Cedar City Field Office Resource Management Plan/Environmental Impact Statement:

Analysis of the Management Situation

Appendix F

Fire Interaction with Vegetation

APPENDIX F. FIRE INTERACTION WITH VEGETATION

Pinyon and Juniper Woodland

The area covered in this vegetative type is in part due to past overgrazing and historic fire suppression, primarily in grasslands and sagebrush communities. It is estimated that pinyon-juniper woodlands have increased tenfold over that last 130 years throughout the Intermountain West (Miller and Tausch, 2001). Old-growth pinyon and juniper woodland is estimated to be less than 10 percent of the current area classified as pinyon and juniper woodland (Miller and Tausch, 2001). These old-growth areas are often restricted to fire-safe habitats such as steep, rocky terrain on thin substrates along ridges.

Most of the area where pinyon and juniper woodland currently dominate was historically characterized by fires burning every 15 to 50 years, Fire Regime II (Kitchen, 2004; Miller and Tausch, 2001). These areas in the Decision Area are described by FRCC 2 (greater than 7,000 feet in elevation*) or 3 (*less than 7,000 feet in elevation*).* Areas of FRCC 3 are dense stands of pinyon and juniper with scarce understory and high potential for cheatgrass invasion following fire. FRCC 2 has areas of encroached pinyon and juniper, but less dense than FRCC 3, and is at less risk of cheatgrass invasion following fire.

Because it is a non-sprouter and is thin-barked when young, fire has been the major historical cause of mortality for young juniper trees. However, adult juniper trees in mature stands are difficult to burn because the understory is usually sparse (older trees succumb to fire when 60 percent of the crown is scorched). Pure juniper stands need 35 mile per hour winds or greater to carry fire through the canopy (Winward et al., 1997). Fire is known to have been the most important natural disturbance that affected the distribution of juniper and/or pinyon-juniper woodlands before the introduction of livestock in the nineteenth century (Miller and Rose, 1999). Burkhardt and Tisdale (1976) and Tirmenstein (1999) concluded that fire frequencies of 30 to 40 years would help keep juniper from expanding into Wyoming mountain big sagebrush communities.

Sagebrush

Pre-settlement, stand-replacing fire frequencies for low-elevation sagebrush are estimated to vary from 60 to 110 years (Fire Regime II) (Whisenant, 1990; Peters and Bunting, 1994; Miller et al., 2001). Because of the high risk of losing key ecosystem components following fire due to cheatgrass invasion, 100 percent of the sagebrush type is in a FRCC 3 condition.

Wyoming and basin big sagebrush do not re-sprout after fire, and low- to high-intensity fires kill most plants. Generally, the herbaceous understory composition does not determine the intensity and severity of wildland fires – sagebrush itself is the primary carrier. Although sagebrush does not re-sprout after fire, it is a prolific seeder, and if a seed source is present, reestablishment is quite rapid and dominance would occur within 20 years (Winward, 1997).

In the absence of fire, sage canopy increases. According to Winward (2004) the maximum canopy cover for sagebrush is 30 percent; any time canopy cover reaches more than 15 percent, the sagebrush individuals compete with each other. Because sagebrush is a relatively short-lived species (approximately 60 years), in the absence of disturbance, there is no recruitment of younger individuals. Consequently, the stand has the tendency to become old and decadent.

Salt Desert Shrub

Fire frequency has been estimated at 35 to more than 300 years and is historically classified as Fire Regime V. Most species of this type are not fire adapted and are considered climax. The exception is threadleaf rabbitbrush, which is sensitive to competition when growing with other species, but can dominate a post-burn site. Because rabbitbrush easily establishes from seed after fire, it is considered fire adaptable. Due to the risk of losing key ecosystem components and greatly increased fire regimes as invasive annual grasses dominate, salt desert shrub is typically classified as FRCC 2 or FRCC 3, depending on the relative departure from its historic fire regime.

A lack of continuous cover (fuels) made fire rare to nonexistent in salt desert shrub communities. Historically, these types did not burn often enough or in large enough patches to support dominance of fire-adapted plants. Most salt desert shrub species do not readily regenerate following fire. Further expansion of invasive species following fire is a major concern for salt desert shrub communities.

Grasslands

Perennial grasses respond vigorously to fires of various intensities by re-sprouting following fire. Fast, high-intensity fires have lower severity that seldom causes substantial mortality to native perennial bunchgrasses. Slow-backing fires have a greater severity; mortality to native perennial bunchgrasses can be high under these conditions. With most natural ignitions, the predominant fire spread would be as a fast-moving head fire.

