Streamwater Quality Data from the 2002 Hayman, Hinman, and Missionary Ridge Wildfires, Colorado, 2003

By Anthony J. Ranalli and Michael R. Stevens

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Problem

Concern about water-quality issues related to wildfires in Colorado has intensified because of the wildfires that occurred in Colorado during the summer of 2002. In 2003, the U.S. Geological Survey (USGS) conducted water-quality sampling of burned and unburned watersheds in the areas affected by the Hayman, Hinman, and Missionary Ridge wildfires to provide information to scientists, watershed managers, and public-water suppliers regarding the extent to which wildfires may cause water-quality degradation.

Purpose

The purpose of this report is to present the postfire water–quality data collected from streams draining watersheds burned by Colorado wildfires in 2002.

Description of the Study Areas

Water-quality sampling was done in watersheds affected by the following fires:

1. The Hayman fire occurred approximately 40 mi southeast of the Denver Metropolitan area in mid-elevation Ponderosa and Douglas Fir forests on highly weathered Pikes Peak granite (fig. 1). The Hayman burn area affects a major portion of Denver's raw water supply. No substantial prefire USGS data are available. Two small watersheds were selected for a water-quality comparison of a site not affected by the wildfire (Pine Creek) and a site affected by the wildfire (Fourmile Creek).
2. The Hinman fire occurred approximately 20 mi north of Steamboat Springs in high-elevation coniferous forest on crystalline, sedimentary, and metamorphic rock types (fig. 1). Prefire USGS water-quality data are available for 1999 and 2000 along the North Fork of the Elk River and selected tributaries (Leib and von Guerard, 2002). These data were collected after a 1998 blowdown in that area of the Zirkel Mountains. Two sites were selected downstream from burned watersheds that had preexisting water-quality data available to facilitate a prefire/postfire comparison of water quality. Lost Dog Creek is a small, 3.2 mi^2 watershed that was severely burned and represents upland runoff conditions. North Fork of the Elk River is a larger 41.4 mi^2 watershed that integrates many different areas affected to various degrees by the fire.
3. The Missionary Ridge fire occurred approximately 10 mi northeast of Durango, Colorado in high-elevation coniferous forest on igneous and sedimentary rock types (fig. 1). The Missionary Ridge fire burned portions of the watersheds of Vallecito Reservoir, Lemon Reservoir, and the Animas River. These water bodies serve as a portion of the water supply for the city of Durango, the city of Bayfield, and the Southern Ute Indian Tribe. Prefire USGS water-quality data are available for 1996, 1997, and 2000-2002 for Vallecito Reservoir, its two major inlets, and its outlet. Postfire water–quality data in the Vallecito Reservoir watershed were collected from the same sites as the prefire water–quality data. In the Lemon Reservoir watershed postfire water quality data were collected from the major inlet to Lemon Reservoir (above the burn area), Lemon Reservoir (adjacent to the burn area), and two sites downstream from the reservoir (below the burn area). I

Data and Methods

The major ion, metals, sediment, dissolved organic carbon, and ultra violet absorbance data are presented in table 1. The concentrations of targeted organic compounds are presented in table 2. These compounds are those known to form or thought highly likely to form during a fire. A list of tentatively identified organic compounds is presented in table 3. Tentatively identified compounds are those compounds that were identified by matching the mass chromatogram of a sample with mass chromatograms in an electronic mass spectral library. The difference between the targeted and tentatively identified organic

compounds is as follows. For the targeted organic compounds, the mass spectrometer was calibrated for these compounds and a quantitative measurement of the concentration of each compound was possible. For the tentatively identified organic compounds, the mass spectrometer was not calibrated for any organic compound so this was a qualitative assessment rather than a quantitative one. In other words, it was possible to determine if a certain organic compound was present but its concentration could not be accurately measured. Results of limited samples collected for the purpose of running a trihalomethane (THM) formation potential test are listed in table 4. Figure 1, tables 1 through 4, and a page explaining abbreviations and acronyms are at the back of this report. The methods used for the analyses of all the constituents listed in tables 1–4 can be found in Fishman (1993). The methods used for the collection of the water–quality samples can be found in the USGS National Field Manual for the collection of water–quality data. The methods used for the THM analysis can be found in Crepeau and others (2004).

