



State Trust Lands Implementation Monitoring Report: Implementation Monitoring Report: Implementation of the Roads Component of the Riparian Forest Restoration Strategy

This document is meant to fulfill Washington Department of Natural Resources' (DNR's) ongoing commitment to report on the implementation of the State Trust Lands Habitat Conservation Plan (HCP). The intended audience includes the Services (including the U.S. Fish and Wildlife Service and National Marine Services), the public, and DNR staff.

This project represents the final in an initial round of implementation monitoring of the HCP Riparian Forest Restoration Strategy (RFRS). Previous implementation monitoring of the RFRS has included review of restoration treatments in conifer-dominated ([Implementation Monitoring Report published in 2013](#)) and hardwood-dominated ([Implementation Monitoring Report published in 2014](#)) RMZs.

Executive Summary

The RFRS specifies that wood from the inner zone of Riparian Management Zones (RMZs) is not to be removed from the RMZ, except in specific instances. During road management activities where it is necessary at times to fall inner zone trees, the RFRS provides guidance for mitigation that involves leaving wood from the inner zone on site. The goal of this project was to review current implementation of the roads component of RFRS. To accomplish this goal, we visited 31 stream crossings in order to determine if the guidance was implemented correctly and if any modifications of the guidance could make activities more consistent with the management goal of RFRS. We found implementation was typically consistent with the wood placement expectations described in the guidance. Monitoring staff noted three instances where placed wood was either less than two times the width of the ordinary high water mark (OHWM) and/or placed upstream of the crossing without documentation in an approved site plan. There were no instances of wood not being placed at a crossing where placement of wood was prescribed, or evidence of inner zone wood removed from the RMZ that was significantly larger than what was placed in the stream. On average, DNR placed 3.1 pieces of wood per crossing into and adjacent to streams (range 1 to 7 pieces). Additionally, we present a discussion of different aspects of the guidance that are potentially unclear or do not cover common operational situations that arise while implementing road management activities in riparian areas. Some

examples of areas of the guidance that may benefit from further clarification or training include wood placement standards in the middle and outer zone, whether placement of hardwood species is permissible, and situations in which the guidance may be altered to achieve site specific management objectives that better meet the RFRS objective for the inner zone.

Introduction

Past logging practices, including the harvest of overstory riparian trees and the removal of large instream wood to facilitate logging operations, have resulted in an a condition that has proven to have a negative impact on riparian ecosystem function. The Riparian Forest Restoration Strategy¹ (RFRS, [Washington State Department of Natural Resources 2006](#)), which was developed to help ameliorate the impacts of past and present management practices, introduced a provision to actively manage Riparian Management Zones (RMZs) for restoration that did not exist in the 1997 State Trust Lands Habitat Conservation Plan Riparian Conservation Strategy (HCP, [Washington State Department of Natural Resources 1997](#)).

DNR manages approximately 13,000 miles of forest roads statewide ([Washington State Department of Natural Resources 2013a](#)). This road network is a valuable trust asset that facilitates cost-effective management of state timberlands, implementation of land and resource leases, and provides access for public recreation and general management. In addition to guidance for the management of conifer- and hardwood dominated RMZs, the RFRS

provides guidance for the utilization of trees felled within the inner zone (the first 25 feet from the edge of the 100-year floodplain, or further depending on site-specific conditions) of streams as a result of road construction, reconstruction, and/or maintenance activities. The placement of inner zone wood in the RMZ serves as mitigation for road construction through RMZs, which may permanently impact large wood recruitment into streams, and the permitted removal of right-of-way wood from outside of the inner zone. This mitigation is implemented by placing inner zone wood and root wads into and adjacent to the stream so as to emulate the large woody debris accretion that would have occurred naturally.

While the RFRS provides specific guidance for mitigating stream crossings (see the RFRS and Forest Roads Guidebook [Washington State Department of Natural Resources 2011] for more information), it also recognizes the complexity of implementing road management activities within RMZs. To address these complexities, the RFRS allows for site-specific management plans to be developed that allow DNR staff to use professional judgement in determining the best methods for achieving RFRS objectives at each

¹ The RFRS applies to westside HCP planning units excluding the Olympic Experimental State Forest (OESF).

crossing location. For this project, we reviewed the current procedures and site-specific plans related to road crossing mitigation and assessed stream crossings in the field to determine how the procedures were interpreted and implemented.

