

Use of the Helitorch to Enhance Diversity on Riparian Corridors in Mature Pinyon-Juniper Communities: A Conceptual Approach

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Abstract—As pinyon-juniper have increased their dominance throughout the Great Basin, other perennial plants have declined in abundance. Riparian areas traditionally have the greatest biodiversity found in the region. The increase of pinyon-juniper can generally be attributed to a change in the disturbance regime. To increase the plant diversity found in the riparian areas pinyon-juniper plants must be removed, but traditional methods, such as individual tree cutting, chaining, or herbicides, are not practical or acceptable in many cases. Fire has generally not been thought of as a viable alternative. A helitorch, with a fan nozzle, could be used to follow the riparian corridor and burn out pinyon-juniper trees when leaf moisture is lowest and weather conditions would restrict fire spread to just those trees where the fuel has been placed. Burned areas could be used to break up fuel continuity associated with mature pinyon-juniper communities. This would allow land managers to work with small areas to (1) break up fuel bed structure, (2) reestablish desired plants in both riparian and upland areas, and (3) enhance and restore plant diversity found in the Great Basin and Intermountain West.

Pinyon-juniper communities have encroached into many new areas because of altered disturbance regimes in the Great Basin. This has primarily been due to changes in fire return intervals. In addition, occurrence of exotic annuals now make these communities susceptible to being invaded and dominated by these annuals once a disturbance occurs. This is particularly apparent on large-scale fire disturbances because of the difficulty often encountered in revegetation. Within the riparian corridors the loss of plant diversity and the increased erosion potential following large disturbances can lead to numerous negative consequences. Disturbances need to be gradually reintroduced into these systems. This would allow reestablishment of diverse species that could provide a seed source to aid in the recovery of the plant communities following larger disturbances.

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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Currently there are several disturbance practices available to treat riparian zones including mechanical, individual tree cutting, herbicides, and broadcast burning. All have distinct advantages and disadvantages. One approach that has not been considered is the use of a helitorch during periods when precise ignition placement and speed could be used to limit the scale of the fire and reduce soil disturbance.

The helitorch has been developed to burn large complex units on forest and rangelands. It has been successful on these large units where hand ignition was not practical or safe (Masters and others 1986). This ignition tool has been very successful in treating redberry juniper (*Juniperus pinchottii*) communities (McPherson and others 1985) and Utah Juniper (*J. osteosperma*) (Brad Barber personal communication). However, the successful use of this ignition technique requires people with experience and the desire to burn large units, which limits its application (Masters and others 1986). This technique provides a very precise placement of the ignition pattern to develop sufficient heat to overcome many of the fuel discontinuities associated with rangeland fuels. While many have tried to use the helitorch, often the size of the units are not sufficient to be cost effective (Rasmussen and others 1988). In addition, many land managers felt that large units were often logistically impractical to treat.

While this ignition technique is associated with large units it also has the capability to deal with smaller areas for specific objectives. We propose that many of the riparian corridors in the Great Basin where pinyon-juniper has become a dominate at he expense of the original riparian vegetation can be effectively restored using prescribed fire ignited with a helitorch. This can be done by precise placement of the fire and modifying the fire prescription to allow the fire to stay within the original riparian corridor. Non-sprouting juniper and pinyon could be removed which would allow riparian vegetation to reestablish. Because of weather conditions at time of burning few personnel would be needed for containment which would reduce the cost of the burn. An added benefit would be to break up fuel continuity associated with mature woodlands. This practice could also be used to enhance fire manage capabilities especially if the associated ridges were burned in the same manner.

Attempts of using spring burns in mature pinyon-juniper communities have been difficult because of the limited number of days that occur when weather conditions at this time in the season promote the desired spread of fires and amount of herbaceous fine fuel needed to carry the fire is often lacking. However, ignition of individual trees has been successful when the ignition source was placed directly on

the tree foliage (personal communication Stan Miller). Bunting and others (1976) found juniper readily ignited when leaf moisture was below 45 percent. Low moisture levels normally occur in the summer, but may also be encountered in the spring. Spring leaf moisture of Utah juniper in Cache County, Utah has been recorded as less than 40 percent in March and April. The ability to ignite individual trees appears to be related the leaf moisture of the juniper during this period of the year.

Factors that limit the use of prescribed fire during the winter spring periods in the Great Basin can also be used to effectively burn small areas for the specific objectives. Re-establishment of a variety of communities in the riparian areas and uplands could be accomplished using this technique. In addition reducing continuous fuel beds by strategically placing corridors in the riparian areas and ridges could reduce the spread of wildfires. Instead of promoting large fires with 50 to 80 percent burn coverage, prescribed fires can be limited to those trees where the fuel is placed. Fire spread could be minimized by selecting the appropriate weather conditions. This would limit the disturbance to small areas that can be effectively restored with desired plant species.

The helitorch provides an ignition source that could effectively ignite sufficient trees along a corridor (riparian or ridge) during the spring period. Since the rate of fire spread is not the driving factor in developing prescription for burning, weather constraints would be greatly relaxed. A fire prescription could be developed which would increase the number of days that burning could be used. An additional advantage would be the increased availability of equipment which is normally not being used for fire suppression during this period.

A modified helitorch with a fan nozzle was used to ignite 1000-4000 ha units in West Texas (Masters and others 1986). The helicopter flew at 60-90 km/hr, 30-50 m above the surface. This resulted in a 10 m swath with burning fuel in very m². To ensure sufficient fuel lands on individual trees and increase the precision of fuel placement the helicopter would probably have to slow down. We would suspect from experience that 10 to 30 km/hr may be sufficient. This would increase the amount of fuel/m². Table 1 provides an initial prescription range that would allow individual trees to ignite but limit fire spread. Research would have to be conducted to refine the prescriptions and the most desired speed and height needed to ignite the trees along a desired corridor. In most cases we suspect several passes of the helitorch would be required to create the desired corridor width.

Table 1—Proposed possible weather conditions in the Winter/spring that could be used to develop fire prescriptions to burn corridors in mature Pinyon-Juniper communities in the Great Basin.

Weather conditions	Winter/Spring
Temperature (F)	40-80
Wind (mph)	0-10
Relative humidity (percent)	10-50
Cloud cover (percent)	<25
Juniper leaf moisture (percent)	<45

This approach while unconventional offers several advantages over existing methods of treatment managers can use to restore narrow corridors in pinyon-juniper communities.

1. It has the potential to limit soil disturbance compared to most mechanical techniques and summer fires.
2. Allows managers to work with small areas to increase the success of establishing desired plant community (diversity), which can then be used as a seed source when other disturbances occur.
3. Can be used in remote rough sites.
4. Can be incorporated in the large scale fire management plans to break up fuel bed structure and help in wildfire suppression.
5. Application would be rapid though it is doubtful planning costs would change.

Before this approach is used research or tests would need to be established to refine the prescriptions and decrease the risk of failures by burning under the wrong conditions.

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