

INTRODUCTION

Stephen F. Arno

This publication displays and interprets changes in a managed ponderosa pine forest in western Montana based on a series of repeat photographs taken between 1909 and 1997 at 13 camera points. We also present information on:

- Pre-1900 conditions and ecological relationships in this forest.
- Historical harvesting treatments (beginning in 1906) and ensuing stand development.
- Changes associated with fire suppression and related forest succession.
- The initial effects of ecosystem-based management treatments carried out as a research and demonstration study in the early 1990's. Ecosystem-based management treatments are designed to benefit the ecosystem as a whole, rather than focusing on a few components such as timber production or big game habitat.

Our presentation is relatively nontechnical; for example, in the text we use only common names of animals and plants and direct the reader to appendix B for a list of scientific names. We intended this publication for a broad audience of people interested in forest conservation and management. The information should give readers insight to some of the outcomes associated with alternative management and protection strategies. Such knowledge is critical in view of major decisions currently being weighed by professionals, the public, and politicians regarding future management direction for most National Forest lands (for example, Haynes and others 1996).

Evaluations of ecosystem-based management treatments, although not comprehensive, do include responses of trees, undergrowth, fuels, soil nutrients, wildlife cover and forage habitat, and esthetic values. We also assess the effectiveness of the treatments as a first step in the process of restoring the ecological role of fire in perpetuating forests containing old growth ponderosa pine.

Our report is an update and expansion of Gruell and others (1982), which presented the 1909 to 1979 photo sequence. We describe historical changes in forest structure and some effects of ecosystem-based management treatments, but we do not include the

descriptions of general wildlife relationships and livestock use (now relatively minor) provided in Gruell and others (1982). We have added photographs taken in 1989 and 1997 as well as one previously unpublished photo series and a newly discovered series from 1909 to 1937. The 1909 photographs were taken during the Lick Creek Timber Sale on the Bitterroot National Forest—a silvicultural partial cutting that constituted the first large ponderosa pine timber sale in what is now the Northern Region of the USDA Forest Service. In the 1920's the photopoints were relocated, permanently marked, and rephotographed. Thereafter, the photographs were retaken every decade. These photo series allow readers to witness changes in the forest. Accompanying captions provide interpretations of factors linked to visible changes—for example, harvest and thinning activities, tree mortality from bark beetle attacks, and advancing forest succession in the absence of fire.

Gruell and others (1982) was greeted with considerable interest by forest managers, biologists, and the general public because it illustrated the dynamic change that the forest underwent over time. The press run of 3,000 copies was exhausted in less than a year. The authors presented detailed evidence that prior to 1900, frequent low-intensity fires had maintained open stands of large ponderosa pines, still visible in the 1909 photos. The 1909 to 1979 sequences of photographs from each camera point showed that despite carefully guided partial cutting, cessation of fires often allowed development of a dense understory of small trees. Gruell and others (1982) concluded that the 1909 to 1979 successional trend was creating structural conditions that would increase susceptibility to severe wildfires, shifting composition toward the more shade-tolerant Douglas-fir and contributing to a loss of wildlife forage. To reverse these trends, the authors recommended reintroduction of low-intensity fires through the use of prescribed burning in conjunction with partial cutting and thinning.

To test the above recommendations, in 1989 the Bitterroot National Forest requested that the Inter-mountain Research Station (now Rocky Mountain Research Station) conduct research and demonstration studies at Lick Creek. In 1991, a series of replicated

treatment studies was begun with a suite of silvicultural cutting and underburning. The goal was to maintain healthy pine-dominated forests containing large trees, desirable wildlife habitat, and low risk to severe damage by wildfire or epidemics of insects or disease. Cutting treatments were commercial thinning in a young stand, retention shelterwood in a 80-year-old stand, and single-tree selection in a stand containing some old-growth trees. Fire treatments (and no-burn controls) combined with the cuttings were conducted in both spring and fall and under contrasting levels of duff moisture.

We now report the initial effects of the experimental treatments, and also illustrate the appearance of the treatments at the historical photopoints. The 1989 retakes represent a pretreatment condition, and the 1997 retakes are 4 years after experimental treatments were conducted at some of these sites (see poster in pouch on back cover). We have also included an example photo series that was established in 1991 expressly to illustrate the treatments and year-by-year response. Coincidentally, the kinds of treatments that we report and illustrate are now widely recommended for large areas of ponderosa pine forests throughout western North America. These treatments fit the concept of ecosystem-based management that was embraced by the USDA Forest Service soon after this study began (Overbay 1992). Ecosystem-based management seeks to sustain desired conditions, uses,

and values of wildland forests using management that works within the scope of natural processes that historically shaped these forests (Salwasser and Pfister 1994).

The success of the Lick Creek ecosystem-based management treatments led us to propose a much broader research and demonstration effort—the Bitterroot Ecosystem Management Research Project (BEMRP)—which was funded in 1994 by the Washington Office of the USDA Forest Service. BEMRP has been a 5-year project to help develop ecosystem-based management at the landscape level. Many researchers from the Rocky Mountain Research Station and The University of Montana have worked with National Forest personnel and communicated with interested publics. This publication has been produced just in time for the conference (May 1999) that culminates BEMRP, although as a result of its success another 5-year BEMRP with an updated mission has now been established.

In a broader sense, however, we are clearly just beginning the process of instituting ecosystem-based management on the Bitterroot National Forest and elsewhere in the ponderosa pine zone of the Inland West. The photo series and historical inventories and documentation at Lick Creek will be consulted as a basis for continual refinement of management that fits in with natural ecological processes. This publication is intended to serve as a reference for that long-term effort.