Abstract

Scientific and historical literature was searched for documented accounts of early fires in the “interior West”—Montana, Wyoming, Idaho, Utah, Nevada, and eastern Oregon. One hundred and forty-five accounts of fires by 44 observers were found. The majority of accounts described fires in progress. A smaller proportion referred to burned areas that were encountered; a few simply described regional fire occurrence based on the journalists' observations. Indians were identified as the primary ignition source over wide areas at lower and middle elevations. Some journalists noted that fire enhanced grasses and inhibited growth of woody plants.

The historical record, and fire history based on analysis of fire scars demonstrate that fire was a major perturbation in the interior West. Such knowledge can help resource managers understand subsequent vegetative changes, and can enable them to use prescribed fires intelligently.

Introduction

Various researchers in western North America have concluded that wildfire was a major perturbation before the turn of the century (Stewart 1951, Pyne 1982). This knowledge is important for managing forest and rangelands, for interpreting successional patterns of early-day vegetation, for understanding successional changes that have taken place in modern times, and ultimately for managing forests and rangelands. Vegetational changes, after all, have major implications for management of wildlife, timber, and other resources.

Researchers in various disciplines have cited historical literature that describes early fires in the interior West. Only a few, however, have used these sources to interpret fire’s past role in various ecosystems (Moore 1972, Shinn 1980, Barrett 1981). These previous studies provide insight on early fire occurrence in parts of the interior West, but over large areas there was little knowledge of historical fire occurrence. Therefore, a broader search of western literature prior to 1900 was conducted. This paper summarizes and interprets accounts of fire pertaining to a large area of the interior West, including Montana, Wyoming, Idaho, Utah, Nevada, and eastern Oregon.

Methods

Early journals were located and all accounts of early-day fires were recorded. A detailed search was also made through diverse and obscure literature covering the activities of fur trappers, explorers, government surveyors, naturalists, emigrants, military expeditions, miners, and others. This search turned up other references on fire that had not

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been previously reported in the scientific literature. Each narrative was examined and the observed name, date, and approximate location was recorded. Categories were then developed to aid ecological interpretations about past fire occurrence and effects. These categories included whether the citation described a fire in progress or denoted evidence of past burning, relative size of burn, duration of burning, and ignition source. To the extent possible, fire characteristics, and the direct or indirect effects of fire on vegetation, people, wildlife, and stock were also categorized.

**Results and Discussion**

The literature search resulted in 145 accounts of fires documented by 44 observers from 1776-1900 (Table 1). Most accounts described fires in progress. Others referred to burned areas that were encountered, while a few simply described regional fire occurrence based on the journalists' observations.

<table>
<thead>
<tr>
<th>Map No.</th>
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<th>Date</th>
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Gruell
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Wyoming

1. Fremont, Fremont 1887 | 8-15-1845 | Kemmerer | U  |
2. Fremont, Fremont 1887 | 8-20-1845 | Kemmerer | U  |
4. Raymond, Raymonds 1858 | 5-17-1860 | Powder R. | U  |
7. Palmer, H., Hagen & Hagen 1861a | 8-11-1865 | Fort Reno | I  |
8. Bradley, Bradley 1873 | 1872 | Jackson Hole | U  |
12. Brandsegg, Brandsegg 1899 | 1857 | Yellowstone P. | U  |