Objective

In order to determine our level of compliance with the strategy, we reviewed road crossing mitigation activities guided by RFRS at 31 Type 3 water crossings in terms of quantity, type, length, and placement of wood. Additionally, we present a review of the guidance from the perspective of operational feasibility and the intent of RFRS in order to inform and clarify acceptable practices in future management decisions. The scope of this project includes DNR-implemented timber sales and public work contracts that closed in fiscal years 2013 and 2014.

Methods

Road crossings selected for monitoring come from two population groups. The first population includes all timber sales in westside HCP planning units, excluding the Olympic Experimental State Forest (OESF), that were listed as completed in NaturE (DNR's financial tracking system) during fiscal years 2013 and 2014 (n = 153). The second population includes Forest Roads Program public works contracts that took place in westside HCP planning units excluding the OESF and had a "final acceptance date" in fiscal years 2013 or 2014 (n = 44). From these populations, we identified projects where

road construction, reconstruction, and/or maintenance was planned within the inner zone of Type 2 and 3 waters (this was accomplished by reviewing available documentation on the Timber Sales Document Center [TSDC] and the Public Works Document Library). An inquiry was also made to engineering staff in each DNR region regarding any projects that wouldn't be identified using these methods; there were no additional projects identified. This process identified 17 crossings associated with 14 timber sales, and 14 crossings associated with 8 public works contracts; implementation monitoring program staff (staff of the Forest Resources Division Silviculture and Monitoring Section) visited all 31 of these crossings.

Prior to visiting project sites, monitoring staff reviewed available documentation in order to identify the wood placement plan for each crossing. Wood placement plans for all crossings were described at varying levels of specificity in the Forest Practices Application (FPA) and/or road plan, and were supported and/or amended by approved Hydraulic Project Approvals (HPAs). It is important to note that monitoring staff were only interested in reviewing wood placement in the context of specific RFRS procedural guidance (specifically the length and location of placed wood), and were not assessing compliance with approved FPAs (complied by Forest Practices) or HPAs (complied by Washington Department of Fish and Wildlife).

At each crossing, monitoring staff recorded the size, species, and location of logs and root wads placed in the stream

and associated floodplain (when present), inner, and middle/outer zones (the middle zone spans from the outer edge of the inner zone to 100 feet from the edge of the 100-year floodplain while the outer zone extends the RMZ to a distance dependent on the site growth potential, which is typically less than 200 feet from the edge of the floodplain). Monitoring staff noted whether logs placed in or adjacent to the stream channel were at least two times the width of the OHWM (we used documented stream widths from the FPA, road plan, and/or HPA whenever possible for comparison), and the location of placed wood relative to the road crossing (downstream, within the crossing, or upstream). Because the RFRS does not specify a minimum log diameter, log length was used to determine if logs were adequately sized for placement. While the diameter of placed logs was noted, this information would only influence an assessment of compliance if the size of the placed logs was noticeably smaller than the size of an inner zone stump present on site as the intent of the RFRS guidance is for the largest available material to be placed. Additionally, the quantity of different types of wood pieces was tallied for wood placed in the stream and in the inner zone at each crossing (the types of wood pieces tallied can be found in Table 1). Tallies were not collected for wood placed in other areas

of the RMZ because the pieces were often scattered and the sites overgrown, making it difficult to objectively determine the amount of wood placed.

Because monitoring staff visited crossings only after the completion of work, it was difficult to make an objective determination of what was initially present within the inner zone and what was therefore required or available for placement into the stream. Conversely, it was difficult for monitoring staff to know if placed wood originated from the inner zone or was brought from an outside source or other area of the RMZ. An exception to this would be if the work plan specifically prescribed wood placement, or there was an inner zone stump still present on site at the time of monitoring, and no wood was placed at the crossing.

