

EARTHWATCH INSTITUTE FIELD REPORT

Project Title: Restoring the Sagebrush Steppe

Principal Investigators: Steven S. Seefeldt and Bret Taylor

Position/Affiliations: Rangeland scientist and Nutritionist USDA – Agricultural Research Service

Research Site: northern part of SE Idaho, 44°14'44" N latitude, 112°12'47" W. longitude

Local Management Status of the Research Site(s) (e.g. National Park, RAMSAR Site, World Heritage Site, IBA etc.): United States Sheep Experiment Station

Scientific names of primary species being studied: *Artemisia tridentata*, *Artemisia tripartite*, *Ovis aries*, *Euphorbia esula*, and *Centaurea maculosa*

Key Research Objectives:

- Determine whether sheep can be used to halt the spread of leafy spurge
- Determine whether sheep can reduce the impact of the exotic plant spotted knapweed
- Determine the long-term benefits of using sheep and the herbicide Plateau to control leafy spurge
- Determine the practicality of using very-large scale aerial photography to develop a range management plan
- Determine whether very-large scale aerial photography can be used to monitor vegetation
- Determine the impact of fire size and type of fire (prescribed or wild) on soil movement, vegetation establishment, and plant population dynamics

Date this report was completed: October 19 2004

Data Collection and Results

a) Give a concise account of the data you have collected during the past field season.

Data was collected to determine plant biomass in an area that will be burned using a prescribed fire. Leafy spurge stem counts were determined in 5 x 5 m areas of larger pastures in preparation for a study on measuring the reduction of leafy spurge expansion and density after strategic sheep grazing and to correlate to digital imagery obtained from an ultra light aircraft. Edges and isolated pockets of leafy spurge and spotted knapweed infestations were mapped in preparation for future disturbance research.

More than data was collected this year. Almost all of four hundred 50 cm long rebar stakes were located in area where vegetation was carefully measured in 1977. The area was burned in a wild fire in 1981 and will soon be burned again. Finding these points gives us the ability to very precisely measure vegetation changes and the influence of soils, grazing management practice and fire. Each Earthwatch team took at least one day to clip leafy spurge that is being used to measure diet preference and the passage of plant metabolites through the sheep digestive system.

b) What progress have you made towards achieving your original objectives?

We are on track with all our objects. Some we are just beginning, some we are in the middle of, and others we are finishing. This year was the last for our spotted knapweed research. Many of these objectives will not be completed for 5 more years.

c) Please provide a summary of your results.

For the first objective, we confirmed that sheep can be used to prevent leafy spurge seed production while minimizing grazing of native plant species. For objective 2 we have not analyzed the seedling response to three years of grazing, but we have determined that sheep grazing when spotted knapweed is bolting is most effective for reducing seed production and minimizing grazing of native forbs. Objective 3 results indicate that sheep grazing alone for two years will reduce leafy spurge biomass productivity only slightly; however the long-term benefits of combining sheep grazing with herbicide will be determined later. Objective 4 results measured a correlation between estimates of grass cover and biomass. This was not found for the forb component. One-hundred meter above ground imagery resulted in the most precise measures of vegetation cover. Objective 5 results have not been analyzed and three more years of data still remain to be gathered. Objective 6 results are in for the first two years and we are finding initial decreases in forbs and grasses after a fire with increases of soil moisture deeper than 40 cm. Sagebrush seedling establishment occurs where competition from surviving forbs and grasses are reduced (where distances to forbs and grasses are greater).

Significance/Benefits of Research

a) What is/are the significance/benefits of your research at the following levels?

- Local (in the area of the research site)
- National
- International

All the objectives above address issues important to rangeland restoration in the local area. Finding new ways to add value to sheep, in this case using them as biocontrol agents to reduce exotic weeds has national significance to the American Sheep Industry. Improving vegetation measurement technologies as well as measuring vegetation response to fire have national and international significance and will result in changes to how prescribed fire and wild fire rehabilitation is managed.

b) How do your findings contribute to issues of sustainability?

With more precise measures of vegetation we will be able to more accurately detect vegetation response to our treatments. Our treatments are designed to improve native

vegetation at the expense of exotic plant species. We are especially concerned with management decisions being made concerning fire and rehabilitation after fire. Our research will add science to the decision making process and hopefully lead to improved native vegetation.

Dissemination of Results

a) Have you provided details of results from your research to or within:

- Scientific papers (indicate status; e.g., peer reviewed or in progress/press)
 - A manuscript concerning using new technologies to measure rangeland vegetation is currently in review in *Rangeland Ecology and Management*
- Management plans and reports (in progress or completed)
 - None to date
- Presentations (given or planned)
 - Field day for the Idaho Wool Growers. Fifty people, including ranchers, BLM, U.S. Forest Service, NRCS, and University professors looked over research at the USSES.
 - Three invited presentations to the BLM on using digital imagery and computer software to measure vegetation. There was a regional presentation in Idaho Falls (25 people) and Challis (12 people) and a state-wide corporate BLM presentation (20 people) in Boise.
 - Two invited presentations at the Idaho State University, Geo-Spatial & Range Sciences Symposium. About 50 people, including federal and university scientists, private and public land managers, and ranchers attending the meeting.