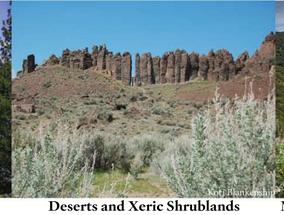
# Conservation Risk for the Lower 48 United States

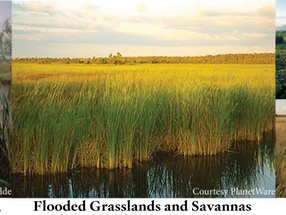

Harvey Payne


Les Miller


Kori Blankenship


Douglas Steakley


Harold E. Malde


Courtesy Planet Ware


Harold E. Malde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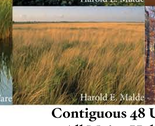
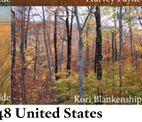

Harold E. Malde


Kori Blankenship

**Temperate Grasslands, Savannas and Shrublands**

44% Converted
26% Highly Altered
1% Protected

**Temperate Broadleaf and Mixed Forest**

40% Converted
56% Highly Altered
3% Protected

**Temperate Conifer Forests**

12% Converted
27% Highly Altered
11% Protected

**Deserts and Xeric Shrublands**

8% Converted
27% Highly Altered
13% Protected

**Mediterranean Forests, Woodlands and Scrub**

31% Converted
31% Highly Altered
9% Protected



**Tropical and Subtropical Grasslands, Savannas and Shrublands**

50% Converted
35% Highly Altered
5% Protected



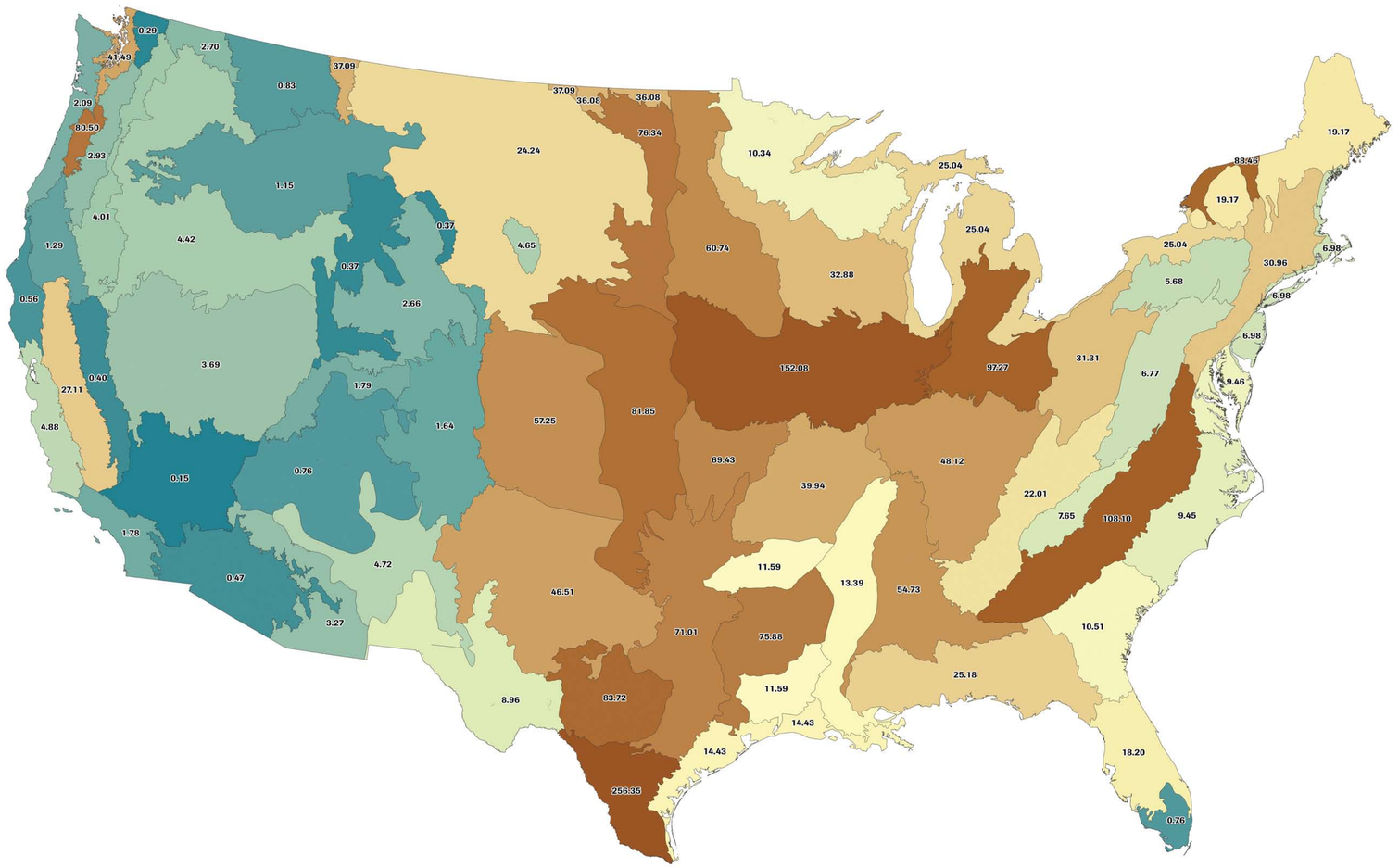
**Flooded Grasslands and Savannas**

28% Converted
16% Highly Altered
52% Protected



**Contiguous 48 United States All Major Habitat Types**

29% Converted
23% Highly Altered
7% Protected

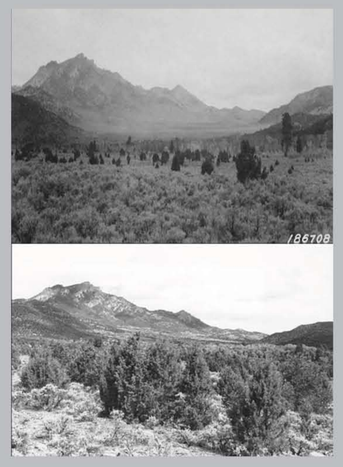



## Introduction

It is neither practical nor feasible to fully protect or restore all habitats, so conservationists must make tough choices about where to invest limited resources. Several methods of prioritizing conservation investment have been devised but previous analyses have rarely included a measure of vegetation condition or of management effectiveness and therefore missed a critical component of evaluating conservation risk. In this poster, we present an assessment of conservation risk for ecoregions and major habitat types in the lower 48 United States using a metric we call the Ecological Conservation Risk Index. Although our assessment covers only terrestrial areas in the conterminous U.S., it advances upon other assessments of ecosystem risk by incorporating a measure of vegetation condition that covers all vegetated lands in the study area.

