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Hi Karen

March 30, 2010

Here are my suggested changes to the draft, based on my concerns about including "no harvest" areas. I was glad to see that the sections on Cultural Resources, Seeps and Old Growth Forests did not include no harvest buffer restrictions, and yet still offer adequate protection. This only adds to my anxiety for including no harvest buffers when dealing only with wetlands.

In your quest to edit the project to fewer pages, I vote to eliminate the section on Harvesting in High-Use Recreation Areas. It is only a few pages, but the recommendations are so obvious and common sense that this section is not really needed. That is, I didn't see much "science" in the recommendations, just every day good judgement. Much of this was already covered in the Logging Aesthetics chapter earlier.

Cheers.

Nute

Good Forestry in the Granite State: Draft Water Resources - Wetlands

2.1 WETLANDS

BACKGROUND

Wetlands are ecologically important and should receive special consideration in order to protect water quality, wildlife habitat, and aesthetic values. Wetlands protect water quality, help control floods, recharge groundwater, and provide recreational and scenic opportunities. Wetlands are among the most critical parts of any forest ecosystem. Forested wetlands can include economically important trees as well as rare plants and natural communities. There are 47 rare plants that grow in forested wetlands in New Hampshire, including 31 listed as endangered. Riparian areas and wetlands are used by over 90% of the region's wildlife species and are the preferred habitat for over 40% of them.

Wetlands are identified using hydrology, soils, and vegetation. Hydrology is the presence of water at or near the soil surface. Some signs of wetland hydrology include swollen tree trunks, drift lines, and water or silt-stained leaves or plant stems. All wetlands have saturated soil for at least part of the growing season, and all support vegetation adapted to wet conditions.

Wetlands may be forested (such as red maple or cedar swamps) or non-forested (such as marshes, wet meadows, scrub-shrub wetlands, peatlands or beaver-created meadows). They can have open water. Shrub wetlands are dominated by shrubs and saplings and may be in a transitional state between an open wetland and a forested one, or they may remain shrubby. They include small or ephemeral areas such as seeps and vernal pools (see xx vernal pools and xx seeps). Riparian areas are associated with wetlands and surface waters (xx riparian areas). *Best Management Practices for Erosion Control on Timber Harvesting in New Hampshire* includes a basic guide to wetland identification.

Wetlands and the adjacent upland have a long history of use and alteration by humans. Combined pressures along with their ecological significance, underscores the importance of properly managing those that aren't yet heavily impacted and restoring those that are currently degraded. Wetlands protection

begins with careful road and skid trail layout to minimize wetland and surface water crossings. The timing and silvicultural methods used in wetlands and adjacent uplands are also key.

OBJECTIVE

Maintain the important functions and values of wetlands.

CONSIDERATIONS

- The N.H. Department of Environmental Services (NHDES), pursuant to RSA 482-A, regulates activities in wetlands and the N.H. Department of Resources and Economic Development, pursuant to RSA 227-J, regulates timber trespass, basal area and slash. Together they regulate forestry practices in wetlands.
- Cities and towns may have adopted their own wetland ordinance. Municipalities may further identify wetlands of significant value worthy of extra protection because of their uniqueness, fragility, or unspoiled character. These wetlands, and the 100 foot buffer adjacent to the wetland, are designated as "prime wetlands" and are afforded special protection under RSA 482-A.
- Guidelines for harvesting in and adjacent to wetlands and surface waters are known as best management practices, or BMPs. These guidelines, some of which are law, are found in *Best Management Practices for Erosion Control on Timber Harvesting in New Hampshire.*
- Proper planning reduces the number, width, and length of surface water and wetland crossings and saves money.
- Use of corduroy or tree tops minimizes impact to the ground. These materials are considered fill in wetlands and require a permit from NHDES. However, corduroy can be left in place where there is no defined stream channel.
- Excessive rutting in wetlands affects the surface hydrology, severs plant root and can cause erosion.
- Identification of forested wetland boundaries may be difficult.
- The integrity of wetlands may be affected by activities of others throughout the watershed.
- Forested wetlands may be highly productive so that limiting harvesting in wetlands and upland areas bordering them will entail an economic loss.
- Some wetlands are rare, some are designated exemplary natural communities, and some wetlands are more sensitive to disturbance than

other wetlands. The N.H. Natural Heritage Bureau (NHNHB) is the best source for determining if a wetland is rare, an exemplary natural community, or susceptible to disturbance.

