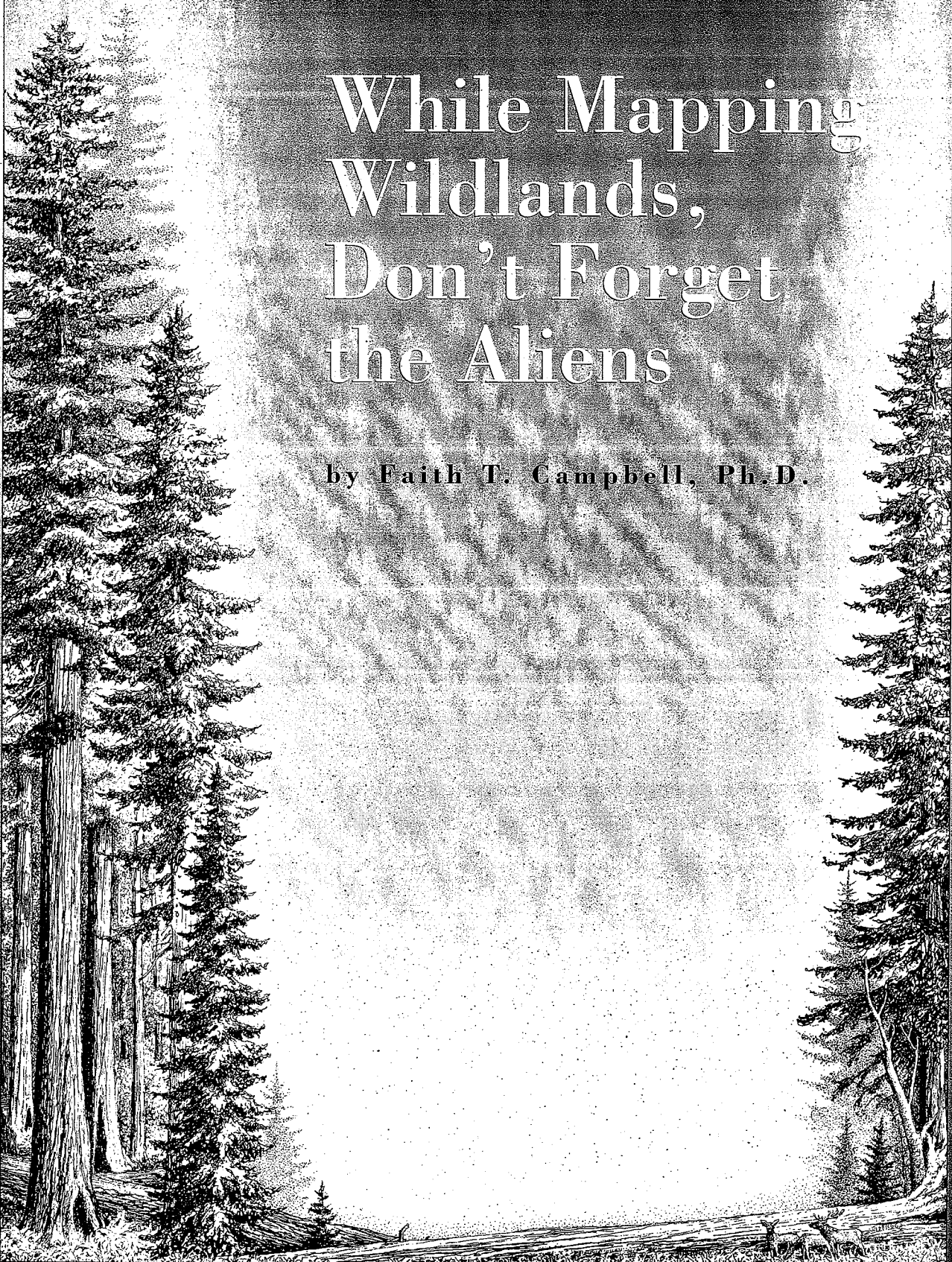


While Mapping Wildlands, Don't Forget the Aliens

by Faith T. Campbell, Ph.D.



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Through the quarterly journal *Wild Earth*, other publications, and advocacy, **Wild Earth** works to foster a culture of conservation, helping to communicate and shape the latest thinking in conservation science, philosophy, politics, and activism.

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- We expose threats to habitat and wildlife, and regularly explore the links between human population growth and biodiversity loss.
- We defend wilderness both as *idea* and as *place*.

