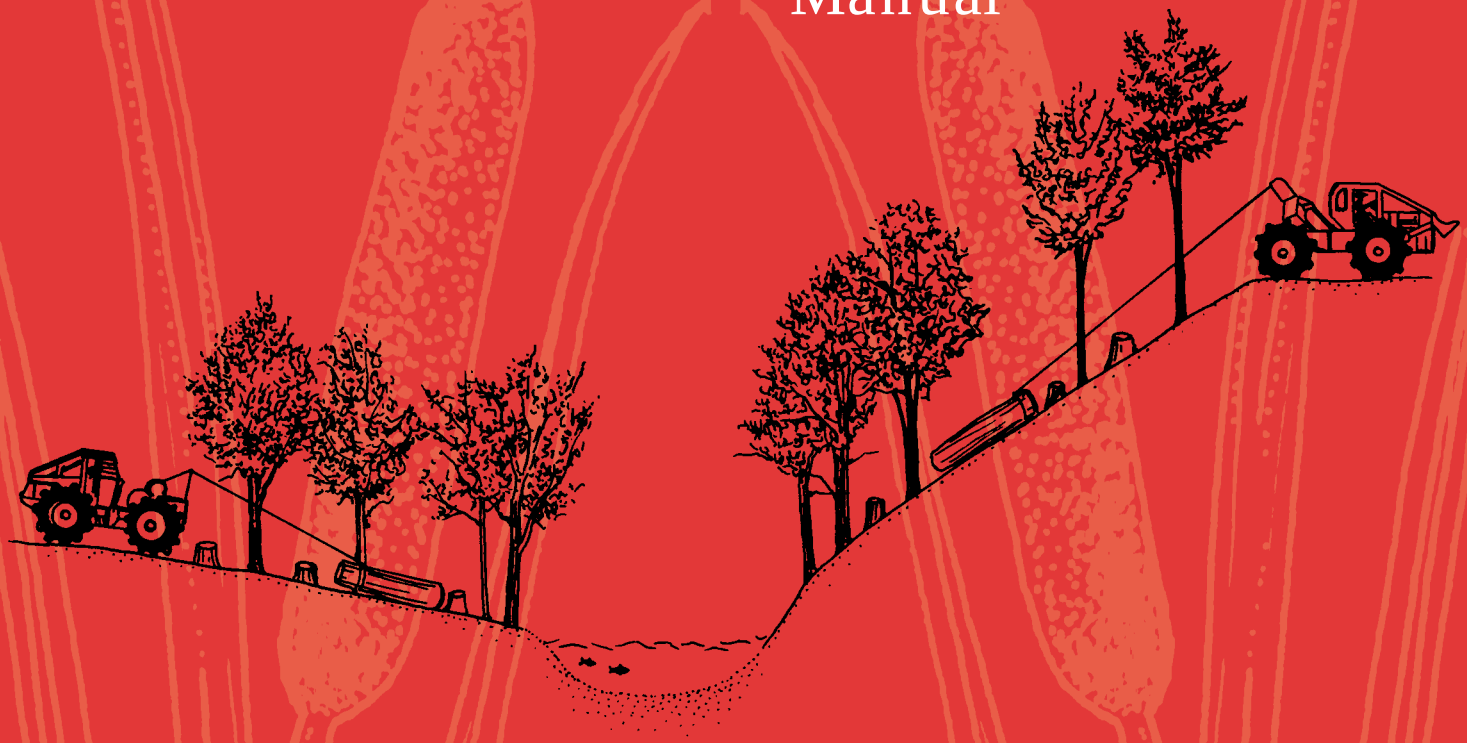
Massachusetts Forestry Best Management Practices Manual



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and

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Region I, Water Division, Water Quality Section

Massachusetts Forestry Best Management Practices Manual

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1
Why BMPs (Best Management Practices)?

When forest products are harvested using heavy equipment that can disturb soil, runoff carrying sediment may occur. This sediment-laden runoff is called non-point source pollution if it gets into rivers, streams, lakes, ponds, or wetlands. Other types of non-point source pollution include lubricant leaks, and fertilizer/pesticide applications.

The basic principle behind BMPs is to minimize the overland speed and volume of water carrying sediment and nutrients that:

- **impact wetlands and water bodies,**
- **impact drinking water supplies, and**
- **impact fish/amphibian/reptile habitat**

BMPs are required to prevent or minimize non-point source water pollution by MGL Chapter 132, sections 40-46 - the Massachusetts Forest Cutting Practices Act, and the latest (1995) revision of its regulations.

The US Environmental Protection Agency (EPA) and National Oceanic and Atmospheric Administration (NOAA)administer several federal laws that require state agencies to address non-point source pollution from forest harvesting:

Section 6217 Federal Coastal Zone Act of 1990 requires the MA Coastal Zone Management office to assess non-point source pollution problems caused by harvesting, publish specific man-

Figure 1 (above) – The path of water over and through soil towards a water body.

agement recommendations, and coordinate the implementation of these recommendations in areas affecting coastal regions of the state. Harvesting activities throughout the entire state are considered to possibly have an effect on the coastal zone.

Section 319 of the Federal Clean Water Act of 1987 requires MA Department of Environmental Protection to assess nonpoint source forestry problems statewide as they affect water quality standards, identify best management practices needed to reduce levels of pollution, and coordinate the implementation of these BMPs.

Section 404 of the Clean Water act of 1977 requires the US Army Corps of Engineers to provide jurisdiction over activities that result in discharges of dredged or fill material in waters of the United States. Recently the Corps of Engineers and the states have been cooperating to transfer the jurisdiction to the appropriate state agency for easier administration.

Massachusetts General Laws Chapter 131 The Wetland Protection Act and Chapter 132 the Forest Cutting Practices Act require BMPs to control non-point source pollution from harvesting operations. Under the wetland regulation, BMPs are required in order to meet the conditions for the exemption from the Wetlands Protection Act. There is a Memorandum of Understanding (MOU) between the Department of Environmental Management, responsible for administering Chapter 132, and the Department of Environmental Protection, responsible for administering Chapter 131, that provides Service Forester oversight of wetland protection during harvesting, and thereby exempts harvesting from Chapter 131 procedures so long as it is in compliance with Chapter 132.

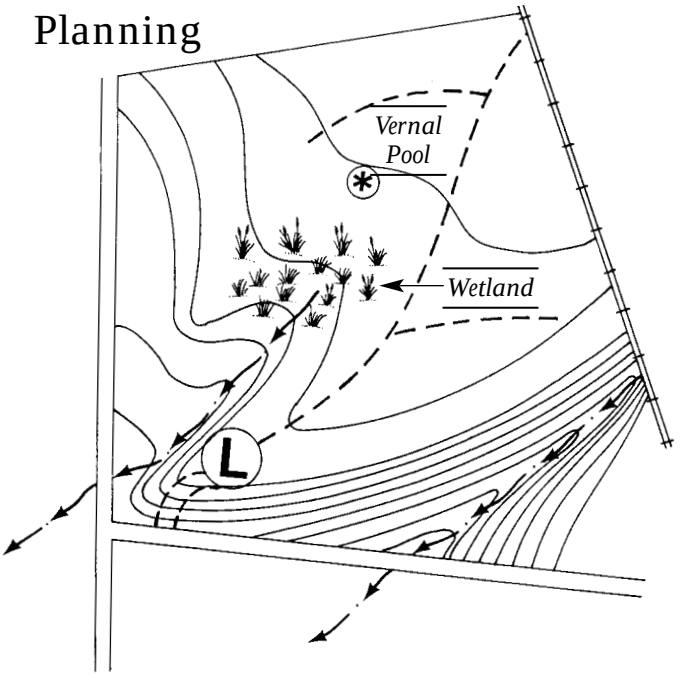
Finally, BMPs prevent rutting and will preserve access for future activities. They will also improve the looks of a timber harvest, which is important to landowners and the public in general.

This manual contains BMPs required by Chapter 132, as well as BMPs that are not required but highly recommended to protect water supplies, terrestrial and aquatic wildlife habitat, and the forest environment.

R **BMPs required by Chapter 132 are indicated by a red R.**

G Recommended activities or guidelines are indicated by a gold G.

2
Planning



Planning is one of the **most important BMPs, and the first to consider.** Planning ahead can save time in the future once the job begins, and insure prompt approval of the Forest Cutting Plan by the DEM Service Forester. It can also result in the most efficient use of machinery, and reduced wear and down-time.

Locate landings, access roads, and skid roads carefully to avoid steep slopes, wetlands, vernal pools, and stream crossings. It may be more cost-effective and efficient to layout longer skid trails to avoid these situations. Avoiding them will also mean less possibility of erosion. Consider alternatives such as obtaining permission to access the timber sale from a neighboring property to avoid such situations.

Planning not only means **how** you will access the timber sale, but also **when** the timber will be cut. **Timing** is one of the most important BMPs. Operating when the ground is dry, frozen, or snow-covered is an excellent way to reduce erosion.

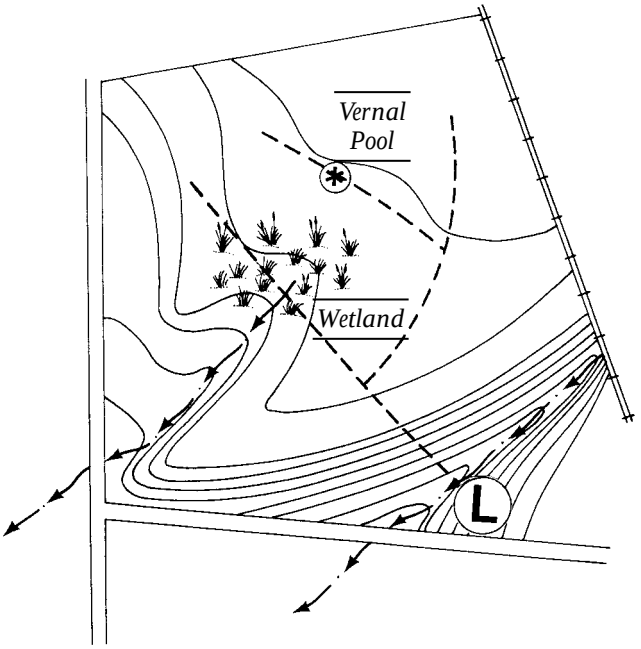


Figure 2 – Topograpic map of the same timber sale. Left, a well-planned operation, avoiding sensitive areas. Right, skid trails in conflict with such areas.

