

The Nature Conservancy, Owyhee Plaza 1109 Main Street, Suite 333, Boise, ID 83702 asands@tnc.org

ABSTRACT

Lava Lake Land and Livestock was organized in 1999 to (i) achieve landscape-scale conservation in the Pioneer and Boulder Mountains and in the Craters of the Moon area and (ii) establish an ecologically-sound and financially-viable business that supports our conservation activities. The Company's business is currently focused on all-natural and organic lamb production. Our grazing and conservation activities take place on 24,000 acres of private lands and 850,000 acres of state and federal lands administered by the Bureau of Land Management (BLM), the U.S. Forest Service (USFS), and the Idaho Department of Lands (IDL).

We are pursuing our conservation mission by establishing a comprehensive scientific program, protecting private lands, restoring habitat for wildlife, managing livestock in ways that are compatible with habitat recovery and native wildlife, participating in public lands management, and managing noxious weeds. Our science program includes ecological inventory and assessments, conservation planning, monitoring of aspen, sagebrush steppe, and riparian ecosystems, and research. A major thrust of the ecological surveys included mapping the vegetation of approximately 200,000 acres within our operating area. We are focusing our science and conservation efforts on two wide ranging species, (sage grouse and gray wolf), two endemic species, (Wood River Sculpin and bugleg goldenweed), and the dominant habitat types, (aspen, sagebrush steppe, riparian and coniferous forest ecosystems).

Our partners include The Nature Conservancy, BLM, National Park Service, USFS, U.S. Fish and Wildlife Service, IDL, Idaho Department of Fish and Game, Blaine County, Defenders of Wildlife, Department of Environmental Quality (DEQ), and the NRCS.

INTRODUCTION

Lava Lake Land and Livestock was organized in 1999 to (i) achieve landscape-scale conservation in the Pioneer and Boulder Mountains and in the Craters of the Moon area and (ii) establish an ecologically-sound and financially-viable business that supports

our conservation activities. The Company's business is currently focused on all-natural and organic lamb production. Our grazing and conservation activities take place on 24,000 acres of private lands and 850,000 acres of state and federal lands administered by the Bureau of Land Management (BLM), the U.S. Forest

Service (USFS), and the Idaho Department of Lands (IDL).

The Lava Lake operating area is bisected by two major ecoregions: the Middle Rockies and the Columbia Plateau. BLM grazing permits are located along the northern Snake River Plain and in the foothills of the Pioneer, Boulder, and Smoky Mountains. State leases and deeded lands occur amidst BLM allotments primarily in the Pioneer Mountain foothills. USFS grazing permits are in the mountainous region to the north of the deeded properties. Elevation ranges from below 4,100' to above 11,000' with average annual precipitation ranging from 9" to over 25".

The ecological significance of this region has long been recognized, evidenced in part by the expansion of the neighboring Craters of the Moon National Monument from 54,440 acres to over 750,000 acres in 2000. Lava Lake shares approximately 6^{3/4} miles of boundary with the Craters of the Moon National Monument along the northern edge of the Great Rift.

The Lava Lake operating area supports a diverse range of vegetation. The most common cover types include Wyoming big sagebrush, basin big sagebrush, and mountain big sagebrush. Low sagebrush, Douglas fir, and sub-alpine fir are also common. Riparian and aspen habitat, while critical to sustaining biological diversity, covers only about 2% of this landscape.

The region's diverse topography and transitional vegetation provides habitat for many animals including mule deer, pronghorn, black bear, coyote, river otter, and silver-haired bat; several amphibian and reptile species including the Columbia spotted frog; and number of fish including the locally endemic Wood River sculpin and redband trout.

There is also a rich diversity of bird species on Lava Lake. Over 100 bird species have been recorded to date, 33 of which have been given a high conservation priority by the Idaho Bird Conservation Plan including sage grouse, sage thrasher, Calliope hummingbird, yellow warbler, and sandhill crane (Paige 2005).

GOALS AND APPROACH

Our conservation goals are to implement environmentally sound livestock management practices, improve and protect biological diversity at a landscape scale, and restore degraded habitats within Lava Lake's deeded lands and grazing allotments.

