

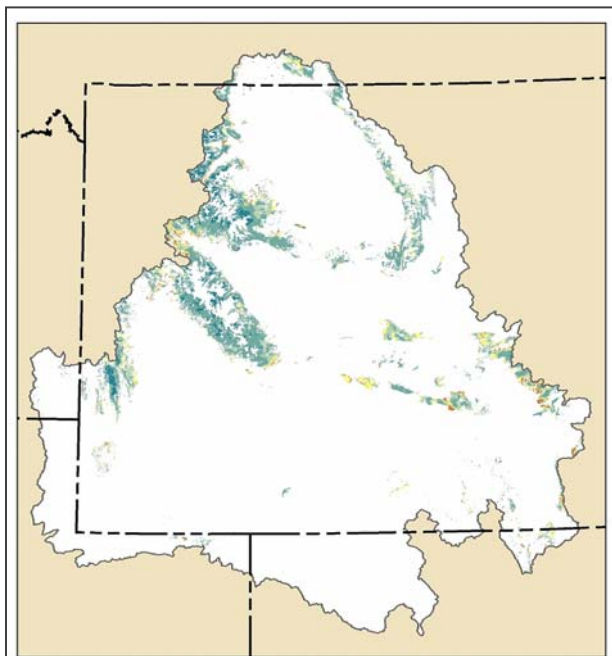
Five-Needle Pine Forests and Woodlands

Management Questions

- Where are the baseline five-needle pine species (whitebark and limber pine), and what is the total area of each?
- Where does development pose the greatest threat to baseline five-needle pine forests and woodlands, and where are the relatively undeveloped stands? (Left map below)
- How has development fragmented baseline five-needle pine forests and woodlands, and where are the large, relatively undeveloped patches?
- Where are baseline five-needle pine stands with high structural connectivity and stands that function as stepping stones?
- Where are potential barriers and corridors that may affect animal movements among baseline five-needle-pine patches?