R Forest Cutting Plan must include a description of the erosion control measures to be used. The Forest Cutting Plan map must show the proposed location of all truck roads, principal skid roads, stream and wetland crossings, as well as the general location of appropriate erosion control measures such as filter strips.

R Operating on sustained slopes of 30% or more for a slope distance of 200 feet or greater requires the indication of these Steep Slope areas on the Forest Cutting Plan map. Special care must be taken to prevent erosion from roads, skid roads, and trails by closely following erosion control practices such as water bars to stabilize these areas during and

after the operation. Specific measures to be used to control erosion in these areas must be detailed in the Plan.

R No logging equipment may operate in a filter strip except:

- to reduce environmental damage shown to be necessary in a statement in an approved Forest Cutting Plan,
- at an approved stream crossing,
- on a pre-existing logging road, or
- in filter strips greater than 50 feet in width, beyond 50 feet from the water body. In this case, equipment can operate beyond 50 feet of the waterbody, as long as no principal skid road is located there, disturbance of the forest floor is minimized, and any disturbed soil is promptly stabilized.

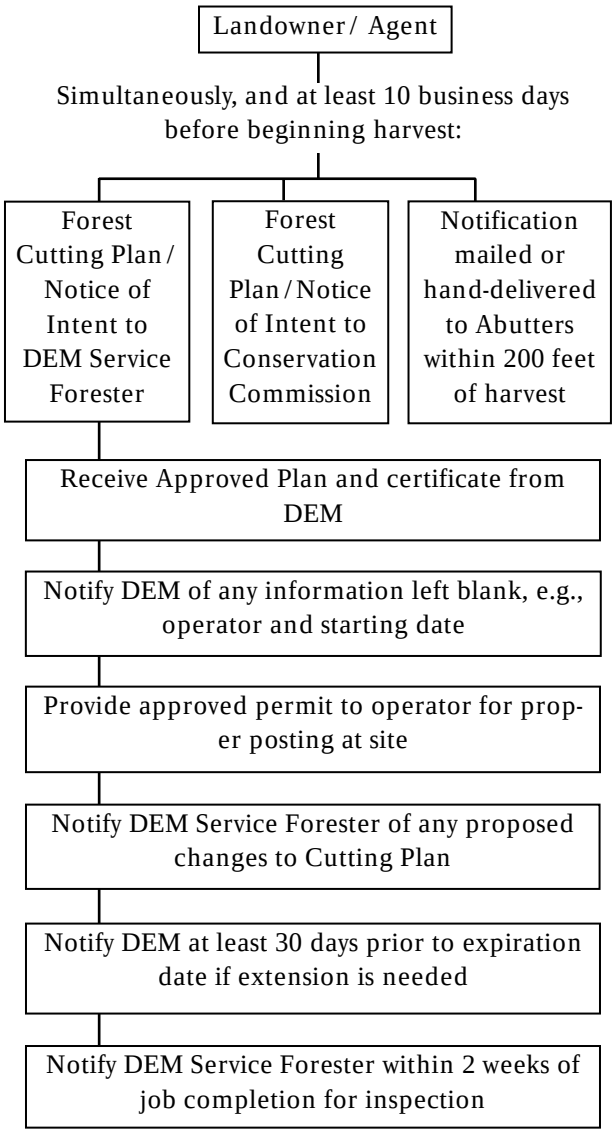
R MA Slash Law requirements pertain, and should be considered in the planning phase before the sale begins. See the section on slash for more details.

R Upon approval of the submitted Forest Cutting Plan, post the certificate at the landing of the job.

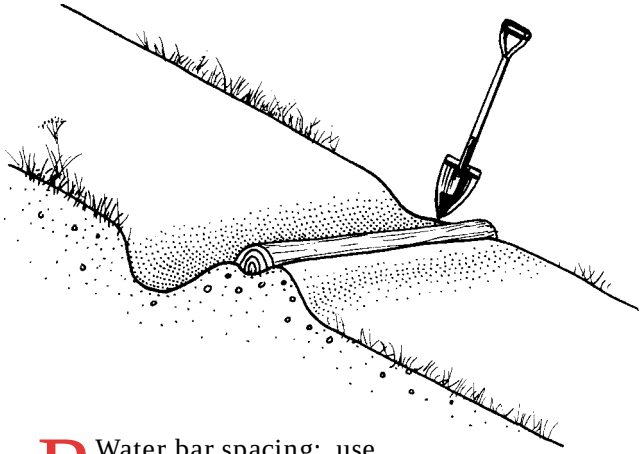
R Operators are required to have a copy of the approved Forest Cutting Plan on the job site.

R An approved Forest Cutting Plan is valid for up to two years from the date of receipt at the DEM regional office. Two one-year extensions may be granted for adequate reasons, at the discretion of the Director or the Director's agent, when requested in writing by the landowner or the landowner's Agent at least 30 days before the expiration date of the Plan. All logging, engineering, and stabilization requirements of the Plan must be fulfilled by the completion of the operation or by the expiration date, whichever is sooner.

Figure 3 – Steps in filing a Forest Cutting Plan/ Notice of Intent including threshold for Chapter 132



3
Skid Trails



Water bar spacing: use common sense in the location of water bars. Local terrain often prevents them from being located exactly where the guidelines below specify, however these guidelines are a requirement of Chapter 132.

road grade (%)	***approximate distance needed between water bars(feet)***
1	400
2	245
5	125
10	78
15	58
20	47
25	40
30	35
35	32
40	29

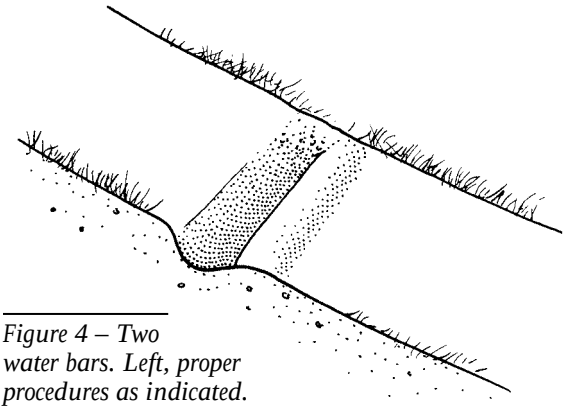


Figure 4 – Two water bars. Left, proper procedures as indicated. Above, incorrect procedures.
1. Angle to the center line of the road of roughly 30 degrees (i.e., not perpendicular)
2. Height of the berm (8-12"), depth of the ditch
3. Outflow for water from the ditch is open, and extends beyond the edge of the skid road; use of a shovel
4. Reinforce berm with a log
5. Make them deep to insure that they last a long time, and serve as a possible deterrent to ORV traffic, which can be a significant source of erosion
6. Mulching or seeding the berm will reduce scouring or erosion of the berm and make it last longer

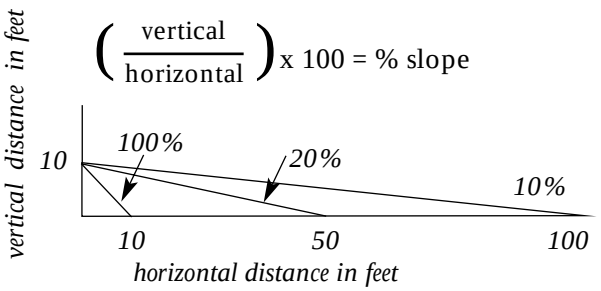


Figure 5 – How slope is determined

Do not operate skidders on slopes greater than 60%, unless special permission is given by the Service Forester in the approved Forest Cutting Plan. In these cases, the applicant must show that soils are stable and that measures will be used to minimize erosion during and following the operation.

R Do not operate a machine in a wetland unless the ground is dry, frozen, or otherwise stable enough to support it. Identify the location of wetland and stream crossings on the ground with flagging or paint, as well as on the map with the Forest Cutting Plan. See the section on Wetland Protection (page 35) for further information.

R No machinery is allowed to operate in a certified vernal pool at any time of the year. A 50-foot filter strip must surround each certified vernal pool. See the sections on filter strips (page 21) and vernal pools (page 40) for more information.

R No logging equipment may operate in the filter strip except:

- to reduce environmental damage shown to be necessary in a statement in an approved Forest Cutting Plan,
- at an approved stream crossing,
- on a pre-existing logging road, or
- in filter strips greater than 50 feet in width, beyond 50 feet from the water body. In this case, equipment can operate beyond 50 feet of the waterbody, as long as no principal skid road is located there, disturbance of the forest floor is minimized, and any disturbed soil is promptly stabilized.

R All principal skid roads will be stabilized whenever they are left inactive for one month or more, or whenever the Service Forester determines such work is necessary. All necessary and required erosion control work will be performed by the completion of the operation.

G Watch the weather forecast and plan ahead for severe storms. Most sediment enters a stream following a severe storm. Hay bales and reinforced water bars are the best way to keep water from entering streams at crossings.

