

Technical Report #1

Implementation of a Method to Detect the Presence of Bull Trout

Overview

The purpose of Technical Report #1 is to describe the results of a new survey method to determine bull trout populations in streams and watersheds. Scientists working with Plum Creek Timber Company implemented this statistically based survey method on 43 streams in Idaho, Montana, and Washington in 1993 (82 more streams were surveyed from 1994 to 1997). Six of the surveyed streams contained bull trout. Three of those streams had previously been surveyed by the U.S. Forest Service with no detection of bull trout. Comparison of the old method with the one used here indicates that the old method was not as rigorous.

In addition to the population density survey, scientists collected data about the type of habitat surrounding bull trout streams. This information could eventually be used to predict the presence or absence of bull trout in streams (see Technical Report #2).

Key Points

Technical Report #1 describes the methods used in the survey for bull trout in terms of the following:

- Sampling design
- Site selection
- Data collection

The report also contains a table listing the fish species captured in the sampling areas. The results indicate that bull trout can be found in watersheds with a history of

mixed land uses. Therefore, the degree or extent of historic land use may not predict the presence of bull trout.

Supporting Technical Information

From June through October 1993, 43 streams in Idaho, Montana, and Washington were surveyed for the presence of bull trout. The sampling design uses a probability of 95 percent, which is higher than the 80 percent probability typically used in fish surveys. Sampling sites were selected based on the historical range of the bull trout. Various habitat measurements were reported to describe any correlations between habitat characteristics and fish abundance.

Sampling Design

The sampling design is based on the following:

- Minimum population density
- Distribution of bull trout in streams
- Probability of detection

The expected **minimum population density** of bull trout was based on a review of available literature. The lowest reported density for a population of bull trout is 0.25 fish per kilometer (fish/km). This density was used for the survey.

The **distribution of bull trout in streams** is based on a model called the Poisson. This model, which is illustrated as a curve

on a graph, is based on the assumption that bull trout are rare.

The Poisson curve shows how many sample sites are required to get the desired **probability of detection**. As discussed, the probability of detection for this survey is set at 95 percent. To achieve this probability, it was determined that twelve, 100-meter-long, randomly located sections (transects) would need to be sampled in each 10 km stream reach.

Site Selection

According to researchers, juvenile fluvial (river dwelling) and adfluvial (lake and river dwelling) and resident bull trout are generally found in smaller watersheds. By looking on a map, streams can be grouped into **orders** based on their size. To target stream reaches that might contain bull trout, only second- to fourth-order watersheds (those containing smaller streams) were selected for sampling.

Data Collection

Four types of data were collected:

1. Site description
2. Fish presence
3. Habitat measurements
4. Stream ecological classification

The **site description** involves the physical attributes of the site, including date, weather, location, stream width and depth, and valley width and type. The description also includes temperature and streamside vegetation information.

Sampling for **fish presence** was conducted by snorkeling and single-pass electrofishing in the 100-meter site. Species were grouped into size classes and counted.

Habitat measurements were taken of each sampling site. The measurements included wetted channel width, depth of pools, percent of surface fine sediment, amount of large woody debris, amount of woody debris and boulder cover, percent of streambank undercut, and percent of canopy cover and vegetation overhang.

A **hierarchical classification** was used to identify reaches of distinctive form, function, and ecological potential. For more information about this classification, see Technical Report #4: *An Ecological Classification Integrating Uplands and Riverine/Riparian Habitats Applied to the Thompson River Basin, Montana*.

Conclusion and Implications

The six bull trout streams identified by the survey had varied land management histories ranging from essentially undisturbed watersheds to watersheds with many decades of human disturbance. The same range of disturbance was also noted in watersheds where no bull trout were detected. Bull trout observed ranged from the 0 to 75 millimeter (mm) size class to the 225 to 300 mm size class.

Scientists found bull trout in watersheds with diverse management histories. These results suggest that past disturbance does not reliably predict the presence of bull trout. Since bull trout were found in streams that were previously reported to not have bull trout populations, some watersheds may need to be surveyed again.

Future surveys will likely use the method applied in this survey because of the high degree of statistical confidence in the results. A map of survey results and known bull trout distribution within the project area is provided in the technical report.