



ORGANIC FOREST ECOSYSTEM CONSERVATION CHECKLIST

Optimal Conservation Practices to protect water quality, site productivity, native biological diversity, and carbon sequestration and storage and to attenuate flood damage in forests actively managed for wood products, non-wood forest products and other forest ecosystem products and services.

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Introduction

Vermont Family Forests Foundation, Inc. is a not-for-profit organization working to conserve the health of the forest and, when appropriate, cultivating local family forests for community benefits. Vermont Family Forests (VFF) has adopted a set of principles to guide forest conservation activities. One of these principles states that “ECOLOGICAL FORESTRY should conserve native biodiversity, water quality, carbon storage, site productivity and scenic beauty; use only biological pest control; and mimic natural processes.” The following forestry practices have been designed for forest friends and stewards who are interested in practicing ecological forestry. They are most applicable to the following natural community types: Northern Hardwood Forest; Rich Northern Hardwood Forest; Mesic Red Oak-Northern Hardwood Forest; Red Spruce – Northern Hardwood Forest; Hemlock-Northern Hardwood Forest; Mesic Maple-Ash-Hickory-Oak Forest; and the Valley Clayplain Forest. Owners of lands in the VFF-verified pool agree to comply with the VFF Organic Forest Ecosystem Conservation Checklist to the maximum practical extent.

Accessing the Forest

Forwarding Paths, Truck Roads, Skid Trails and Log Landings

- ✓ Design, build, and maintain access system – including forwarding paths, truck roads, skid trails, and log landings -- in full compliance with the standards contained in *Erosion control on Logging Roads in the Appalachians* (USDA Forest Service 1970) and *Permanent Logging Roads for Better Woodlot Management* (USDA Forest Service 1978). Check *Vermont Acceptable Management Practices* (VT-FP&R 2019). Space and maintain drainage structures as shown in Table 2.
- ✓ Out-slope to 6% all logging access paths, roads, and trails. Avoid inside ditches, use broad-based dips, and retain near vertical cut banks to the optimal practical extent to reduce storm flow concentration and to protect water quality.
- ✓ Log under frozen winter conditions to maximize the soil’s ability to store carbon and protect breeding birds. Delay summer harvests at least until after August 15th. Avoid spring harvests and rutting that extends beyond the A soil horizon.
- ✓ Design and construct forwarding paths, skid trails, truck roads, and log landings before logging begins and under dry summer conditions. The average grade of the access network should be 7% or less.
- ✓ Minimize the width, number and extent of truck roads and skid trails -- particularly in or near sensitive areas such as stream crossings and protective strips. The access network of roads, trails, and paths should not exceed 5% of the treated area.
- ✓ Access networks should avoid topography with slopes of 35% or greater.
- ✓ Road and trail networks should be planned to avoid fragmenting forest blocks and to avoid creating linear openings in the forest as these can serve as vectors for predators or contribute to desiccation of leaf litter on the forest floor.
- ✓ Forwarding paths, skid trails, truck roads, and log landings -- should only be used when adequately dry or frozen.
- ✓ Properly buffer and protect special habitats such as cliffs, caves, talus slopes, beaver meadows, vernal pools, spring seeps, and remnant patches of old growth forest.

- ✓ Take special care to protect wetlands, particularly those with muck and peat soils and a thick organic layer. These wetland soils are often capable of storing ten times as much carbon as other soils in the region.
- ✓ Use only clean, seed-free, low-impact trucking and logging equipment to avoid invasives, site damage, and soil compaction.
- ✓ Log landings should: be located on nearly-level, stable ground; be kept away from protective strips; have water diversions installed; and be graded to prevent erosion and sedimentation.

Protective Strips and Buffer Strips

- ✓ Maintain protective strips—characterized by minimal soil disturbance, nearly-complete canopy closure, and many large, mature trees—between the access network and surface waters according to Table 4 at a minimum.
- ✓ Seed areas of exposed soil within the protective strip using native species to the maximum extent and mulch with material free of invasive exotics. Apply according to Table 3. Install brush barriers at the toe of fills within 150 feet of streams
- ✓ Keep stream buffer strips at least 100 feet in width, free of logging vehicles. Conduct little or no tree cutting in buffer strips.
- ✓ Take particular care to prevent stream bank erosion in order to avoid the release of sediment and stored carbon.

Stream Crossings

- ✓ Restore stream crossings and remove non-permanent structures as soon as possible.
- ✓ Cross streams with bridges or culverts that are properly sized according to Table 2 and installed at right angles to the stream.
- ✓ Prevent sediment from reaching streams by using turn-ups or broad-based dips on forwarding paths, truck roads, and skid trails prior to all stream crossings. Drainage ditches should not feed directly into streams or other surface waters.

Closeout

- ✓ Restrict post-harvest use of the access network to prevent erosion, compaction, and site disruption.

Vegetation Management

- ✓ Use single-tree and small group selection methods for communities with gap-phase replacement (e.g. northern hardwoods). Use the irregular shelterwood method for communities with stand-replacing disturbance regimes (e.g. spruce-fir). Uneven-aged management by area regulation is recommended. If using the group-selection method, keep canopy openings less than 0.25 acres. If using the group-shelterwood method, the size of the regenerated areas can be increased. Avoid clear-cutting and whole-tree harvesting.
- ✓ Forests generally sequester and store the most carbon when left untouched. Therefore, avoid creating canopy gaps other than those that are deemed essential to meet non-ecological forest functions and values.
- ✓ Maintain gradual or soft edges between habitats. Allow native shrubs, saplings, and some overstory trees to remain along the harvest boundary. Edges may also be “feathered” by retaining more trees closer to the uncut forest and gradually fewer trees closer to the harvested area.
- ✓ Manage for at least four large and secure cavity, snag, and/or decadent, living trees per acre on average, with one exceeding 21 inches diameter breast height (DBH) and four exceeding 15 inches DBH.¹ Leave trees that have cavities of varying sizes and are located in the upper trunk of the tree. Give priority to hardwood trees with cavities, as they remain intact longer than softwoods.
- ✓ Manage for at least four downed trees or 16+ foot long logs per acre on average, with one exceeding 21” DBH and four exceeding 15” DBH.