- Wetlands can be surrounded by productive upland forests and may be affected by cutting along the wetland edge. Uplands bordering wetlands filter runoff, capture pollutants before they enter the wetland, and are critical to the survival of wetland-dependent wildlife. A wetland buffer, as used in this chapter, is this vegetated upland area adjacent to a wetland. Deciding on the width and management actions in wetland buffers depends on what functions and values you want to preserve. It is difficult to generalize about wetland buffer widths because of the many types of wetlands and the diversity of wildlife. Different species require different widths for breeding, nesting, and overwintering. Leaving the understory adjacent to wetlands intact will provide many wildlife and water quality services. Timber harvesting within a wetland buffer can provide benefits to wildlife habitat (x.x Beaver). The size of a buffer is influenced by, among other things, the type of wetland, steepness of slope surrounding the wetland, the erodibility of soils, the size and type of vegetation within the wetland, and the landowner's objectives.
- There can be wildlife-related, ecological and silvicultural reasons to harvest in wetlands.

RECOMMENDED PRACTICES

- Survey the property (ideally in early spring) and identify important hydrologic features such as streams, ponds and wetlands including s vernal pools.
- Consult a natural resource professional to help identify wetlands ~~and to~~ determine what permit(s) may be needed. AND PLAN FOR A REDUCED HARVEST BUFFER.
- Check with the NHDES or the city or town before timber harvesting in or within 100 feet of prime wetlands.
- Protect surface waters and wetlands by appropriately locating roads before harvesting begins and appplying other BMPs.
- When logging in and near forested wetlands, avoid rutting and other damage by cutting when the ground is frozen or sufficiently dry to support the type of equipment used.
- Before harvesting within or near rare or highly sensitive wetlands, consult with the NHNHB for suggested management recommendations specific to the wetland type and landscape context.

- Designate a wetland buffer adjacent to forested and non-forested wetlands. Include steep slopes, highly erodible soils, known endangered species habitat, rare plants and exemplary natural communities, and heron, eagle or osprey nests. The effectiveness of the buffer increases with width. Sensitive wetlands will require larger areas of upland to reduce the risk of disturbance.
- Leave the area closest to the stream, pond or wetland unharvested to provide increased protection to aquatic habitats and allow a reliable long-term supply of cavity trees, snags, and downed woody material. Larger zones will increase the protection of non-timber values, however, no-harvest zones may not always be consistent with ecological or silvicultural objectives.
- Retain trees with cavities, standing dead trees, downed logs, and large supra-canopy trees.

THESE ARE ALREADY DISCUSSED OR IMPLIED IN PREVIOUS PARAGRAPHS.

CROSS REFERENCE

Erosion and Soil Damage 1.1; Beaver-Created Openings 3.3; Deer Wintering Areas 3.5; Rare Plants and Natural Communities 4.1; Vernal Pools 4.2; Seeps 4.3; Heron Colonies 4.5; Bald Eagle and Osprey Nests 4.6; Bald Eagle Winter Roosts 4.7. Riparian, Water Quality, Rare Wildlife,

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Good Forestry in the Granite State: Draft Water Resources - Riparian Areas

2.1 FOREST MANAGEMENT IN RIPARIAN AREAS

BACKGROUND

Riparian areas should be managed to protect water quality, streamf[redacted] and wildlife habitat, and scenic values.

A riparian area is land adjacent to and directly influenced by streams, rivers, ponds, lakes, and associated ~~non-forested~~ wetlands. It forms a transition from aquatic to terrestrial ecosystems. Soils and growing conditions are often moister, more nutrient rich, and more productive than those in surrounding uplands, resulting in considerable species diversity and productivity. Because of their proximity to surface waters, these areas are vital for maintaining water quality and aquatic resources.

Riparian areas have a long history of use and alteration by humans, including urbanization, road-building, agriculture, dam-building, and timber harvesting. The combined pressures, along with their documented ecological significance, underscore the importance of properly managing the riparian forest.

