

Soil Health and Productivity: Recommended Operational Guidelines

Conservation Caucus perspective

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Woody biomass collection has the potential to impact “public resources” (water, fish, wildlife and capital improvements of the state or its political subdivisions) by increasing the likelihood of sediment delivery to the stream network and other water bodies. The FP Rules appear to be comprehensive in addressing the potential for sediment delivery, but there are some gaps in the Rules with respect to the protection of soil resources *per se*. RCW Chapter 76.09.010 (Forest practices, legislative finding and declaration) explicitly calls for the designation of FP Rules to protect forest soils (emphases added):

- (1) The legislature hereby finds and declares that the forest land resources are among the most valuable of all resources in the state; that a viable forest products industry is of prime importance to the state's economy; that it is in the public interest for public and private commercial forest lands to be managed consistent with sound policies of natural resource protection; that coincident with maintenance of a viable forest products industry, it is important to afford protection to forest soils, fisheries, wildlife, water quantity and quality, air quality, recreation, and scenic beauty.
- (2) The legislature further finds and declares it to be in the public interest of this state to create and maintain through the adoption of this chapter a comprehensive statewide system of laws and forest practices rules which will achieve the following purposes and policies:
 - (a) Afford protection to, promote, foster and encourage timber growth, and require such minimum reforestation of commercial tree species on forest lands as will reasonably utilize the timber growing capacity of the soil following current timber harvest;
 - (b) Afford protection to forest soils and public resources by utilizing all reasonable methods of technology in conducting forest practices;

Only a handful of the existing FP Rules apply to potential biomass harvest impacts *independent of impacts to public resources*, and only a subset of these apply to forest soils *per se*:

- WAC 222-16-010: General definitions
 - "Erodible soils"
 - "Low impact harvest"
 - “Site preparation”
 - “Slash”
- WAC 222-30-070(5)(b): Ground-based logging systems, moisture conditions (soil compaction)
- WAC 222-30-070(6): Ground-based logging systems (protection of residual timber)

- WAC 222-30-080(3)(a): Landing cleanup (impact to reforestation)
- WAC 222-30-090(2) and (3): Postharvest site preparation (impact to reforestation)
- WAC 222-34-040(1)(a): Site preparation and rehabilitation, heavy equipment (soil compaction or productivity)

The collection of woody biomass can introduce greater risks to forest soils than was expected when the current FP Rules were drafted, such as the loss of soil productivity, soil compaction, soil erosion, and slope instability. Fortunately, the risks to forest soils can be minimized by adhering to a set of operational guidelines based on the scientific literature and BMPs from other states. These guidelines can be divided into two categories, those which apply to all sites and soil types and those which are site-specific:

1. Universal guidelines

- a. Retain the forest floor, litter layer, and stumps
- b. Retain legacy wood/coarse woody debris (CWD)
 - i. Leave all CWD except where fuel loads are high (amount to be determined)
 - ii. Where CWD is sparse, leave additional slash (amount to be determined)
 - iii. Wildlife reserve trees, green reserve trees, and logs should be retained in perpetuity across rotations (WAC 222-30-020(11))
 - iv. Retain as many wildlife reserve trees/snags as possible
- c. Soil disturbance classification (Scott 2007)
 - i. Limit soil disturbance to class 1, minimize class 2, and avoid classes 3-5
- d. Where possible, delay yarding after felling to allow slash/needles to dry and fall off in more even distribution across the site (feasible?)
- e. Cover skid trails with slash during harvest operations
- f. Where skidders are used, mark and flag “high and dry” equipment corridors to limit the total area disturbed during harvest (not logger’s choice)
- g. After the initial harvest, do not reenter the site beyond the landings to collect woody biomass
- h. Ensure good communication between the landowner, harvest manager, and equipment operators
 - i. Training and certification opportunity (see below)
- i. Road construction and maintenance (WAC 222-24)
 - i. Postpone access road abandonment requirement until after biomass collection
 - ii. Ensure all local RMAP work is still completed within annual report timelines
 - iii. Ensure that roads are maintained and “storm proofed” immediately following tree bole harvest, and prior to biomass collection, while retrievable biomass is drying
- j. Minimize impacts to non-soil resources (wildlife, water quality, etc.)
 - i. To be determined
 - ii. Must maintain protection of public resources
 - iii. Retain all slash created within RMZ, WMZ, ELZ and CMZ (or within the 100-year flood level of any typed waters)