We recognize that we cannot accomplish this work independently and have engaged a number of partners. Our partners extend the reach and breadth of Lava Lake's own efforts. Lava Lake's partners include the BLM, National Park Service (NPS), USFS, U.S. Fish and Wildlife Service, Idaho Department of Fish and Game (IDFG), The Nature Conservancy (TNC), Defenders of Wildlife, University of Idaho, Montana State University, Nez Perce Tribe, DEQ and NRCS.

A key component of our strategy for achieving these goals is to employ science to guide management decisions. Lava Lake is dedicated to achieving a scientific understanding of the ecological systems, the native species dependent on those systems, and the natural processes that shape and sustain the systems and species within Lava Lake's surrounding landscape. Lava Lake needs this understanding to make scientifically based resource decisions that ensure Lava Lake's actions protect the ecological integrity of the native systems and species.

INVENTORY AND ASSESSMENT

At the time of the first ranch acquisition in 1999, we knew Lava Lake was a wildlife-rich area, but we lacked detailed and current ecological information, especially for the private ranch units. Data were more readily available for the public lands but, in nearly all cases, the information was dated, having been gathered and analyzed 20 or more years earlier. We began to develop baseline data so that we could base resource decisions on current ecological conditions. Moreover, current data were also needed to determine if management actions were having the desired outcome. Consequently, an intensive scientific effort was

begun during the spring of 2001.

We started by compiling existing information on the species, conservation concerns, and ecological systems for the operating area from our network of partners. Once we understood the gaps in ecological knowledge we initiated several studies. Our first and largest effort was to develop an understanding of the vegetative communities. Information on vegetation would help us to understand fish and wildlife habitats and to make resource management decisions, especially with regard to livestock grazing. As of January 2004, mapping and condition assessment had been completed on 292,500 acres within the operating area. BLM was a major funder and partner on these vegetation surveys. The vegetation inventory work, conducted by ecologists and botanists at the IDFG Conservation Data Center, revealed that over 50% of the sagebrush steppe habitat in the Pioneer foothills was in good or excellent condition, further highlighting the conservation significance of this region. In addition, over 50% of the coniferous forest habitat was in excellent condition. On the other hand, the riparian and aspen habitats were generally in fair to poor condition at the time of the field surveys conducted during 2001-2002 (Rust et al. 2001, Rust et al. 2003).

In addition to mapping vegetation, we also wanted to learn more about the distribution and condition of wildlife species, especially rare and/or sensitive species. In total, we have initiated and/or supported 18 studies including surveys of amphibians and reptiles, rare plants, and riparian birds.

DEVELOPMENT OF CONSERVATION PLAN

We then developed a Conservation Plan to integrate all of this information and to structure our approach to conservation in this large and complex landscape. We followed The Nature Conservancy's Site Conservation Planning approach (TNC 2000). This required us to identify conservation targets on which

we would focus our management actions and conservation strategies. We selected eight conservation targets on the basis of their conservation significance in the area. We identified four ecological systems targets:

- sagebrush steppe
- riparian zones
- aspen
- coniferous forest

We then selected gray wolf due to its status as a federally-listed species; sage grouse due to its wide-ranging use of habitat in this region and its evident declining trends across the West; Wood River Sculpin and bugleg goldenweed because they are locally endemic species, unique to this area.

For each target we identified threats, set objectives, and determined the most important actions to achieve those objectives. We then outlined a detailed action plan for accomplishing these objectives. Our plan was peer-reviewed by our volunteer Science and Conservation Advisory Board.

PRIORITY MANAGEMENT ACTIONS

The Conservation Plan helped identify priority management actions to protect biological diversity and improve the ecological condition of the lands under our use and management; some of these actions were already underway before we completed our Conservation Plan. These actions have included private lands protection, livestock management, habitat restoration, noxious weed management, non-lethal management approach to predators, and participation in public lands management.

In 2000, a 7,500 acre portion of Lava Lake Ranch was placed under a perpetual conservation easement, forever preventing development of this area.

