# Alternate Plans for Riparian Hardwood Conversion: Challenges and Opportunities

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## Abstract

Many riparian stands in western Washington are dominated by red alder and other hardwood species. Riparian harvest restrictions designed to protect salmon habitat can be problematic in these stands, as they may preclude establishment of desirable large conifers while also resulting in economic losses for landowners. Washington forest practices rules allow for development of "Alternate Plans" which are intended to provide flexibility for solutions to avoid unintended consequences. A case study has been done of a hardwood conversion alternate plan. Observations from this case study have identified problem areas in the alternate plan approval process. Approaches such as templates may help address these problems.

Keywords: red alder, riparian management, economics

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# Introduction

The state of Washington has recently updated its forest practices regulations, adding new restrictions on timber harvesting in riparian areas. The purpose of the new rules, known as the "Forests and Fish Rules," is to protect endangered salmon and other aquatic resources in compliance with the federal Endangered Species Act and Clean Water Act. In western Washington, the Forests and Fish Rules are specifically intended to put riparian stands on a trajectory towards desired future conditions (DFC). The DFC are conditions of mature, unmanaged riparian stands, characterized by large conifers that provide shade and a long-term source of large woody debris (LWD) thought to be important for fish habitat.

The Forests and Fish Rules for western Washington require a three-zone riparian buffer along fish-bearing or potentially fish-bearing streams. The total buffer width is one site potential tree height, which varies from 90 to 200 feet depending on site class. No harvest is allowed in a 50-foot core zone immediately adjacent to the stream. The next zone is the inner zone, which extends from the core zone to two-thirds or three-fourths of the site potential tree height depending on the size of the stream. Partial harvest may be allowed in the inner zone if the number and basal area of the conifers in the core and inner zones are projected to meet minimum requirements when the stand is 140 years old. The remainder of the buffer is the outer zone, in which harvest is allowed so long as 20 conifers per acre with a diameter at breast height (DBH) of 12 inches or greater are retained.

Many riparian stands in western Washington are dominated by red alder (*Alnus rubra*) and other hardwoods. In these situations, the Forests and Fish Rules can be problematic. Because of inadequate conifer density and basal area, no harvest will be allowed in either the core or inner zones. However, without active management to harvest some of the alder and establish a greater conifer component, it is unlikely that these riparian stands will achieve the DFC within the desired time frame. Instead, as the alder, which is not a long-lived species, becomes senescent, the riparian stand may become dominated by salmonberry (*Rubus spectabilis*) and other brushy vegetation. The lack of opportunity to harvest valuable hardwood timber in the riparian zone also means economic losses for landowners. The economic impacts of the riparian harvest restrictions can be significant, especially when no timber can be harvested from the inner zone (Zobrist 2003; Zobrist and Lippke 2003).

In order to accommodate situations where the rules may hinder the achievement of the DFC and to provide opportunities for landowners to find lower cost approaches for protecting riparian areas, the rules allow landowners to submit a site-specific alternate plan for managing a riparian stand. A case study has been done of one of the first "hardwood conversion" alternate plans to be submitted. This case study offers insights into some of the challenges of and opportunities for using alternate plans as a solution for the sustainable management of riparian hardwood stands.

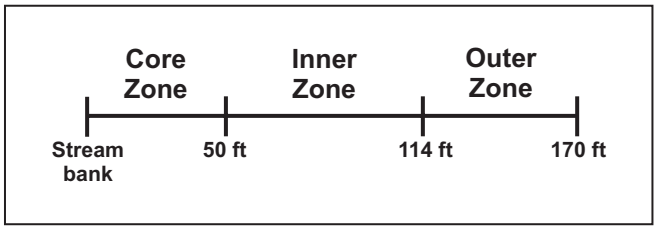


Figure 1—A 170-ft riparian buffer is required for small streams on site class II. The buffer includes a 50-ft core zone, followed by a 64-ft inner zone and a 56-ft outer zone.

