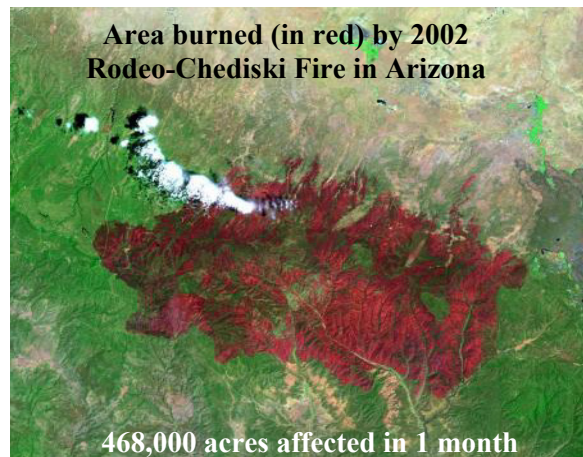


## **SOUTHWEST FOREST ASSESSMENT PROJECT**

Uncharacteristic wildfires have focused public attention on the health of western forests. Fire suppression and prolonged drought have left forests overgrown and vulnerable to insect outbreaks and uncharacteristic stand-replacing fires. Region 3 of the U.S. Forest Service (USFS) is addressing forest health through the revision of its land management plans for all eleven National Forests in Arizona and New Mexico.

The Nature Conservancy has entered into a cost-share agreement with USFS to synthesize the best available science and develop tools to assist USFS in the revision of Forest Plans. The Southwest Forest Assessment Project (SWFAP) is generating up to date, peer-reviewed data and models that will enable the USFS to more effectively evaluate desired conditions and set objectives with a process that is straight forward and transparent.

These scientific tools can be important in the development of forest plans; they enable land managers to evaluate and communicate to the public the tradeoffs of different management scenarios.



USFS Region 3 has set an ambitious schedule for its forest plan revisions and seeks to address the issue of forest health across the entire region. Good science tools will play an important role in helping USFS meet their schedule and to engage the public in a dialogue about the desired future condition of the forests, grasslands, deserts, and streams managed by USFS.

The SWFAP helps land managers and the public look at land health comprehensively, across forests, grasslands, deserts, and rivers. Scientific tools will assist USFS meet new planning standards for ecosystem diversity and ecological sustainability.



### **Background**

USFS Region 3 is comprised of 11 National Forests in Arizona and New Mexico, and several National Grasslands in Oklahoma and Texas. The agency manages more than 22 million acres of forest, grassland, desert, and contains numerous important headwater stream systems.

## SOUTHWEST FOREST ASSESSMENT PROJECT: SCIENTIFIC TOOLS

---

### Primary Tools Developed Under the Southwest Forest Assessment Project

1. **Photo Archive:** A photographic database compiled from university and institutional archives throughout Arizona and New Mexico depicting change in forest and grassland conditions over the last 130 years.
2. **Historical Range of Variation (HRV):** Syntheses of the scientific literature characterizing variation in the structure, composition, and ecological condition of forests, grasslands, and desert systems, as well as the influence of climatic fluctuations and disturbance regimes such as wildfire and flooding. HRVs enable land managers to understand the drivers of change in our region's major vegetation types.
3. **Models of Vegetation Change:** Data derived from the HRV characterizations described above were integrated into the Vegetation Dynamic Development Tool (ESSA Technologies Ltd.), a simulation modeling platform that enables users to evaluate vegetation dynamics at the landscape level. The models provide a common methodology for defining the roles of various processes (e.g., tree growth) and agents of disturbance on vegetation dynamics. It also enables rapid scenario development and testing of the sensitivity of model results to different assumptions. The tool is well-suited for collaborative learning and fostering communication about desired future conditions.
4. **Regional Assessment Data:** Region-wide assessments of species' distributions, vegetation patterns, grassland condition, aquatic habitat, areas of regional biological significance and other datasets are summarized in Ecosystem Diversity Reports prepared for each Forest in Region 3.
5. **Region 3 Species Database:** This database was developed to provide an up-to-date, searchable information source on the species that occur on Region 3 Forests. The database was adapted from a centralized dataset maintained by Region 3 and was updated with information on species' distribution and conservation status, adding consistency, comprehensiveness, and ease of access to information. The R3 Species Database is comprehensive for aquatic and terrestrial vertebrates. It also includes many plants and invertebrates that may be of special management concern, but the database is not comprehensive for these taxonomic groups.
6. **Fire-Return Interval Dataset:** The Fire Return Interval Dataset synthesizes the fire-history literature and is accompanied by a map of historic fire return intervals associated with the vegetation systems across Arizona and New Mexico. The map underscores the spatial extent of fire-adapted ecosystems in the Southwest.