Livestock management has and will continue to be the most important aspect of our conservation strategy. We recognize that livestock grazing represents a potential threat to the ecological condition of our targets and

we keep this in mind as we design our approach to grazing. We have taken a science based approach and have conducted a capability and capacity analysis to determine ecologically appropriate grazing levels in this landscape. Key components to our multi-year grazing management include stocking at conservative levels that anticipate continued cycles of below average precipitation and varying timing and intensity of use for a given area from year to year.

We recognize the contributions that predators make to overall ecosystem health and our goal is to coexist with the predators in our area. We also know that predators can have significant economic and operational impacts on a ranching business. As a result, we have been working with the federal and state agencies and predator conservation groups to develop and implement non-lethal and proactive strategies to prevent and reduce the loss of livestock to predators.

While much of the improvement in ecological condition throughout the Lava Lake operating area can occur through thoughtful livestock management, there are areas that have crossed an ecological threshold and require manipulative restoration efforts. Lava Lake is pursuing a comprehensive restoration program in these areas, particularly where these areas overlap with habitat for sensitive species (e.g., sage grouse). To date, we have pursued restoration strategies in aspen and riparian habitats in partnership with the BLM, IDFG, and the National Resource and Conservation Service.

Lava Lake has developed a strategic and cooperative approach to managing noxious weeds by working in partnership with Blaine County Cooperative weed management group. Lava Lake's integrated approach to weed management includes the use of sheep grazing and biological, manual, and chemical control.

An additional conservation strategy is our approach to recreation management on deeded lands. Motorized recreation was identified as one of the threats to our conservation targets

and we have restricted motorized access to established roadways within Lava Lake's deeded lands while providing for foot- and horse-powered access to over 13,000 acres of private land with linked access to more than 50,000 acres of public land.

DEVELOPMENT OF MONITORING PROGRAM

In order to measure our success in meeting the objectives of the Conservation Plan, we have developed an extensive monitoring program for our conservation targets. Lava Lake is measuring ecological trends in the aspen, riparian, and sagebrush ecosystems. In addition, we are working with wildlife biologists to track the populations of our target species: sage grouse, Wood River sculpin, bugleg goldenweed, and the Gray wolf. Our goal is to document how the changes in our management are influencing the trends for these important ecosystems and sensitive species.

For the sagebrush steppe monitoring, we will use the line point intercept method to monitor ground cover, species composition, invasives, and a circular plot to evaluate soil erosion. We focus our evaluation on the cover of key perennial bunchgrass species, such as bluebunch wheatgrass and Idaho fescue.

Our aspen monitoring approach uses a belt transect method and focuses on aspen stems/acre, utilization, and understory composition as indicators for aspen stand condition. Our key metric will be stems/acre by size class to determine whether stands have a diverse age class structure and whether young aspen sprouts are growing beyond browsing height to establish a new mature age class.

The riparian method is based on a technique developed by the USFS (Winward 2000). We use a step point intercept and belt transects to monitor the key indicators of bare ground, stabilizer species, woody species, and invasive species. We installed the first transects in 2002 and re-sampled these in 2005.

In addition to the quantitative vegetation monitoring, we are using photo monitoring,

GPS collars, and avifaunal surveys to monitor the ecological condition of this landscape in relation to our management. We have established multiple permanently marked photo monitoring locations to document changes over time. In addition, each sheep band is outfitted with a GPS collar at the beginning of the grazing season. This provides us with daily movements of the sheep bands and the ability to compare conditions on the ground with the amount of time and dates when the sheep were located in the area. We have also established a riparian avifaunal monitoring survey using point counts along nine streams and three wetland areas in the Pioneer foothill region.

We intend to expand our monitoring program to include a remote sensing component to allow us to monitor a larger area of the landscape than we can efficiently reach on foot.

EXPERIMENTAL RESEARCH

In addition to the inventory and assessment work and the monitoring program, Lava Lake intends to function as a research site where long-term scientific research efforts can be conducted.

