

ENVIRONMENTAL ASSESSMENT

BLM, Bishop Field Office
351 Pacu Lane, Suite 100
Bishop, CA 93514

EA Number: CA017-03-52

Proposed Action Title/Type: Prescribed fire study - USGS/Joint Fire Science Program – Fire and Invasive Annual Grasses in Western Ecosystems

Location of Proposed Action: Mono Basin. Site #1: T. 2N, R. 25E, NE1/4, NE1/4 Sec. 12. Site #2: T. 3N, R. 25E, NE1/4, NE1/4 Sec. 30. Lundy 7.5 Minute Quadrangle.

Need for Proposed Action: Annual grasses such as cheat grass (*Bromus tectorum*) have invaded shrub and forest ecosystems in western North America and have been linked to changes in both ecosystem structure and function and in some cases have altered fire regimes. Soil type and associated nutrients can affect post fire site susceptibility to cheat grass invasion. Soil nutrient changes can vary widely depending on soil properties and the amount and duration of soil heating. This study would incorporate prescribed fire and nutrient application treatments to determine post-fire cheat grass invasion within different soil types within the Mono Basin.

This study's results would provide managers with important information to predict if habitats are naturally vulnerable or resistant to invasions, enabling limited resources to be more effectively deployed both during and after fires. Fire prescriptions could improve post-fire restoration, by creating site conditions that would reduce the risk of cheat grass invasion in susceptible areas.

Description of Project Area:

Site #1: The project area is within a level to sloping basin (0-2% slope) with a south/southwest aspect at an elevation of approximately 7,000 ft. (2,100m). Soils are comprised of Warrior very gravelly sandy loam. The Great Basin sagebrush scrub plant community is dominated by mountain sagebrush (*Artemisia tridentata* ssp. *vaseyana*), bitterbrush (*Purshia tridentata*) with an understory of Thurber's needlegrass (*Acnatherum thurberianum*), needle and thread grass (*Hespirostipa comota*), Indian rice grass (*Achnatherum hymenoides*) and an understory of annual and perennial buckwheat (*Eriogonum*) species. Vegetation canopy cover is approximately 60-65%.

Site #2: The project area is on a level bench with a southern aspect at an elevation of approximately 8,000 ft. (2,400 m). Soils are comprised of Dechambeau very gravelly. The site is dominated by low sage (*Artemisia arbuscula*) with associated species such as June grass (*Koeleria micrantha*) and cespitose buckwheat (*Eriogonum cespitosum*).

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Vegetation canopy cover is approximately 25-30%. Pinyon pine (*Pinus monophylla*) is encroaching into the site with approximately 2-5 trees per acre.

Description of Proposed Action:

Experimental Objectives:

- 1) Evaluate the role of elevated soil nutrients (N, P) on cheat grass (*Bromus tectorum*) and native species growth.
- 2) Evaluate the role of reduced soil nutrients by addition of C and CaCO₃ on cheat grass and native species growth.
- 3) Contrast different fuel load effects on fire intensity with post-fire levels of soil nutrient availability in cheat grass productivity.
- 4) Correlate soil heating profiles with fuel loads used in field experiments for calibration of greenhouse experimental results.
- 5) Determine soil nutrient (C,N,P,K) changes associated with all burning treatments.

Each experimental site would be approximately 0.4ha (1 acre). Each of the 40 experimental plots at each site would be 5x5m (25m²), for a total of 1000m² (0.1ha) of experimental area. Experimental plots would be separated by 5m buffer strips, within which we would construct control lines to prevent the spread of fire outside of the plot (e.g. hand line, foam line, wet line or combinations thereof). The experimental site, plus the buffer strips between the plots, would each comprise 0.4ha.

Table 1. Treatment combinations – 10 combinations x 4 reps = 40 plots/site (160 total plots).