# Hardwood Conversion Case Study

The case study is of a hardwood conversion alternate plan that was submitted in 2002 by a small forest landowner in southwest Washington. The landowner planned to harvest a 26-acre stand that bordered 1,570 feet on the east side of a north-south stream. The stream ran dry in the summer, but it was identified as potential winter fish habitat and so was classified as fish-bearing. The stream was considered small, as its bankfull width was less than 10 feet. The stand was site class II, requiring a total riparian buffer width of 170 feet. The first 50 feet from the stream was the no harvest core zone. The inner zone then extended 64 feet from the edge of the core zone out to two-thirds of the buffer width (114 feet), as required for small streams. The remaining 56 feet was the outer zone (fig. 1).

The dominant species in the riparian zone was red alder, which was 30 years old, had a density of 105 trees per acre (TPA), and ranged in size from 6 to 18 inches DBH. There were also 35 TPA of 55-year-old Douglas-fir (*Pseudotsuga menziesii)* ranging in size from 6 to 40 inches DBH, along with a few (less than 6 TPA) other hardwoods, such as black cottonwood (*Populus trichocarpa*) and bigleaf maple (*Acer macrophyllum*) (fig. 2). The core and inner zones, which comprised approximately 4 acres, had an inadequate conifer component to allow harvesting in the inner zone under the default rules. The landowner proposed a hardwood conversion alternate plan to harvest some of the existing alder in both the core and inner zones to establish more conifers and generate some revenue.

The alternate plan addressed the riparian zone as two different management units, with unit 1 bordering the southern 1,070 feet of stream and unit 2 bordering the northern 500 feet of stream (fig. 3). For unit 1, the alternate plan proposed leaving all of the Douglas-fir and 49 red alder along the stream bank in the core zone while harvesting the rest of the hardwoods in that zone. For the inner zone the plan proposed leaving 13 Douglas-fir (12 less than 9 inches

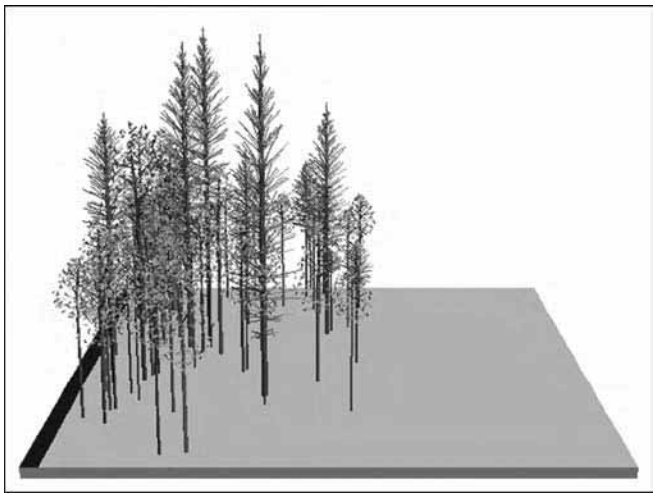

Figure 2—A visualization of the case study riparian stand, which is predominantly 30-year-old red alder with some older conifers and additional hardwood species present.

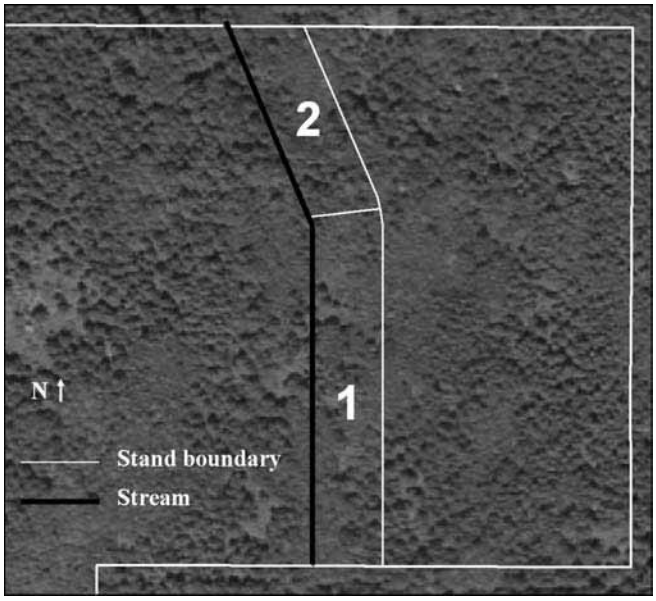


Figure 3—The case study riparian zone comprised two management units along 1,570 feet on one side of a small, north-south stream.