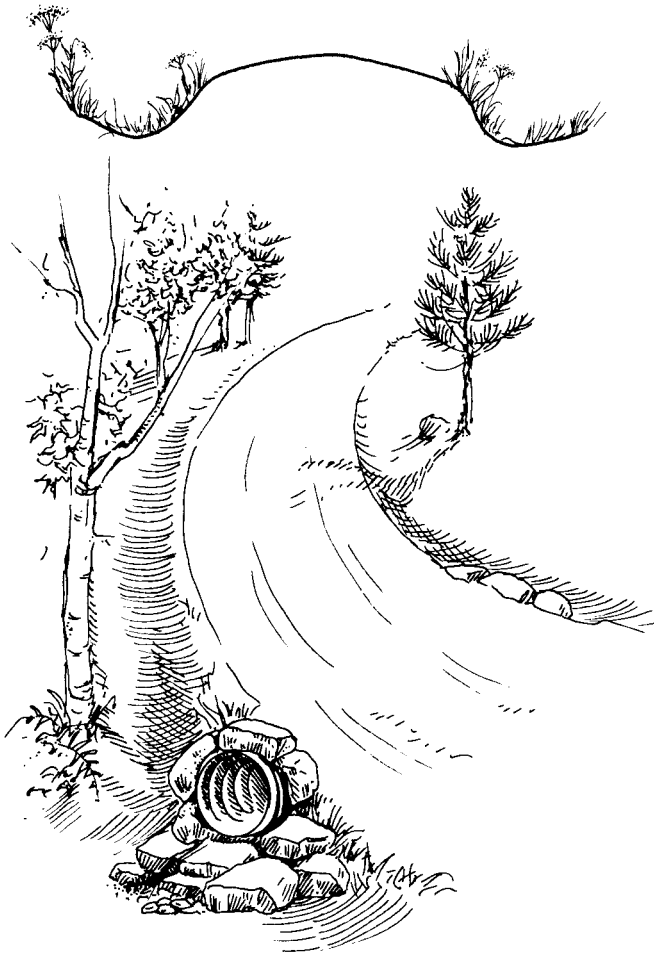
G Consider topography in the location of skid roads. Avoid steep slopes.

G Minimize debarking and other damage to residual trees.

G Choose skid roads partially on the basis of which trees are the “best” to damage. Every reasonable effort should be made to preserve advanced regeneration.

G Woods roads and skid trails should be smoothed and repaired after logging, and left in a stable condition to resist erosion.

4
Truck Roads



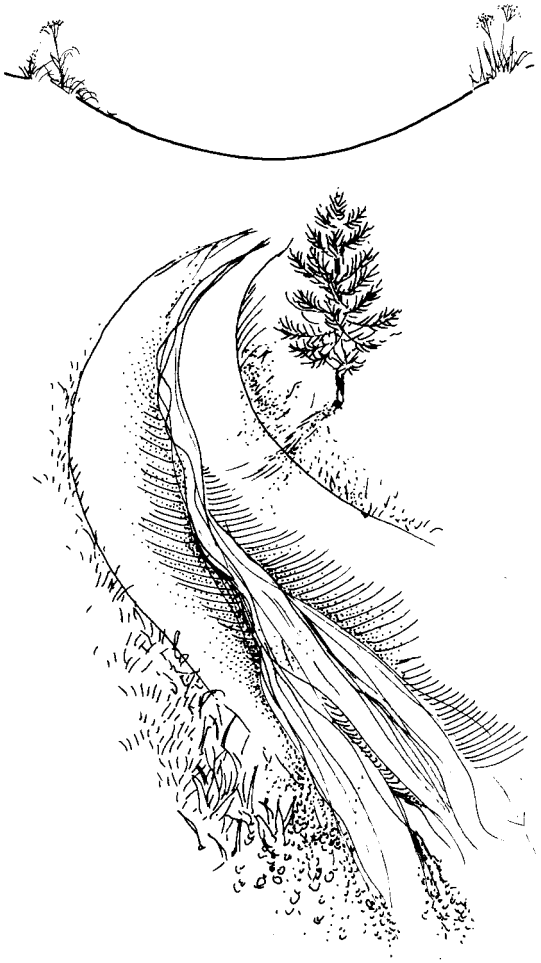


Figure 6 – Left, woods road with proper crown and ditches in place, and occasional broad-based dips, open-topped culverts, and culverts in use. Above, woods road with no crown, no ditches, water running down the center, spewing mud on the highway.

R Adequate drainage ditches, culverts, and water bars will be provided, and runoff will be led into filter strips or haybale impoundments to remove sediment.

R Access roads from a landing to a highway must be graveled or mulched to prevent mud from tracking onto the highway. Alternatively, they must not be used during wet weather, or mud must be removed immediately from the public highway. At the end of the operation, the soil must be stabilized, and if necessary, seeded with grass. Refer to the section on seeding for specifics (p. 46).

R No logging equipment may operate in the filter strip except:

- to reduce environmental damage shown to be necessary in a statement in an approved Forest Cutting Plan,

• at an approved stream crossing,
• on a pre-existing logging road, or
• in filter strips greater than 50 feet in width, beyond 50 feet from the water body. In the last case above, equipment can operate beyond 50 feet of the waterbody, as long as no principal skid road is located there, disturbance of the forest floor is minimized, and any disturbed soil is promptly stabilized.

When a culvert is used, the Forest Cutting Plan must state its diameter, based on the culvert sizing table below:

Area above pipe (acres)	*pipe diameter (")* *Type I*	*Type II*
1	8	8
5	12	12
10	15	18
15	18	24
20	24	24
25	24	24
30	24	30
35	30	30
40	30	30
45	30	30
50	30	36
75	36	36
100	48	48
150	48	48
200	60	60
250	60	60

Type I terrain is forested and rolling, with slopes between 5 and 10%. Type II terrain is forested and hilly, with slopes between 10 and 30%. Culvert diameters are based on the 25-year storm.

Broad-based dips can be installed by a bulldozer, and are easier to maintain than culverts, since they do not have to be cleaned out. They also can not be broken down by Off-Road Vehicles (ORVs). They are effective at moving surface water off the road and into adjacent ditches or the forest floor. Recommended spacing is:

road grade (%)	*approx distance between dips (ft)*
1	500
2	300
5	180
10	140

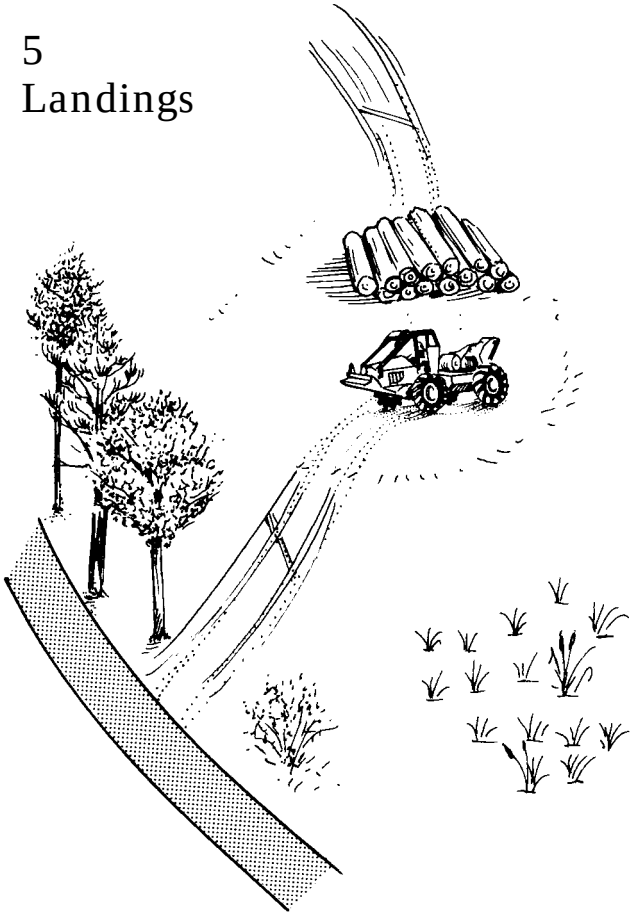
Open-topped culverts can also be used to move water off of the road surface. recommended spacing is:

road grade (%)	*approx distance between culverts (ft)*
1	400
2	245
5	125
10	78
15	58
20	47

If possible, avoid grades of more than 5%.

Good road management practices during and after the harvesting operation include: maintain and clear culverts, maintain and periodically reinforce broad-based dips and water bars, and close roads to unauthorized use.

5 Landings



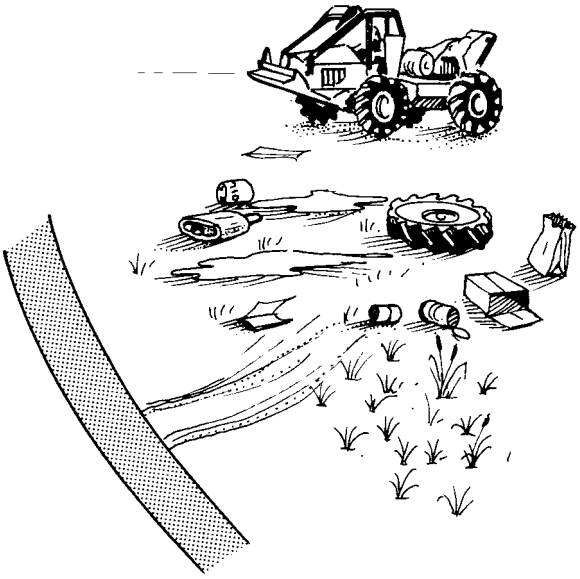


Figure 7 – Left, a good landing, as described in this section. Above, an improper landing.

R All unnatural debris such as cans, papers, discarded tires, metal parts, and other junk must be removed. Woody debris will be placed neatly to improve appearance and promote rapid decay.