Because soil types and conditions are highly variable across our state, there is general consensus among stakeholder groups that a risk management approach is appropriate for minimizing the impacts of biomass collection on forest soils, and that this risk should be managed at a low to moderate level. At a minimum, the risk assessment process should include the following factors:

	RISK				Sources
	Low	Moderate	High	Very High	
Site class	I/II	II/III	IV	V, red alder, noncommercial, marginally commercial	FPARS
Proportion N removed (above-ground N: total N)	<10%	10-20%	20-30%	>30%	Direct measurement, Evans 1999
Soil erosion hazard	Slight	Moderate	Severe	Very severe	NRCS Soil Survey
	1	2	3	3	DNR soils maps
			Highly unstable or highly erodible	Highly unstable & highly erodible	FPARS
Mass wasting hazard/ slope instability	1	2	3	3	DNR soils maps
		Medium	High	High	FPARS
	1	2	3	3	SLPSTAB
Soil operability risk rating	Low	Moderate	High	Very high/potential for saturation	NRCS Soil Survey, Heninger et al. 2010

- Risk level of site to be determined by the risk level of the majority of factors listed.
- Field verification by a qualified expert is recommended.
- Assessment of additional site-specific risks such as the susceptibility to fire, pests, and weeds and impacts to wildlife should also be made.

2. Site-specific guidelines

- a. The site risk rating dictates the amount of fine woody debris (FWD/slash) that must be retained
 - i. Low: 25%
 - ii. Moderate: 50%
 - iii. High: 75%
 - iv. Very high: 100%
- b. The percent of slash retained can be estimated using the methods of Cross et al. (2011).
- c. To the extent possible, retained slash should be even distributed across the site.
- d. Retained slash can be moved into mini-piles distributed evenly across the site to facilitate stand regeneration.
- e. Utilize low impact harvest methods on high risk sites
- f. Observe the following precipitation limiting factors for each soil operability risk rating (Heninger et al. 2010):
 - i. Low risk: short-term rainfall event restrictions (hours)
 - ii. Moderate risk: intermediate-term rainfall event restrictions (days)
 - iii. High risk: longer-term rainfall event restrictions (seasonal)
 - iv. Very high risk (very susceptible): longer-term, seasonal rainfall event restrictions

To ensure the adequate protection of forest soils as required by RCW 76.09.010, the Conservation Caucus proposes that the above guidelines be codified into new FP Rules, and if necessary, a Board Manual be written to provide an accurate interpretation of the new FP Rules for landowners and operators. New FP Rules designed to protect soil resources will be especially important if the market for woody biomass increases significantly in the future as a result of an increasing demand for renewable energy sources. The set of rules proposed here will need to be integrated with other resource concerns as we assess them over time (i.e. wildlife, water quality, etc.).

3. DNR Consulting and Enforcement Provisions

The above provisions are the Conservation Caucus' initial attempt to recommend universal and site-specific measures for forest biomass harvest relative to preserving soil health, productivity, and quantity. Because many of these prescriptions are site-specific and complex, they will require a certain amount of expertise and training to implement and enforce. Moreover, it is important to attempt to achieve uniform enforcement of biomass regulations/BMP's among the DNR regions so that landowners/biomass operators who commit to exemplary practices are not put at a competitive disadvantage to those who do not share the same commitment. Accordingly, the Conservation Caucus recommends the following:

- a. DNR Biomass harvest officers. DNR should train and employ at the regional level a biomass harvest officer whose responsibility includes visiting proposed biomass harvest FPA sites, making assessments of biomass harvest limitations and restrictions on site, and enforcing those limitations during biomass harvest. The fees necessary to fund these

positions should come from biomass harvest permit fees, a subject that should be taken up at the soonest possible time in the Legislature. The fees could be placed on, or shared by, the forest landowners, the operator, and the purchaser of the biomass material. A voluntary fee should be considered until legislative authorization is secured.

- b. Biomass harvest operator certification. To ensure familiarity and compliance with biomass harvest rules and restrictions, DNR should initiate and maintain a biomass harvest operator certification program, including appropriate licensing fees. This certification will make biomass harvest operators accountable and will vastly improve the uniform application of the regulations/BMP's.
- c. Biomass Harvest Penalties. We recommend DNR develop, or consider the suitability of the existing penalty system, to discourage over-harvesting of forest biomass contrary to the regulations/BMP's.