

Changing landscapes in the world's first national park

Yellowstone and the Biology of Time: Photographs Across a Century

By Mary Meagher and Douglas B. Houston

A BOOK REVIEW BY DAVID L. PETERSON

Iwish I could have seen this place a hundred years ago." Nearly all of us have uttered that phrase at one time or another, and thanks to a creative photo-filled book, we can now take that step back in time for Yellowstone National Park (Wyoming, Montana, Idaho). *Yellowstone and the Biology of Time* is a landmark volume in the retrospective analysis of parks and protected areas. This chronology of landscape change trumpets the message that ecosystems are dynamic over a wide range of spatial and temporal scales.

Forest Service scientist George Gruell pioneered the use of repeat photography to document ecological change in his classic studies of Montana and Wyoming landscapes published in the early 1980s. Biogeographer Thomas Veblen also used this technique in an interesting analysis of the Colorado Front Range published in 1991. Biologists Mary Meagher and Douglas Houston, both retired federal scientists who spent most of their careers with the National Park Service, follow in this tradition with a heroic effort of repeat photography that provides good spatial coverage of Yellowstone over 120 years.

As Meagher and Houston tell us in the preface, the book had a gestation period of 25 years. They first compiled an impressive collection of photos from the Yellowstone archives, most of which were taken by W. H. Jackson, J. P. Iddings, F. J. Haynes, and J. E. Haynes during the late 1800s. Between 1971 and 1973, they relocated the scenes in the old photos and compiled a new set of photos. A number of logistical difficulties kept them from completing the project, then the fires of 1988 occurred, providing an opportunity to document the ef-

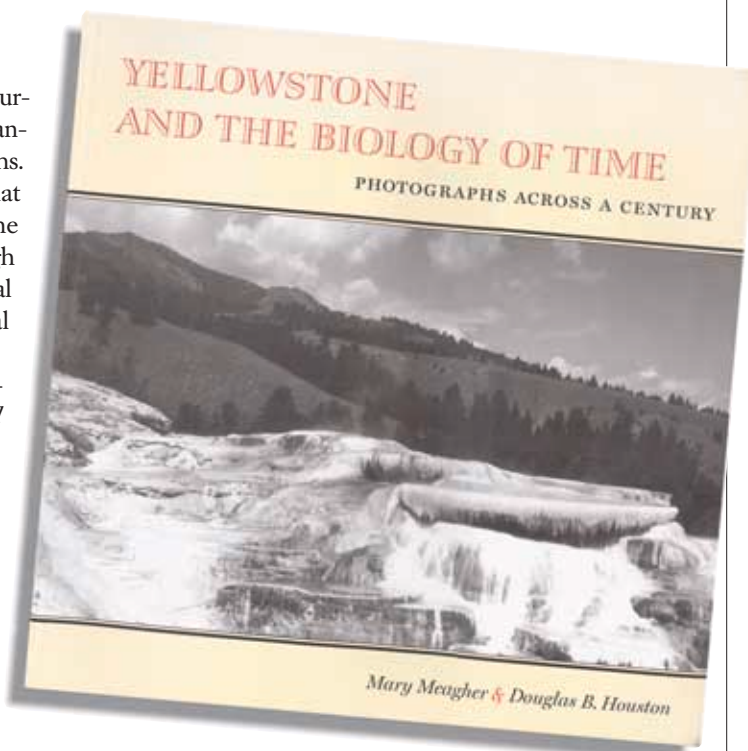
fects of large-scale disturbance. So they took another set of photographs. We were fortunate that the authors delayed the publication long enough to capture this critical milestone in ecological time!

The historical photos in *Yellowstone and the Biology of Time* are striking in their beauty and clarity. The cumbersome technology of a century ago must have posed considerable challenge for photographers working in the outdoors, particularly in the backcountry. It is therefore not surprising that many of the photos are adjacent to roads. But that also affords us the opportunity to see the effects of human activities, both historical and contemporary. It is heartening to see the restoration of many sites that were previously heavily grazed by cattle, cut for hay, and used for Army encampments. Conversely we can also see the degradation of modern-day sites by buildings and parking lots.

