CRITERION 3—

Chapter 4. Fire Occurrence (2004)

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Why Is Fire Important?

Fire is a powerful, selective regulatory mechanism in forest ecosystems. It is a natural part of the environment, and fire-affected ecosystems depend on a particular frequency and intensity of fire. These ecosystems will remain in their natural state only if the fire regime to which they are adapted is present (Kimmins 1987). The frequency and intensity of burning depends on the buildup of fuels, weather conditions, management activities, and the occurrence of ignition sources. Fire frequency and intensity have been significantly altered on approximately 15 percent of the forested area in the conterminous United States (Schmidt and others 2002). Wildland fires in these areas can have significant economic and ecological impacts.

Methods

Moderate Resolution Imaging Spectro-radiometer (MODIS) Active Fire Detection data for the conterminous United States for 2004 (U.S. Department of Agriculture Forest Service, Remote Sensing Applications Center 2004) were examined to determine the proportion of forested pixels in each ecoregion section with active fires recorded. The pixel size was 1 km^2, but the MODIS sensor does not differentiate between a fire as small as 0.01 km^2 burning at very high temperatures and a 1-km^2 low-intensity fire. The entire 1-km^2 pixel may be classified as having a fire in either scenario. For this reason the MODIS fire data were not used to determine area burned. Information on area burned was obtained from the National Interagency Coordination Center (2004). MODIS data for the 2004 fire season were analyzed as suggested by Coulston and others (2005). Specifically, we examined the timing of the fire season using a cumulative distribution function and identified ecoregion sections containing a relatively high proportion of forested pixels that had fires in 2004.

What Do the Data Show?

The length and timing of each fire season can differ among years. In 2004, approximately 70 percent of the fires in forested areas recorded

by the MODIS satellites occurred between day-of-year 170 (18 June 2004) and day-of-year 246 (2 September 2004) (fig. 4.1). According to the official wildland fire statistics, the total area burned in the conterminous United States in 2004 was 5876 km^2, which is only 40 percent of the annual 10-year average (National Interagency Coordination Center 2004).

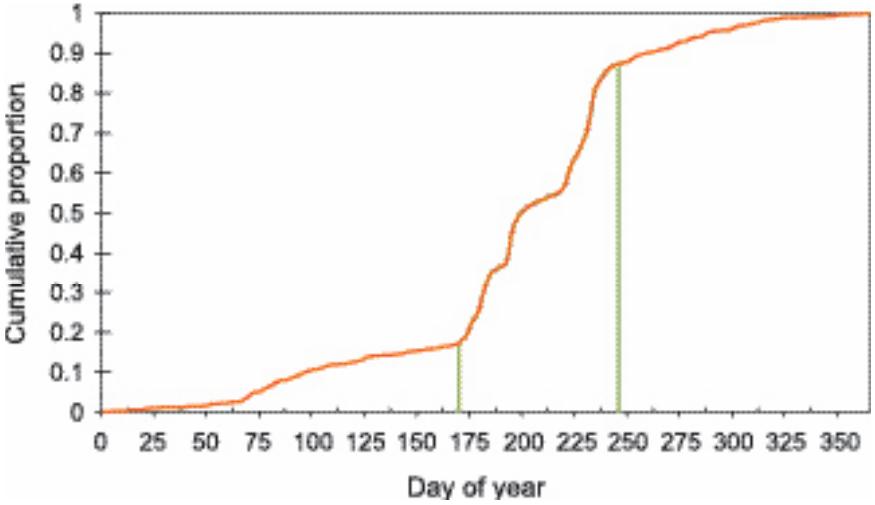

Figure 4.1—Cumulative distribution function of fire occurrence in 2004 by day-of-year. The vertical lines show the approximate start and end of the fire season. (Data source: U.S. Department of Agriculture Forest Service, Remote Sensing Application Center.)

However, Alaska had a severe fire season in which 26 895 km^2 burned, and this area was 82 percent of the national total for 2004 (32 771 km^2). The number of forested pixels in the United States with fires recorded on them by the MODIS satellites increased from 2003 to 2004, but this increase was mostly a result of relatively high fire occurrence in sections M139A–Upper Yukon Highlands and 139A–Upper Yukon Flats in Alaska. Both the Upper Yukon Highlands and Upper Yukon Flats sections had fires recorded on > 10 percent of the forested pixels (fig. 4.2). In the conterminous United States, section 315A–Pecos Valley in New Mexico had the largest percentage (5.96 percent) of forested pixels with fires recorded by the MODIS satellites in 2004 (fig. 4.2). However, this area was not heavily forested, containing a relatively small area of forest in northeastern New Mexico and another small area of forest in south-central New Mexico. Sections 251F–Flint Hills in Oklahoma and Kansas and 255A–Cross Timbers and Prairie in Oklahoma and Texas had fires detected on 4.7 percent and 3.9 percent of the forested pixels, respectively. In Louisiana, fires were detected on 3.3 percent of the forested pixels in section 232F–Coastal Plains and Flatwoods, Western Gulf.