R Soil will be stabilized and if necessary seeded to grass at the end of the operation (see p. 46).

G Locate the landing on gently sloping or level ground with good drainage, to avoid ponding of water. Whenever possible, place the landing out of sight of public ways. Curve the access road to break the line-of-sight from the public way.

G Set the landing at least 100 feet from water bodies and wetlands.

G If the landing must be closer than 100 feet to a water body or wetland, use hay bales or silt fence to check erosion.

G Locate diversions such as water bars or broad-based dips on skid trails leading into the landing, to prevent water from flowing into the landing and ponding, due to soil compaction from the machinery.

G Locate diversions such as water bars and broad-based dips on the truck road leading out of the landing, to prevent the flow of accumulated water and sediment from the landing out onto the public way.

G Check hoses and fittings regularly to prevent leaks of lubricants and hydraulic oil from machinery.

G Have oil-absorbent mats on the landing in case fuel, lubricant, or hydraulic fluid spills or leaks. In the event of slow leaks while the machine is parked overnight or for an extended period, place an oil-absorbent mat to catch the leak.

6 Hay Bale and Silt Fence Installation

Hay bales can be used as temporary means to intercept runoff and trap sediment. They can be used downslope of disturbed areas such as landings or on a skid trail upslope from a stream crossing, to keep water carrying sediment from entering the stream while the job is inactive (e.g., overnight, on weekends or during down times).

Proper installation includes:

- Hold the bales in place with stakes.
- To prevent being undercut, dig a foundation for the bales several inches deep. Compact soil up against the bales on the upslope side.
- Overlap hay bales to increase their effectiveness and insure that they will remain in place.

Wire or nylon-bound bales are more durable than those bound with twine.

Hay bales will only last 2-6 months, and will need to be replaced when saturated with sediment.

Silt fence is intended to temporarily retain sediment from small disturbed areas by reducing the speed of overland flow.

The rule of thumb for placement downgradient of disturbed areas such as landings generally is to use 100 feet of silt fence for every 1/4 acre of disturbed area.

Proper installation of silt fence involves:

- Drive in posts spaced 4-6 feet apart.
- Fence height should be at least 2.5 feet.

- Attach a continuous length of fabric to the posts. Attach the posts downgradient from the fabric, so water and sediment do not pull the fabric from the posts.
- Bury several inches of the fabric in the ground to anchor it and prevent flow beneath it.
- Backfill the base of the fabric with compacted soil or crushed stone.

Consider reinforcement of silt fence by stringing wire mesh fencing between the posts.

Beware of undercutting of silt fence due to improper burying of the fabric.

Do not install silt fence across streams, ditches, or waterways.

Inspect fence periodically and after each rainfall.

Replace worn fabric immediately.

Remove accumulated sediment deposits immediately.

Remove all fence materials and unstable sediment after the drainage area is stabilized.

The design life of silt fence is 6 months or less. Do not leave the silt fence in place as a permanent erosion control structure. It may serve as a barrier to amphibian and reptile travel.

7
Filter Strips

It is the purpose of filter strips to:

- slow the movement of overland flow of water, thus enabling transported sediment to be left behind,
- provide an opportunity for vegetation to take up nutrients that may otherwise flow into the water body,
- provide shade to the adjacent water body, to prevent warming of the water, and thus injury to aquatic and riparian wildlife habitat, and
- protect bank stability and prevent erosion.

It is important not to disturb the forest floor of filter strips, to permit the filtration of overland flow through ground vegetation and forest floor debris. It is likewise important to retain at least 50% of the overstory basal area, to provide the important shade function to the adjacent water body.

Filter strips are required along all water bodies and certified vernal pools. No more than 50% of the basal area may be cut at any one time, and a waiting period or five years must elapse before another cut is made. The residual stand will be composed of healthy growing trees well distributed over the area. Exceptions to this standard may be made by the Service Forester if it is shown in the Forest Cutting Plan that a heavier cut is necessary to protect the stream, bank, or water quality.

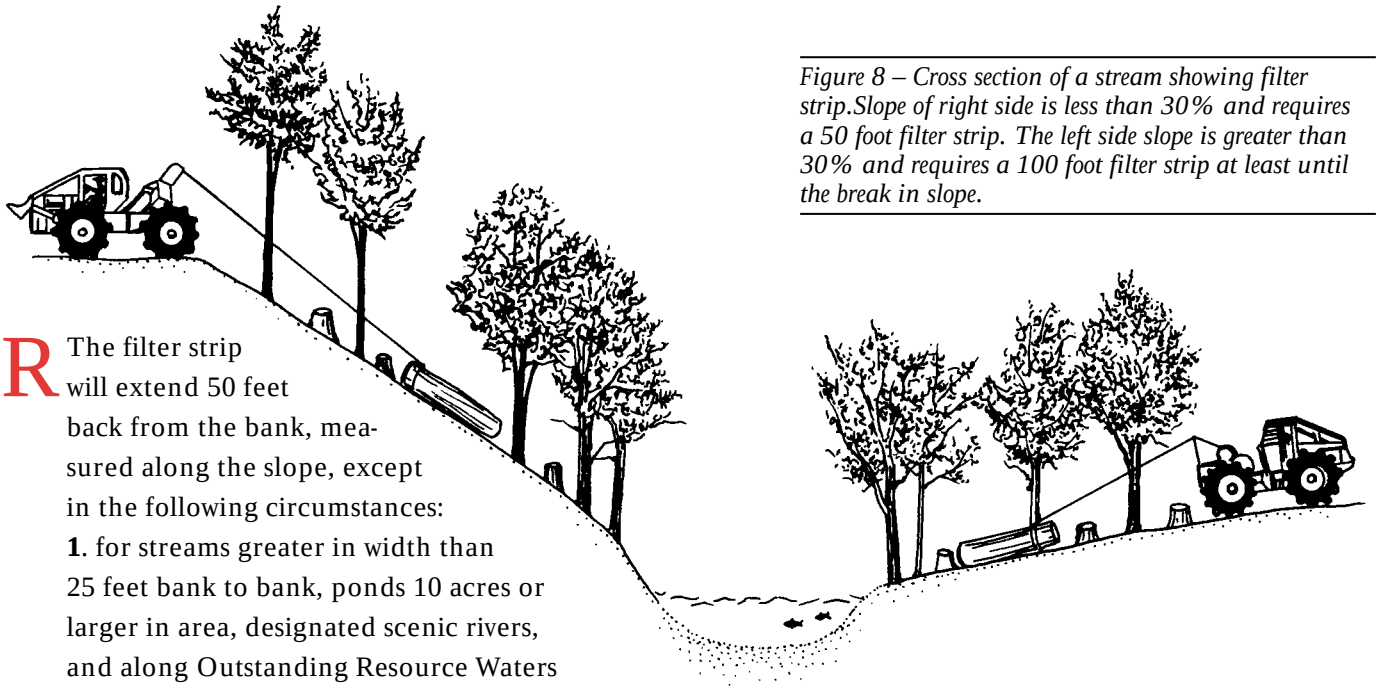


Figure 8 – Cross section of a stream showing filter strip.Slope of right side is less than 30% and requires a 50 foot filter strip. The left side slope is greater than 30% and requires a 100 foot filter strip at least until the break in slope.

The filter strip will extend 50 feet back from the bank, measured along the slope, except in the following circumstances:

1. for streams greater in width than 25 feet bank to bank, ponds 10 acres or larger in area, designated scenic rivers, and along Outstanding Resource Waters and their tributaries (excluding vernal pools), filter strips will be of variable width, depending on slope, as described in the following table:

slope %	*filter strip width (feet)*
0	50
10	90
20	130
30	17
40	210
50	250
60	290
70	330
80	370
90	410
100	450

Variable-width filter strips may be advisable to use in other circumstances, as well.

2. where slopes are 30% or greater, the filter strip will extend 100 feet back from the bank, or to the point between 50 and 100 feet from the bank, where a break in the topography reduces the slope to less than 30%.

No logging equipment may operate in the filter strip except:

- to reduce environmental damage shown to be necessary in a statement in an approved Forest Cutting Plan,
- at an approved stream crossing,
- on a pre-existing logging road, or
- in filter strips greater than 50 feet in width, beyond 50 feet from the water body. In the last case above, equipment can operate beyond 50 feet of the waterbody, as long as no principal skid road is located there, disturbance of the forest floor is minimized, and any disturbed soil is promptly stabilized.

R Cut trees will be winched out of the filter strip and slash will be disposed of according to the Slash Law. No slash can remain within 25 feet of any continually flowing brook, stream, river, or any lake, pond, or water supply.

G The following guidelines may be used to provide additional protection to sensitive streams (tributaries to water supply reservoirs, high-quality trout streams, and rare species habitat) and wildlife habitat in riparian corridors:

- 15-foot no-cut buffer
- avoid soil compaction and rutting within 200 feet of a stream
- maintain areas within 200 feet of the stream in a forested condition
- preserve important habitat characteristics within 200 feet of a stream, such as trees with cavities, downed logs, stone walls and rock jumbles
- use variable-width filter strip guidelines above
- avoid the cutting of trees directly on the stream bank
- avoid the use of rip-rap to stabilize banks.

8
Buffer Strips

Buffer strips are areas of light cutting along roads, where the intensity of cutting is restricted to maintain a forested appearance and an attractive landscape.

R Buffer strips will be left along the edges of publicly maintained ways, except along forest management roads in federal, state, county, or municipal forests, parks or reservations. Within buffer strips, no more than 50% of the basal area may be cut at any one time, and a waiting period of five years must elapse before another cut is made. The residual stand in the buffer strip will be composed of healthy growing trees well distributed over the area.