Our results are presented as a case study to illustrate the ways DNR has implemented the roads component of RFRS. Our discussion highlights areas of the guidance that are potentially unclear, operationally difficult to implement consistently, or which may be implemented in ways not described in the RFRS procedures but still meet the objectives and intent of the RFRS.



Figure 1. A reconstruction project on a Type 3 stream with placed wood downstream of the crossing. This crossing has a log spanning the stream as well as logs and detached root wads placed adjacent to the stream within the inner zone.

Results

Please refer to Tables 1a (timber sale contracts) and 1b (public works contracts) for information on individual crossings.

Frequency and types of project work – Implementation of the roads component of RFRS in Type 2-3 water is a rare activity on state lands, with 9% of timber sale contracts and 18% of public works contracts closing during fiscal years 2013 and 2014 being required to implement the guidance. All road crossings visited for this review took place in Type 3 waters. The types of road management activities reviewed for this project and associated with timber sale contracts included construction only (C, 1 crossing), reconstruction (R, 5 crossings),

construction and reconstruction followed by medium or heavy abandonment (C + A [6 crossings] and R + A [1 crossing], respectively), and construction and reconstruction followed by road decommission (C + D [1 crossing] and R + D [3 crossings]), respectively (Table 1a). Decommissioned roads, where much of the non-riparian road prism remains intact but access is blocked and culverts are pulled, are likely to be used to facilitate forest management activities in the near future, whereas abandoned roads are not likely to be used again in the near-term, if ever (See the Forest Roads Guidebook for more information on these activities, Washington State Department of Natural Resources 2011). These two aforementioned activities are discussed separately due to potential differences in management options for

wood placement, see the Discussion section for more information. All 14 crossings associated with public works contracts visited for this review were RMAP fish barrier culverts upgraded to passable structures (either a fish passable pipe or bridge), which were considered reconstruction projects.

Types and quantity of wood placed in the RMZ – Conifer logs (CL) and/or conifer logs with attached root wads (CLR) were placed in the stream or inner zone at all but three crossings (Figure 1, for discussion purposes in this report, the stream is inclusive of the 100-year floodplain because the two were generally congruent since all visited crossings were in either gullied or confined channels). Hardwood logs (HL) and/or hardwood logs with attached root wads (HLR) were placed at seven crossings. Other types of wood placed in the stream and/or inner zone include conifer root wads (CR), hardwood root wads (HR), puncheon material (PUN, puncheon material was typically composed of large, sound, rot resistant conifer species, such as western red cedar or Douglas-fir), and snags and/or downed woody debris with attached root wads that needed to be moved for road management activities to occur (DOWN, Tables 1a and 1b). On average, 3.8 pieces of wood per crossing (range 1 – 7 pieces) were placed into the stream and/or inner zone at crossings associated with timber

sale contracts and 2.3 pieces per crossing (range 1 – 5 pieces) for public works contracts.

Wood placement in the middle zone occurred at 14 crossings, and included placement of CL, HL, CR, and PUN. In most instances, it was difficult or not possible for monitoring staff to objectively tell if inner zone trees were cut as a result of the road management activity and therefore would be required to be placed in the stream. The challenge resulted from the new road prism covering the initial project site. This difficulty was magnified if the wood placement plan did not make it clear that inner zone trees were to be cut; typical contract language simply stated that wood should be placed when available. There was no wood placed within the outer zone at any visited crossing that monitoring staff were able to locate, and there were no specific prescriptions for outer zone wood placement in any of the site plans.

Table 1. For each a) Timber Sale Contract crossing and b) Public Works Contract crossing visited by monitoring staff, these tables describe the types of road management implemented, the types of wood placed into the stream, inner and middle zones, whether that wood was greater than two times the width of the OHWM, and where wood was placed relative to the stream crossing. Monitoring staff found no wood placed within the outer zone at any crossing. Tallies for the different categories of wood placed in the stream and inner zone are outlined in orange.