The Functions and Values of Riparian Areas

Riparian areas provide many ecosystem services and benefits such as:

- Flood control and stream flow regulation especially where the riparian area includes a river's floodplain
- Water quality protection by filtering and retaining sediment, nutrients, and other pollutants from upslope areas, and through bank stabilization.
- Aquatic habitat protection including:
  - Regulating temperatures by shading streams, which is particularly important for lower order streams that support coldwater fish (e.g., brook trout). Increases in water temperature can have negative effects on stream chemistry, aquatic insects, stream flora, and fish.
  - Large woody material (e.g., fallen trees and large branches) which creates pools, riffles, debris jams, and related aquatic habitat including necessary spawning habitat for brook trout.
  - Leaves, twigs, fruit and insects contributing energy to drive aquatic food webs. Headwater streams and small rivers derive most of their

energy this way.
    - Fish habitat during high flow periods.
- Rare natural communities (e.g., calcareous riverside seeps, swamp white oak floodplain forest) and many rare plants. More than 1/3 of all New Hampshire vascular plants occur in riparian natural communities, including 93 rare species.
- Habitat for feeding, cover and travel for many amphibians, birds, furbearers, and reptiles. Deer-wintering areas are often associated with riparian softwood forest. Large trees in these areas are the primary nesting sites for bald eagles, osprey, and colonial waterbirds.
- Recreational and scenic opportunities, such as hiking, fishing, hunting, boating, bird-watching, and wildlife viewing.

Identifying Riparian Areas and Designing Riparian Management Zones

Riparian areas are defined by their location adjacent to lakes, ponds, streams and rivers, by their characteristic vegetation, and by the function they serve. Vegetation can vary from a narrow band of shrubs to floodplain forests hundreds of yards wide. The size depends on what function is being considered and may include upland forest as well as truly riparian communities.

GOOD!

Riparian management zones (RMZs) are linear zones along the shores of lakes, ponds, rivers, streams, and associated wetlands, within which special forest management practices are used.

GOOD

Just how wide should the RMZ be? Unique combinations of ecological functions, physical characteristics, and landscape context, make it difficult to arrive at a one-size-fits-all width. An important first step is to identify what you wish to protect – the width needed to provide shade to a stream, for example, may be one tree height or less, whereas riparian wildlife habitat may extend several hundred feet into upland forests adjacent to a river or lake. Foresters and landowners are in the best position to consider and apply localized factors.

GOOD

Variable, tailor-made RMZs reflect localized site conditions, but are generally more complicated to consistently define, apply, and monitor. Fixed-width RMZs have the practical benefit of being clear, consistent, relatively simple to apply and monitor, and provide reasonable confidence that RMZ values and goals will be attained. We suggest a tiered approach that provides the practical benefits of a fixed-width, but includes key modifiers offering some added benefits of a variable-width approach.

The following widths are recommended as general guidelines. The RMZ extends upland from the top of the streambank or from the upland edge of any stream-, pond-, or lake-side wetlands (see illustration). For additional information about establishing RMZs, see chapter 2 in *Riparian Management in Forests of the Continental Eastern United States*.

Guidelines for Riparian Management Zones

	Legally Required1		Recommended	
	Riparian Management Zone	No Harvest Zone2	Riparian Management Zone	No Harvest Zone2
Intermittent streams	none	none	75 ft.	none
1st and 2nd order streams	50 ft.	none	100 ft.	25 ft.
3rd order streams5	50 ft.	none	300 ft. 4	50 ft.3
4th order and larger streams5	150 ft.	none	300 ft.4	25 ft.
Pond <10acres (see footnote 1)	50 ft.	none	100 ft.	none
Lake or Great Pond (>10 acres)	150 ft.	none	300 ft.	25 ft.

1 Width required under RSA 227-J:9 (basal area law). Within a 12-month period, no more than 50% of the basal area may be cut in these areas. Includes ponds less than 10 acres associated with a stream or brook that flows throughout the year.

2 Portion directly adjacent to the water body in which no cutting is recommended. It may be desirable to expand if there are steep slopes (>25%), unstable soils, sensitive wetlands, or exemplary natural communities. Increasing the width of the no-harvest zone will provide greater protection of non-timber values, but will also encumber a larger amount of timber. There may be valid ecological and silvicultural reasons to harvest in the no-harvest zone.

3 A 50' no-harvest zone is recommended for 3rd order streams because of the importance of large woody material on streams of this size.

4 RMZ width on 3rd & 4th order and larger streams and rivers may expand to encompass known wildlife travel corridors, drinking water supply considerations, and the full extent of the 100-year floodplain.

5 For a list of fourth-order and higher streams (http://des.nh.gov/organization/divisions/water/wetlands/cspa/documents/consolidated_list.pdf) see NHDES Consolidated List of Waterbodies Subject to RSA 483-B.