Idaho

1. Lewis, Thwaites 1899 | 8-26-1905 | Salmon R. | I  |
2. Lewis, Thwaites 1899 | 8-26-1905 | Salmon R. | I  |
3. Stuart, R., Rolles 1915 | 8-20-1842 | Soda Springs | U  |
4. Stuart, R., Rolles 1915 | 8-20-1842 | Soda Springs | U  |
5. Roos, Sparkling 1915 | 4-24-1821 | Lemhi Valley | N  |
6. Ogden, Rich 1950 | 4-26-1826 | Fort Union | I  |
7. Ogden, Rich 1950 | 4-26-1826 | Fort Union | I  |
8. Ogden, Rich 1950 | 4-26-1826 | Fort Union | I  |
13. Work, Haines, F. D. 1971 | 2-7-1821 | Snake R. | I  |
15. Ferris, Phillips 1940 | 8-19-1821 | Lemhi Range | I  |
17. Work, Lewis & Phillips 1923 | 9-19-1822 | Lost R. | N  |
18. Townsend, Thwaites 1950a | 8-16-1833 | Wood R. | I  |
19. Wright, Young 1899 | 8-16-1841 | Mica Creek | I  |
20. Wright, Young 1899 | 8-17-1841 | Mountain Home | I  |
22. Weilber, Weilber 1912 | 8-14-1829 | Soda Springs | U  |
23. Bilbrey, Kelly 1950 | 8-10-1841 | Soda Springs | U  |
24. Fremont, Fremont 1887 | 8-24-1842 | Coeur d'Alene | U  |
25. Fremont, Fremont 1887 | 8-25-1842 | Soda Springs | U  |
26. Fremont, Fremont 1887 | 8-26-1842 | Soda Springs | U  |
27. Fremont, Fremont 1887 | 10-6-1842 | Boise | I  |
30. Palmer, J., Thwaites 1856b | 4-29-1846 | Boise | I  |
31. McKinstry, McKinstry 1875 | 7-26-1850 | Blackfoot | U  |
32. Mullen, Mullen 1863 | 8-22-1859 | Coeur d'Alene R. | U  |
33. Mullen, Mullen 1863 | 8-23-1859 | Coeur d'Alene R. | U  |
34. Stuart, J., MT Hist. Soc. 1902b | 6-11-1862 | Bear R. | U  |
35. DeLacy, MT Hist. Soc. 1902a | 8-12-1862 | Centennial Mtns. | U  |
36. DeLacy, MT Hist. Soc. 1902a | 8-17-1862 | Palisades Reservoir | U  |
37. DeLacy, MT Hist. Soc. 1902a | 8-18-1862 | Palisades Reservoir | U  |
TABLE 1. (Continued)

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Utah

1. Escalante Alter 1928: 9-31-1776 Spanish Fork I
2. Escalante Alter 1928: 9-22-1776 Spanish Fork I
4. Bidwell Kelly 1870: 8-17-1874  Garfield I
5. Fremont Fremont 1857: 8-31-1845 Tremonton 1
6. Stansbury Stansbury 1852: 8-26-1849 Huntsville I
7. Powell Stegner 1862: 1870 Univ. Statewide I

Nevada

2. Ogden Rich 1950: 5-30-1826 Bruneau R. U
3. Ogden Williams 1871: 4-20-1829 Independence Valley I
4. Ogden Williams 1871: 6-7-1829 Santa Rosa Mts. I
5. Bidwell Kelly 1870: 5-15-1841 Pilot Range U
6. Fremont Fremont 1857: 11-8-1844 Reno I

Oregon

1. Ogden Davies 1861: 9-24-1826 Deschutes R. U
2. Ogden Davies 1861: 7-28-1826 Deschutes R. U
3. Ogden Davies 1861: 10-4-1826 Paulina I
4. Ogden Davies 1861: 10-29-1826 Malheur Lake U
5. Ogden Davies 1861: 5-26-1827 Warner Valley I
6. Ogden Davies 1861: 6-22-1827 Malheur Lake U
7. Ogden Davies 1861: 7-14-1827 Vale I
8. Ogden Davies 1861: 9-21-1827 Huntington U
9. Ogden Williams 1871: 6-20-1829 Malheur Lake I
10. Work Maloney 1845: 9-29-1842 Molalla Lake I
12. Work Maloney 1845: 10-1-1852 Malheur Lake U
13. Townsend Twelvetrees 1866a: 9-1-1853 LaGrande I
14. Townsend Twelvetrees 1866a: 9-5-1854 Umatilla R. I
15. Bonneville Todd 1861: 10-16-1834 SE Oregon I
16. Wyeth Young 1869: 9-1-1834 Umatilla R. U
17. Fremont Fremont 1857: 10-17-1843 LaGrande U
18. Fremont Fremont 1857: 10-23-1843 Pendleton U
19. Cross Settle 1940: 8-6-1849 Blue Mts. U
20. Griffiths Griffiths 1902: 1900 Burns U

Notes:
- FP: Fire in progress
- WY: Fire within past year
- HD: Historical documentation of fire
- I: Indian
- N: Non-Indian
- U: Unknown

Each fire's approximate location was plotted (Figure 1). Narratives lacking sufficient detail to plot fire location are listed in inset boxes within the appropriate state. Most of these are observations of smoke that could not be isolated to the approximate point of origin, or, are repeated observations over several days. A few are regional observations of recent and past fires. Though not mappable, these descriptions provide further perspective on the frequency, size, and effect on vegetation. The most explicit of these are Ayres (1900, 1901), Brandege (1899), and Leiberg (1899a, 1899b, 1899c, 1904a, 1904b).