The Lava Lake Foundation for Science and Conservation, founded in 2004, was created in part to promote this research. The mission of the Lava Lake Foundation is to promote, conduct and disseminate scientific research on the natural communities, wildlife populations and land use practices of the high desert and mountain regions of the Northern Inter-mountain region and to restore and conserve native ecosystems at a landscape scale.

In 2005, we established the Lava Lake Research Fund, which is part of the Lava Lake Foundation, to support research that will contribute to an improved understanding and management of sagebrush steppe and montane ecosystems in the West. We will support research on wide ranging species like sage grouse, pronghorn, and gray wolf and endemic species such as the Wood River sculpin. Research priorities that we have identified

include:

- identification and development of the best methods for assessing ecological change at a landscape scale resulting from management changes
- sagebrush steppe restoration with the goal of identifying the best methods for restoring the native forb, bunchgrass, and sagebrush components of mountain big sagebrush communities
- invasive weed management with a focus on the best methods for promoting native species in communities with noxious and invasive weeds without long term reliance on herbicides, especially when working at a landscape scale, and
- aspen management with the goal of identifying the best methods to maintain (or improve) the condition of aspen stands within the context of ongoing livestock and wild ungulate use.

Lava Lake has supported two experimental research projects to date, both beginning in 2002. One completed study assessed the effects of cattle and sheep grazing on Lewis's woodpecker nest survival, riparian breeding bird densities, and vegetation in aspen riparian woodlands (Newlon and Saab 2004).

EDUCATION & OUTREACH

Lava Lake is interested in expanding our outreach efforts, particularly to include educational programs for school age students.

CONCLUSION

Lava Lake is pleased to be an immediate neighbor to the National Park Service and BLM and seeks to be an active participant in the conservation and restoration of the landscape surrounding the Great Rift.

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*An ugly hemorrhage
from the air
the Flows
like the oceans
or the greatest mountains
explains its integrity
to those who venture.*

*This archipelago
is like desire
in that you access the center
from any one of its entrances.*