Crossing #	Project work ¹	Wood placed into stream and/or inner zone ²								Wood placed in the middle zone ²								Placed logs greater than 2x the width of the OHWM			Wood placement location relative to crossing		
		CL	HL	CLR	HLR	CR	HR	PUN	DOWN	CL	HL	CLR	HLR	CR	HR	PUN	DOWN	All	Some	None	Downstream	Within	Upstream
a) Timber Sale Contracts																							
1	R			1														X			X		
2	R			1														X			X		
3	R			1	3													X			X		
4	C+A	3	1															X			X	X	
5	C+D	3	1			3												X				X	
6	C+A	4		3														X			X		
7	C			3			2											X			X		
8	C+A	1		1					X	X			X						X		X	X	
9	C+A	1		2					X	X			X						X		X	X	
10	R+A	2	2			2		1										X				X	
11	R		3																	X			X
12	R	3				1	1		X	X			X					X			X		
13	R+D	3				2		1					X					X			X	X	
14	R+D	1				1												X				X	
15	R+D	1				1												X				X	
16	C+A			2														X			X		
17	C+A			2				1											X		X	X	
b) Public Works Contracts																							
18	R	2				3			X						X			X			X		
19	R			3					X	X			X					X			X		
20	R	1		1					X										X		X		X
21	R			2					X	X								X			X		
22	R			2					X						X			X			X		
23	R			2														X			X		
24	R			2											X			X			X		
25	R			2														X			X		
26	R			2					X									X			X		
27	R					1	1		X									X			X		
28	R		1			1									X			X			X		X
29	R							1											X		X		
30	R	2																X			X		
31	R	2						1							X			X			X		

¹ C - construction; R - reconstruction; A - abandonment; D - decommission

² CL - conifer log; HL - hardwood log; CLR - conifer log with attached root wad; HLR - hardwood log with attached root wad; CR - conifer root wad; HR - hardwood root wad; PUN - puncheon material from fill of original crossing; DOWN - snag or downed wood with attached root wad



Figure 2. *At this crossing, road construction followed by full abandonment resulted in wood placement throughout the RMZ, including within the road prism. This stream had two branches and some stream-associated wetland so DNR staff elected to place longer logs across the entire feature instead of individual pieces for each crossing.*

Discussion

While the RFRS was written so as to allow DNR staff to develop and implement site specific management plans, there are some areas of the guidance for the roads component of RFRS that are potentially unclear or do not cover common operational situations that arise while implementing road management activities in riparian areas. The following discussion highlights some of these difficulties and how DNR staff may approach implementing some of the procedural guidelines in a way that may better meet the intent of RFRS while also reducing the risk of damage to public resources.

Applicable projects – Given that the Forest Practices Division Compliance Monitoring Program reviews road work on both public and private lands, including stream crossings, there was some confusion among region staff regarding exactly what road projects are required to apply the roads component of

RFRS. Specifically, there was confusion about whether Road Maintenance and Abandonment Plan (RMAP) projects, which are commonly associated with timber sale or public works contracts, were required to implement the strategy. It was confirmed through discussion with the HCP Implementation Manager that any RMAP project that requires the felling of trees from the inner zone of Type 2-3 waters, is expected to implement the roads component of RFRS as this guidance replaces Forest Practice rules when the activity occurs on state lands covered by the HCP. Additionally, abandonment projects through Type 2-3 waters that are preceded by road construction (Figure 2), reconstruction, or maintenance that require falling inner zone trees are expected to implement the RFRS guidance (e.g., road pioneering followed by immediate abandonment). While road abandonment activities that require harvest of inner zone trees don't require implementation of RFRS guidance, region staff indicated that these

trees (which are rare) are left as woody debris as a best management practice.

Wood placement in the stream and inner zone – The RFRS prescribes that the length of placed logs be greater than two times the width of the OHWM, the purpose of this is to help assure that placed wood does not move downstream during high flow events. At 76% and 86% of crossings associated with timber sales and public works contracts, respectively, all placed logs were at least two times the width of the OHWM, and at all but two crossings the placement of undersized wood was authorized by an approved plan (at one of the crossings without written authorization no inner zone trees were cut but undersized puncheon material made available from the reconstruction project was placed with on-site verbal approval from an engineer). The availability of adequately sized wood to place, as well as the operational difficulty of placing this wood, increases with channel width; consequently, risk to ecological and public resources also increases with channel size. Movement of materials downstream during high flows not only risks damage to infrastructure, but can also damage the stream channel. It is important that undersized logs not be placed if there is a risk of their moving downstream. A more suitable place for these materials is the inner and/or middle zone of the RMZ, if these materials can be placed while also minimizing the project's footprint and risk to public resources. If the only material present is not sufficiently sized it is recommended that it not be placed in the stream without approval from an engineer or biologist.