R Buffer strips will extend 50 feet back from the outer edge of the highway, except for designated scenic roads, where they will extend 100 feet from the highway.

R Hardwood slash must not be left more than 2 feet above the ground within 40 feet of any highway. Softwood slash must not be left on the ground within 40 feet of any highway, and must not be more than 2 feet above the ground between 40 and 100 feet of any highway.

9
Stream Crossings

Studies in Massachusetts have shown that stream crossings represent one of the principal ways that sediment can enter a water body. They do, however, prove necessary on the majority of jobs.

For purposes of Chapter 132, and determining when mitigation is necessary, a stream is defined as follows:

> **a body of running water, including brooks and creeks, which moves in a defined channel due to a hydraulic gradient, and which flows within, into, or out of an area subject to protection under the Wetlands Protection Act. A portion of a stream may flow through a water control structure such as a culvert or bridge. Such a body of running water, which does not flow throughout the year (intermittent) is a stream except for the portion up-gradient from all bogs, swamps, wet meadows, and marshes.**

R When a crossing is essential, existing old crossings will be rehabilitated and used, provided that it can be shown that this will cause less disturbance than constructing a new crossing.

R **Temporary crossing structures will be removed at the end of the operation, and the site will be stabilized.**

R The installation of permanent stream crossings and the construction of permanent roads involving fill through wetland resource areas requires the approval of the local Conservation Commission under the Wetlands Protection Act MGL 131 section 40. See page 33 for a description of this procedure.

R The rehabilitation, new construction, and stabilization of stream crossings will be done to the standards defined below:

Banks	***streambed***	***acceptable crossing method***
shallow *(less than one foot in height)*	rocky	ford with stabilized approaches, corduroy, culvert, bridge
	soft	corduroy, bridge, corduroy with culvert
steep *(greater than one foot in height)*	rocky	corduroy, culvert, bridge
	soft	corduroy, culvert, bridge

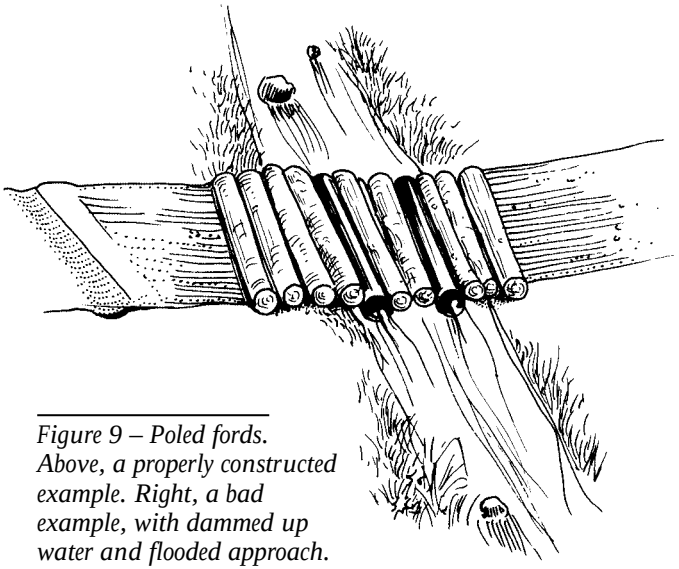
R All crossing will be made at right angles to the channel.

R When crossing involves fill or other closed or semi-closed structures which will obstruct flow, they will be designed to accommodate at least the 25-year storm (refer to the table of culvert sizes on p. 14).

R If a culvert is to be used, the Forest Cutting Plan must state the diameter of the culvert based on the culvert sizing table in this manual (p. 14).

R All banks and approaches to stream crossings will be stabilized during and at the end of the operation.

R All stream crossings will be accurately mapped and labeled on the Forest Cutting Plan map, and marked on the



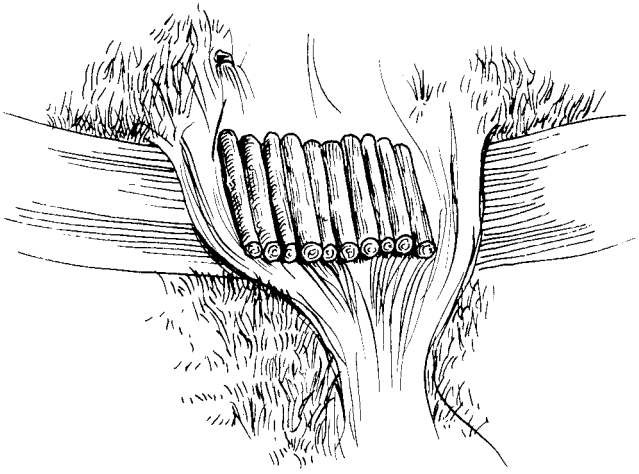


Figure 9 – Poled fords. Above, a properly constructed example. Right, a bad example, with dammed up water and flooded approach.

ground with paint or flagging at the time the Plan is filed.

R If a stream crossing must be changed during the operation, the Service Forester must be notified and approve the change before it is made.

R Within 1000 feet upstream of a public water supply reservoir, measured along the course of the stream from the high-water mark of the reservoir, all stream crossings must use a temporary bridge. Exceptions to this will require filing of an Environmental Notification form (ENF) in accordance with MGL Chapter 30, sections 61-62H and CMR 11.00.

G Avoid steep or undercut banks. Gentle banks minimize erosion. The approach to the crossing should be level for roughly 50 feet on both sides.

Crossing Options:

A. Corduroy, or Poled Ford:
Place logs in a stream parallel to the direction of flow. Logs should be large enough to keep the skidder out of the water, and should be level with the stream banks. Place one or several culverts in and amongst the logs, to permit streamflow though the ford, and prevent damming. Ductile iron culverts or pieces of gas pipeline can withstand great impact and support heavy logging equipment without collapsing, including fully-loaded forwarders.

B. Bridge:
From the standpoint of water quality, it is most advisable to use a bridge to keep the machine and hitch completely out of the water. This means that lubricant and fuel will not wash into the stream water, and sediment will not be dragged into the stream on the tires and hitch. Also, the banks will remain intact, and their disturbance will not represent another source of sediment. There are two ways to bridge a stream:

1. Skidder bridges can be constructed on-site.

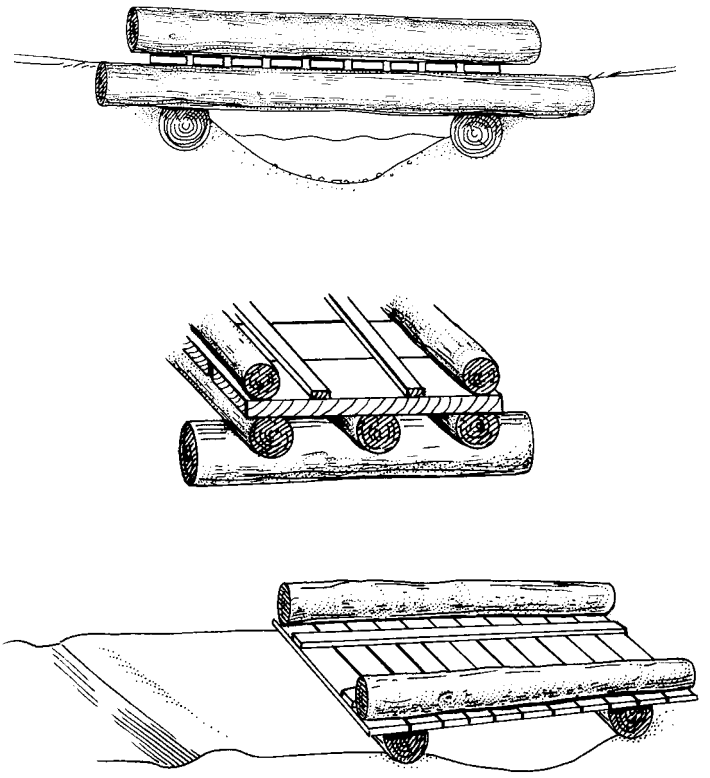


Figure 10 – A skidder bridge will include:
a) 3-6 stout tree-length logs used as stringers across the stream,
b) 4-inch planks used as decking, bumper logs added to the sides to keep the hitch from falling into the stream,
c) straight approach to line up the hitch,
d) sills or log abutments to improve stability, anchor the bridge in place, and elevate it above the level of the bank.

2. Re-usable temporary skidder bridge. There are many different designs possible, including the recommended one below.

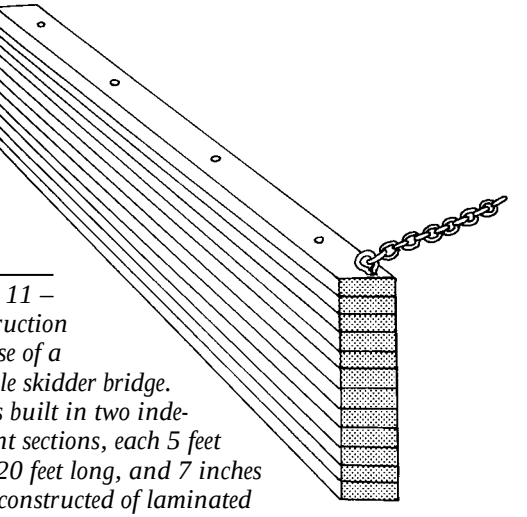
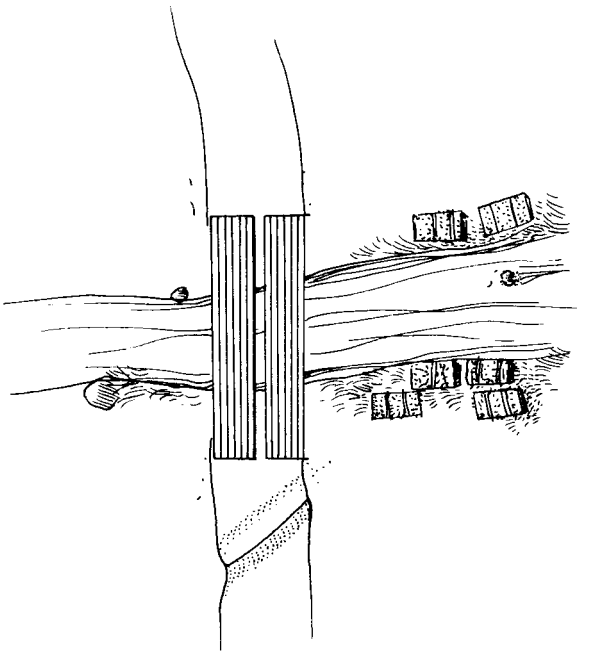


Figure 11 – Construction and use of a reusable skidder bridge.
a) It is built in two independent sections, each 5 feet wide, 20 feet long, and 7 inches thick, constructed of laminated timber bolted together.
b) A chain on one end facilitates skidding into place.



