MONITORING THE STABILIZATION OF SEMI-ARID GRASSLAND IN THE BRIDGE CREEK WATERSHED OF CENTRAL OREGON

R. Demmer, L. Andrews, and B. Keller
Bureau of Land Management, Prineville, Oregon, USA

ABSTRACT
Using land exchanges the Bureau of Land Management (BLM) in central Oregon consolidated its land base in the Bridge Creek Watershed between 1987 and 1992 to obtain a 64,500 acre land block. The uplands had been grazed and the valley bottoms farmed since the middle 1800s. Due to improper grazing, primitive irrigation, fire suppression and juniper invasion, the native vegetation was sparse. Weeds were ubiquitous, and soils were eroded. The results of actions taken after baseline inventories of riparian and range communities were monitored. This feedback prompted further actions. Monitoring confirms that increasing native vegetation and decreasing erosion is stabilizing the watershed.

KEYWORDS
Monitoring, grazing, irrigation, erosion, riparian, weeds

INTRODUCTION
Land management by public agencies in the United States has come under increasing scrutiny by environmental and political organizations. Management has become more difficult as funding and personnel have been reduced. Yet it is imperative that the public lands be managed in a sustainable way. Land managers have little time to perform research and analysis. Although research results are useful, consistent monitoring is the cornerstone of effective management. Monitoring focuses on both quantitative and empirical aspects. It is a dynamic system by which actions to improve management are taken as the result of monitoring.

When monitoring is not efficient, mistakes can be made. The suppression of fire has resulted in the invasion of some grasslands by shrubs and trees. The removal of woody debris from many streams in the western United States resulted in the loss of fish habitat and an increase in erosion. Monitoring is the feedback necessary to stop or modify such destructive actions before damage becomes severe.

This paper focuses on the interplay between monitoring and actions on the Bridge Creek watershed that have increased stability. Stabilization is defined as increased soil stability resulting from an increase of vegetative cover on stream banks and eroded surfaces.

METHODS
Beginning in 1987, fifteen upland photo points and 25 trend studies, including the Daubenmire method (Daubenmire 1968), line intercepts (Canfield 1941) and 3 x 3 foot cover plots (BLM 1985) were initiated. Along Bridge Creek and 5 tributaries within the land block, quarter mile photo points were established on 37.25 miles and 5 riparian coverboard studies were initiated. In 1988 Bridge Creek and its tributaries were inventoried for vegetation, vertebrate species, bank stability and aquatic habitat. Decisions were made using the information collected in these baseline efforts. Total grazing was reduced and sheep use was encouraged. Irrigation was reduced and made more efficient. Riparian areas were protected, and a ban was placed on beaver trapping. In some areas, junipers were thinned and/or native vegetation was seeded or planted.

Figure 1 describes the sequence of monitoring activities and actions taken. It is evident that the baseline studies prompted a series of actions and monitoring activities. For example, riparian inventories motivated the banning of beaver trapping. Beaver activity was then monitored to gage the impact on riparian and aquatic habitat. When monitoring indicated that beavers could easily cut the remaining large cottonwoods, the decision was made to protect them by wrapping chicken wire around the base of their trunks. In another example, a sand dropseed/weed competition study was initiated after empirical monitoring indicated that the native grass was replacing weeds in some sites.

RESULTS AND DISCUSSION
Results presented in tables 1 and 2 suggest that native perennial grass is increasing. The studies are often not extensive enough to have statistical significance, but when combined with photo points, and other information they become convincing evidence. Vegetative frequency and cover have increased, and at the same time, healing of gullies and stream banks are evident in photo points. In July 1988 during the riparian inventory, only 0.25 cubic foot/second was found flowing in Bridge Creek near it's confluence with the John Day River. Through the drought years that followed, stream discharge increased. The origin of this increase is not clear, but reducing the amount of irrigation water taken from the creeks was probably most responsible and the banning of beaver trapping may also have played a significant part. Beaver dams have increased. They catch sediment and raise water tables. Observations along Bridge Creek of Sagebrush (*Artemisia tridentata*) being replaced by willow (*Salix sp.*) and basin wild rye (*Elymus cinereus*) are indicators that subsurface water is more available for plant growth.

However, not all of the news has been good, at the same time native vegetation has increased so have exotic weeds. Evidence of this is present in the dropseed study summarized in Table 2 and has been seen in numerous observations by field personnel. Plantings of bitterbrush (*Purshia tridentata*), cottonwoods (*Populus trichocarpa*) and grass seedings have had mixed results. Field observations, since these plantings and seedings, and photo points will help us make more informed planting decisions in the future.

The BLM has taken advantage of many information sources. Continuous monitoring compares the present with the past and the desired outcome. Management is refined as information becomes available. Decisions are made by weighing the evidence of monitoring studies, photo points and field notes. This system has worked well in promoting stabilization in the Bridge Creek watershed.

REFERENCES
Bureau of Land Management. 1985. Rangeland Monitoring: Trend Studies. USDI BLM TR4400-4, 130 pages.

Canfield, R. 1941. Application of the line interception method in sampling range vegetation. J. For. **39**: 388-394.

Daubenmire, R. 1959. A canopy-coverage method of vegetational analysis. NW Sci. **33**:43-64.

Table 1

Changes in four parameters between 1988 and 1995 at 13 study sites.

I = Increase D = Decrease N = No change

Type of study	Perennial Grass Frequency			Vegetative Cover			Shrub Frequency			Litter Cover		
	I	D	N	I	D	N	I	D	N	I	D	N
3 x 3 foot plots	4	2	2	7	1	0	1	3	4	3	0	5
Line intercept transects	4	1	0	4	1	0						
Totals	8	3	2	11	2	0	1	3	4	3	0	5

Table 2

Frequency changes in a native perennial grass and four weed species on 27, 20 feet diameter circular plots between 1994 and 1996. Estimates were made non-randomly using 10% of each plot area.

Species	Increase	Decrease	No Change
Sporobolus cryptandrus	12	5	3
Bromus tectorum	5	2	12
Taeniatherum caput-medusae	7	0	0
Centaurea solistitialis	4	0	0
Centaurea repens	4	0	0

Figure 1

Sequence of actions and monitoring in the Bridge Creed Watershed between 1987 and 1995.