

Fire and Nonnative Invasive Plants

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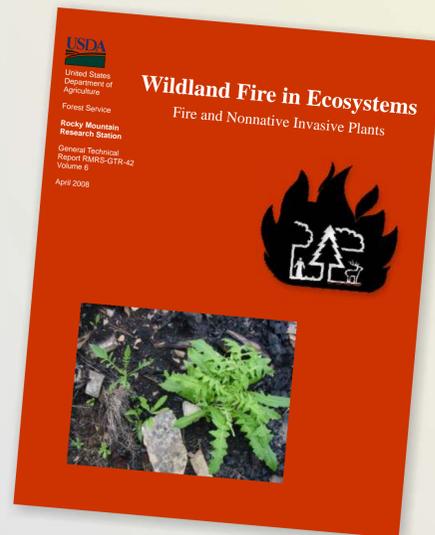
Wildland Fire in Ecosystems

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PART I FUNDAMENTAL CONCEPTS

- Chapter 1 Introduction
- Chapter 2 Fire Effects on Nonnative Invasives and Wildland Invasibility
- Chapter 3 Plant Invasions and Fire Regimes
- Chapter 4 Use of Fire to Manage Nonnative Invasives

PART II BIOREGIONAL ANALYSES

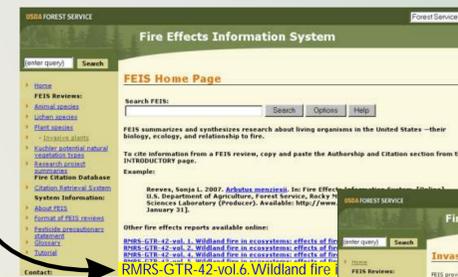


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Fire Effects Information System

www.fs.fed.us/database/feis

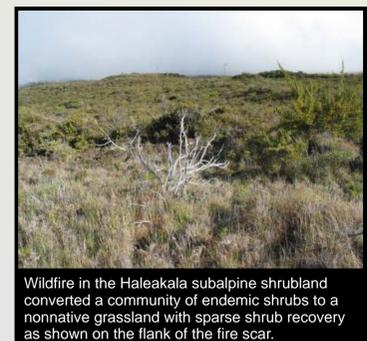
FEIS is a database with information on more than 1,100 North American plant and animal species, including over 100 invasives. Each species is described by a literature review summarizing fire effects and related biological, ecological, and management information. New species are added continually.



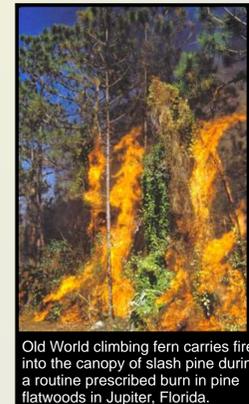
Dense prickly lettuce establishment after stand-replacing fire in ponderosa pine forest in western Montana. Red-stemmed plants are native fireweed.



Buffelgrass invading a desert plant community dominated by saguaro near Tucson, Arizona.



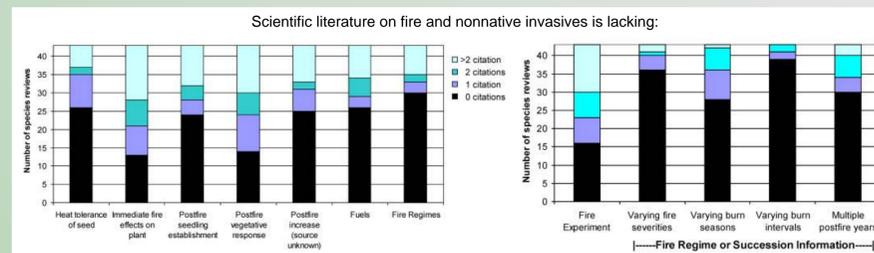
Wildfire in the Haleakala subalpine shrubland converted a community of endemic shrubs to a nonnative grassland with sparse shrub recovery as shown on the flank of the fire scar.



Old World climbing fern carries fire into the canopy of slash pine during a routine prescribed burn in pine flatwoods in Jupiter, Florida.

PART III MANAGEMENT AND RESEARCH ISSUES

- Chapter 12 Gaps in Scientific Knowledge
- Chapter 13 Effects of Fuel and Vegetation Management
- Chapter 14 Effects of Fire Suppression and Postfire Management
- Chapter 15 Monitoring



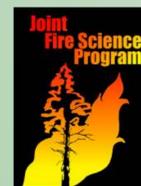
Of 43 invasive species reviews in FEIS, the majority had fewer than 2 citations addressing each of these fire and fuel topics.