## Vegetation condition

The condition of vegetation is an important factor when prioritizing conservation risk, and has been a gap in most previous studies. Vegetation condition is often linked to biodiversity status and ecosystem services. In our analysis we use the LANDFIRE National Fire Regime Condition Class (FRCC) spatial data to measure vegetation condition for the entir study area. This data depicts the departure of current vegetation conditions from reference condition (defined as pre-Euro-American settlement) terms of vegetation structure (measured by vegetation height and cover) and composition for naturally vegetated lands. Non-vegetated lands are classified as agriculture, urban, snow/ice, barren, sparsely vegetated and water.




Vegetation conditions as measured using the LANDFIRE data show the departure of current conditions from reference conditions. Above: A juniper woodland in 1924 with a productive understory and widely spaced trees. Below: The same woodland in 1999 showing a decline in the understory and an increase in tree density.

## Ecological Conservation Risk Index

In this assessment we use the Ecological Conservation Risk Index (ECRI) to evaluate the relative conservation risk of ecoregions and major habitat types. ECRI is based on the Conservation Risk Index (CRI: Hoekstra *et al*, 2005) which provides a ratio of land conversion to protection. ECRI builds on the CRI by including a measure of vegetation condition. It is calculated as follows:

**ECRI = (% Converted + % Highly Altered) / % Protected**

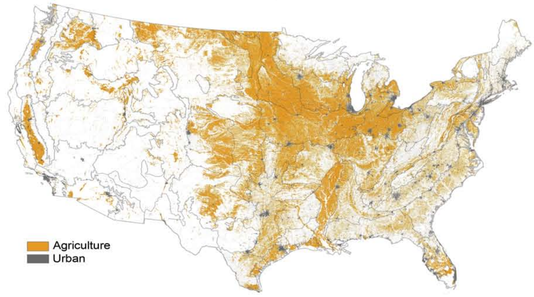
The metric provides a ratio of percent area converted to percent area protected for a given ecoregion. As such it provides an indication of conservation risk by comparing habitat loss to conservation enabling factors (i.e. protected area and vegetation condition). Higher index values indicate high levels of habitat alteration relative to the level of protection, suggesting greater conservation risk.