Mountain Shrub

Stand-replacing fire frequency ranges from 25 years to 100 years in mountain shrub (Gruell and Loope, 1974), although return intervals can vary widely with changes in elevation, aspect, site moisture, and the associated forest or woodland type. Mountain shrubs are classified as Fire Regimes I (e.g., Gambel oak), II (e.g., mixed mountain shrub or maple), and IV (e.g., mountain mahogany), depending on the dominant species and the site. The FRCC also varies depending on the dominant species and the understory. Mountain shrub communities at lower elevations (less than 6,500 feet) are classified as FRCC 3 due to the high risk of cheatgrass invasion following fire. In the Southern Utah Support Area Planning Area, 3 percent of the mountain shrub vegetative type is in FRCC 1, whereas 97 percent is in FRCC 2. Some species, like oak, readily re-sprout after fire because they reproduce vegetatively. Others, like Ceanothus, have specialized seed, which enable it to readily invade burns (Knight, 1994), while some are intolerant of fire (e.g., curl-leaf mountain mahogany, mountain big sagebrush, and bitterbrush). This can cause a temporary shift in the species composition; however, most mountain shrub communities generally recover rapidly following wildland fire and are considered to be fire tolerant. In general, fire suppression in this vegetative type has shifted the seral balances toward greater representations of climax vegetation and older age classes, with a corresponding loss of early seral vegetation and younger age classes. Overall, wildlife quality has declined, while acreage of decadent stands and the attendant fuel loadings have increased.

Ponderosa Pine

Ponderosa pines have thick bark, which protects them from serious damage from surface fires. However, in the absence of fire (and an increase in grazing), ponderosa pines increase in density, or other woody species like juniper or shade-tolerant firs encroach in the understory, resulting in an increased risk of crown fire. Also, increased density of shade-tolerant species can place greater stress on larger old trees, mostly due to competition from other species, resulting in increased susceptibility to insects and disease (Keyes et al., 2003).

Fire frequency for ponderosa pine communities ranges from 10 to 40 years, with low- to mixed-severity fires (USDA, 2002). These forests have typically missed between 5 and 10 fire cycles in the years of fire suppression, and as result can have a higher composition of woody vegetation in the understory.

Riparian Vegetation

Historically, fire in riparian communities would have been infrequent and varied from small size, with highly mosaic burn patterns as a result of the higher moisture content generally present in riparian areas/species, to stand-replacing burns likely to have occurred only in extreme drought periods. Willow species typically sprout vigorously following a fast-moving fire because slow-moving fires are generally more damaging, presumably due to greater heat transfer to root crowns. The riparian vegetative type is classified as FRCC 3, mainly as a result of tamarisk invasion. Because of its high water and salt content and extensive root system, fire is ineffective in the control of tamarisk and can actually encourage its growth. Light (low temperature) fire encourages tamarisk to re-sprout and become even denser, whereas hot fire would sterilize the surrounding soil so that desirable shrubs and herbaceous species are unable to get established (Francis, 2004).

Mix Conifer

Fire frequencies in mixed conifer range from 100 to 300 years. These forests are characterized by a combination of understory and complete-stand-replacement fire regimes (Arno, 2000). Mixed conifer is classified as Fire Regime III or IV, depending on the elevation and related dominant species. Fire Regime III would characterize conifer-shrub communities at lower elevations that have pure conifer stands. Due to the longer historic fire return intervals and well-functioning vegetation attributes, mixed conifer is classified as FRCC 1 when associated with Fire Regime IV, and FRCC 2 when associated with Fire Regime III.

In recent years prolonged drought has predisposed species like Douglas-fir to insects (bark beetles), resulting in an increased fuel load. Dead woody fuels are accumulating, either standing and on the ground often in a haphazard manner; with the greatest fuel loadings occurring on the most productive sites, which are predominantly stand-replacement fire regimes. This mixed-severity fire regime often results in a mosaic pattern of stand structure and fuels. Past stand burn mosaics tend to increase the probability that subsequent fires will also burn in a mixed pattern (Arno, 2000). When fires do occur, they tend to be intense and often sterilize the ground, with some 30-year-old fire scars showing very little vegetation returning (USDA, 2002).

Aspen

Fire frequencies range between 25 to 100 years, with mixed severity (Gruell and Loope, 1974). Because of their high water content, aspen stands do not easily burn and often act as natural fuel breaks during wildland fires. Fire regimes and vegetative structure have been moderately altered from historical conditions, mostly as a result of conifer encroachment. Because they are thin barked, aspen-dominated sites are particularly susceptible to mortality of aboveground stems from fire of low intensity, even though aspen is well adapted to regeneration by sprouting after fire (Jones and DeByle, 1985; Mutch, 1970). Fires in young aspen stands tend to be low-intensity surface fires unless there is a great deal of understory fuel. In older stands, during the warmest and/or driest months of the year, abundant fuel can lead to higher intensity fires.
Decadent aspen stands and other areas with thin, acidic soils can be less vigorous at regenerating via suckering, and can tend to support conifers even after fire (USDA, 2002).