OBJECTIVE

Maintain the important ecological functions and values of forested riparian areas.

CONSIDERATIONS

- Wetland permits (RSA 482-A) or other legal requirements (RSA 227-J) may apply to forestry operations in riparian areas (x.x wetlands). Timber harvesting is exempt from RSA 483-B, the Comprehensive Shoreland Protection Act, so long as it isn't associated with shoreland development or land conversion, and is conducted in compliance with RSA 227-J:9.
- Landowner objectives, water body size, landscape context, vegetative composition, slope and other factors helps determine the appropriate width and management of RMZs.
- There are benefits to managing riparian areas with a long-term perspective (>100 yrs). Some potential effects of harvesting in riparian areas may be short-lived while others, such as reduced input of large woody material, are much longer lasting. Trees retained today will be the source of key terrestrial and in-stream habitat structure many decades into the future.
- Active forest management can be compatible with maintaining riparian functions and values. Trees regenerated today will be the future so[redacted] cover, cavity trees, woody material, and snags. Some silvicultural [redacted] wildlife habitat objectives can conflict with ~~no harvest or~~ limited harvest RMZs. For example, maintaining beavers at an active flowage within a particular stream reach may require active tree harvesting within these zones (x.x Beaver-Created Openings). Soil scarification improves the likelihood of regenerating white pine, red oak, or red spruce and may conflict with the recommendation to minimize ground disturbance.
- Riparian forests may be highly productive. Limiting harvesting in RMZs will entail some financial loss to riparian landowners.

- The integrity of aquatic, and riparian ecosystems may be affected by activities of others throughout the watershed.

RECOMMENDED PRACTICES

- Survey the property (ideally in early spring) and identify important hydrologic features such as rivers, streams, lakes and ponds.
- Establish RMZs along streams, rivers, ponds, and lakes. Recommended minimum zone widths and key considerations are described above.
- Include maintaining or restoring riparian functions and values as a silvicultural objective in RMZs.
    - Retain trees with cavities, standing dead trees, downed logs, and large supra-canopy trees (especially white pine).
    - Leave windfirm trees that are well-distributed. Leave other vegetation, including existing groundcover.
    - Choose a regeneration system most likely to maintain riparian functions and values and rapidly regenerate the site with the desired trees. Choosing a method is complicated by wet soils and the desire to maintain forest structure that contributes to wildlife habitat and other ecological values.
        - Use uneven-aged techniques such as single tree or small group selection, maintaining 60-70% crown closure or full stocking as recommended in silvicultural guides. (To convert crown closure percentages to basal area, see Leak and Tubbs 1983).
        - Use even-aged techniques such as shelterwood or patch cuts to achieve regeneration goals when rapid regeneration is likely (x.x silviculture).
- Locate new truck roads and log landings outside RMZs, except where doing so would result in greater overall adverse environmental impacts.
- Design roads and skid trails within RMZs to minimize the long-term impacts on water quality and wildlife habitat. Put roads to bed at the [redacted] the harvest operation.
- Minimize ground disturbance. Operate ground-based equipment when the ground is dry or frozen.
- Time harvesting to avoid disturbance to nesting birds (x.x woodland raptors) and other sensitive species (x.x wetlands).
- Leave the area closest to the stream, pond or wetland unharvested to provide increased protection to aquatic habitats and allow a reliable long-term supply of cavity trees, snags, and downed woody material. Refer to the table for guidance. Larger zones will increase the protection of non-timber values,

THESE CONDITIONS ARE PROBABLY MENTIONED IN OTHER PARTS OF THIS CHAPTER

~~however, no-harvest zones may not always be consistent with ecological or silvicultural objectives.~~

- Keep trees along banks to stabilize shorelines.
- Avoid leaving isolated riparian management zones with long distances of abrupt edge. Riparian forests next to heavy cuts, agricultural, or urban land uses may be subject to increased edge effects (e.g., invasives, nest predation) and risk of blowdown. Practices that minimize these risks include limiting harvest within the riparian management zone, increasing the width of the zone, or feathering the edges of the heavy cut.
- Refer to the x.x wetlands for recommended practices specific to wetlands.

