



FOREST HEALTH CONSERVATION CHECKLIST

Best conservation practices to protect water quality, site productivity, native biological diversity, and carbon sequestration and storage in forests managed for timber and fuelwood.

Updated 3/02/2010

Introduction

Vermont Family Forests™, Inc. is a not-for-profit organization working to conserve the health of the forest community and, when appropriate, promoting the careful cultivation of local family-owned 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, 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-certified pool agree to comply with the VFF Forest Health Conservation Checklist to the maximum practical extent.

Accessing the Forest

Skid Trails, Truck Roads, and Log Landings

- ✓ Truck roads, skid trails, and log landings should be built and maintained in full compliance with the standards contained in the *Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont* (VT FP&R 1987). The drainage structures should remain fully functional with post-harvest use.
- ✓ Avoid spring harvests and rutting that extends beyond the A soil horizon.
- ✓ To maximize the soil’s ability to store carbon, harvesting should only be done when the soil is completely frozen.
- ✓ It is strongly recommended that all skid trails, truck roads, and log landings be designed and constructed prior to the inception of harvesting.
- ✓ The timber harvesting access network should not expose mineral soil on more than 5% of the treated area.
- ✓ 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 as these wetland soils are capable of storing ten times as much carbon as other soils in the region.
- ✓ Use low-impact logging equipment, including small forwarders, to minimize residual stand damage and soil compaction.
- ✓ Winter harvesting is preferred to protect breeding birds. Delay summer harvests until after August 1st.
- ✓ Skid trails, truck roads, and log landings -- should only be used when adequately dry or frozen.
- ✓ Minimize the width, number and extent of truck roads and skid trails -- particularly in or near sensitive areas such as stream crossings, protective strips, and steep slopes.

- ✓ Road and trail networks should be planned to avoid fragmenting forest blocks and to avoid creating linear openings in the forest. These can serve as vectors for predators or contribute to desiccation of leaf litter on the forest floor.
- ✓ 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

- ✓ Protective strips -- characterized by minimal soil disturbance, nearly-complete canopy closure, and many large, mature trees - should be maintained between the access network and surface waters according to Table 4 in the Vermont AMPs at a minimum.
- ✓ Areas of exposed soil that occur within the protective strip should be seeded using native species and sources to the maximum extent possible and mulched with material free of invasive exotics and applied according to Table 3 in the AMPs.
- ✓ Stream buffer strips should: be kept free of logging vehicles; have only little or no tree cutting; and be at least 25 feet in width.
- ✓ Particular care should be taken to prevent stream bank erosion in order to avoid the release of sediment and stored carbon.

Stream Crossings

- ✓ Stream crossings should be restored and non-permanent structures should be removed as soon as possible.
- ✓ Streams should be crossed with bridges or culverts which are properly sized according to Table 2 in the Vermont AMPs and installed at right angles.
- ✓ Sediment should be prevented from reaching streams by using turn-ups or broad-based dips on truck roads and skid trails prior to all stream crossings. Drainage ditches should not feed directly into streams or other surface waters.

Closeout

- ✓ Post-harvest use of the access network should be restricted in order to prevent erosion, compaction, and site disruption.

Vegetation Management

- ✓ The single tree and small group selection methods should be used for communities with gap-phase replacement (e.g. northern hardwoods) and the irregular shelterwood method should be used for communities with stand-replacing disturbance regimes (e.g. spruce-fir). Uneven-aged management by area regulation is recommended. Where the group-selection method is employed, canopy openings of 0.25 acres or less are preferred. Where the group-shelterwood method is employed, the size of the regenerated areas can be increased. Clear-cutting and whole-tree harvesting should be avoided.
- ✓ Forests generally sequester and store the most carbon when left untouched. Therefore, it is not recommended to artificially create canopy gaps other than those that are deemed essential to meet non-ecological forest functions and values.
- ✓ Gradual or soft edges between habitats are preferred. 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. Also, give priority to hardwood trees with cavities, rather than softwood, as they remain intact longer.
- ✓ Manage for at least four downed trees or 16+ foot long logs per acre on average, with one exceeding 21” DBH and four

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.

exceeding 15" DBH.

- ✓ 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.
- ✓ Tree felling should be avoided on slopes exceeding 60%.
- ✓ In general, leave as much biomass on site as possible including all materials that are less than 3 inches in diameter.
- ✓ Promote a vertical stand structure that includes over-story, mid-story, shrub, and herbaceous vegetation layers.
- ✓ Most woody, invasive exotics should be removed before harvesting forest products. The use of agrochemical pesticides or hormone herbicides must be avoided.
- ✓ Use biodegradable, non-petroleum bar and chain oil to protect forest workers and groundwater supplies.
- ✓ The use of genetically modified organisms or "GMOs" must be avoided.
- ✓ Residual stand damage -- including basal wounds, broken and/or scraped tops, and exposed roots -- should be confined to 10% or fewer of the dominant or co-dominant trees.
- ✓ It is recommended that all trees to be removed be marked prior to the inception of harvest.
- ✓ Average annual removal of woody biomass from the site should not exceed 70% of the average annual growth.
- ✓ Avoid grazing by domestic animals and support active control of deer populations.

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: Recommended Distances Between
Drainage Structures on Logging Roads**

Feet			
Road Grade (Percent)	Distance Between Waterbars	Distances Between Culverts	Distances Between Turnups, Dips & Pole Culverts
1	400	450	500
2	250	300	300
5	135	200	180
10	80	140	140
15	60	130	130
20	45	120	120
25	40	65	----
30	35	60	----
40	30	50	----

Table 2: Guide for Determining Culvert Size When Permanent and Temporary Truck Roads Cross Streams.

DRAINAGE AREA - The number of acres sloping toward the stream

Well Drained Soils	Shallow Soils with Frequent Rock Outcrops Or Impermeable Soil Conditions	Recommended Pipe Diameter (Inches)
16	4	15
25	7	18
40	12	21
55	16	24
84	27	30
130	47	36
190	64	42
260	90	48
335	120	54
400	166	60
550	205	66
650	250	72

Table 3: Methods of Seeding and Mulching Logging Roads, Log Landings and Skid Trails.

Temporary Cover

Material	Rate of Application	Recommended Time of Application
(A) Straw or hay free of invasive species seed	60 bales/acre	Any time
(B) Domestic Ryegrass	20 lbs./acre	Fall (for spring growth)

OR

Permanent Cover

Material	Rate of Application	Recommended Time of Application
(A) Soil Conservation Mix*	42 lbs./acre	April 15-June 15 Or Aug. 1-Sept 15

*Use mixes that contain native species only.

Table 4: Protective Strip Width Guide

Slope of Land Between Roads or Landings and Streambanks or Lake Shores (percent)**	Minimum Width Between Roads or Landings and Stream (Feet Along Surface of Ground)
0-10	50
11-20	70
21-30	90
31-40*	110

*Add 20 ft. for each additional 10% side slope.