Appendix H—Fire Regimes

Fire Regimes for the Giant Sequoia National Monument

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The following table summarizes the characteristic fire regimes for the vegetation types described in this document for the Giant Sequoia National Monument (GSNM). The two primary sources for this information are A Manual of California Vegetation – Second Edition (Sawyer et al. 2009) and Fire in California's Ecosystems (Sugihara et al. 2006). The information will not always correspond exactly with either source, because they have been adjusted to address the local conditions and additional studies relevant to the GSNM. It is important to note that the fire regime information that is listed here refers to fire regimes that are characteristic of the vegetation types in the GSNM. This is a general description of the tolerance of that vegetation type to variation in the seven defined fire regime attributes (Fire Return Interval, Seasonality, Size, Spatial Complexity, Intensity, Severity, and Fire Type). For more information see Sawyer et al. (2009) (pp. 1211-1215) and Sugihara et al. (2006) (pp. 68-74).

Table 71 Fire Regimes for the Giant Sequoia National Monument, 2010

Component of Habitat Types (b)	Vegetation Type from Literature	Seasonality	Fire Return Interval	Fire Size	Spatial Complexity	Intensity	Severity	Fire Type
(a) Cover Type: Conifer								
(b) Habitat Type: Red fir								
Red fir	Red fir	Late summer–fall	Medium	Medium	Multiple	Multiple	Multiple	Multiple
Red fir	Abies magnifica forest alliance	Summer–early fall	Medium (5-150 years)	Medium	Multiple	Multiple	Multiple	Multiple
Red fir	Abies magnifica–Abies concolor forest alliance	Summer–early fall	Medium (20-150 years)	Small to large	Multiple	Multiple	Multiple	Multiple
Lodgepole pine	Pinus contorta spp. Murrayana forest alliance	Late summer short	Medium to long (100+ years for large stand replacing fires, 20-30 years for surface fires	Medium to large	Multiple	Multiple	Multiple	Multiple
Western white pine	Pinus monticola forest alliance	Late summer short	Long (200+ years)	Small to medium	Low	Low	Low	Surface to passive crown
(a) Cover Type: Mixed conifer								
(b) Habitat Type: Mixed conifer, including giant sequoia								
Giant sequoia	Sequoiadendron giganteum forest alliance	Summer–early fall	Short (1-32 years)	Small to medium	High	Low-moderate	Low-moderate	Surface to passive crown
Jeffrey pine	Pinus jeffreyi forest alliance	Summer–early fall	Short to medium	Medium to large	Low to moderate	Low to moderate	Low to moderate	Surface to passive crown
White fir	Abies concolor forest alliance	Summer–fall	Short to medium	Large	Low to high	Low to moderate	Low to moderate	Surface
Incense cedar	Calocedrus decurrens forest alliance	Summer–early fall	Short to medium (5-30 years)	Small to medium	Low to moderate	Low to moderate	Low to moderate	Surface to passive crown
Sugar pine	Pinus lambertiana forest alliance	Summer–fall	Short	Small to large	Moderate	Low to moderate	Low to moderate	Surface
(b) Habitat Type: Montane hardwood–conifer								
Ponderosa pine–black oak	Ponderosa pine/black oak	Summer–fall	Short (regular)	Large	Low	Low	Low-moderate	Surface

Component of Habitat Types (b)	Vegetation Type from Literature	Seasonality	Fire Return Interval	Fire Size	Spatial Complexity	Intensity	Severity	Fire Type
Ponderosa pine	Pinus ponderosa forest alliance	Summer–early fall	Short	Medium to large	Moderate to high	Low to moderate	Low to moderate	Surface to passive crown
Ponderosa pine–incense cedar	Pinus ponderosa–Calocedrus decurrens alliance	Summer–early fall	Short	Medium to large	Moderate to high	Low to moderate	Low to moderate	Surface to passive crown
(b) Habitat Type: Riparian								
White alder	Alnus rhombifolia forest alliance	Summer–early fall	Medium to long (dependent on neighboring alliances; half the medium frequency of surrounding forests)	Medium	Medium to high	Low to moderate	Moderate-high	Surface-passive crown fire
Mountain alder	Alnus incana shrubland alliance	Summer–fall	Dependent on neighboring alliances; half the medium frequency of surrounding forests	Small to medium	High	Low to high	Low to high	Surface-crown fire
Willow[1]								
(a) Cover Type: Hardwood								
(b) Habitat Type: Oak associated hardwood and hardwood–conifer								
Oak woodland	Oak woodlands/ grasslands	Summer–fall	Short	Large	Low	Low	Low	Surface
Oak woodland	Foothill woodlands (central valley)	Summer–fall	Short	Small to medium	High	Low to moderate	Low to moderate	Surface
Blue oak savanna	Quercus douglasii woodland alliance	Summer–early fall	Short (5-15 years)	Medium to large	Low	Low to high, mostly low (higher with well-developed shrub understory)	Low to high, mostly low (higher with well-developed shrub understory)	Surface to passive crown

1. Several Salix alliances occur within the Monument. Most are in riparian locations and located within meadows. Sawyer et al (2009) state that fluvial processes are more important than fire.