CROSS REFERENCE

Erosion and Soil Damage 1.1; Beaver-Created Openings 3.3; Deer Wintering Areas 3.5; Rare Plants and Natural Communities 4.1; Rare Wildlife X.X; Vernal Pools 4.2; Heron Colonies 4.5; Bald Eagle and Osprey Nests 4.6; Bald Eagle Winter Roosts 4.7; Wetlands X.X; Floodplain Forests X.X.

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x.x VERNAL POOLS AND THE SURROUNDING FOREST

BACKGROUND

Vernal pools and the adjacent forest provide critical habitat for numerous wildlife species, but vernal pools are easily overlooked because they are small and dry seasonally.

Vernal pools form in shallow depressions or basins, and may appear as simple pools of water, with little or no vegetation growing in them. To be considered a vernal pool, the pool can't have a permanently flowing outlet and it must hold water for at least two months after spring ice-out (See NH Administrative Rule Env-Wt 101 for the official state definition).

Vernal pools differ from other wetlands in that they have a seasonal cycle of flooding and drying - this cycle determines what wildlife use vernal pools. Many flood then dry each year, though some pools may hold water for several years between drying.

Vernal pools are unique wetlands that provide critical habitat for several amphibian and reptile species. Fish are major predators in wetlands, but they are unable to maintain viable populations in vernal pools (because they dry). As a result, vernal pools provide critical breeding habitat for amphibians whose tadpoles and larvae are especially vulnerable to fish predation. These species include spotted salamanders, blue-spotted/Jefferson's salamanders, state-endangered marbled salamanders, and wood frogs.

Other species besides amphibians use vernal pools. Fairy shrimp are small crustaceans that require vernal pools for all life stages. State-endangered Blanding's turtles and state-threatened spotted turtles feed on amphibian eggs in vernal pools and use them for basking, mating, and overwintering. These turtles also use vernal pools as stop-over habitat when migrating, because pools provide moist refuge and abundant food. Many mammals, birds and snakes also forage at vernal pools, including song birds, wood ducks, ribbon snakes, bats, and raccoons.

While vernal pools are essential habitat for many wildlife species, the forest surrounding the pools is equally important. For example, wood frogs and the salamanders that breed in vernal pools spend over 11 months in the forest.

OBJECTIVE

Manage vernal pools and the surrounding forest to provide amphibian, invertebrate, and turtle habitat, by maintaining pool hydrology, water quality, forest floor integrity, and sufficient canopy cover.

CONSIDERATIONS

Many vernal pools meet the statutory definition of wetland and are subject to state wetlands regulations pertaining to timber harvesting.
Marbled salamanders and Blanding's turtles are listed as endangered, and spotted turtles as threatened species by the state of New Hampshire, and are protected under the NH Endangered Species Conservation Act. The NH Natural Heritage Bureau can tell you if these or other listed species have been documented on or near your property.
In preparation of a timber harvest, it may be necessary to mark the perimeter of vernal pools when they contain water in the spring, so they can be identified during the dry season or during winter.
When a vernal pool fills with water, how long it holds water, and the type and abundance of amphibians and invertebrates it supports can all change dramatically from year to year. Animals that use the pools are adapted to this variation. Though some species may not be present at a particular pool in a given year, that pool and its surrounding forest may still be high-quality habitat.
Although reptiles and amphibians are small, they travel long distances. Juvenile wood frogs and salamanders may disperse to vernal pools as far as 1/2 to several miles from the pool in which they were born. These movements maintain genetic variability within amphibian populations and recolonize sites where local amphibian populations are gone.
Both the vernal pool and the surrounding forests are part of the functional vernal pool system, but each serves different functions. Breeding habitat includes the vernal pool basin and a forested buffer extending 200 feet from the pool edge. The pool basin is the physical breeding location for vernal pool-dependent species and is a nursery for their eggs and larvae. The buffer helps protect pool water quality by filtering sediment and pollutants, providing shade, and slowing surface runoff. The buffer also provides leaf litter, which is the foundation of the vernal pool food chain, and shelter for adult and metamorphic amphibians immediately after they emerge from the pool. Core habitat extends from the breeding habitat out to 950 feet from the pool edge. It provides critical habitat for amphibians of all ages during the non-breeding season, and provides aestivating and basking habitat for spotted and Blanding's turtles.
The lack of long-term studies in the northeast means that much is still unknown about the specific effects of timber harvesting on vernal pool-dependent reptiles and amphibians. Available research suggests the within the core habitat:
Excessive compaction or scarification of the soil during timber harvesting may reduce leaf litter and burrows, and reduce the amount of suitable upland habitat available to wood frogs and mole salamanders. Maintaining natural topography maintains the volume and timing of water reaching vernal pools.
Vernal pool-dependant amphibians and reptiles are most sensitive to disturbances that alter water quality or temperature within the pools, alter the length of time the pools hold water, or alter the air and soil temperature in the forest surrounding vernal pools.
Wetland buffers intended to protect water quality may be too narrow to allow amphibians to complete all of their life-history.
Negative effects of temporary openings are less in a forested landscape than in a developed one.
As forest opening size increases, the negative effects of habitat drying and increased soil and air temperature also increases. However, it is unclear how specifically these impacts change as the disturbance increases from a single-tree opening, to a small group opening, to a large clearcut of many acres. In most cases, the negative effects of timber harvesting on vernal pool-dependant species are temporary and decrease with time as the forest regenerates.
Canopy cover reduced below 55%, will probably have at least a temporary negative affect on vernal pool-dependent amphibians - until the canopy or understory cover fill in.
Openings such as wildlife food plots, pastures, fields and landings create barriers to reptile and amphibian dispersal because they are