Figure 3. *At this crossing, two logs with attached root wads were placed across the stream on the downstream side of the crossing. It was common for logs with attached root wads to be placed in and adjacent to streams. While the language of the RFRS implementation procedures may imply that placing logs and root wads separately may be a preferred practice, it is acceptable (and potentially preferred) to place logs with attached root wads if operations made this material available, which is common when heavy equipment is used.*

It was common practice for logs with attached root wads to be placed in the stream, with 53% of crossings associated with timber sale contracts and 64% of crossings associated with public works contracts placing logs with attached root wads (Figure 3). To some, the language of the RFRS implementation procedures imply that placing logs and root wads separately is a preferred practice, but in an operational context the method that

can best balance efficiency and the safety of workers and public resources is the most desirable. Section 5, Guidelines for Forest Practices Hydraulic Projects, of the Forest Practices Board Manual (FPBM, [Washington State Department of Natural Resources 2013b](#)) mentions placing “logs with root wads in the channel downstream of the new crossing” as a preferred mitigation measure for fish stream crossings. The placement of larger and more structurally complex pieces of wood may have more interaction with the water and be more stable within the stream channel. DNR staff should continue to exercise discretion in determining which method is best at a specific crossing.

The RFRS guidance prescribes one log and three root wads be placed in the stream, when available. The RFRS is less clear about what other placement options may be preferred when different amounts and/or combinations of materials are available. For example, when only a single tree is felled to facilitate operations leaving a single root wad and multiple log lengths (occurred at 3 crossings), or when a felled tree’s stump didn’t require grubbing (tree cut to increase working area for machinery) but resulted in multiple log lengths worth of material being available (occurred at 2 crossings). In these situations, DNR consistently opted to leave more material in the stream than may be required (e.g., leaving more logs in the stream than available root wads). The 3.1 pieces of wood, on average, placed in the stream and inner zone of visited crossings is in line with the upwards of 4 pieces prescribed in RFRS (it is important to consider that many

projects had logs with attached root wads, lowering their piece tally as compared with placing them separately). Crossings associated with timber sales contracts more commonly had more than 4 pieces of wood placed in the stream (35% of crossings) as compared to crossings associated with public works contracts (7% of crossings). This is largely because timber sales contracts included more instances of road construction, where more wood material is typically made available. If DNR staff wish to place more wood in the stream than is recommended in RFRS, it is important that their intentions be documented in the site plan.

Wood placement in the middle zone – Placement of wood in the middle zone was more common at crossings associated with public work contracts (71% of crossings) as compared to timber sale contracts (24% of crossings). The RFRS states that after the minimum wood placement requirements are met, all other wood cut from the RMZ “may” be removed from the site, including wood cut from within the inner zone. This removal allows excess logs to be sold for the benefit of the trusts. However, difficulties marketing this excess wood arise when only a few trees are cut (typical of public works contracts) or the wood was not of a desirable quality, species, or size for sale. The higher frequency of wood in the middle zone of the public work contract crossings may be related to the fact the excess wood could not be sold with an associated timber sale. In situations where there is excess or unsaleable wood, it is recommended that instream wood

placement be restricted to 1 log and 3 root wads (per RFRS requirements) while the extra wood be distributed as far off the road as operationally feasible and

throughout the RMZ in places where the disturbance by the placement of wood is minimized.