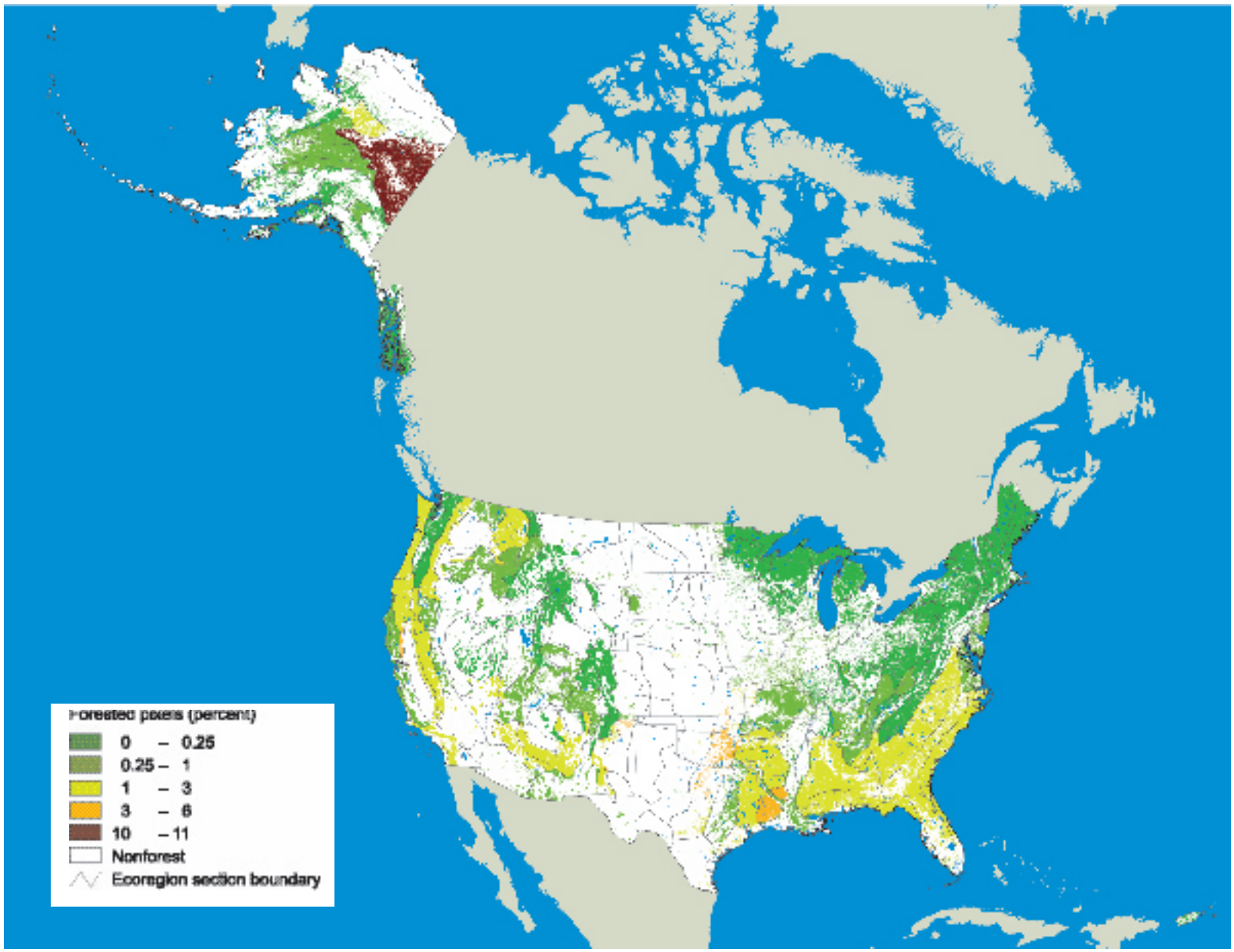

Figure 4.2—The percent of forested pixels in 2004 with fires recorded by the MODIS satellites by ecoregion section (Bailey 1995, McNab and Avers 1994). Forest cover is derived from Advanced Very High Resolution Radiometer (AVHRR) satellite imagery (Zhu and Evans 1994). (Data source: U.S. Department of Agriculture Forest Service, Remote Sensing Application Center; Map projection: Lambert azimuthal, center of projection: 100° W, 45° N.)

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