---

### Photographic Archive Documenting Historical Conditions and Change in Forests and Grasslands

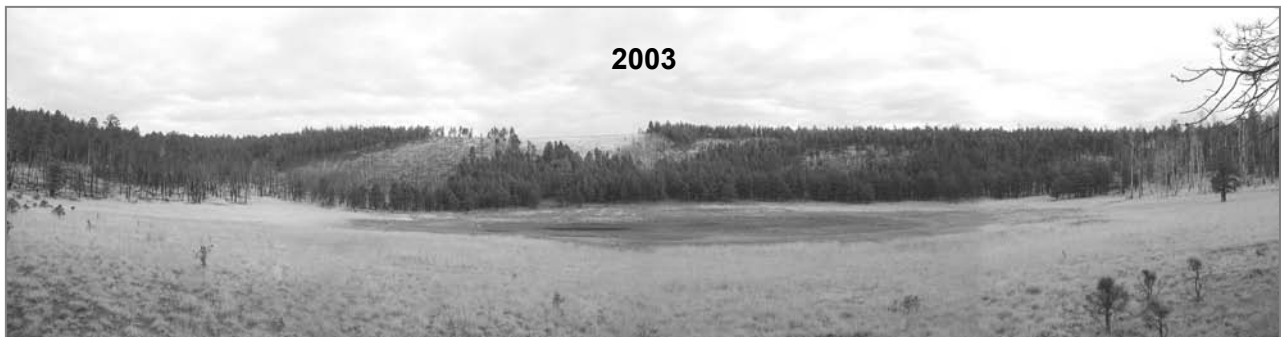
As part of SWFAP we searched the archives of 17 government agencies, universities, museums, and the archives of professionals throughout Arizona and New Mexico to compile a photographic catalog that helps illustrate the variation and extent of change in forests and grasslands of Region 3. The photos to the right illustrate examples from Arizona and New Mexico and in both grasslands and forest systems.

## SOUTHWEST FOREST ASSESSMENT PROJECT: SCIENTIFIC TOOLS

---



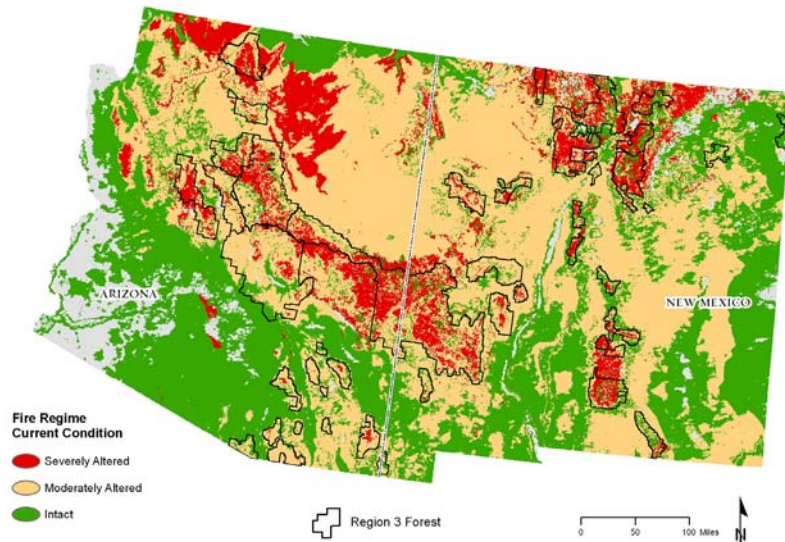
The two panels above are 1899 photographs of grasslands in Lincoln County, NM showing open, low shrub cover valleys with increasing shrubs and one-seed juniper on hillsides and drainages (Photographs courtesy of USGS and Hollis Fuchs).