Nutrient Treatments	Fire Treatments		Total plots	Total area (m ²)
	Burned	Control		
+N	4	4	8	200
-N	4	4	8	200
+P	4	4	8	200
-P	4	4	8	200
Control	4	4	8	200
Total plots	20	20		
Total area (m ²)	500	500		

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Prescriptions of fire treatments (summer/fall 2002):

Burned – strip fire using a drip-torch around the entire perimeter of the plot, and burn out unburned islands within the plot using a propane torch

Control – no fire

Prescriptions for nutrient treatments (fall 2002):

+N – Nitrogen addition as NH_4NO_3

-N – Carbon addition as $\text{C}_6\text{H}_{12}\text{O}_6$

+P – Phosphorous addition as K_2PO_4

-P – Carbonate addition as CaCO_3

Control – no experimental nutrient alterations

Sampling Design

Fuel conditions (loading, arrangement, moisture), weather conditions (RH, temp, wind) and fire behavior (flame height, rate of spread) would be measured for each experimental fire.

All temperature, soil, and plant sampling would be done within the 2 x 2m center of each experimental plot (>1m from the edges). The schedule for sampling and the number of samples for soil temperatures, soil nutrients, and plants are summarized in Table 2.

Soil temperatures within the burned plots would be monitored below and above-ground, and in the beneath-canopy (sagebrush canopy) and interspace microhabitats. Temperatures would be monitored at -5, -2, 0, and 15cm from the soil surface using 30-gauge Chromel alumel thermocouples (Omega Engineering) connected to Campbell CR10 data loggers (Campbell scientific).

Soils would be sampled at two depth intervals (0-3cm and 0-10cm) in two microhabitats (beneath canopy and interspace). Four subsamples of each depth in each microhabitat would be pooled in each plot (4 strata/plot x 160 plots = 640 samples/sampling period). If the effects of fire and nutrient treatments on soil nutrients at the two depth intervals are similar based on initial sampling, subsequent sampling would only be done for the 0-10cm interval. All soil samples would be separated by >5cm. We would measure soil C, NO_3 , NH_4 , PO_4 , and K. A subsample of the initial soil samples would also be analyzed for CaCO_3 , pH, and texture to provide descriptive information on soil characteristics at each site. Soil analyses would be done by the University of California Davis, DANR Analytical Laboratory.

Percent ground surface covered and average height of each plant species, and species richness, would be measured in four 1x1m contiguous subplots within the 2 x 2m sampling plots. Above-ground live herbaceous plant biomass would be measured by clipping plants at ground level within a 10 x 10cm sampling frame, drying at 60°C to constant biomass in an oven, and weighing.

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Herbaceous plants would include annual and biennial species, perennial geophytes, and seedlings of perennial grasses and shrubs. Four biomass subsamples would be collected in each of the beneath-canopy and interspace microhabitats. Biomass samples would be collected >5cm from where samples were collected during previous years.

Table 2. Number of samples for the 160 treatment plots during each sampling period.

	Sampling Period	Temperature	Soils [^]	Plant Cover & Richness	Herb Biomass ^{^^}
2002	Before fire		640	160	320
	During fire	80			
	After fire [#]		320		
2003	Start of growing season 1 [*]		640		
	End of growing season 1 [*]		640	160	320
2004	Start of growing season 2 [*]		640		
	End of growing season 2 [*]		640	160	320

[^] stratifying by beneath-canopy and interspace microhabitats, and 0-3cm and 0-10cm depths

^{^^} stratifying by beneath-canopy and interspace microhabitats

[#] only on burned plots

^{*} may be n=320 samples if previous analyses show no difference between 0-3cm and 0-10cm soil sampling depths, or may be n=0 samples during season 2 if treatment effects dissipate by the end of growing season 1

Pre-project Actions (October/November 2003)

- Field review and flagging of hand-lines
- General vegetation cover assessments in control and treatment plots
- Establishment of photo points

Fire Monitoring: Would follow National Park Service Minimum Acceptable Standards; NPS 1992) for Simulated Natural Fire (October 1997)

Fire Weather Variables:

- 1) Dry bulb temperature
- 2) Relative humidity
- 3) Wind speed
- 4) Wind direction
- 5) Cloud Cover
- 6) Time-lag fuel moisture
- 7) Live fuel moisture

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Fire Characteristics

- 1) Linear rate of spread
- 2) Flame length
- 3) Fire spread direction

Smoke Characteristics: Minimum standard smoke monitoring variables would include ocular assessments of visibility and documentation of any complaints from downwind areas.

Environmental Impacts:

The proposed action is not within a Wilderness, Wilderness Study Area, Area of Critical Environmental Concern, nor Wild and Scenic River corridor, and there would be no impacts to any lands so designated. There would be no impacts to Farm Lands, Flood Plains, nor water quality (including ground or surface waters).