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This document is the second in a series of occasional *Wild Earth* special papers:

Special Paper #1

How to Design an Ecological Reserve System
by Stephen C. Trombulak

Special Paper #3

A Citizen's Guide to Ecosystem Management
by Reed F. Noss

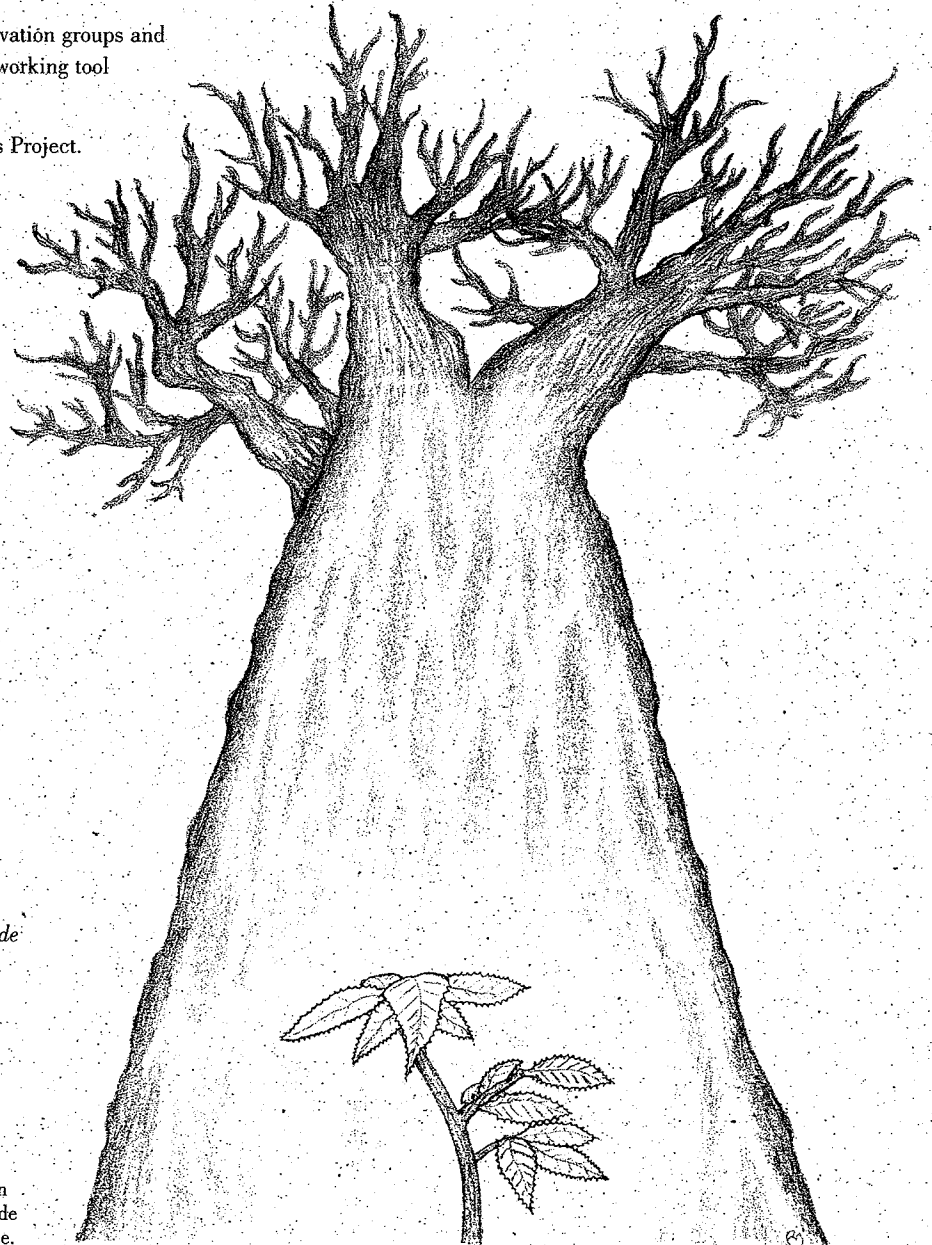
Special Paper #4

Biocentric Ecological Sustainability: A Citizen's Guide
by Reed F. Noss

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FOR THOSE OF US PARTICIPATING IN REGIONAL efforts to map large ecological reserves and connecting corridors, we must factor in the current and possible future impacts of invasive exotic (alien) species. Two general types of exotics threaten the biological integrity of terrestrial ecosystems across the entire continent: exotic pests of native tree species, and exotic plants. Alien vertebrate terrestrial animals, a third general type of exotic pests, threaten many ecosystems as well. Pigs in particular are devastating small unique ecosystems in Hawaii and some other insular ecosystems. Cattle have caused widespread and severe damage, especially in the West. Aquatic systems have suffered severe and widespread damage by introduced fish, frogs, mussels, crawfish, and other organisms. The ecosystems in the Great Lakes, for example, have been almost completely restructured by waves of introductions, beginning with the deliberate introduction of the common carp in the 1880s. The zebra mussel, introduced accidentally in the early 1990s, is predicted to cause major changes throughout the vast Mississippi and Great Lakes watersheds. This paper will focus on alien pathogens and plants.