Brief, descriptive text interprets each photo set with ecological and historical context; on-ground examination of each site by the authors provides helpful information on plant species and other characteristics not apparent to the casual observer. The photos point out dramatic changes in many geothermal features. They also indicate that many of the aquatic systems are surprisingly dynamic in terms of extent,

water level, and associated vegetation. Beavers, whose near-elimination has altered the aquatic ecology of Yellowstone, apparently act as a keystone species and may deserve more study with regard to effects that cascade to other species.

The photos also demonstrate that the magnitude of changes in vegetation are extraordinarily site-specific in Yellowstone. Change appears to be relatively fast at many low-elevation sites, but considerably slower at higher elevations (in the absence of fire). Variation in the distribution and abundance of big sagebrush over time is a striking feature in many photos. Reduced cover of quaking aspen and willows, which is cited by some as evidence of "overgrazing" by native ungulates, is apparent in many photos. However, there are also photos that indicate an increase in these species at some





locations in the park. The post-fire photos show a mosaic of effects to forest overstory and shrub-steppe species (see the three photos, below).

Photos give way to summaries of the physical and biological framework of

Yellowstone, including geology, climate, soil, and vegetation, as well as discussion of the interaction of climate, fire, grazing, and human activities on the dynamics of present-day ecosystems. These sections are rather brief, but they cover the basics.

Some readers will be disappointed that the authors do not include detailed discussion of the seemingly endless debates about management of the charismatic megafauna of Yellowstone. Indeed, Meagher and Houston were embroiled in these debates for many years. To their credit, the authors discuss wildlife management and alternative viewpoints evenhandedly from a *scientific* perspective. Proponents on any side of current issues related to elk and bison management will not find much fodder for advocacy positions here.

The book has few shortcomings. It would have been nice to see greater consideration of ecosystem dynamics outside the boundary of Yellowstone National Park, particularly given the long-standing existence of interagency assessments and management activities within the greater Yellowstone region. Appendix 2 summarizes temporal changes by vegetation type as seen in photos, but it is not particularly useful due to the high variability between sites. I was also hoping for some better maps, given the ready availability of GIS coverages for Yellowstone.

Yellowstone and the Biology of Time is intended for a general audience. It provides a solid background on basic ecology, natural history, and landscape dynamics for the layperson, and includes sufficient information to hold the interest of those with some technical training in biology. Scientists may be

disappointed that the book simply summarizes resource management issues and scientific controversies, rather than shedding much new light on them. The most frequent users of the book will likely be Yellowstone aficionados—those who work in the park, visit it frequently, or otherwise

have a strong connection to the park's resources. Fortunately the moderately priced paperbound version will make the book accessible to many readers.

I hope that some enterprising individual will now develop a Web-based archive to provide broader access to this important collection of photos. By having digital images catalogued by topic and geographic location, future photographers—or landscape detectives, as Meagher and Houston call them—will be able to locate particular scenes and add new photos to the archive. All parks and protected areas should consider developing this type of electronic archive, which would be a dynamic information source for scientists, resource managers, and the public.

If you are planning a trip to Yellowstone, buy a copy of *Yellowstone and the Biology of Time*. Read it before you go, then take it with you and note the photo points along the roads and trails. As a modern-day time traveler, you will be able to more fully experience the dynamic Yellowstone landscape. **P₅**

Yellowstone and the Biology of Time...

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The three photographs of the Tower Junction area, looking east across the Yellowstone River to Junction Butte, document changes in quaking aspen (foreground) from a low, dense stand that was present in 1900 (top photo), to a mature stand in 1972 (middle photo). Taken two years after the 1988 fires, the bottom photo reveals that the large aspen stems were killed by fire. In the background, Douglas-fir and probably big sagebrush increased over the same time period, while aspen declined. The authors conclude that "reduction in fire frequency undoubtedly had a role in vegetative change."



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