Most of the narratives of travels during summer and fall mention fires one or more
times. The majority of these reports were made along principal travel routes (Figure 1). Documentation is lacking over large areas where travel was infrequent or not mentioned by the journalist.

Whether early travelers would mention fire seems to have depended on the observer, vegetative type, and season. For example, Lewis and Clark carefully noted events and landscape appearance for scientific purposes (Thwaites 1959). Ten different fires and burned landscapes were cited (Table 1). Others seemed to record only unusual events. Burned landscapes, apparently common in many areas, may not have been mentioned by various journalists. When burned landscapes were recorded, it often was in reference to destruction of grass needed for horse forage. This was experienced by Peter Skeen Ogden (Davies 1961), Maximilian Prince of Weid (Thwaites 1966c),

Figure 1. Fires listed in Table 1. Circles are fire locations. Boxed numbers represent observations not mappable or fires reported more than once. Squares are towns and cities.
Lieutenant Mullan (1863), and DeLacy (Montana Historical Society 1902) during the period 1826-63. A fire in progress, however, was likely to be noted. In some regions, fire observations were unlikely because fire was an unimportant ecological force. For example, wildfires were apparently rare on the Laramie plains in 1832; Captain Bon­neville noted that the short, scanty growth of grasses was insufficient for hunters to set on fire in the autumn (Todd 1961). There is a dearth of reports from sparsely vegetated regions in the drier, sagebrush valleys. Mention of fire is also unlikely in those journals covering travel during cool seasons or rainy periods when weather conditions precluded fire. Consequently, there is little or no mention of fire in these journals and reports.

Indian-set fires were apparently the primary ignition source over wide areas at lower and middle elevations. Of the 145 references to fires listed in Table 1, 60 (41 percent) were attributed to Indians; 7 (5 percent) were attributed to non-Indians, and 78 (54 percent) made no mention of ignition source. Very likely some lightning fires were inaccurately attributed to Indians, and the fires of unknown origin were caused by both Indians and lightning. Nevertheless, the available record does indicate that Indian-set fires were common (Gruell in press).

The amount of fire on early landscapes seems to have varied by region, depending on weather and fuels. Extensive fires swept through grasslands every year during the period 1832-1877 at various locations in central and eastern Montana as suggested by Denig (Ewers 1961), Catlin (1891), and Havard (1878). Other reports show that very large fires occurred in the forested regions of northwestern Montana during exceptionally dry years. One of these burned about 853 square kilometers (530 square miles) in 1889 on the Lewis and Clark Forest Reserve (presently Lewis and Clark, Flathead, and Lolo National Forests) (Ayres 1901). Likewise extensive fires were reported by Beaver Dick Leigh in 1875 and 1878 in southeastern Idaho (Thompson and Thompson 1982), in 1879 by Thomas Moran in Wyoming (Fryxell 1943), and Captain Bonneville (Todd 1961) and Nathaniel Wyeth (Young 1899) in 1834 in western Idaho and eastern Oregon.

During early government surveys, some observers recorded the effects of fires on vegetation. After an extensive survey of Utah's forests in the 1870's John Wesley Powell (Stegner 1962) concluded that fires set mainly by Indians prevented establishment of trees.

Ayres (1901) reported extensive, almost continuous, burns on the foothills along the east slope of the Rocky Mountain Front. Only weeds and brush, including willow and aspen, were observed on recent burns.

In the Little Belt Mountains of north-central Montana, Leiberg (1904a) noted that during the Indian occupancy there were many fires. Leiberg concluded that these fires were responsible for perpetuating grassy parks on slopes and in the larger canyons.

It was widely recognized that burning of grass improved forage. In August 1833, in the Wood River Valley below Ketchum, Idaho, Peter Townsend observed that the prairie had been recently burned by Indians to improve the crops of next year (Thwaites 1966a).

In October 1943 southeast of Boise, Idaho, Fremont (1887) noted green grass wherever Indian-set fires had burned the landscape.

Similarly, in September 1853, near the confluence of the Little Blackfoot and Clark
Fork Rivers in Montana, Lt. John Mullan (1855b) found young green grass growing abundantly in many places that had been burned over.

