

# Cheatgrass Frequency at Two Relic Sites Within the Pinyon-Juniper Belt of Red Canyon

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**Abstract**—Frequency of cheatgrass (*Bromus tectorum*) is reported for two relic sites within a belt of Colorado pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*), where non-Native Americans and their livestock are likely to have had little effect.

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Young and Tipton (1990) suggested the concept of cheatgrass spreading in a biological vacuum created by grazing may be somewhat misleading or overstated, and they cited two works from Washington that documented observations of cheatgrass successfully inserting itself into climax perennial grass/shrub communities that had been protected from fire and grazing for as long as 50 years. While livestock grazing is a factor in the spread of cheatgrass, other works collaborate the idea that livestock grazing and other human-induced disturbance are not the only factors. Kindschy (1994) reported the presence and increase of cheatgrass in southeastern Oregon's Jordan Crater Research Natural Area that has been protected from human activities including livestock grazing. Tausch and others (1994) found cheatgrass has displaced native perennial species on Anaho Island in Nevada despite a general absence of human-caused disturbance and fire. They attributed the increase to the competitive ability of cheatgrass. Knight (1994) reported the cheatgrass problem is not restricted to land managed for livestock, and he gave an example of an increase of cheatgrass following fire in Little Bighorn Battlefield National Monument in southern Montana. He suggested that managing vegetation of a National Monument so it reflects presettlement conditions is a goal that may be impossible once certain introduced species become established.

The sites of this study are located within a belt of Colorado pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) within the Green River corridor, Daggett County, Utah. They are located on steep, warm exposures within Red Canyon above the Flaming Gorge Reservoir at about 1,890 to 1,950 m (6,200-6,400 ft) elevation and about 9.7 km (6 miles) west of Dutch John, UT, where data from the Flaming Gorge Weather Station indicates mean

annual precipitation for the area of 31.75 cm (12.50 inches) (Ashcroft and others 1992).

In the Bare (Bear) Mountain area of the Green River corridor, Smith (1992) and Greenwood and others (these proceedings) found older pinyon-juniper burns were highly preferred by bighorn sheep (*Ovis canadensis*). In these studies, bighorn sheep were also found to frequently use areas where fire (including recent fire) kept pinyon and juniper at low levels. However, these workers also found the sheep avoided moderate or dense stands of pinyon-juniper, and recent burns in dense stands of pinyon-juniper where tree skeletons were still standing. Radio monitored sheep were found repeatedly in a pinyon-juniper burn site (Site 5-26) in which size and growth form of the trees that established since the fire indicate the burn to have been about 80 years old. Trees at the site were small and scattered and the site was dominated by grasses. Another site, which apparently had not been burned in the past 150 years or more, had open tree cover (Site 5-18), and it was also used by bighorn sheep in preference to surrounding areas with greater canopy cover of pinyon-juniper. Rock debris covered about 50 percent of both sites, which were located below massive cliffs. These sites were visited in 1988 and 1991 to monitor forage conditions in relation to bighorn sheep. The bighorn sheep herd is not expected to have played an important role in plant community dynamics and composition since this was a transplanted herd of 1983 and 1984.

Domestic livestock use is expected to have been minimal as the sites were protected by massive cliffs and steep slopes. The sites are within a large area that has been closed to permitted livestock grazing since the early 1960's.

## Methods and Results

Frequency of plant species was determined in 100 quadrats of 50 by 50 cm at intervals of 1.5 m (5 ft) along five belts of which each was 30.5 m (100 ft) long. Within these quadrats, presence of species was recorded in nested frequency plots of 5 by 5 cm, 25 by 25 cm, and 25 by 50 cm as well as the 50 by 50 cm quadrat.

Table 1 shows quadrat frequency and nested frequency values. Sampling methods are those outlined by U.S. Department of Agriculture, Forest Service (1993) in which each species has a potential nested frequency score of 400.

Other species of low frequency (not listed in table 1) were also found on the sites. Ground cover was also determined by a point method that indicated 54 percent of the surface was covered by rock at both sites. Ground cover provided by vegetation and litter was about 30 percent at both sites, and

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In: Monsen, Stephen B.; Stevens, Richard, comps. 1999. Proceedings: ecology and management of pinyon-juniper communities within the Interior West; 1997 September 15-18; Provo, UT. Proc. RMRS-P-9. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

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**Table 1**— Quadrat frequency percent (QF) and nested frequency (NF) score based on a potential score of 400.