helps protect pool water quality by filtering sediment and pollutants, providing shade, and slowing surface runoff. The buffer also provides leaf litter, which is the foundation of the vernal pool food chain, and shelter for adult and metamorphic amphibians immediately after they emerge from the pool. Core habitat extends from the breeding habitat out to 950 feet from the pool edge. It provides critical habitat for amphibians of all ages duri[redacted] non-breeding season, and provides aestivating and basking habitat fo[redacted] spotted and Blanding's turtles.

- ~~The lack of long-term studies in the northeast means that much is still unknown about the specific effects of timber harvesting on vernal pool-dependent reptiles and amphibians. Available research suggests the~~ ~~within the core habitat.~~
  - Excessive compaction or scarification of the soil during timber harvesting may reduce leaf litter and burrows, and reduce the amount

REPLACE WITH

Most research has evaluated the effects of land development that permanently changes the landscape near vernal pools. Much is still unknown about the temporary effects of timber harvesting in this environment. Available studies suggest that in forest land adjacent to vernal pools:

allow amphibians to complete all of their life-history.

- Negative effects of temporary openings are less in a forested landscape than in a developed one.
- As forest opening size increases, the negative effects of habitat drying and increased soil and air temperature also increases. However, it is unclear how specifically these impacts change as the disturbance increases from a single-tree opening, to a small group opening, to a large clearcut of many acres. In most cases, the negative effects of timber harvesting on vernal pool-dependant species are temporary and decrease with time as the forest regenerates.
- Canopy cover reduced below 55%, will probably have at least a temporary negative affect on vernal pool-dependent amphibians - until the canopy or understory cover fill in.
- Openings such as wildlife food plots, pastures, fields and landings create barriers to reptile and amphibian dispersal because they are often hot and dry. These openings are most likely to create barriers when

http://goodforestry.pbworks.com/Draft+Sensitive+Areas+-+Vernal+Pools

they are located directly between adjacent wetlands.

- Vehicle ruts can reduce the length of time a pool holds water by directing water away from the pool. Ruts at any distance from a pool can create breeding "traps" for amphibians, since wood frogs and salamanders will often deposit eggs in ruts. Most ruts dry too quickly to allow the eggs to develop completely.

RECOMMENDATIONS

- Mark the locations of vernal pools before harvest. Alert equipment operators. Locations and management recommendations could be included in the forest stewardship plan.
- Locate openings such as landings, main skid trails, roads, wildlife food plots, pastures, and fields as far as reasonably possible from vernal pools. Avoid locating permanent, non-forest openings directly between two adjacent vernal pools.
- The vernal pool basin:
  - DO NOT RUN → ~~Avoid running~~ machinery through vernal pool basins, even during dry periods, to avoid changing the pool's ability to hold water.
  - Avoid adding slash (woody material) to vernal pools. Where significant amounts of slash fall into the pool, remove it by hand or some other low-impact method. If the pool contains water, leave the slash until the dry season. Removing it when the pool holds water can disrupt amphibian egg and larval development.
  - Avoid removing trees that have crowns immediately overtopping any portion of the pool in order to maintain water temperature and nutrient inputs.

