

Design of Effective Riparian Management Strategies for Aquatic Resource Protection in Montana, Idaho, and Washington

Overview

A complex issue facing the forest industry is managing riparian areas. These sensitive areas surround streams and affect fish habitat in a number of ways. Scientists disagree on the amount of riparian area required to maintain a healthy fish habitat. Technical Report #7 does not provide standards and guidelines, but does provide the foundation for answering the question: "how much riparian buffer is enough?" The objectives of the report are as follows:

1. Describe differences in fish resource sensitivities within a watershed
2. Design a way to evaluate the results of various riparian management scenarios
3. Apply this tool to evaluate existing management strategies
4. Identify gaps in existing strategies

Key Points

A successful solution to riparian management balances habitat needs of fish with economic needs of landowners. To reach this balance, we need to better understand riparian structure and function:

- Where are fish most vulnerable to management in riparian areas?
- How much woody debris is needed?
- What is the acceptable risk to fish populations?
- What other riparian functions are critical to fish habitat?

Supporting Technical Information

Riparian vegetation has two main influences on a stream: physical and biological. The **physical** influences concern the structure provided by shrubs, grass, trees, and their root systems. This structure affects the shape of the stream channel, the temperature of the water, the amount of sediment reaching the stream, and the diversity of the habitat. The **biological** influences concern the flow of nutrients through the system. Nutrient use and input is based on the cycling of organic matter in the system, which involves such steps as the decay of vegetation, death of post-spawning fish, and the uptake of these nutrients by soil and aquatic insects. Understanding physical and biological influences is critical to managing riparian areas.

Where are Fish Most Vulnerable to Riparian Management?

All portions of the stream network throughout a watershed influence the quality of the stream for fish habitat. The simplest approach to riparian management is to establish a **riparian buffer**, a strip of land on either side of the stream that is free of all timber harvest, at a set width along all streams in the watershed. The problem with this approach is that it assumes that all riparian areas are equally important to fish habitat.

We have found that the interplay between riparian forests and channel conditions can change significantly along a stream and that a

tailored management approach is both suitable for the fish and acceptable to the land owner.

How Much Woody Debris is Needed?

Large woody debris (LWD) is an important physical contribution from riparian forests to the stream. LWD creates pools, reduces stream velocity, traps spawning gravels, and provides shelter from predators. To decide how much LWD is needed for a particular stream, the landowner must look at how sensitive that particular stream is to a loss of LWD. Some streams have naturally low LWD loads, while others have relatively high loads, and this is largely determined by the character of the riparian forest adjacent to the stream. The amount and quality of fish habitat that a given stream reach provides is also variable, and is greatly influenced by channel gradient. Certain stream reaches have a high sensitivity to LWD loss, while others are relatively less sensitive. Technical Report #7 evaluates the degree of channel and habitat sensitivity to wood loss for different channel types, and estimates how much LWD is produced as the result of different management options.

What is the Acceptable Risk to Fish Populations?

Every planning process involves an assessment of risk. To conduct the management analysis in this Technical Report, we made several assumptions about the cause and effect relationships between a given riparian protection level and the resulting habitat change. One assumption is that the selected management strategy would be used throughout the entire watershed. For example, if Montana's existing state riparian management rules were applied throughout

an entire watershed, most riparian stand types would contribute enough LWD to maintain the amount and sizes within natural levels. However, land ownership is intermingled, and more than half of the stream miles flow through U.S. Forest Service lands, which feature riparian buffers that provide more protection than what the analysis shows is needed. The end result of this land use mixture is reduced risk to fish habitat across the entire watershed.

What Other Riparian Functions are Critical to Fish Habitat?

Riparian areas provide more than LWD; they also provide shade, canopy closure, bank stabilization, nutrients, filtration of fine sediments, and flood energy dissipation. Based on a literature review and the analysis in the Technical Report, it appears that in most cases an adequate riparian buffer for LWD is also adequate for other riparian functions. For example, bank stabilization can be achieved by a continuous buffer of riparian trees or by discontinuous buffers with a near-stream equipment exclusion zone.

Conclusion and Implications

Several opportunities are available for landowners to manage their land for economic and fish habitat benefits. The goal of successful riparian management is to tailor timber harvest to match the riparian area with the localized fish habitat needs. This approach optimizes habitat conservation for the fish and economic gain for the landowner.