## Relevant Literature


Swaty R., K. Blankenship, S. Hagen, J. Fargione, J. Smith, et al. 2011 Accounting for Ecosystem Alteration Doubles Estimates of Conservation Risk in the Conterminous United States. PLoS ONE 6(8): e23002. doi:10.1371/journal.pone.0023002

Hoekstra, J.M., T.M. Boucher, T.H. Ricketts and C. Roberts. 2005. Confronting a biome crisis: global disparities of habitat loss and protection. Ecology Letters 8:23 -29.

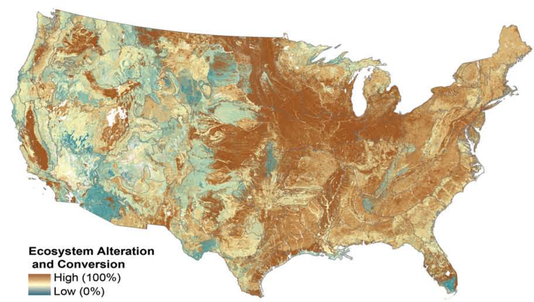
Rollins, M.G., B.C. Ward, G. Dillon, S. Pratt and A. Wolf. Developing the LANDFIRE Fire Regime Data Products. [online] URL: http://www.landfire.gov


### Conversion

Twenty-nine percent of terrestrial land in the lower 48 states has been converted to agriculture or urban land uses. Conversion is highest in the central and eastern ecoregions. Eighteen ecoregions are less than 5% converted while 12 are greater than 50% converted.

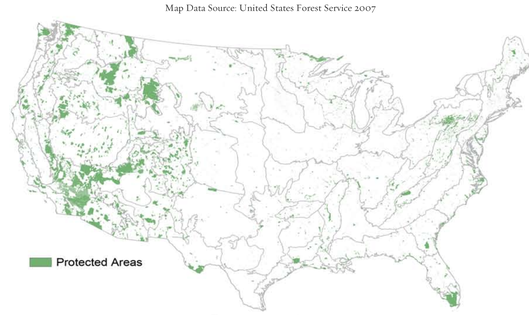
Map Data Source: United States Forest Service, 2007. LANDFIRE FRCC.




### Ecosystem Alteration

The ecosystem alteration map shows the level of similarity between the current vegetation conditions and pre-settlement vegetation conditions. Areas in low alteration are considered to have vegetation conditions today that are similar to historic conditions, but vegetation in areas that are in high alteration is very different from historic conditions. The difference may be caused by one or more factors, including the presence of non-native species, altered disturbance regimes, land management practices or changes in hydrology. In general, vegetation conditions are better in the western ecoregions than in the central and eastern ecoregions. Twenty-five of 29 ecoregions in the lower 48 states have less than 5% of their land in a low alteration condition.

Map Data Source: United States Forest Service 2007




### Protected Areas

Protected areas are designated places such as wilderness areas, national parks, national monuments, nature preserves and wildlife refuges that receive protection based on their environmental, cultural, or other values. The United States has one of the largest protected areas networks in the world and it serves as a foundation for conservation efforts in this country. The level of protection varies considerably by ecoregion from less than 1% to over 50%, but in general, protected lands are concentrated in western ecoregions. Thirty-six, or more than half, of the ecoregions in the lower 48 states are less than 5% protected.

Map Data Source: World Database on Protected Areas Annual Release 2009 (web download version) February 2009. Map includes terrestrial areas designated for biodiversity protection (IUCN categories I - IVo and those designated for multiple management objectives (IUCN categories V - VI).

## Take-Home Messages

--ECRI is an "index." Indices are often used in the decision-making or prioritization processes. No index is perfect, and no single index can contain all the information needed to make good decisions or establish priorities. Indices can help simplify complex situations and provide a way to compare across time and space.

--ECRI provides a relative measure of the "risk" of the loss of ecosystem function at the ecoregion and major habitat levels.

--ECRI identifies areas where the level of habitat conversion and degradation may outweigh conversion enabling factors, putting ecosystems and the services they provide at risk.

--ECRI cannot substitute for local and ecoregional assessments which can account for factors such as biological uniqueness, threatened and endangered species and fragmentation that may guide on the ground action.

--ECRI is one tool in the conservation planner's toolbox – one that is mathematically simple, yet potentially informative. Data on protected areas and converted areas are readily available, and "condition" could be included using metrics other than FRCC that is used in this example.

--Greater resources should be directed to U.S. ecoregions that are at greatest conservation risk as a result of high levels of conversion and alteration and low levels of protection in remaining areas.

The Nature Conservancy
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This work was developed and funded by The Nature Conservancy's North America Conservation Region LANDFIRE Team. Principal contact is Jim Smith, Project Director. jim_smith@tnc.org