DBH and one with 28 inches DBH) and harvesting the remaining Douglas-fir and all of the hardwoods. All trees would be harvested in the outer zone. For unit 2, no harvest would be done in the core zone. The plan proposed to leave 8 Douglas-fir dispersed in the inner zone, while harvesting the remaining Douglas-fir and all of the hardwoods. All trees would be harvested in the outer zone.

The alternate plan called for the harvested areas to be replanted with 300 TPA of 1-1 seedlings. The seedlings would be 80 percent Douglas-fir and 20 percent western hemlock (*Tsuga heterophylla*). Brush control would be done at 3 years and 7 years after planting to ensure that the planted conifers become free to grow. To evaluate the expected results of the proposed alternate plan over time, the riparian stand was treated according the prescription

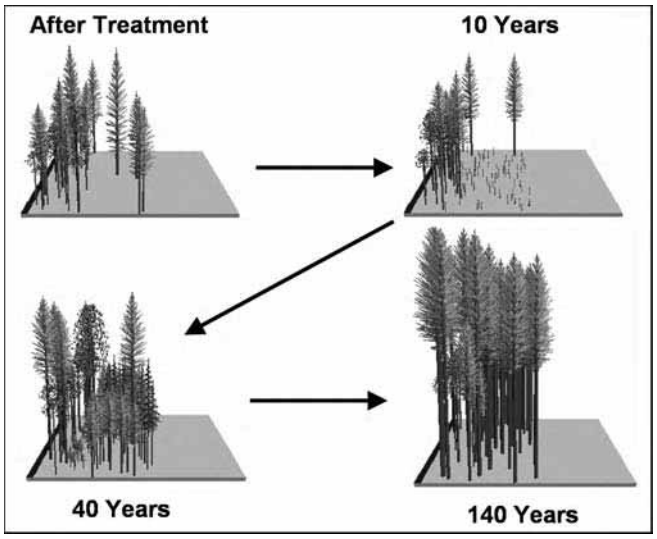


Figure 4—LMS simulation of the riparian stand conditions over time under the proposed alternate plan.

and then projected over 140 years using the Landscape Management System (LMS). LMS is an analysis tool that integrates growth, treatment, and visualization models (McCarter et al. 1998). The projected stand conditions immediately, 10 years, 40 years, and 140 years after treatment are shown in fig. 4. These projections suggest that in the long term this alternate plan would result in a riparian stand dominated by large conifers and characteristic of the DFC.

In order for an alternate plan to be approved, it must be reviewed by an interdisciplinary (ID) team that includes representatives from the Washington Departments of Natural Resources, Fish and Wildlife, and Ecology, along with local tribes. The ID team that reviewed this alternate plan proposed several revisions. The ID team proposed a wider no-harvest area in the core zone of unit 1. They proposed that only the smallest Douglas-firs be harvested in the inner zone, and only those leaning away from the stream. They also proposed in-stream LWD placement of 37 to 45 conifer logs originating from outside the riparian area (i.e. the upland portion of the harvest unit).

The economic costs of the revisions proposed by the ID team were unacceptable to the landowner. However, a compromise was reached in which the logs for LWD placement were allowed to include leave trees and downed wood from the core and inner zones. This eliminated the cost of using merchantable upland logs for LWD placement by allowing the placement of logs that would not otherwise have gone to the mill. The final revised plan included an additional 54 red alder and 5 cottonwood leave trees in the core zone of unit 1. In the inner zone of unit 1, 12 Douglas-fir leave trees were to be retained with an average DBH of 18 inches. In the inner zone of unit 2, 10 Douglas-fir leave trees were to be retained with an average DBH of 26 inches.

**Table 1—Itemized cash flows for the original proposed alternate plan, the plan with proposed revisions, and the final approved compromise. Only the additional cash flows associated with the alternate plan are included.**

| Cash Flow | Proposed Plan | Proposed Revisions | Approved Compromise |
|---|---|---|---|
| Net Harvest Revenue | $12,210 | $8,710 | $8,710 |
| Site Preparation | -$625 | -$625 | -$625 |
| Planting | -$810 | -$670 | -$670 |
| LWD Log Value | $0 | -$4,000 | $0 |
| LWD Placement Cost | $0 | -$1,000 | -$1,000 |
| Brush Control Year 3 (discounted at 5%) | -$275 | -$230 | -$230 |
| Brush Control Year 7 (discounted at 5%) | -$225 | -$190 | -$190 |
| Consulting Fees | -$1,500 | -$1,500 | -$1,500 |
| Net To Landowner | $8,775 | $495 | $4,495 |