Figure 4. *The RFRS describes placing wood in the middle and outer zones at least 50 feet from the road. In practice, this can be difficult depending on the size and species of the material and the equipment being used to move it. At this crossing, some of the wood placed in the middle zone was less than 50 feet from the road prism.*

The guidance states that excess stumps from the inner zone “shall be placed in a linear fashion at least 50 feet from the road in the middle or outer zone of the RMZ”. At none of the crossings visited by monitoring staff where excess or unsaleable wood was placed in the middle zone, was all wood placed more than 50 feet from the road grade (The RFRS is unclear where this measurement should specifically be taken from; monitoring staff took measurements from the edge of the road prism). At all but one of these crossings logs or puncheon material was placed, both of which can be difficult for

machinery to work with. In practice, placing wood 50 feet from the road is impractical considering that some of the largest machinery used when implementing this type of work can only reach approximately 30 feet (Figure 4). The intent of this guidance was to get extra wood off the side of the road where it could get in the way of road management activities, or potentially be removed from the site during full road abandonment. In practice, it is advised that wood being placed in the middle zone be placed as far off the road as operationally feasible and in a way that

minimizes site disturbance. It is acceptable, and congruent with the intent of the RFRS, to place wood adjacent to the road if it reduces the risk of damaging public resources (e.g., blocking access to off-road vehicles [ORVs]). It is recommended that situations requiring wood placement within 50 feet of the road be described in the site plan in order to assure compliance with the RFRS.

Minimum diameter of placed material –

While the RFRS states that logs from the “largest cut conifer diameter class” be utilized at crossings, it does not stipulate specific minimum size requirements for crossings occurring in RMZs containing small diameter trees (e.g. young or multiple canopied stands). In theory, a tree cut from within the inner zone need only be 1-2 inches in diameter to be long enough (2x times the width of the OHWM, which can be as narrow as 2 feet for a Type 3 stream) to require placement into the stream under the RFRS procedure. The risk is that this smaller diameter wood has a greater likelihood of being moved downstream during high flow events, potentially resulting in pipe blockages and resource damage (this is the primary reason why wood should be placed on the downstream side of a crossing). While small diameter wood (< 3 inches in diameter) was placed in contact with the stream at only one crossing (Figure 5), at two other crossings it was placed in the inner zone as part of road abandonment for erosion control. Discussions with region staff highlighted potential confusion as to how small is too small for wood placed into the stream. DNR’s Forest Resources Division may be able to easily address this confusion by



Figure 5. While the RFRS doesn’t prescribe a minimum diameter for wood requiring placement into or adjacent to the stream, DNR staff should use professional judgement as to whether wood placement is stable (i.e., has little risk of moving down stream during high flows) and functional. At this crossing associated with road reconstruction, conifer saplings are placed along the edge of the stream for erosion control in addition to meeting apparent RFRS requirements.

providing additional guidance. In the meantime, DNR staff are advised to place whatever wood is available so long as it is placed downstream of the crossing and poses little risk to resource damage either on site or downstream. The Guidelines for Large Woody Debris Placement Strategies, Section 26 of the FPBM ([Washington State Department of Natural Resources 2013b](#)), require placed wood be at least 12 inches in diameter to count towards large woody debris credit (on applicable projects related to allowing harvest of outer zone trees) on streams with a bankfull width less than 5 feet

(typical for a DNR stream crossing project). Regardless, it is essential that DNR staff consider how the potential

downstream migration of placed wood during high flow events may impact public resources.



Figure 6. Conifer logs with attached root wads both spanning and within the stream channel. Region staff highlighted how it can be difficult to effectively place wood at crossings with a structurally dense surrounding forest, such as this one.

Wood placement relative to crossing –

The RFRS instructs DNR staff to place wood downstream of the road crossing. Downstream placement is critical to minimize the risk of the wood migrating into the crossing where it could cause blockages and other problems. The guidance is less clear about crossings where the area within the crossing (i.e., road prism) is a potential location to place wood. Wood was placed within the crossing at 9 out of 17 project sites associated with timber sale contracts, while this did not occur at any crossing associated with public works contracts. This practice is more commonly associated with timber sale contracts because these projects typically include