In September 1859, while traveling between the Bighorn River and present day Sheridan, Wyo., Capt. W. F. Raynolds (1868) encountered an extensively burned landscape and the temporary absence of grasses. Raynolds believed this was caused by Indian fires. He noted that although the country was black and forbidding, in the spring it would be most beautiful.

Fire's effect on woody plants was also noted by early explorers. For example, Havard (1878) described slow crown sprouting by woody vegetation, after prairie fires in central and eastern Montana. Fremont (1887) observed in August 1843 that Indian fires prevented the establishment of trees on the lower Bear River near present day Tremonton, Utah. The custom of burning to produce better grass had suppressed willow growth.

In July 1850, Byron McKinstry recorded that much aspen had been killed by fire the previous year in the Portneuf Mountains west of Soda Springs (McKinstry 1975).

Fire's effect on valley bottom vegetation in southwestern Montana was noted in the Lewis and Clark journals. Lewis recorded on 4 August 1805, near the outlet of the Big Hole River that in some localities the Indians appeared to have destroyed a great proportion of the low density timber by setting fire to the bottoms (Thwaites 1959).

A subsequent journal entry suggests that these fires were common. On the upper Beaverhead River, Lewis commented that fires were "frequently kindled in these plains by the natives."

Conclusions

These historical fire observations demonstrated that fire was a major perturbation in the interior West. Many of these fires were set by Indians.

Based on the analysis of fire-scarred trees, fire history studies have documented the frequency of early fires in the major cover types of the northern Rocky Mountains, middle Rocky Mountains, and Owyhee Plateau. These studies suggest that fire periodicity varied with climate and fuels. Average pre-settlement fire intervals often ranged from 4 to 20 years in ponderosa pine/Douglas-fir (Pinus ponderosa/Pseudotsuga menziesii) forests in the Bitterroot Valley of western Montana (Arno and Peterson 1983). Scar data from higher and cooler Douglas-fir/sagebrush (Artemisia vaseyana) ecotones in Yellowstone Park and southwest Montana suggest fire intervals of 20-40 years (Houston 1973, Arno and Gruell 1983). Shorter intervals probably prevailed in the drier grassland associations. Fire scar evidence in aspen stands in Ephraim Canyon, Utah, showed a mean fire interval of 7-10 years during the period 1770-1875 (Baker 1925). Burkhart and Tisdale (1976) report pre-settlement fire intervals in southwestern Idaho sagebrush-grass/western juniper (Juniperus occidentalis) ecotones were comparable to the 13-18 year interval found by Keen (1937) for ponderosa pine forests in eastern Oregon.

Frequent fires in dry regions inhibited optimal growth of woody vegetation. Today, the number and sizes of fires in these regions have been markedly reduced, and large areas have not burned since the late 1800's. This change has apparently been caused by the reduction of fine fuels by livestock, elimination of Indian ignitions, and efficient fire suppression (Gruell 1982). Where fires were frequent, the reduction of fire
has resulted in a dramatic increase in woody vegetation. In the Oregon Cascades and western Montana, for example, ponderosa pine is being successively replaced by shade tolerant species (West 1969, Gruell and others 1982). On the Owyhee Plateau juniper has invaded the sagebrush and perennial bunchgrass type (Burkhart and Tisdale 1976). In the cool-dry regions of Yellowstone Park and southwestern Montana, Douglas-fir forests are now more densely stocked, and sagebrush/grasslands are being heavily invaded by trees (Houston 1973, Arno and Gruell 1983).

In general, fires have been less frequent in the moist regions of north Idaho and high-cold regions elsewhere (Loope and Gruell 1973, Arno and Davis 1980, Romme 1979, Barrett 1982). Fires were particularly prevalent during dry years 1910-1934. Since the early 1940's, the marked reduction in acres burned yearly has resulted in successional advances and reduced diversity (Gruell 1983).

Historical narratives documenting early fire occurrence provide an understanding of the past role of fire in shaping patterns of vegetation. These narratives and fire history studies demonstrate that fires have had a major influence on vegetation in the interior West. This knowledge can help land managers understand why vegetation has changed and aid in assessing the desired role of fire in the future.

Literature Cited

Gruell, G. E. 1982. Fire's influence on vegetative succession-wildlife habitat implications and man-


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