The two panels above illustrate the extent of change in ponderosa pine forest. This photo comparison is from Walker Lake on the Coconino National Forest north of Flagstaff, Arizona. The top panel is from 1875 where the system is characterized by mid- and mature-aged trees with an open canopy, grass understory, and low risk of uncharacteristic fire. In contrast, the forest in 2003 shows a closed canopy and markedly higher density of trees, yielding heavy fuel loads and a much higher risk of uncharacteristic fire (Photographs courtesy of the Ecological Restoration Institute).

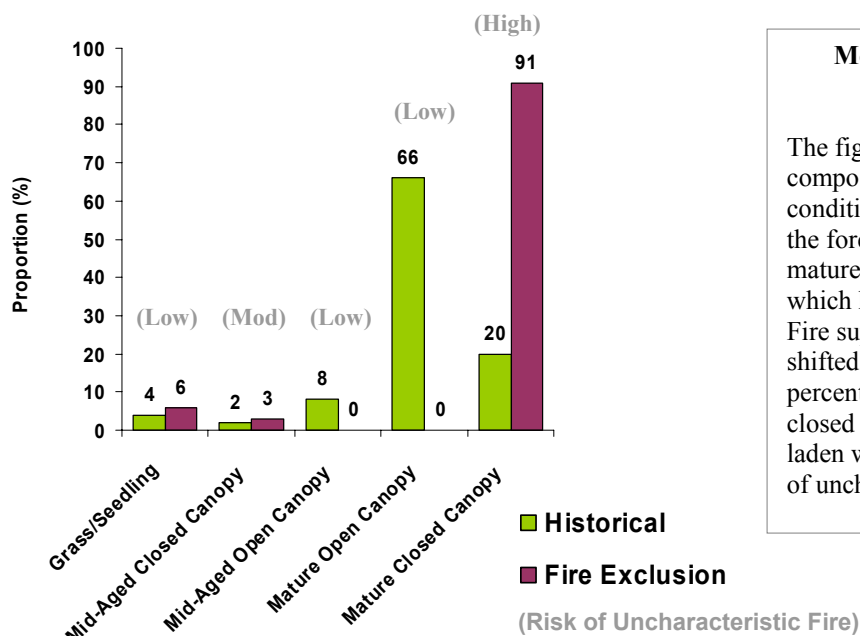


## SOUTHWEST FOREST ASSESSMENT PROJECT: SCIENTIFIC TOOLS



### Current Conditions and Projecting Changes in Forest Structure and Composition Over Time

Fire Regime Condition Class, depicted in the figure above, measures the degree of alteration of forest systems and the risk of uncharacteristic fire. SWFAP has developed tools to assess what it will take to maintain the health of the areas in green where fire regimes are currently intact, and to restore areas in yellow and red where fire regimes are moderately and severely altered, respectively. The series of figures below demonstrate the “*what if*” capability of tools developed to evaluate vegetation change over time, using the model for pine-oak forests as an example.