Wildland chaparral near Sequoia National Park dominated by native vegetation. Adjacent fire line dominated by nonnatives including soft brome, ripgut brome, and wild oat.



Fall prescribed burn in a mountain grassland in western Montana following herbicide treatment to reduce spotted knapweed.



Partners and sponsors:

- USDA Forest Service Fire and Aviation Management
- Joint Fire Science Program
- Rocky Mountain Research Station

- Montana State University
- Oregon State University
- Pacific Islands Forestry Institute

- University of Arizona
- University of Florida
- University of Montana

- USGS National Wetlands Research Center
- USGS Western Ecological Research Center
- USDI Bureau of Land Management, National Park Service, and Fish and Wildlife Service

BOTANICAL AND ECOLOGICAL CHARACTERISTICS

SPECIES: *Cytisus scoparius*, *C. striatus*

- GENERAL BOTANICAL CHARACTERISTICS
- RAVINE LIFE FORM
- REGENERATION PROCESSES
- SITE CHARACTERISTICS
- SUCCESSIONAL STATUS
- SEASONAL DEVELOPMENT

GENERAL BOTANICAL CHARACTERISTICS: Scotch broom and Portuguese broom are 2 of 4 nonnative invasive broom species that occur in North America. All are perennial, leguminous shrubs. [11] provides a table of characteristics to distinguish among broom species and common grass. All species occur in similar habitats and Scotch, Portuguese, and French brooms have similar morphological characteristics. Common broom also occurs in similar habitats but is morphologically distinct from the brooms. Portuguese broom is often misidentified as Scotch broom, however, Portuguese broom is neither as widely distributed nor as common as Scotch broom (see Distribution and Occurrence). Less is known about the biology and ecology of Portuguese broom, but it is thought to have ecological characteristics similar to Scotch broom [11].

Available information on invasives: Information about interactions between fire and invasive species is often sparse. FEIS reviews summarize all available information on:

- ~ Role of fire in enabling plant invasions
- ~ Fire regime changes following plant invasions
- ~ Use of fire to control invasives

Example from review of broom species:

FIRE EFFECTS

SPECIES: *Cytisus scoparius*, *C. striatus*

- IMMEDIATE FIRE EFFECT ON PLANT
- DISCUSSION AND QUALIFICATION OF FIRE EFFECT
- PLANT RESPONSE TO FIRE
- DISCUSSION AND QUALIFICATION OF PLANT RESPONSE
- FIRE MANAGEMENT CONSIDERATIONS

FEIS reviews of native plants often include information about fire regime changes resulting from plant invasions.

Example from review of Joshua tree:

FIRE ECOLOGY

SPECIES: *Yucca brevifolia*

- FIRE ECOLOGY OR ADAPTATIONS
- POSTFIRE REGENERATION STRATEGY

FIRE ECOLOGY OR ADAPTATIONS: Fire adaptations: Apical meristems growing high above the ground and fire-resistant bark on mature trees may allow Joshua tree to survive fire in some vegetation types [114]. Vogt [99] reports that Joshua tree is more fire resistant once the dead leaves that fire spread into the crown are shed from its trunk. If top-killed or damaged by fire, Joshua tree can sprout from the root crown, rhizomes, and/or branches [114,62,88,39,99]. Vigorous postfire sprouting is described by Maxwell [62].

Fire regime: Postsettlement fire history in the Mojave Desert is largely unknown [8]. Many researchers have speculated frequency or occurrence of fire in desert ecosystems based on vegetation patterns and fuel structure. In creosotebush-white cholla, the open stand structure does not carry fire well except when high annual herbaceous production follows warm winter rainfall. The ordinarily low fuel and grass cover in blackbrush communities suggests that high temperatures and wind low relative humidity are necessary for burning [89].

Changes in fire frequency and size with nonnatives: It is well documented that increases in herbaceous nonnative shrubs (brown cholla) and trees (G. monosperma) have facilitated increased fire incidence and fire size. Mojave and Great Basin deserts since the mid 20th century. At the Nevada Test Site, researchers have been surveying plant fuel biomass and observing how increased density and frequency since 1957. The density of cholla and red brome complex by 1988 [115]. Following the very wet winter of 2004 to 2005 in Nevada's Delmore Valley, Joshua tree on subsoil grew in dense cholla up to 20 inches (60 cm) tall. In the Mojave-Great Basin desert transition zone, cholla and red brome promote previously uncommon large fire by filling in the shrub interspace that once extended fire spread in and across.