

Factors Affecting the Distribution and Abundance of Bull Trout: An Investigation at Hierarchical Scales

Overview

Bull trout (*Salvelinus confluentus*) has recently been listed as threatened by the U.S. Fish and Wildlife Service. To help this species recover, it is important to first understand what factors affect bull trout distribution and population density. This understanding will form the basis of the Habitat Conservation Plan (HCP) proposed by Plum Creek Timber Company, L.P. The purpose of Technical Report #2 is to determine, based on the kinds of factors that affect bull trout populations, whether management should be region-wide or site-specific.

Key Points

To determine the large-scale habitat factors affecting bull trout populations, we studied the relationship between the occurrence of bull trout and several physical and biotic factors. Bull trout occurred significantly more often at sites with the following characteristics:

- Lowlands and mountain valleys where stream channels are unconfined and have shallow stream gradients
- Undercut banks
- Large gravel substrates
- Large, deep pools without extensive canopy cover
- Wood and boulder cover in the stream
- Trees and shrubs are dominant riparian vegetation

Supporting Technical Information

We surveyed 1,057 randomly selected sites from 93 streams within 18 major drainages throughout Washington, Idaho, and Montana for the presence of bull trout. Then, we correlated the survey results to the land types that contained bull trout. Through this analysis, we discovered that there are significant correlations between bull trout numbers and the physical characteristics at the site, stream, and basin scales of analysis. However, the important variables affecting bull trout populations varied across different scales of analysis.

Bull trout occur more often in lowlands and valleys and in sites with undercut banks, large gravel substrates, deep pools, and where trees and shrubs are the dominant riparian vegetation. Bull trout population density increased as the amount of canopy cover decreased. Bull trout also avoid areas that contain brook trout populations.

Our studies indicated bull trout distribution is associated with large-scale habitat characteristics (i.e., valley bottom type and basin size), while population density is most strongly associated with small-scale features that vary among watersheds. Therefore, life history requirements and localized landscape patterns drive bull trout distribution while population density is influenced by the manner in which habitat diversity is expressed within specific basins.

Conclusion and Implications

The results of this study indicate bull trout distribution is related to the habitat classification of stream segments, not the overall classification at a watershed level.

Therefore, bull trout do not (and historically did not) occur everywhere, and land management plans for enhancing bull trout populations should be tailored and site-specific, and not be implemented region-wide.