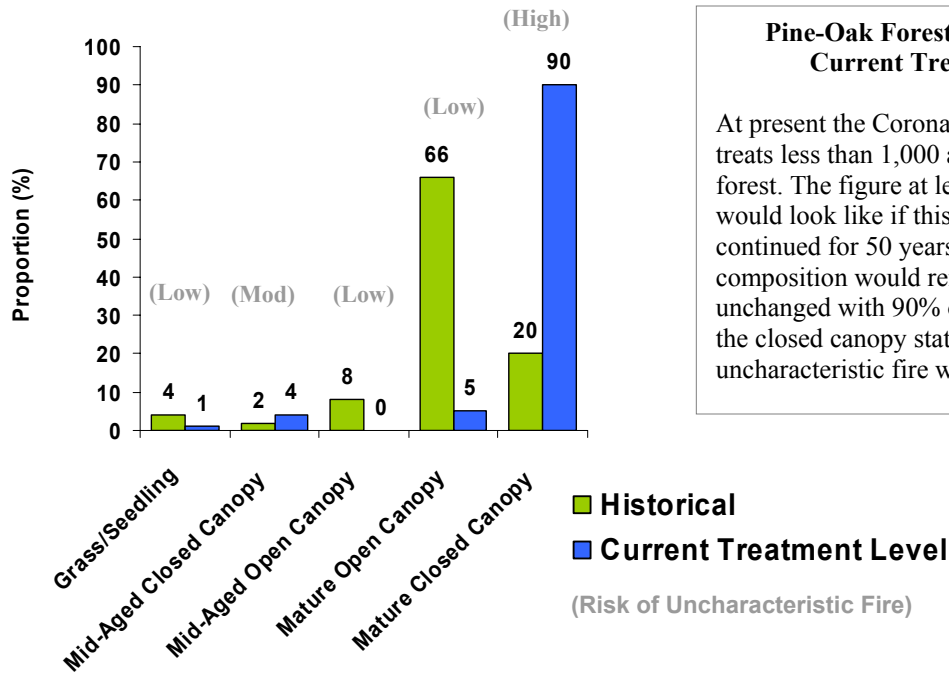


### Model for Pine-Oak Forests on the Coronado National Forest

The figure to the left compares the historical composition of pine-oak forests with current conditions. Before the era of fire suppression the forest was predominantly composed of mature trees with an open canopy (66%), which had a low risk of uncharacteristic fire. Fire suppression over the last 120 years has shifted the forest composition to a higher percentage (90%) of mature trees with a closed canopy, indicative of a dense forest laden with fuels that greatly increase the risk of uncharacteristic fire.