Air Quality: There would be moderate impacts to air quality but the action would not result in significant PM₁₀ emissions. The project would occur on a sanctioned "burn-day" that would be established within the confines of the Great Basin Air Pollution Control Board and Mono County air quality protocols.

Candidate Species: There would be no impact to listed or sensitive species. There are no known listed or candidate species or habitats within the proposed action area.

Cultural Resources: No archaeological sites were recorded within the proposed project areas.

Minerals: There would be no negative impacts to mining claims since none have been documented to occur in the project area.

Range: There would be a no impacts to range for site 1 which is not within an allotment and site 2, although within the Rancheria Gulch Allotment, is not historically used by sheep due to the marginal forage availability. The permittee would however need to herd sheep around the project sight to avoid impacts to treatments.

Soils: The soils that comprise the project area consist of gravelly to rocky soils that are derived from both alluvium and lakeshore deposits. Due to the level nature of the project sites, potential post-fire erosion would be slight due to plot size. Short-term impacts would include rapid, surface heating of the soil surface that would remove litter and alter in a positive way, the nutrient cycling capacity of the site. Some impacts to the soil surface would occur from the construction of hand lines but would be limited to narrow (5m buffer strips).

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Visual Resources: The project area is within a Visual Resource Management II category, but only site 1 would be slightly visible from key observation points. The key observation point would be along U.S. Highway 395. VRM II objectives include retaining the existing landscape character. Any change to the landscape should be low. Management activities may be seen from the key observation points but should not attract the casual observer's attention. There would be a short-term contrast between burned and unburned vegetation. Because the burn treatments would be scattered within the project sites there would be a natural mosaic pattern of burned and unburned vegetation that would soften visual contrasts. The VRM objectives would be met under this proposal because of the low and temporary nature of the scenic contrast.

Vegetation: Impacts would include burning and removal of approximately 0.25 acres of mixed Great Basin sagebrush/perennial bunchgrass vegetation. Some post-fire seedling establishment of perennial bunchgrasses is expected to occur. Resprouting of Great Basin sagebrush is not expected but post-fire seeding establishment from extant seed banks is likely due to the low intensity of the prescribed burn.

Rare Plants: No rare plants were found in the project areas during surveys conducted in May of 2003.

Wildlife: Due to the location and vegetation conditions of the proposed burn area, there would essentially be no negative impacts to local habitat conditions for species like mule deer, sage grouse and pronghorn. Small animal species habitat (including non-migratory songbirds) would be eliminated for a period of three to five years. Habitat conditions for all large and small animal species would be substantially improved three to five years post fire, assuming average precipitation and other environmental factors.

Description of Mitigation Measures and Residual Impacts:

Cultural: If archaeological resources are encountered during project implementation, work would cease until the Field Office archaeologist is notified and an assessment is performed.

Range: The permittee would be required to avoid treatment site #2 through sheep herding.

No residual impacts have been identified.

Persons/Agencies Consulted:

California Department of Fish and Game,
Inyo National Forest,
Great Basin Air Pollution Control Board,
Fred Fulstone – Affected Range Permittee

Preparer(s): Anne S. Halford, Terry Russi, Kirk Halford, and Joe Pollini

Date: August 26, 2003

Reviewed By: _____ **Date:** _____
Environmental Coordinator

FINDING OF NO SIGNIFICANT IMPACT/DECISION RECORD

I have reviewed this environmental assessment including the explanation and resolution of any potentially significant environmental impacts. I have determined that the proposed action with the mitigation measures described below would not have any significant impacts on the human environment and that an EIS is not required.

I have determined that the proposed project is in conformance with the Bishop Resource Management Plan, which was approved March 25, 1993. This plan has been reviewed, and the proposed action conforms with the land use plan terms and conditions as required by 43 CFR 1610.5.

It is my decision to implement the project with the mitigation measures identified below.

Mitigation Measures/Remarks:

Cultural: If archaeological resources are encountered during project implementation, work would cease until the Field Office archaeologist is notified and an assessment is performed.

Range: The permittee would be required to avoid treatment site #2 through sheep herding.

Authorized Official: _____
Bill Dunkelberger, Field Office Manager

Date: _____