References

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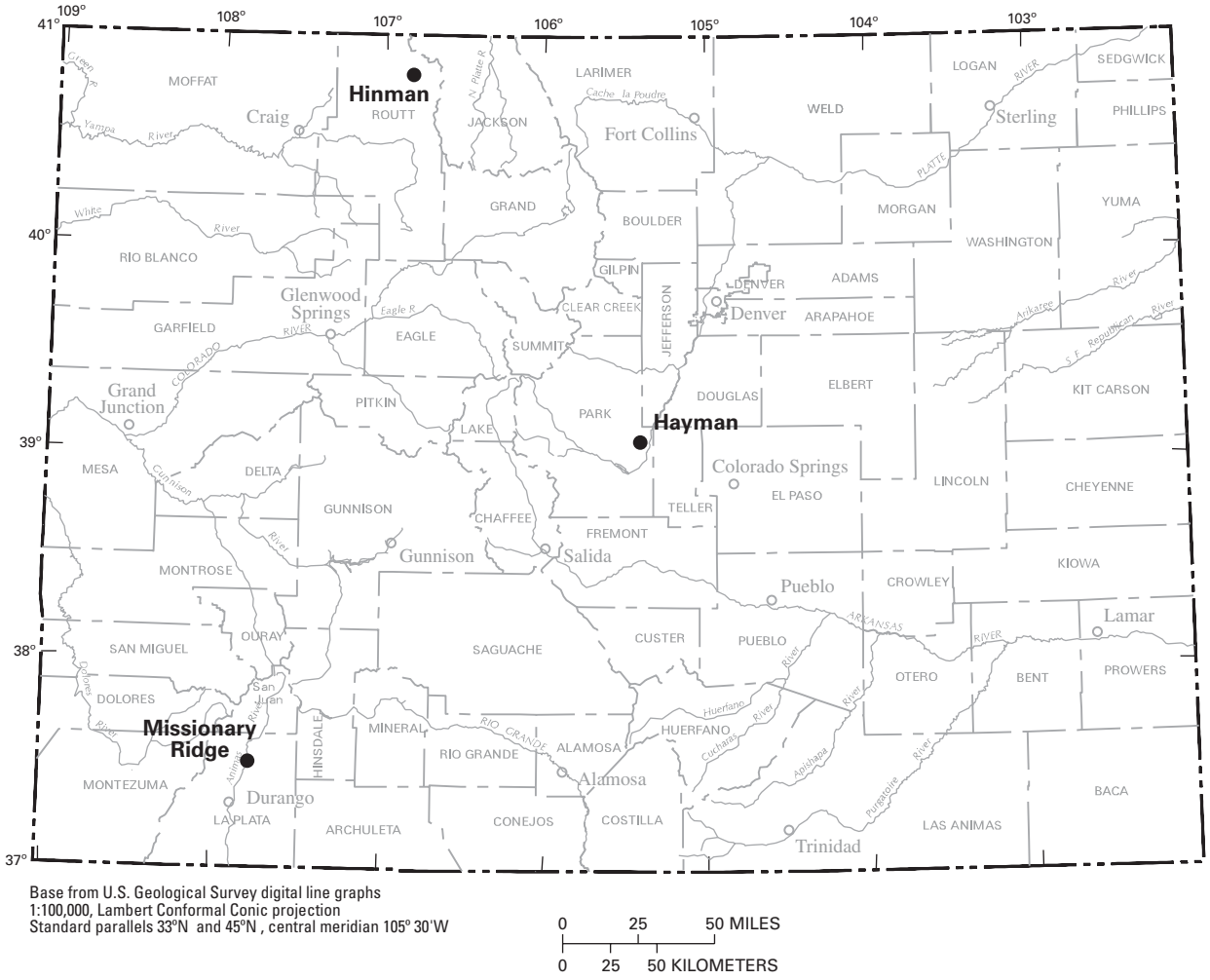

Figure 1. Location of Hayman, Hinman, and Missionary Ridge wildfires in Colorado, 2002.

ABBREVIATIONS AND ACRONYMS

CAS	Chemical Abstract Service
cm	centimeter
deg C	degree celsius
E	estimated
ft^3/s	cubic feet per second
mg/L	milligrams per liter
ng/mL	nanograms per milliliter
nm	nanometer
NTU	Nephelometric Turbidity units
Std units	standard units
µg/L	micrograms per liter
µS/cm	microsiemens per centimeter at 25 degrees celsius
<	less than
-	No data available

Data Section *(tables available in Excel format)*

Table 1

Table 2

Table 3

Table 4

Table 5