Component of Habitat Types (b)	Vegetation Type from Literature	Seasonality	Fire Return Interval	Fire Size	Spatial Complexity	Intensity	Severity	Fire Type
Canyon live oak woodland	Quercus chrysolepis forest alliance	Summer–early fall	Medium (5-100+ years)	Medium	Moderate to high	Low to high	Low to high	Surface to passive–active crown
Black oak woodland	Quercus kellogii forest alliance	Summer–early fall	Short	Medium to large	Low to high	Low to moderate	Low to moderate	Surface to passive crown
Interior live oak	Quercus wislizeni woodland alliance	Summer–early fall	Short–medium (5-15 years in open woodlands, 50-100 years in forests)	Medium to large	Low	Low to high	Low to high	Surface, passive crown
Quaking aspen	Populus tremuloides forest alliance	Summer–early fall	Medium (10-100 years)	Small to medium	Moderate to high	Low to moderate	Low to high	Surface
California buckeye	Aesculus californica woodland alliance	Summer–early fall	Short	Medium	Low	Low to moderate	Low to moderate	Surface to passive crown
(a) Cover Type: Shrub								
(b) Habitat Type: Shrubland								
Mixed chaparral	Chaparral	Summer–fall	Medium	Large	Low	High	High	Crown
Mixed chaparral	Quercus berberidifolia shrubland alliance	Summer–early fall	Medium (30-100+ years)	Medium to large	Low to moderate	High	High	Active–independent crown fire
Mixed chaparral	Quercus garryana shrubland alliance	Summer–early fall	Medium (25-50+ years)	Medium to large	Low	Moderate to high	High	Active–independent crown fire
Mixed chaparral: buckbrush	Ceanothus integerrimus shrubland alliance	Summer–early fall	Medium (10-50+ years)	Medium to large	Moderate	Moderate	Moderate to very high	Surface to active–independent crown fire

Component of Habitat Types (b)	Vegetation Type from Literature	Seasonality	Fire Return Interval	Fire Size	Spatial Complexity	Intensity	Severity	Fire Type
Mixed chaparral: birchleaf mountain mahogany	Cercocarpus montanus shrubland alliance	Summer–early fall	Medium (40-80 years)	Medium to large	Low to moderate	High	High	Surface to active–independent crown fire
Mixed chaparral: poison oak	Toxicodendron diversilobum shrubland alliance	Summer–early fall	Short–medium	Small to large	Moderate to high	Low to high	Moderate to high	Surface to passive crown
Montane chaparral: greenleaf manzanita	Arctostaphylos patula shrubland alliance	Summer–early fall	Medium	Medium to large	Low to moderate	Medium to high	Medium to very high	Active–independent crown fire
Montane chaparral: mountain whitethorn	Ceanothus cordulatus shrubland alliance	Late summer	Medium	Medium to large	Low to moderate	Moderate to high	High	High
(a) Cover Type: Herbaceous								
(b) Habitat Type: Annual grassland[2]								
Grasslands (central valley)		Summer–fall	Short	Medium-large	Low	Low	Moderate-high	Surface
Oak woodlands/ grasslands		Summer–fall	Short	Large	Low	Low	Low	Surface
(b) Habitat Type: Wet meadow[3]								
(a) Cover Type: Barren								
		Late summer short	Long	Small	Low	Low	Very high	Surface to passive crown

2. There are a number of herbacous alliances that occur within the monument. Most are at lower elevations and many are dominated by invasive, non-native species. Limited information on fire regimes is available.

3. There are a number of wet meadow alliances within the Monument. Sawyer et al. (2009) state that fluvial processes are the primary disturbances. Native American burning likely influenced many of these alliances.

This description is a different perspective from other fire regime treatments in that it is an effort to display the fire conditions under which the vegetation type (as defined in Sawyer et al. 2009) retains its long term viability. In other words, the fire regime under which 1) the characteristic species can remain dominant, and 2) other vegetation types that could potentially occur in the same place, will not expand their ranges, and replace the current vegetation type. This description is inherently a wider range of fire variation than has occurred on most of the landscape, and would be detected in more detailed studies such as tree ring or other site specific fire history studies.

The period of time or the geographic location which this fire regime table describes is not specific; rather it is intended to define the types of fire patterns that would enable the long term viability of the vegetation type within any time period. Recent fire history for many areas differs from characteristic and historic patterns, and is not likely to sustain current vegetation patterns within GSNM without some significant changes. Ongoing climate change is adding directional variability and potentially changes to the geographic distribution of vegetation types. It is likely that the vegetation types listed would be viable under the same fire regimes no matter when, or were they are located on the GSNM landscape.

How does this relate to other fire history and fire regime information?

The information in this table is intended to describe a broad concept of fire regimes for each of the vegetation types within the GSNM. These broad concepts are intended to be used in combination with any site specific fire studies and information that are available to refine our concepts for fire regimes on specific landscapes. We recognize that the science in this area is still developing and that more information will be incorporated as more is known.

These characteristic fire regimes are also not intended to be identical to the historical fire regimes for all of the area within the GSNM. This table describes the fire regimes that are characteristic of the vegetation types. Vegetation types have often changed in composition, function and geographic distribution during the past 200 years. These fire regimes are characteristic of the vegetation types that are currently in the GSNM.

What does it means to land managers?

Restoring fire regimes to ecosystems necessitates a defined desired outcome from those fires. The fire regimes that are described in this table can serve as background information on which management decision can be made, but they **should not** be interpreted as defining a desired condition for fire. In some situations public and fire fighter safety, public health, or other social or resource values will be determined to outweigh the maintenance of vegetation types and ecosystems. However, knowledge of the characteristic fire regime for an area provides the basic background for prescribing and assessing managed fire.

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