The impacts of these biological pollutants come on top of other threats to ecosystems and species. Biological pollution (invasion of alien species) tends to grow worse over time, spreading from an ever growing base. To make an analogy to economics, it is the same as the way your credit card debt can quickly overwhelm you if you pay off only the minimum balance while continuing to charge more expenditures to the card. On top of the continuing interest charges on the expanding unpaid balance (expanding populations of invasive species that are already here), any new purchases (new introductions) add insult. The result can quickly become an unsustainable debt load.

Tree Pests

As pointed out in an earlier article for *Wild Earth* ("Exotic Pests of American Forests," by Faith T. Campbell, Winter 1993/94), insects, fungi, and diseases brought to the US have already severely altered the hardwood forests of the eastern part of the continent, and millions of acres of coniferous species in the West have been damaged.

In danger of extinction are two tree species, the widespread butternut (*Juglans cinera*) and the narrowly endemic Fraser fir (*Abies fraseri*), as well as a narrowly endemic subspecies, northern bracted balsam fir (*Abies balsamea* var. *phanerolepis*). The American chestnut (*Castanea dentata*) persists primarily as root sprouts; how much longer roots left behind 40 or more years ago will continue to resprout is uncertain, and chestnut sprouts don't reach a sufficient size for effective reproduction. Severely reduced in major portions of their ranges are Canadian or eastern hemlock (*Tsuga canadensis*), flowering dogwood (*Cornus florida*), and, in Oregon and California, Port-Orford-cedar (*Chamaecyparis lawso-*

niana). The American elm (*Ulmus americana*) is greatly reduced in number, although isolated trees still reach reasonable size. Severely reduced in a smaller portion of its range is the whitebark pine (*Pinus albicaulis*) of the western mountains.

Butternut and Fraser fir were considered to be "C2" candidates for listing under the Endangered Species Act. Such species were those for which the information available to the US Fish and Wildlife Service (FWS) indicated the species might need protection, but the data were not sufficient to warrant action. In summer 1995, Interior Secretary Bruce Babbitt abolished that category. According to a FWS news release of 27 January 1996:

The Fish and Wildlife Service remains concerned about many of the species formerly on the "Category 2 Candidates" list, and will continue working with states and others to gather information about these and other species that may be at risk.

However, I have been unable to find information about specific tracking mechanisms.

FWS officials ask how listing these species would contribute to efforts to save them—a question rarely asked when the species under consideration is an animal. I believe that listing would provide at least one benefit: heightened awareness of the species' dire predicament and, probably, funding for research. Scientists in the Forest Service and Biological Resources Division of the US Geological Survey (formerly National Biological Service) who are seeking solutions continue to be hampered by low funding levels.

Butternut, also called white walnut, formerly grew virtually throughout the eastern deciduous forests from Maine to Minnesota to as far south as northern Alabama. The densest populations were in Wisconsin and Minnesota. The nuts are a component of many wildlife species' diets.

Since the late 1960s, **butternut canker**, caused by the probably exotic fungus *Sirococcus clavigignenti-juglandacearum*, has infested populations throughout much of the tree's range. In 1991, the United States Department of Agriculture Forest Service (FS) reported new infestations in Vermont: "[Butternut canker] disease has eliminated most of the Butternut in the Southern region" (Forest Insect and Disease Conditions in the United States survey, USDA Forest Service 1992). Unlike chestnut, butternut will not sprout from the root crown when the top is killed by cankers. The disease kills seedlings and young sprouts as well as mature trees (Prey and Kuntz 1982). Therefore, when butternut canker destroys a population, that particular gene pool is lost forever.

No known cures exist for the disease. Research to develop a disease-resistant tree began in 1989, years after the first infestation was documented. A few possibly resistant trees have been found in various locations and are presently being evaluated (Anderson, personal communication). Graft material from 148