Using figures provided by the consulting forester who prepared the alternate plan, a breakdown of the costs and revenues for the original alternate plan, the proposed revisions, and the final, approved compromise is given in table 1. These are only the costs and revenues exclusive to the alternate plan that are above what would be expected if management was done according to the default rules. The original proposed plan would have resulted in a net return to the landowner of $8,775. The revisions proposed by the ID team would have reduced this by 94% to $495, at which point the landowner was no longer willing to pursue the alternate plan. The compromise resulted in a net return of $4,495, a 49% reduction from the original proposal.

# Discussion

Alternate plans are potential solutions for situations such as hardwood-dominated riparian areas in which the regulatory prescription is unlikely to achieve the DFC in a timely manner. However, observations from this case study suggest that the development and approval of such plans may be problematic. The approval process can be long and costly for both the landowner and the agencies participating on the ID team. In this case, the plan development and approval process took approximately one year and involved three ID team field visits. The cost to the landowner was $1,500 for consulting fees, which was 17% of the net harvest revenue for the approved plan and represents approximately $1 per foot of stream. Agency costs included the personnel and equipment costs of the three field visits, plus the associated office time. Additional agency costs were expected for supervision of the LWD placement.

Another problem observed was the lack of guidelines for alternate plan development and approval. There were no objective, measurable performance criteria to gauge the effectiveness of the proposed plan or subsequent revisions. At the same time, a lack of economic guidelines almost resulted in a failure to reach an agreement. Without clear guidelines and objective, measurable performance criteria, the overall goals of alternate plans can easily get lost in the negotiation process and opportunities for "win-win" solutions of greater effectiveness and lower compliance costs can be missed.

The problems observed with this case study were not unexpected. This was one of the first alternate plans to be submitted, and as with any new process, time and experience are needed to work out logistical issues. The purpose of this case study was to identify areas of need and potential solutions for improving process efficiency and results. One such solution suggested in the rules is the development of alternate plan templates. These templates would be pre-established guidelines to expedite the development and approval of alternate plans for common situations. Conversion of predominantly hardwood riparian stands for conifer regeneration has been identified as a common situation for which a template approach would be appropriate.

Alternate plan templates for hardwood conversion present an opportunity to provide for short and long term riparian habitat goals while also providing economic relief to landowners. These templates could provide landowner incentives for future stewardship. They could also facilitate an increase in the available short term supply of red alder, as much of the current inventory is located in riparian areas. A streamlined approval process would make alternate plan implementation more feasible for both landowners and regulatory agencies, which is necessary for the large-scale success of alternate plans.

Several key elements will likely be needed for a successful hardwood conversion template. A narrow, no-harvest buffer will be needed immediately adjacent to the stream for interim shade, bank stability, and short term LWD recruitment. Sufficient harvest of the remaining riparian hardwoods will be needed to create adequate growing

space for conifers. Regeneration specifications (species mix and density) should be appropriate for the site and for long term growth. The template process should be simple and affordable and provide sufficient economic benefits to landowners.

The observations from the case study suggest several challenges that will need to be addressed in developing a hardwood conversion template. Short term function needs, such as shade and bank stability, will need to be balanced with the long term establishment of the DFC. Specifically, the appropriate width of the no-harvest buffer adjacent to the stream will need to be identified. Appropriate regeneration strategies will need to be developed. These strategies will need to extend beyond planting, such as brush control and pre-commercial thinnings. This will increase landowner costs but may be necessary for establishing conifers while preventing the subsequent development of too densely stocked conditions. Treatment of existing conifers will also need to be addressed. As was the case for the case study, hardwood-dominated stands often include some conifers—too few to achieve the DFC, but enough to potentially impact regeneration. Finally, it will be important to establish sufficient conifers to achieve the DFC while still maintaining a hardwood component. Hardwoods play an important role in riparian forest ecosystems. Ultimately the goal is not the eradication of riparian hardwoods in favor of purely coniferous stands, but rather the sustainable management of both conifers and hardwoods.

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