Sections are skidded into place from the landing, and located side-by-side at the crossing. At the end of the operation, the pieces can be skidded back to the landing, loaded onto a log truck, and moved to another site. It is important to stabilize the approaches while installing and removing portable or temporary skidder bridges.

C. Culverts:

(Refer to the culvert guidelines on p. 14.)

For all Stream Crossings:

Use hay bales staked at stream crossing approaches parallel to banks to catch sediment before it enters the stream (see p. 19). Locate hay bales prior to bridge installation to intercept as much sediment as possible. It is better to use hay bales or silt fence to intercept runoff before it gets into the stream than to use them in the stream itself. Do not use silt fence in a stream. However, if hay bales are used in the stream, they should be staked at least 15 feet downstream to prevent ponding at the crossing. Hay bales that become full of sediment should be removed, placed away from the stream, and replaced with fresh ones.

It is very important to stabilize the approaches to a stream crossing both during the logging operation and after completion. Unstable approaches are one of the primary ways that sediment can enter a stream. Although water bars are generally installed at the end of a timber harvest, it is advisable to install at least one directly uphill from a crossing to prevent water moving down a skid road from reaching a stream. **This waterbar will need to be occasionally reinforced during the course of the job.** The approaches can be corduroyed with poles to prevent rutting and the churning of soil. Consider staking a few hay bales in the skid road at the approach to a stream crossing at the end of the day or week, especially if there are showers or heavy rains in the forecast.

Although not covered under Chapter 132, permanent accessways/ stream crossings may be obtained by the following procedure:

I.
Under the wetlands regulations, 310 CMR 10.53(3)(r), "limited project":

A . File Notice of Intent under 310 CMR 10.53(3)(r), limited project for permanent access for forestry (if uncertain that activity will take place in an area subject to the wetland regulations you can file a Request for Determination of Applicability (RFD)- there is no fee associated with an RFD);

B. Work must conform to Order of Conditions, all seven conditions listed below, and any conditions determined necessary by the Conservation Commission;

C. Filing fee for the limited project Notice of Intent is minimal.

Conditions that must be met as part of the above approval:

1a. The road is designed and constructed in accordance with a Forest Cutting Plan approved by DEM under provisions of 304 CMR 11.00, and the Massachusetts Forestry Best Management Practices Manual OR

1b. The road is to be built on land with a permanent recorded Conservation Restriction and maintains the land in perpetual forest use.

2. The accessway is minimum practical width required for cutting and removal of trees;

3. Practical alternative access across upland not available;

4. Number of accessways in wetland resource area minimized;

5. Activities conducted when soil is frozen, dry, or otherwise stable to support equipment;

6. The accessway does not increase flood stage or velocity;

7. Design and installation done in accordance with Massachusetts Forestry BMP Manual and allows for 25-year storm.

II.
If the seven (7) conditions under 310 CMR 10.5393)(r) cannot be met, an Order of Conditions for a non-limited project activity must be obtained as follows:

A. File Notice of Intent under standard wetland regulation procedures.

B. Approval is based on engineering considerations and the ability of the activity to meet the wetland performance standards.

C. Work must be done in conformance with the Order of Conditions.

D. Notice of Intent filing fee will be dependent upon the project and the number of wetland crossings.

Order of Conditions received per either I or II above may be appealed to the Massachusetts Department of Environmental Protection (DEP). For further information see the wetland regulations 310 CMR 10.00. For general information see the appendix for Departmental contact, addresses, and phone numbers.

10
Wetlands

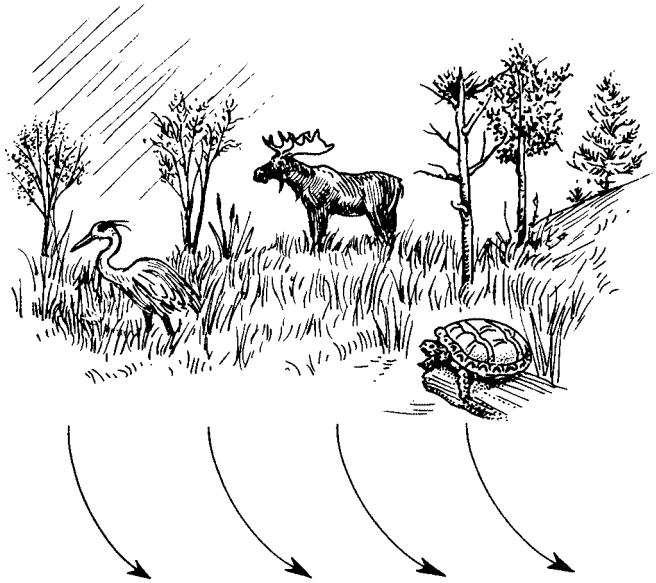


Figure 12 – cross-section of a wetland showing these functions:
1) filters that trap sediment, nutrients, and heavy metals from surface and subsurface flows
2) sources of groundwater recharge
3) buffers of heavy rains, releasing them slowly downstream to prevent flooding
4) habitat for a wide variety of wildlife species, and more than 40 threatened or endangered animal species in Massachusetts

Wetlands in Massachusetts are legally identified in the Wetlands Protection Act (MGL Chapter 131 Section 40) and defined in the wetland regulations 310 CMR 10.00. In general, the wetland resource areas referenced in this BMP Manual are Bordering Vegetated Wetlands (BVWs). These areas are the result of inundated or saturated conditions for sufficient periods of time to cause a change in the plant community and soils. They are generally recognized by the type of plants that comprise the vegetated community (such as red maple, green or black ash, black

Figure 13 – Cross-section of a wetland depicting these features:
1) presence of water at or near the surface for a portion of the year – look for: drainage channels, high water marks, depressions, debris lines
2) plants adapted to wetland conditions, e.g., willow, red maple, green and black ash, cattail, skunk cabbage
3) poorly drained soils with mottling discoloration-indicators: spongy ground underfoot, black organic soils

gum, spicebush, skunk cabbage), the type of soils present (organic soils such as peat or muck and mineral soils gray or dull in color or with other wetness features such as mottling) and the evidence of water present at or near the surface for a significant length of time (look for drainage channels, water marks on fixed objects, water stained leaves, debris lines). Additional information on BVWs is presented in a handbook available from DEP entitled "Delineating Bordering Vegetated Wetlands".

Although wetlands may act as filters, this function may be compromised by excessive pollutant loads, which in turn may cause wetlands to become sources of non-point source pollution, and impair other functions. Thus, it is important to keep sediment out of wetlands, so as to not impair their function as filters. Runoff from roads, skid trails, and landings should not be directed into wetlands.

All forest harvesting activities that take place within 100 feet of a wetland resource area must receive either an exemption to or a permit under MGL Chapter 131 the Wetlands Protection Act. A properly filed, approved, and followed Forest Cutting Plan provides an exemption to the normal filing requirements of the Wetlands Protection Act.

R Wetlands that will be crossed, logged in, or lie adjacent to any harvesting activity will be accurately shown and labeled on the Forest Cutting Plan map. The location of a crossing must be identified on the ground with paint or flagging.

R Roads through wetlands approved under Chapter 132 Forest Cutting Practices Act are temporary. Permanent roads through wetlands require Conservation Commission approval under Chapter 131 Wetlands Protection Act.

R Wetlands will not be operated in unless dry, frozen, or otherwise stable. When these conditions are not met, the Forest Cutting Plan requires special approval by the Service Forester, after showing that it will help avoid significant environmental damage.

R If the wetland crossing needs to change during the operation, the Service Forester must approve the change before it is made.

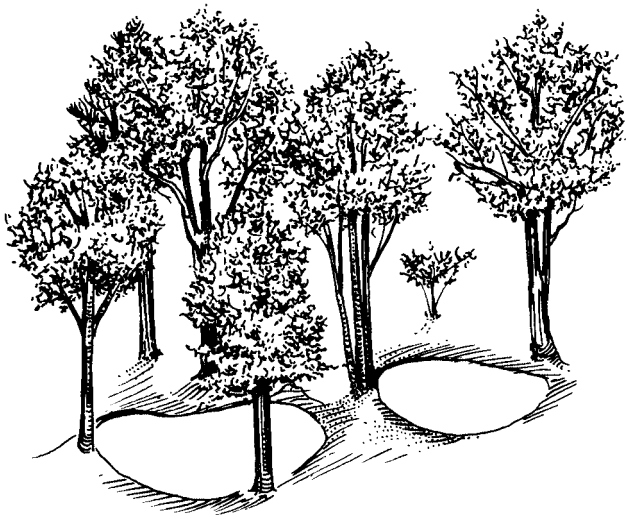
R maintain at least 50% basal area in wetlands.