Species	Site 5—26		Site 5—18	
	QF%	NF Score	QF%	NF Score
Cheatgrass ( <i>Bromus tectorum</i> )	94	286	67	143
Bluebunch wheatgrass ( <i>Elymus spicatus</i> )	53	110	2	6
Hairy goldenaster ( <i>Heterotheca villosa</i> )	39	89	—	—
Louisiana wormwood ( <i>Artemisia ludoviciana</i> )	23	50	—	—
Brickellbush ( <i>Brickellia scabra</i> )	13	19	—	—
Plains mustard ( <i>Schoenocrambe linifolia</i> )	8	19	—	—
Muttongrass ( <i>Poa fendleriana</i> )	8	18	—	—
Pricklypear ( <i>Opuntia</i> sp.)	7	16	—	—
Tansy—mustard ( <i>Descurainia pinnata</i> )	12	16	2	5
Broom snakeweed ( <i>Gutierrezia sarothrae</i> )	4	12	6	14
Fringed sagebrush ( <i>Artemisia frigida</i> )	5	11	—	—
Needle—and—thread grass ( <i>Stipa comata</i> )	5	11	—	—
Sanddrop seed ( <i>Sporobolus cryptandrus</i> )	3	5	1	3
Yellow—eye cryptanth ( <i>Cryptantha flavoculata</i> )	5	9	—	—
Indian ricegrass ( <i>Stipa hymenoides</i> )	1	1	3	8
Bottlebrush squirreltail ( <i>Elymus elymoides</i> )	—	—	3	9
Black sagebrush ( <i>Artemisia nova</i> )	—	—	4	10
Big sagebrush ( <i>Artemisia tridentata</i> )	—	—	5	9

15 to 20 percent of both sites showed exposed soil and pavement (gravel fragments less than 2 cm or 0.75 inches in diameter).

## Discussion

Cheatgrass was by far the most frequent species at both study sites. Its high frequency indicates its high capacity to drive plant community dynamics for many years following fire in the pinyon-juniper belt on steep, south-facing, rocky slopes of Red Canyon in the absence of livestock and with little use by humans. It was also found with high capacity for spreading into areas without post-European settlement fires on these steep slopes. Bighorn sheep were known from the area in the past (Smith 1992), and presence of bighorns on the site represents use that predates European settlement. However, these sheep had been extirpated from the area for many years. The current presence of bighorn sheep is a function of a transplant of less than 10 years prior to the data taken from these sites. Little community change is expected from this use.

The introduction of cheatgrass to the American continent is a function of human activity. However, non-Native American influence has been low at these specific sites. The ability of cheatgrass to drive plant community dynamics where human and domestic livestock activities have been low is vividly demonstrated in Red Canyon.

## Management Implications

Within the past century, cheatgrass has become one of the most potent ecological forces in parts of the West. Peters and Bunting (1994) have suggested the introduction of exotic annual grasses including cheatgrass into the Snake River Plain in Idaho may have been the most important event in the natural history of that region since the last glacial period. Catastrophic ecosystem change for the

western Great Basin has been suggested by Billings (1994) as function of cheatgrass. Spread of this plant is often associated with disturbance by humans. However, it has inserted itself into and has dominated communities without human disturbance.

Cheatgrass can be expected to be a major ecological force within its ecological amplitude, which includes some cold desert shrub, many sagebrush, pinyon-juniper, and mountain brush communities. Its influence is accelerated by disturbance. However, disturbance is often a matter of “when” more than a matter of “if.” Management goals that do not include potential for disturbance are not realistic in many ecological settings.

The concept of potential natural communities based only on native species is seriously challenged by cheatgrass. With reference to cheatgrass, Knight (1994) suggested: “Managing vegetation so it reflects presettlement conditions is a goal that may be impossible once certain introduced species become established.” The status of cheatgrass in Red Canyon and the reports in the literature cited in this text collaborate Knight’s suggestion. Where cheatgrass is highly adapted, it might have to be recognized within potential. Refusing to do so will not reduce its presence, and this will not reduce its potential for dominance.

However, the concept that preservation of native plant communities will prevent, eliminate, or control cheatgrass often prevails in planning, management, and legal maneuvering dealing with cheatgrass prone rangelands. Dynamics of plant communities of warm exposures in Red Canyon do not support this concept, and there seems to be little in literature dealing with cheatgrass to support this concept.

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