- Within 200 feet of a vernal pool:
  - Limit tree removal to individual trees or small groups of trees. Locate groups where there is established advanced regeneration or shrub cover which can help to maintain shady conditions after the overstory is removed.
  - Avoid removing stumps, stones, or other large cover objects.
  - Maintain as much of the existing understory vegetation (i.e., small trees, shrubs, herbaceous ground cover) as possible.
  - Limit the activity of heavy equipment.
  - Locate main skidder roads outside of this ~~buffer~~. REDUCED HARVEST ZONE.
  - Avoid applying herbicides or insecticides.

- Beyond 200 feet:
  - Limit the area that is scarified, stumped or regraded to that necessary to accomplish silvicultural or wildlife objectives.
  - Retain as much existing dead and down woody material, stumps, stones and leaf litter as possible.
  - Avoid or minimize rutting by following best management practices (BMPs). When possible, harvest on frozen ground (preferable) or in dry summer conditions.
  - Retain as much understory vegetation as possible where its removal isn't required to meet other objectives.

CROSS REFERENCE

Harvesting Systems; Water Quality; Wetlands

ADDITIONAL INFORMATION

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Good Forestry in the Granite State: Draft Sensitive Areas - Steep Slopes

X.X STEEP SLOPES

BACKGROUND

Steep slopes are especially vulnerable to erosion.
Good judgment is needed when determining harvest size and timing, when selecting the appropriate silvicultural method and harvesting system, and when laying out skid trails and truck roads. Proper use of the best management practices (BMPs) is needed during harvest operations and closeout. Extra care is needed when harvesting on steep slopes since misjudgments will be greatly amplified.

OBJECTIVE

Limit erosion, maintain water quality and drainage patterns, and aesthetics on steep slopes.

CONSIDERATIONS

- The term "steep slopes" can be subjective, ranging anywhere from 15-60% in pertinent literature and local ordinances. For the purposes of this document slopes greater than 25-35% will be considered steep.
- Logging equipment continues to develop, becoming more powerful and capable of operating on slopes that were inaccessible in the past.
- Some logging equipment may be better suited to operating on steep slopes and may have less impact to the ground, resulting in less erosion.
- Skid trails and forest roads create more erosion potential than any other harvest activity particularly on steep slopes. Proper skid trail and truck road layout, installation, use and maintenance minimizes erosion even on steep slopes.
- Steep slopes often contain intermittent streams that are important to seasonal run-off but may not be apparent at some times of the year. Intermittent streams can fill rapidly with fast moving water during rain or at wet times of the year, and may pose serious erosion, water quality, and drainage pattern issues if they are compromised during harvest activities.

- The size of the harvest area and the silvicultural techniques used can drastically change the forest cover, resulting in less interception and uptake of precipitation which may result in increased run-off on steep slopes.
- Steep slopes may contain thin, fragile, and unique soils, uncommon plants, exemplary natural communities and habitats.
- Steep slopes are often visible to surrounding viewsheds and the choice of silvicultural techniques may impact the aesthetic appeal of a harvest.

RECOMMENDED PRACTICES

- Select a harvesting system that is appropriate for the terrain and conditions.
- Schedule harvests during periods of dry or frozen ground conditions to minimize impacts.
- Increase ~~buffer widths and~~ riparian management zones along wetlands, streams, rivers, ponds and lakes on slopes greater than 25%.
- Minimize the potential of increased run-off and erosion, as well as possible impacts on surrounding viewsheds by avoiding clearcuts on slopes greater than 35%, except when REMOVE "RIPARIAN WIDTHS" when a well established understory i: "RIPARIAN AREAS" WAS
- Layout skid trails and tr ALREADY DESCRIBED IN ons. Identify intermittent streams in t SECTION 2.1 SO IS ALL ary crossings. To help slow down and THAT IS NEEDED HERE. uous skid trails. Use the natural contour: e grade and to create small bends and
- During the course of the slash and tree tops to help stabilize sk
- Monitor weather foreca are skid trails in advance of heavy rains. suspend operations in severe we eatest.
- When operations are completed, close out skid trails and truck roads as soon as possible. Remove temporary crossings and install water bars and ditches as recommended in the BMPs. Seed and mulch skid trails and truck roads to further stabilize exposed areas.
- Check local ordinances, some towns have regulations pertaining to harvesting on steep slopes.
- Check with the N.H. Natural Heritage Bureau for rare plants and wildlife or exemplary natural communities.

CROSS REFERENCE