Photo credit: Natasha B. Carr, U.S. Geological Survey



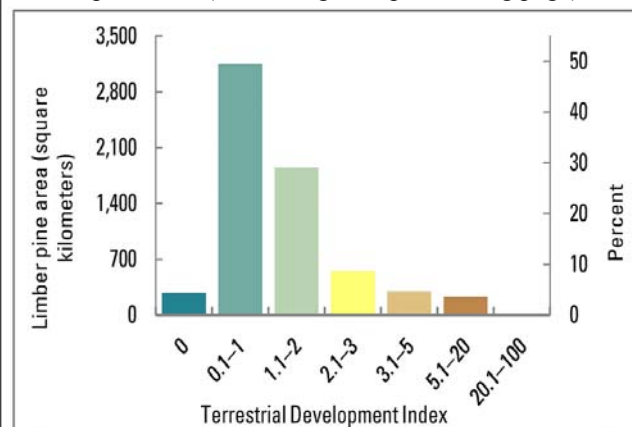
EXPLANATION

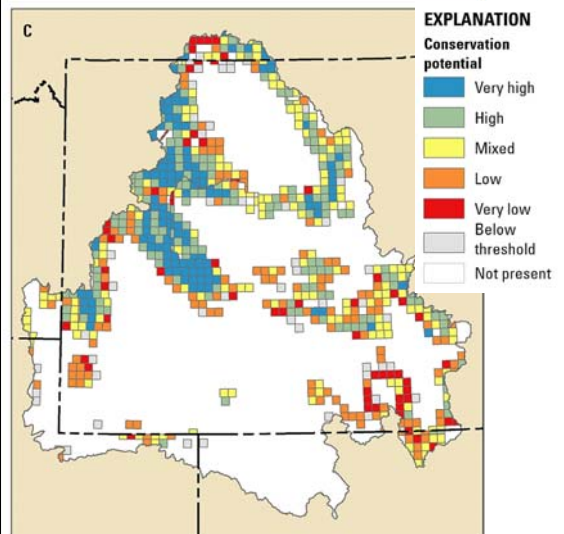
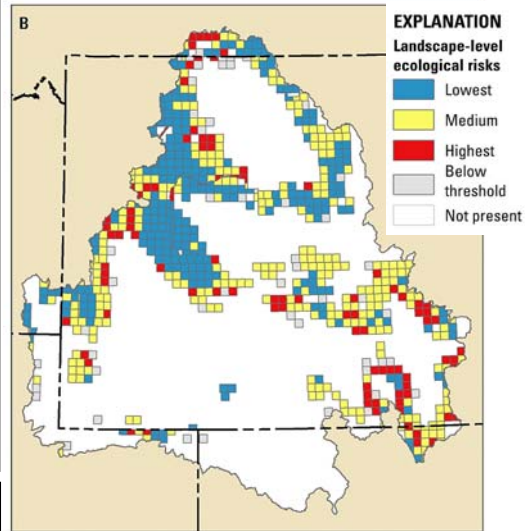
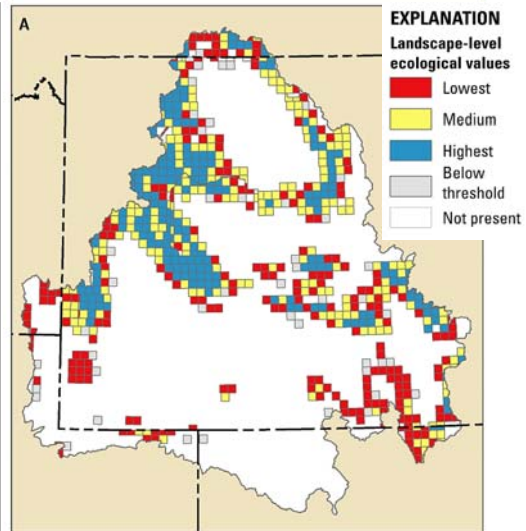
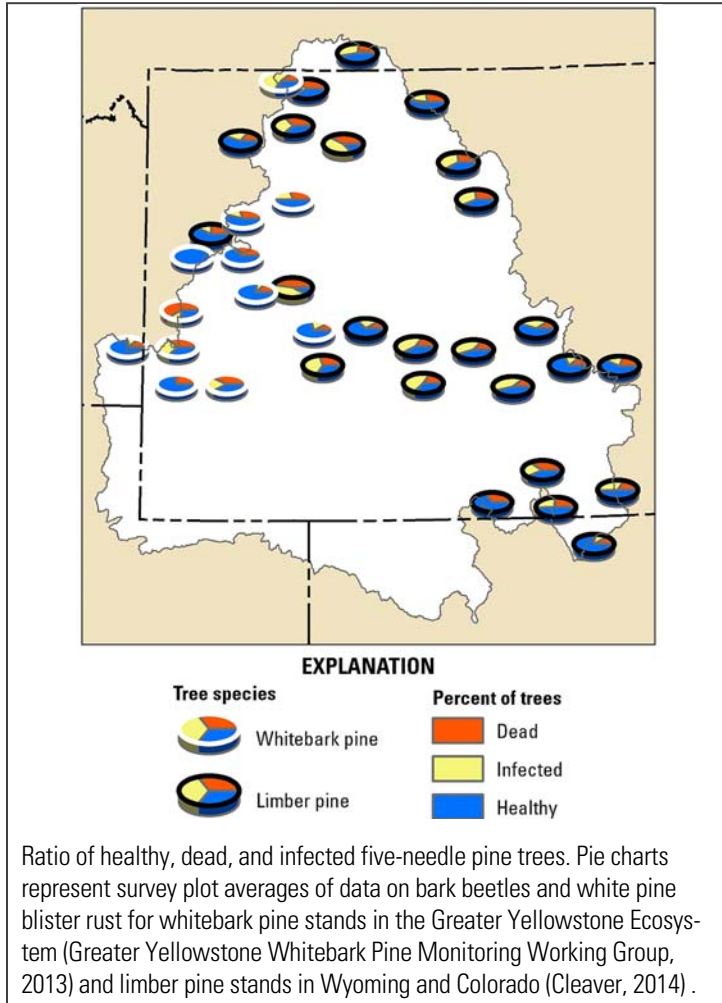
Terrestrial Development Index (percent)

0	2.1-3	5.1-20
0.1-1	3.1-5	20.1-100
1.1-2		

Terrestrial Development Index scores for baseline five-needle pine forests and woodlands in the Wyoming Basin Rapid Ecoregional Assessment project area.

- Where have recent fires and bark beetle outbreaks occurred in baseline five-needle pine stands, and what is the total area affected?
- What limber pine stands in Wyoming and Colorado are at risk for white pine blister rust? (Top left map following page)
- What is the distribution of white pine blister rust infection in five-needle pine stands, and what is the combined mortality from bark beetle infestation? (Top left map following page)
- What is the potential distribution of five-needle pines in 2030?
- How does development risk vary by land ownership for baseline five-needle pine forests and woodlands?
- Where are the townships with the greatest landscape-level ecological values? (Top right map following page)
- Where are the townships with the greatest landscape-level risks? (Center right map following page)
- Where are the townships with the greatest conservation potential? (Bottom right map following page)





(A) Landscape-level ecological values, (B) ecological risks, and (C) conservation potential of five-needle pine forests and woodlands summarized by township.

Summary

Almost 70 percent of five-needle pine falls within federal jurisdiction; U.S. Department of Agriculture Forest Service lands have the greatest proportion of whitebark pine; Bureau of Land Management lands, the greatest proportion of limber pine. Development poses a limited and localized threat to five-needle pines, which are more common at higher elevations and along steeper rocky slopes where development levels are lowest. High Terrestrial Development Index scores occur in limber pine stands at lower elevations, whereas roads at higher elevations fragment some of the largest whitebark pine stands.

The widespread, virulent nature of white pine blister rust is of concern for the long-term viability of five-needle pines forests. The extent of the recent bark beetle outbreak compounds the risks posed by blister rust. The long time required for five-needle pines to reach sexual maturity and the isolated nature of many stands could delay recovery time following widespread mortality. This could negatively affect Clark's nutcracker and pinyon jay populations, which consume and disperse the seeds, and some grizzly bear populations. Projected changes in the bioclimatic envelope for five-needle pine under some climate scenarios indicate the potential for additional declines over the next 75 years.