G When operating in a wetland it is advisable to:

- concentrate skidding in a few well-defined corridors,
- use cable and winch as much as possible,
- use brush or corduroy to minimize ground pressure and rutting,
- reduce hitch volumes to minimize rutting,
- use BMPs to minimize sediment transport,
- avoid landings in wetlands,
- not store fuels or lubricants on landings in or within 100 feet of a wetland,
- not refuel or clean machinery on landings in or within 100 feet of a wetland,
- fell trees away from wetlands, to facilitate winching them out.

G **Isolated Vegetated Wetlands** are areas that are generally saturated by groundwater or covered by surface water long enough to produce hydric soil conditions and which, under normal circumstances, support wetland plant communities. Isolated Wetlands have many of the same characteristics as Bordering Vegetated Wetlands (BVWs), **except** that they do not border on a pond, lake, or stream, and are therefore not defined as wetland resource areas by the Wetlands Protection Act. Isolated Wetlands may perform some important water quality functions, and may also provide wildlife habitat. In order to maintain their ability to perform these functions, it is suggested that the standards required for Bordering Vegetated Wetlands (BVWs) **also** be applied to Isolated Wetlands. That is: avoid them if possible, cross only when the ground is frozen, dry, or otherwise stable, and harvest no more than 50% of the basal area at any one time.

11
Vernal Pools



A vernal pool is a confined basin depression which, at least in most years, holds water for at least two continuous months during the spring and/or summer, and which is free of adult fish populations. These areas provide essential breeding habitat for a variety of amphibian species such as wood frogs, spotted salamanders, and other important wildlife species.

Certified Vernal Pools are those that have been certified by the Massachusetts Division of Fisheries and Wildlife. For information on the location of Certified Vernal Pools, contact The Natural Heritage and Endangered Species Program (see appendix for address and phone number).

The following activities are required under Chapter 132, the Forest Cutting Practices Act, for Certified Vernal Pools, and are recommended for vernal pools in general.

Figure 14 – Two vernal pools. Because of their temporary nature, vernal pools can be difficult to identify. Pools at left are full. Pools above are empty, and show identification features such as depression, matted leaves, and water lines on trees.

R Filter strip 50 feet in width around a Certified Vernal Pool, measured from its edge along the slope. No more than 50% of the basal area may be cut at any time, and a waiting period of five years must elapse before another cut is made. Exceptions to this standard may be made by the Service Forester, if it is shown in the Forest Cutting Plan that a heavier cut is necessary to protect environmental quality.

R Where slopes within the filter strip are 30% or greater, the filter strip will extend 100 feet from the Certified Vernal Pool, or to the point beyond 50 feet from the pool where a break in topography reduces the slope to less than 30%.

R No equipment may operate in the depression of a Certified Vernal Pool, and no logging equipment may operate in the filter strip except:

- to reduce environmental damage shown to be necessary in a statement in an approved Forest Cutting Plan,
- at an approved stream crossing,
- on a pre-existing logging road,
- in filter strips greater than 50 feet in width, beyond 50 feet from the water body.

In the last case above, equipment can operate beyond 50 feet of the vernal pool, as long as no principal skid road is located there, disturbance of the forest floor is minimized, and any disturbed soil is promptly stabilized.

R Tree tops and slash shall be kept out of the Certified Vernal Pool depression. If an occasional top does land in the pool, leave it only if it falls in during the amphibian breeding season (approximately March 1 through July 1).

G Avoid making ruts deeper than 6 inches within 200 feet of a vernal pool. These can represent barriers to amphibian migration.

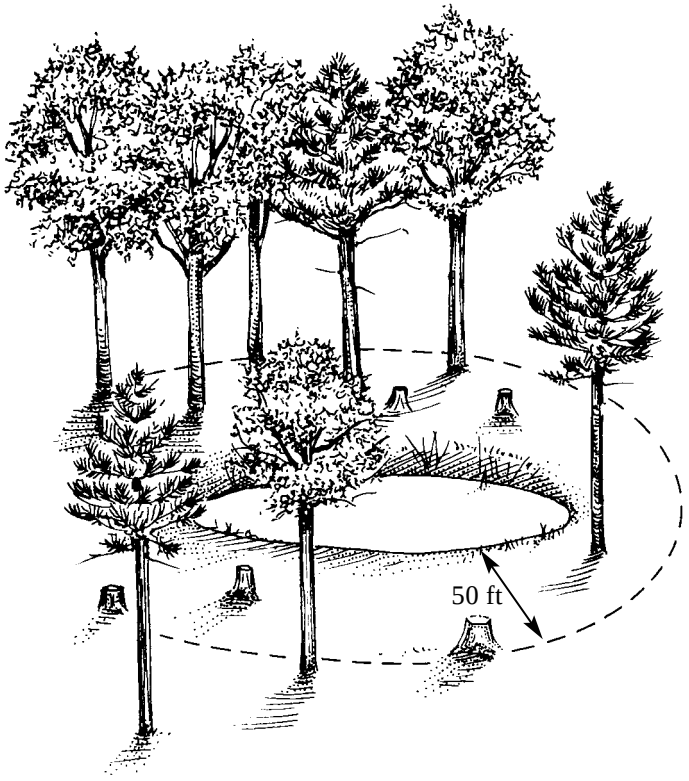


Figure 15 – vernal pool protection measures showing filter strip width and basal area retained.

12
Rare and Endangered Species

The Massachusetts Rare and Endangered Species Act prohibits the taking of rare or endangered species and the alteration of designated significant habitats without the approval of the Director of the Division of Fisheries and Wildlife. Activities conducted in accordance with an approved Forest Cutting Plan are presumed to be in compliance with the Massachusetts Rare and Endangered Species Act. Landowners, timber harvesters, and foresters are encouraged to contact the Natural Heritage and Endangered Species Program of the Division of Fisheries and Wildlife (see appendix)to determine the applicability of this Act to their property or harvesting activities.

Upon receipt of a Forest Cutting Plan, the Service Forester will check the most recent edition of the "Massachusetts Natural Heritage Atlas" to see if the area to be harvested falls within an **Estimated Habitat of Rare Wetlands Wildlife**.

- If the harvest falls within an estimated habitat, the Plan will be forwarded to the Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program (NHESP).
- Upon receipt of the Cutting Plan, NHESP will have 15 business days to determine and report to DEM whether the proposed harvest will negatively impact rare wetlands wildlife habitat.
- If NHESP determines that the proposed harvest will negatively impact the habitat, it will advise DEM of its findings and recommend mitigation of the impact to the habitat.
- Upon receipt of NHESP's recommendations, the Service Forester shall modify the Cutting Plan to avoid negative impacts to the habitat.

Also, upon receipt of a Forest Cutting Plan, the Service Forester will check the most recent edition of the "Massachusetts Natural Heritage Atlas" to see if the proposed area to be harvested falls within a **High Priority Site of Rare Species Habitat.**

- If the harvest falls within a priority habitat, the Plan will be forwarded to NHESP.
- Upon receipt of the Cutting Plan, NHESP will have 10 business days to determine and report to DEM whether the proposed harvest may result in the taking of a rare species.
- If NHESP determines that the proposed harvest may result in the taking of a rare species, it will advise DEM of its findings and make recommendations to avoid the potential take.
- Upon receipt of NHESP's recommendations, the Service Forester shall modify the Cutting Plan to avoid a taking of rare species, and send NHESP a copy of the modified Plan. If the above process has been followed and the modified Cutting Plan complied with, it will be presumed that potential violations of the Massachusetts Endangered Species Act will have been avoided.

13
Seeding

Grasses and other herbaceous cover can stabilize bare mineral soil and minimize erosion. It is a good practice to seed disturbed areas following harvesting. The following table describes different seed mixtures. Mixture number 4 (creeping red fescue, birdsfoot trefoil, and tall fescue)has been traditionally successful in central New England.

None of the recommended grass species are native to Massachusetts. Some are even considered ecologically hazardous because they are so aggressive, and interfere with native plants. Tall fescue, crownvetch, and flatpea are particularly aggressive, or at least so successful that they keep native species from becoming established.

Seeding with native grasses would be preferable, but they are difficult to find commercially (see table of recommended native species below- try some of the larger nurseries in the northeast). A compromise alternative is to use rapidly stabilizing plants like **domestic ryegraass, red fescue, redtop, or Canada bluegrass** which will germinate quickly and stabilize the soil, but are not too aggressive and **will not persist or spread.** In the meantime, the soil is immediately stabilized, and the natural succession of native vegetation is allowed to progress.

Seed Mixture[a]	***Lbs/ Acre***	***Lbs/ 1000 ft^2***	***soil ph range***
1. domestic ryegrass	20	0.45	4.5 - 7.5
2. creeping red fescue,	20	0.45	4.5 - 7.5
red top,	2	0.05	
tall fescue	20	0.45	
3. tall fescue[b] ,	20	0.45	5.5 - 7.5
flatpea[c]	3	0.65	
4. creeping red fescue[b] ,	2	0.45	4.5 - 7.5
birdsfoot trefoil [c,d] ,	8	0.20	5.5 - 7.5
tall fescue	20	0.45	4.5 - 7.5
5. crownvetch[c] ,	15	0.32	5.5 - 7.5
tall fescue,	20	0.45	
creeping red fescue,	20	0.45	
redtop	2	0.05	

[a] *suggested fertilizer rate for mixtures besides ryegrass is 400 lbs/acre of 5-10-10 or 5-10-5.* ***If stabilizing disturbed mineral soil within the filter strip, do not use fertilizer.*** *It may result in nutrient loading into the water body.*

[b] *good mixtures for shady areas*

[c] *innoculate seed*

[d] *better adapted for limestone soils*

It is recommended that the area to be seeded be limed at the rate of approximately 2 tons/ acre, depending on the pH of the soil.