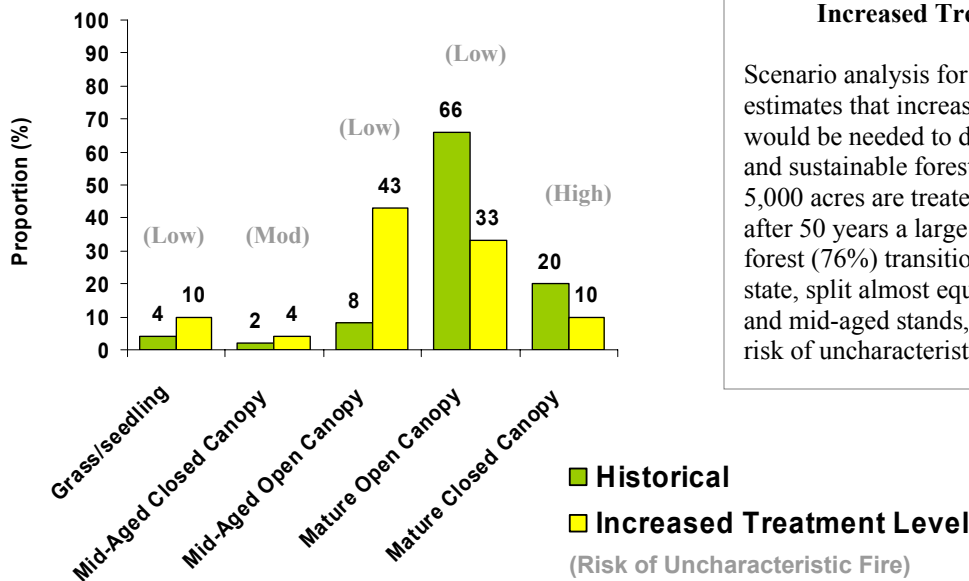
## SOUTHWEST FOREST ASSESSMENT PROJECT: SCIENTIFIC TOOLS

---



**Pine-Oak Forest After 50 Years at Current Treatment Levels**

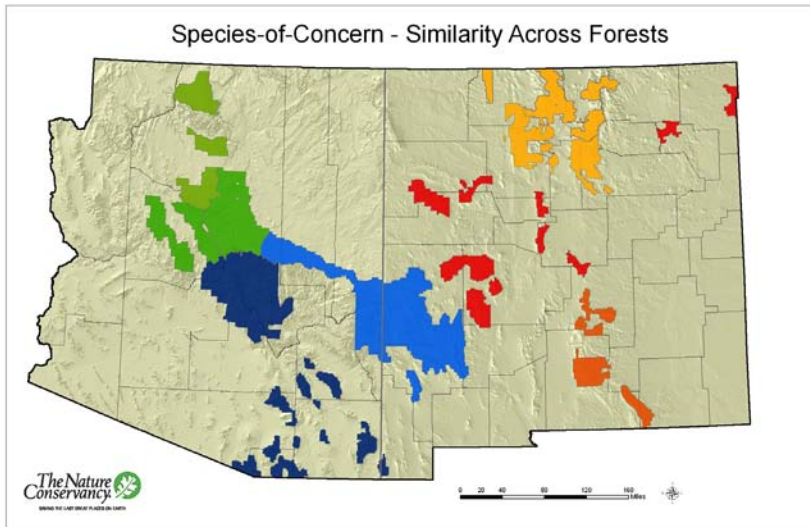
At present the Coronado National Forest treats less than 1,000 acres/year of pine-oak forest. The figure at left projects what forests would look like if this treatment level were continued for 50 years – at this level forest composition would remain essentially unchanged with 90% of the pine-oak forest in the closed canopy state. The risk of uncharacteristic fire would also remain high.



**Pine-Oak Forest After 50 Years of Increased Treatment Levels**

Scenario analysis for the pine-oak forest estimates that increased levels of treatment would be needed to develop a more diverse and sustainable forest. In this example, 5,000 acres are treated annually. Note that after 50 years a large percentage of the forest (76%) transitions to an open canopy state, split almost equally between mature and mid-aged stands, which have a low risk of uncharacteristic fire.

## SOUTHWEST FOREST ASSESSMENT PROJECT: SCIENTIFIC TOOLS

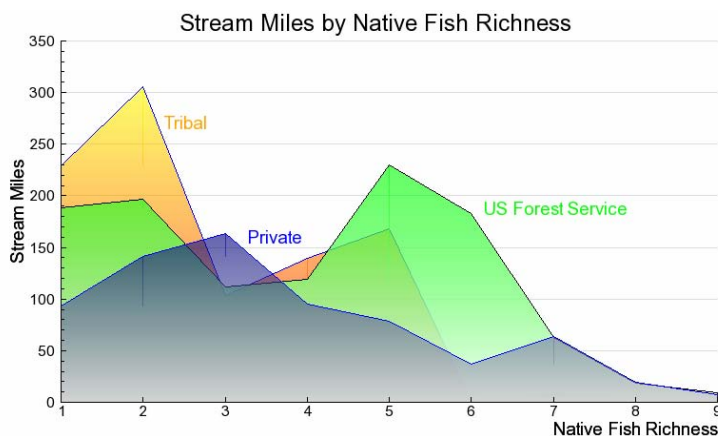


### Maintaining Ecosystem Diversity

The Region 3 Species Database provides updated information on the distribution of vertebrates, invertebrates, and plants in all eleven forests of Region 3. Biological and conservation attributes were added to enable Forest staff to identify and analyze “species of concern” and “species of interest,” a requirement under the new Forest Planning Rules.

The Region 3 Species Database was used to generate the analysis above depicting forests that share a number of the same species of concern (forests grouped by color). These data illustrate how forests could pool resources to develop forest plan analyses that would be applicable to multiple forests. The data also suggest that Forests could better characterize regional trends by developing monitoring programs across multiple forests for similar species. Monitoring data gathered at this scale would help USFS demonstrate the effects of its activities and progress toward strategic goals at a regional scale.

## Regional Assessment Data – Native Fish and Major Land Managers



A new data set developed through the SWFAP focuses on stream systems and provides a regional look at the importance of USFS lands. In the graphic to the right, total habitat for native fish and species richness are summarized for three major land managers in Arizona. The data demonstrate that USFS manages the greatest amount of habitat for the most species rich streams in the state. A companion dataset for New Mexico is under development.