- Will Peterson

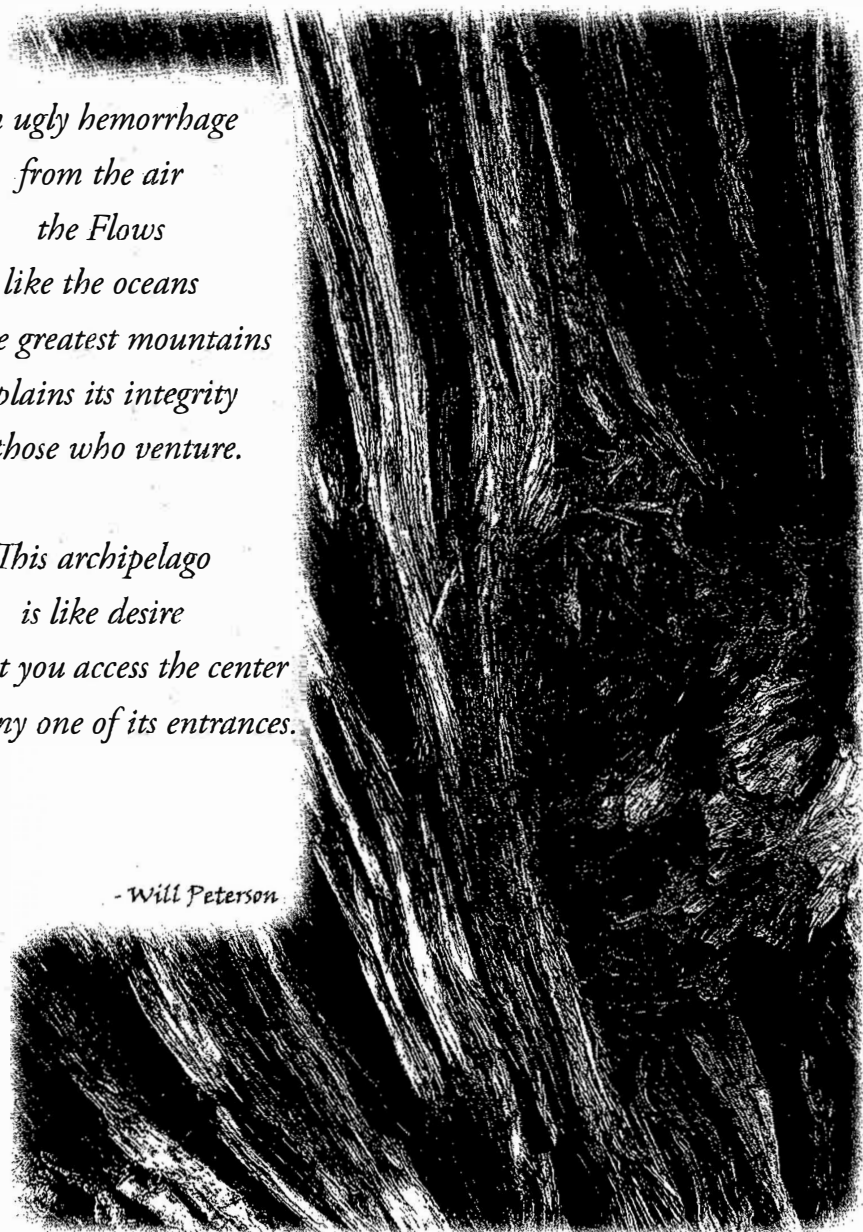


Photo by Roger Boe

Radioactivity at Hagerman Fossil Beds National Monument, Hagerman, Idaho

C. Neal Farmer

Hagerman Fossil Beds National Monument 616 N. Blue Lakes, #104 Twin Falls, ID 83301 cnf_2000@yahoo.com

Craig Christensen

University of Montana, Geology Department & Hagerman Fossil Beds National Monument 32 Campus Drive #1296, Missoula, MT 59812-1296 craig.christensen@umontana.edu

ABSTRACT

The Idaho State Fossil, the "Hagerman Horse", is radioactive at 1,600 counts per minute. Naturally occurring radioactivity has been measured at Hagerman Fossil Beds National Monument, located in south-central Idaho, in both fossil and mineral deposits since 1996. New information from a sampling of over 300 fossils using a Geiger-Muller instrument indicates radioactive emission levels in some specimens near 7,000 counts per minute. About 45% of the 300 samples exhibited levels above 500 counts per minute. Mineral deposits have also exhibited above ambient background levels at about 130 counts per minute. Non-destructive analysis using X-ray fluorescence has shown the presence of uranium, iodine, strontium, yttrium and nearly all Lanthanide series or Rare Earth elements. The geologic association appears to be that fossils derived from coarse grained sediments are higher in radioactivity, than ones found in clay rich deposits, which are near ambient background levels. The authors suggest that ancient groundwater transported radioactive elements through sand bodies and cavernous basal sections of interbedded basalt flows which precipitated out of solution during the mineralization process. Field results indicate that a Geiger-Muller counter may be a viable tool in the search for and safety determination of fossils.

BACKGROUND

Hagerman Fossil Beds National Monument (HAFO), was commissioned in 1988 to preserve, protect, and provide for the study of the Pliocene fossil assemblage. The Idaho State Fossil, the "Hagerman Horse", was discovered at HAFO, located approximately 90 miles southeast of Boise. Over 1,000 fossil sites have been mapped with mostly terrestrial mammals represented from the floodplain environment of ancient Lake Idaho that deposited the Glens Ferry Formation (Malde and Powers, 1958). At least 111 radioactive fossil sites have been documented at HAFO, including the

"Hagerman Horse Site", but not all of the fossil sites have been tested for radioactivity.

EQUIPMENT

In 1996 high levels of radiation were detected in fossil specimens at HAFO using a Geiger-Muller (GM) instrument (Figure 1). The methods and equipment produce quasi-quantitative results for a surface emission rate but it is sufficient for a preliminary scoping-level investigation. The GM instrument detects primarily beta radiation and very small amounts of alpha and gamma. Readings from the meter are reported as gross counts per minute (cpm).