FOREST BIODIVERSITY

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Summary Points

- Most climate scientists believe that a global temperature increases will continue
- While the Pacific Northwest is likely to receive more precipitation in the winter, warmer and drier summers will stress forest communities and species
- The drier summers are likely to enable more frequent and intense fires and insect outbreaks.
- Managers can prepare for these changes by assessing risks, improving the vigor of existing stands, establishing reserves with climate change in mind, and enhancing connectivity across

Climate Impacts Group
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CLIMATE CHANGE AND THE PACIFIC NORTHWEST

The rich forests that cover the Pacific Northwest seem eternal. Yet, they are the product of a climate shift five thousand years ago that brought cooler and wetter weather to this region. In the warmer, drier period that preceded our epoch, grasslands and shrub-steppe covered many areas that are forested today, and many of the forests of that period had a community structure unlike any currently found in the region.

Most climatologists believe that the current trend of increasing temperature will significantly alter climate in the Northwest. Most climate forecasts predict that our region will warm with winters becoming wetter and summers drier than today. If this occurs, the growing season will become longer, but summer water stress will become more intense.

Our region hosts a wide variety of forest communities from rain forests along the coasts, to high subalpine forests, to dry eastside woodlands. Each forest community will have its own reaction to climate change influenced by its unique location. This variety makes it impossible to provide general guidelines for land managers. Instead, land managers can (1) assess the risks for the forests they manage, (2) take steps to minimize the stress caused by climate changes, and (3) protect forest biodiversity.

IMPACTS TO CONSIDER

Ecologists believe that more intense summer drought generally will have a greater impact than the warmer temperatures. Mature trees in intact stands should be able to withstand the increased stress better than younger trees. Seedlings of some species, however, may have trouble surviving the summers.

Mature stands are most likely to be able to withstand the additional stress brought by climate change.

Communities and species currently found near the limits of their climate range generally will be at greatest risk for disruption.

Species that are already rare or at risk may be least likely to withstand a changing climate and should receive special attention in conservation plans.

Possible Impacts (continued)

The distribution of many tree species is primarily determined by the intensity of summer drought and the length of the growing season. If these constraints change, the location at which species can survive is likely to shift. Some species such as mountain hemlock may replace alpine meadows; grasslands and shrub-steppe may replace dry-site forests such as ponderosa pine.

Paleobotany shows that species react individually to climate change; we cannot expect that communities will simply shift to higher elevations or more northern sites. Instead, future communities may consist of entirely new assemblages of species. The greatest impacts are likely to be in areas where communities are currently near their climatic tolerance.

In addition to the stress experienced by individual trees, warmer summers are likely to bring more frequent and more intense disturbances such as fire and insect outbreaks. As trees are lost to these agents, seedlings of the same species may not be able to replace them at those locations. Invasive species may be able to take advantage of these disturbances and replace native species.

Managing to Preserve Biodiversity

Unfortunately, the type, intensity, and duration of the coming climate change cannot be predicted. A precautionary approach can minimize stress and increase the probability of protecting the biodiversity of forests. Potential actions include:

- Work with climatologists and ecologists to model possible climate and vegetation changes to learn which species, communities, and locations may be at greatest risk.
- Provide reserves for communities and species at different latitudes and elevations so that each reserve may be impacted differently. Attempt to locate reserves in areas that are likely to be most buffered from climate change by mature stands, topography, or other factors.
- Allow species to reach new locations by minimizing fragmentation of existing forests.
- Minimize forest fragmentation and retain older age structures where possible, and maintain high-vigor stands.
- Coordinate planning across a broad region because climate's impact on species and communities and their responses will play out over large areas.

For More Information

For more information on the impacts of climate variability and change on Pacific Northwest forest resources, please contact the Climate Impacts Group.

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