¹ To address safety issues, this may be accomplished by clustering cavity and snag trees in areas such as riparian zones and wetlands and away from access roads and trails.

- ✓ Grow the largest trees and use the longest rotations possible within site and log quality limitations.
- ✓ Retain a minimum of three vigorous and wind-firm legacy trees per acre measuring over 19 inches DBH. Intermediate treatments should raise the average (mean) diameter of the residual dominant and co-dominant trees of the forest.
- ✓ Any forest management in natural communities that are ranked as “very rare”(S1) and “rare” (S2) or in natural communities ranked as “uncommon” (S3), “common” (S4), and “very common”(S5) but with little or no evidence of past human disturbance should be reviewed and approved by the VT F&W Natural Heritage Biologists.
- ✓ When planting, use only local sources of native species, plant three or more species, and include deciduous species.
- ✓ When thinning or regenerating stands, favor native species over non-native species and trees and shrubs that produce seeds and fruits.
- ✓ Use natural regeneration to the maximum practical extent.
- ✓ Biological legacies of the forest community—including coarse dead wood, logs, and snags; trees that are large, living, and old; buried seeds; soil organic matter; invertebrates; sprouting plants; and mycorrhizal fungi—should be protected to aid in post-harvest recovery and to keep the forest from becoming "oversimplified."
- ✓ Promote the seed-bearing capacities of poorly represented members of the forest.
- ✓ Avoid tree felling on slopes exceeding 50%.
- ✓ In general, leave as much biomass on site as possible, including all materials less than 3 inches in diameter.
- ✓ Promote a vertical stand structure that includes over-story, mid-story, shrub, and herbaceous vegetation layers.
- ✓ Remove invasive exotics before harvesting forest products. Use only organic-certified pesticides. Do not use agrochemical pesticides or hormone herbicides.
- ✓ Use biodegradable, non-petroleum bar and chain oil to protect forest workers and groundwater supplies.
- ✓ Avoid using genetically modified organisms (GMOs).
- ✓ Limit residual stand damage—including basal wounds, broken and/or scraped tops, and exposed roots—to 10% or fewer of the dominant or co-dominant trees.
- ✓ Prior to the inception of harvest, mark all trees to be harvested.
- ✓ Leave at least 30% of the average annual growth on site.
- ✓ Avoid grazing by domestic animals and support active control of deer populations.
- ✓ Directionally fell low-value timber across slopes and leave in place to slow, spread, and sink storm flows.

Sensitive and Special Habitat Areas

Areas including wetlands, raptor nests, upturned tree roots, seeps, vernal pools, hard/soft mast species, and other unique or fragile, natural or cultural sites including areas of historical or community significance sites require identification and protection.² Harvesting and road building in wetlands, including the construction of new roads or expansion of the width of existing roads by more than 20%, will require a permit or review by the Wetlands Office of the Water Quality Division (802) 241-3770. The UVM publication "Wetlands Rules and Regulations: What they mean to your logging operation in Vermont" should be referred to when building or upgrading access and managing vegetation around wetlands.

² Cultural resources should be protected by following best management practices contained in *Stonewalls and Cellarholes* (VT ANR 1994). Well-drained terraces within 100 feet of permanent streams and having south to west aspect are potential prehistoric sites. These should be mapped and/or otherwise identified and avoided. If site disruption is likely, the Vermont Division of Historic Preservation should be consulted with permission of the landowner(s).

Table 1: Distance Between Drainage Structures on Temporary & Permanent Logging Roads (feet)

Road Grade (%)	Distance between Functioning Waterbars on Skid Trails, Truck Roads & Forwarding Paths	Distance Between Ditch Relief Culverts on Logging Roads	Distance between Broad-based Dips, Open-top Culverts, & Turn-ups on Permanent Logging Roads
1	300	300	300
2	250	250	250
4	170	170	200
5	135	135	180
6	120	120	167
8	100	100	150
10	80	80	140
15	60	60	n/a
20	45	45	n/a
25	40	40	n/a

Table 2: Minimum Culvert Size for Stream Crossings

<i>Drainage Area: number of acres sloping toward the stream</i>	
Drainage Area (acres)	Recommended Pipe Diameter (inches)
4	15
8	18
16	24
20	30
40	36
50	42
80	48
120	60
160	66

Table 3: Methods of Seeding and Mulching Logging Roads, Log Landings, and Stream Crossings

Options	Rate of Application	Timing of Application
Hay or Straw Mulch with Annual Ryegrass	60 bales/acre & Annual Ryegrass at 40 lbs./acre	Any time
Hay or Straw Mulch with Winter Rye	60 bales/acres & Winter Rye at 112 lbs./acre	Any time
Hay or Straw Mulch with Soil Conservation Seed Mix	60 lbs./acre & Soil Conservation Seed Mix at 42 lbs./acre	Any time but best April 15-June 15 Or August 1 – September 15
Hydroseeding with Native Grasses or Weed Free Seed mix	Coverage and seeding comparable to the rates above	Any time

*Use mixes that contain native species only.

Table 4: Minimum Undisturbed Forest Buffer Widths

Slope of Land between Road or Landing and Stream (%)	Width of Filtration Strip (feet along surface of ground)
0	50
10	100
20	140
30	180
40	220
50	260