road pioneering or reconstruction followed by road abandonment or decommissioning. There are situations where placement of wood within the area of the crossing may be best to meet the objectives of RFRS (it is important to document the wood placement plan to assure compliance with RFRS and to assure desired site specific outcomes are achieved). One example of this is when the road project is being implemented in a structurally dense forest where the placement of wood downstream would require a significant expansion of the project footprint and/or unwarranted disturbance to the inner zone downstream of the crossing (Figure 6). Under these circumstances, placing wood

in the area within the crossing is only recommended if the crossing is being fully abandoned and there are no future activities planned that would require reopening the crossing. If the road is being decommissioned, it is recommended that inner zone wood be placed in other parts of the RMZ instead of in the stream channel where it would require removal when the road is re-commissioned. Another situation that may warrant placement of wood within

the crossing is for access restriction to ORV's (Figure 7). It is possible in this situation that placement of wood within the crossing is desirable even if it requires later removal when the road is re-opened. This is because the temporary benefit of access restriction may outweigh the disturbance resulting from future removal since the overall frequency and severity of channel disturbance would be reduced.



Figure 7. *Wood placement within a decommissioned road crossing may result in disturbance to the channel when the road is reopened, but this placement also deters off-road vehicle access which can be a more severe and persistent disturbance agent.*

Placement of hardwood species – The RFRS requires the placement of inner zone conifer trees that were cut to facilitate road management activities, but the guidance is less clear about what should be done with red alder (or other hardwood species) that are felled within the inner zone or their root wads. Placement of hardwood wood into the

stream and/or inner zone occurred at 7 out of 17 crossings associated with timber sales and 2 out of 14 crossings associated with public works contracts, and at all crossings the hardwood species was red alder. At 57% and 100% of these timber sale contract and public works contract crossings, respectively, hardwood wood

was placed in addition to conifer wood at the same crossing.

The objective of RFRS is to facilitate the establishment of structurally complex riparian ecosystems. The input of large rot resistant conifer trees into the stream channel is one of the primary mechanisms to achieve this desired condition. Red alder, while not as rot resistant as many conifer species, is still capable of providing some of the structure and functions requisite of a healthy stream system, although this effect may have a shorter duration. Because of this, the placement of red alder into the stream should be done at the discretion of an engineer or biologist with forethought given to the risks and benefits of the management action. If placement of alder in the stream poses a risk to resources or downstream structures, consider placing the wood in other areas of the RMZ where it may support other riparian functions. Once the minimum wood placement requirements have been met, excess cut wood may be removed from the RMZ.

Conclusion

Implementing the roads component of RFRS is a multi-disciplinary activity that often requires the coordination of foresters (both state lands and forest practices), biologists (potentially DNR and WDFW biologists), affected tribes, and engineers (from region and/division) to prepare, implement, and/or consult on any given project. Regardless, DNR consistently met or exceeded the wood placement standards of RFRS. There were only three instances where the length of placed wood was either less than two

times the width of the OHWM and/or placed upstream of the crossing without documentation in an approved site plan. While middle zone wood placement typically consisted of wood being placed within 50 feet of the road, this requirement in the guidance is operationally difficult to implement without increased site disturbance. There were no instances of wood not being placed at a crossing where placement of wood was prescribed, or evidence of inner zone wood removed that was significantly larger than what was placed in the stream.

It became apparent through discussions with region staff that there is some confusion regarding some areas of the guidance, either because the guidance is unclear or does not cover common operational situations that arise while implementing road management activities in riparian areas. With the ultimate goal of improving the implementation of guidance on the ground, this report discusses potential shortcomings and areas of the guidance that may be improved with more training and/or clarification of the intended outcomes. Some examples of areas of the guidance that may benefit from further clarification and training include wood placement standards in the middle and outer zone, minimum diameter requirements for wood placed within the stream and 100-year floodplain, whether placement of hardwood species is permissible, and situations in which the guidance may be altered to achieve site specific management objectives that better meet the RFRS objective for the inner zone. With the Forest Practices

Division regulating road crossings, and now Forest Practices Hydraulic Projects, it may be beneficial to coordinate training efforts to assure DNR staff are well versed

in best management practices that meet both the HCP and Forest Practice standards.

Citations

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