Recommended times of seeding are from April 15 to June 15, or August 1 to September 15. Winter rye can be used as a temporary cover, and seeded between August 15 and October 15.

Spreading hay on the disturbed site will minimize erosion and also provide a source of seed. Use approximately 60 bales/acre.

The following grasses are **native to Massachusetts**, and would be good for stabilizing disturbed soils:

partial shade:

Agrostis hyemalis - ticklegrass

Deschampsia flexuosa - wavy hairgrass

Luzula multiflora - wood rush

Muhlenbergia schreberi - nimbleweed

Panicum clandestinum - deertongue

Panicum virgatum - switchgrass

moderate-to-heavy shade:

Agrostis perennans - upright bent

Brachyelytrum erectum - woodgrass

Bromus ciliatus - fringed bromegrass

Carex pensylvanica - Penn. Sedge

Cinna arundinacea - stout woodreed

Elymus virginicus - Virginia wildrye

Festuca obtusa - nodding fescue

Hystrix patula - bottlebrush grass

Juncus tenuis - path rush

Oryzopsis asperifolia - mountain ricegrass

open areas:

Andropogon gerardii - big bluestem

Andropogon virginicus - broom-sedge

Panicum virgatum - switchgrass

Schizachyrium scoparium - little bluestem

Sorghastrum nutans - indiangrass

14
Before Leaving the Job

R Pull temporary skidder bridges, and make sure that fords and other stream crossings are left in a stable, and free-flowing condition.

R Remove all temporary structures (e.g., culverts, bridges) from Wetland Resource Areas.

R Install appropriate water bars on skid trails, especially at the approach to the landing and stream crossings, steep slopes, and erodible areas.

R Notify Service Forester to schedule a final inspection.

G Seed and mulch the approaches to stream crossings and banks and steep sections of skid trails.

G Put brush or slash on skid roads, and seed where vulnerable to erosion. Close off access with a gate, cable, massive water bar, or some other means.

G Smooth and grade the landing. Seed or mulch to prevent erosion. Clear permanent culverts. Accentuate broad-based dips

G Smooth the woods road. There is significant aesthetic benefit to using hand tools, such as a hoe or fire rake, to smooth tire tracks and ruts- especially along the most visible sections of trails or roads.

15
Forest Chemical Management

Improperly applied fertilizers or pesticides (insecticides, herbicides, fungicides)may contaminate surface waterbodies as well as groundwater.

In all cases, by federal law, chemical users must follow the directions on the Environmental Protection Agency (EPA) labels on containers.

In Massachusetts, commercial applicators of pesticides which use or supervise the use of restricted or limited-use pesticides must be certified by the MA Pesticide Control Board. For more information, contact MA Department of Food and Agriculture (DFA), Pesticide Bureau at 617-727-3020.

MA Pesticide Control regulations (333 CMR 13.03)require a 400-foot buffer around public drinking water supplies. The regulations further state that no application shall result in pollution of any waterway, groundwater, or waterbody. Other restrictions include abutter notification and special provisions for exclusion areas. Applicators should be familiar with all of the restrictions contained in these regulations.

Use the following BMPs to prevent chemical contamination of surface and ground waters:

- Check local weather forecast before application. Do not apply if high wind or rain is predicted.
- Avoid applying chemicals when temperatures are high or relative humidity is low, to avoid rapid evaporation of chemicals.
- Abide by all restrictions on the label.
- For aerial spray applications, mark and maintain a 100-foot buffer around all water bodies. Ensure that there is no application to water bodies.
- For ground spraying and other types of application, mark and maintain a 25-foot buffer. Ensure that there is no direct application of chemicals to the waterbody.
- Calibrate spray equipment to apply chemicals uniformly and in correct quantities.
- Prevent leaks from equipment. check all equipment for leaking hoses, connections, and nozzles.
- Locate all mixing and loading areas outside of filter or buffer strips, or riparian areas.
- Dispose of pesticide wastes and containers according to labels and state / federal laws.
- Develop a spill contingency plan. Have onsite a spill clean-up kit including:

detergent or soap,

hand cleaner and water,

activated charcoal, adsorptive clay, saw dust, vermiculite, or other absorptive materials,

lime or bleach to neutralize pesticides in emergency situations,

tools such as shovels and containers for disposal,

protective clothing/gloves/masks

- Report spills immediately to the Pesticide Control Board and the Service Forester.
- Apply slow-release fertilizers when possible.
- Base fertilizer type and application rate on soil and / or foliar analysis when possible.
- Do not use fertilizers within filter strip or riparian zone due to possible nutrient loading.

16
Prescribed Burning and Wildfire

Though seldom used in Massachusetts, prescribed burning is a silvicultural tool that may lead to water quality degradation. Exposed soil following burns may lead to increased erosion.

According to 310 CMR 7.07 (1-6), open burning of brush, trees, and forestry debris must be conducted under the provisions of a properly executed permit from the local Fire Department or from the Department of Environmental Protection's (DEP)Division of Air Quality (DAQ). Prescribed burns may only occur between January 15 and May 1, during favorable atmospheric conditions.

The following BMPs have proven effective in reducing impacts:

- Do not conduct burns within 50 feet of a surface waterbody or wetland.
- Avoid construction of firelines within 50 feet of a waterbody or wetland.
- Locate firelines on contour as much as possible.
- Avoid burning on steep slopes or highly erodable soils.
- Revegetate and stabilize firelines and erosion-prone areas with herbaceous cover.
- Avoid applying chemical fire retardant to waterbodies.

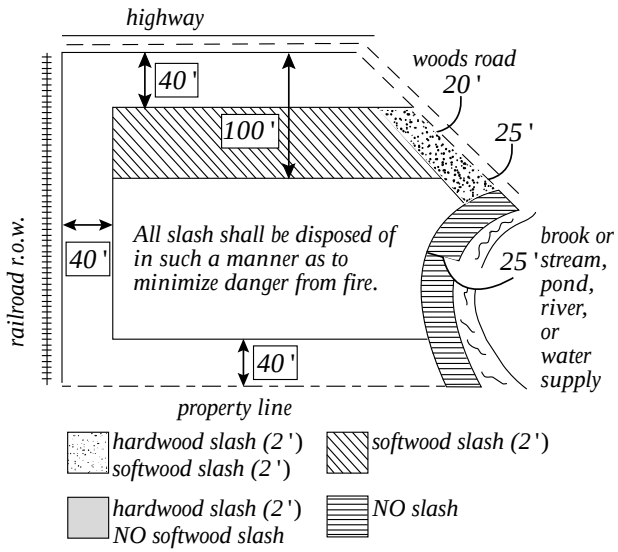
17
MA Slash Law Requirements

R Hardwood slash must not be left more than 2 feet above the ground within 40 feet of any boundary line or outer edge of any highway, or 20 feet of an established woods road.

R Softwood slash must not be left on the ground within 40 feet of any boundary line or outer edge of any highway, and must not be more than 2 feet above the ground between 40 and 100 feet of the outer edge of any highway or 25 feet of an established woods road.

R All slash must be disposed of in a manner as to minimize fire danger.

R No slash is permitted within 25 feet of any continuously flowing brook, stream, river, or any lake, pond, or water supply.



Appendices

1. Massachusetts Department of Environmental Management, Division of Forests and Parks Offices:

Statewide Office

DEM
100 Cambridge Street,
19th floor
Boston, MA 02202

617 626-1250 voice
617 626-1449 fax

Region 1 – Southeast
(Plymouth and Bristol Counties, Cape, and Islands):

Division of Forests & Parks
P.O. Box 66
South Carver, MA 02366

508 866-2580 voice
508 866-7736 fax

Region 2 – Northeast
(Middlesex, Essex, and Norfolk Counties):

Division of Forests & Parks
P.O. Box 829
Carlisle, MA 01741

978 369-3350 voice
978 369-1965 fax

Region 3 – Central
(Worcester County):

Division of Forests & Parks
P.O. Box 155
Clinton, MA 01510

978 368-0126 voice
978 368-0217 fax

Region 4 – Pioneer Valley
(Franklin, Hampshire, and Hampden Counties):

Division of Forests & Parks
Box 484
Amherst, MA 01004

413 545-5993 voice
413 545-5995 fax

Hampton Ponds Field Office:
1048 North Road
Hampton Ponds State Park
Westfield, MA 01085

413 532-6872

Region 5 – Berkshires

Division of Forests & Parks
P.O. Box 1433
Pittsfield, MA 01202

413 442-8928 voice
413 442-5860 fax

2. Massachusetts Division of Fisheries and Wildlife Offices:

Massachusetts Division of Fisheries and Wildlife
Field Headquarters
1 Rabbit Hill Road
Westborough, MA 01581

508 792-7270 voice
508 792-7275 fax

3. Natural Heritage and Endangered Species Program:

Division of Fisheries and Wildlife
1 Rabbit Hill Road
Westborough, MA 01581

508 792-7270 voice
508 792-7275 fax

4. Massachusetts Department of Environmental Protection (DEP) Offices:

Boston office:

One Winter Street
Boston, MA 02108

617 292-5500 voice
617 556-1049 fax

Environmental Crimes Strike Force

617 556-1000 voice

Northeast regional office:

205 Lowell Street
Wilmington, MA 01887

978 661-7600 voice
978 661-7615 fax

Southeast regional office:

20 Riverside Drive
Lakeville, MA 02347

508 946-2700 voice
508 946-2835 fax

Central regional office:

627 Main Street
Worcester, MA 01605

508 792-7650 voice
508 792-7621 fax

Western regional office:

436 Dwight Street
Springfield, MA 01103

413 784-1100 voice
413 784-1149 fax

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