Recommended Best Management Practices For Forestry In Georgia

600 n1 93



DEC. 1 2 1994 DUCUMENTS UGA LIDDADIT

Foreword

This booklet was prepared to inform loggers, foresters, landowners, and others involved with forestry in Georgia about the simple and practical methods to minimize erosion from forestry operations. The methods described are better known as Best Management Practices and will be referred to in this publication as BMPs. These BMPs were developed by the Forestry Non-Point Source Technical Task Force comprised of 14 individuals representing various aspects of forestry in Georgia.

It should be emphasized that these recommendations are strictly voluntary at the present time.

The Task Force feels that these practices are economical, common sense answers for assuring forestry's contribution to a high standard of water quality in the state.

*

ACKNOWLEDGEMENT

The Georgia Forestry Commission wishes to express its appreciation to those individuals, committees, and agencies, which contributed to the development of this publication.

1993

THE PUBLICATION OF THIS DOCUMENT WAS SUPPORTED BY THE GEORGIA ENVIRONMENTAL PROTECTION DIVISION AND WAS FINANCED IN PART THROUGH A GRANT FROM THE U. S. ENVIRONMENTAL PROTECTION AGENCY, UNDER PROVISIONS OF SECTION 205(J) OF THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMMENDED.

TABLE OF CONTENTS

Page

	1 450
Introduction	. 2
Section I - Streamside Management Zones.	. 4
Section II - Stream Crossings	. 6
Section III - Access Roads and Their Construction	. 7
Section IV - Timber Harvesting	. 13
Section V - Site Preparation	. 14
Section VI - Reforestation.	
Section VII - Forest Protection (Prescribed Burning, Fire Lines and	
Chemical Fire Retardants).	. 16
Section VIII - Chemical Treatment (Pesticides, Herbicides, and Fertilizers)	17
Appendix	

LIST OF TABLES

	Pag	ţe
Table 1	-Recommended Diameters for Corrugated Metal Culverts)
	2 - Recommendations for Seeding, Mulching and Fertilizing Roads,	
	Skid Trails and Disturbed Areas in Georgia	
Table 3	-Calculation of Seed and Fertilizer Needs for Roads, Skid	
	Trails and Disturbed Areas	

LIST OF FIGURES

	Page
Fig. 1 - Major Regions in Georgia	. 3
Fig. 2 - Streamside Management Zones and Their Widths by Region	. 5
Fig. 3 - Properly Constructed Road Cross Section	. 8
Fig. 4 - Culvert Installation	. 9
Fig. 5 - Broad Based Drainage Dips	. 10
Fig. 6 - Water Turnout	. 11
Fig. 7 - Profile of Abandoned Skid Trail Showing Water Bars	. 12
Fig. 8 - Water Bars in Firebreak	. 17

INTRODUCTION

Planning for protection of water quality from non-point source pollution $\frac{1}{2}$ is provided for in Section 208 of the 1972 Federal Water Pollution Control Act (Public Law 92-500) as ammended by the Clean Water Act of 1977 (Public Law 95-217), and as ammended by Section 319 of the Clean Water Act of 1987 (Public Law 100-4). The basic goal of the federal law is to protect and improve the quality of the nation's waters so they are "fishable" and "swimmable".

Included in overall area-wide planning is the protection of water quality from possible pollution by forestry (silvicultural) activities. Thus, the Forestry Non-Point Source Technical Task Force was created to assess the extent of pollution caused by forestry activities in Georgia and recommend practices which would eliminate or reduce the amount of pollution.

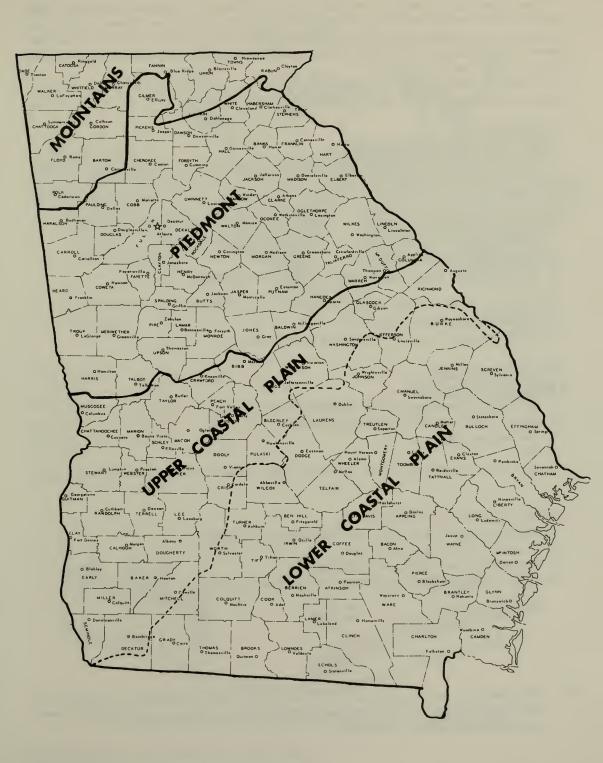
The practices the Task Force recommended are called Best Management Practices (BMP'S). Since soil characteristics and slope vary greatly within the state, these BMP'S were designed for each of Georgia's four major regions: Lower Coastal Plain, Upper Coastal Plain, Piedmont and Mountain (Fig. 1).

The BMP'S are arranged in the following sections:

- 1. Streamside Management Zones
- 2. Stream Crossings
- 3. Access Roads and Their Construction
- 4. Timber Harvesting
- 5. Site Preparation
- 6. Reforestation
- 7. Forest Protection (Prescribed Burning, Firelines, and Chemical Fire Retardant)
- 8. Chemical Treatment (Pesticides, Herbicides, and Fertilizers)



 $\frac{1}{2}$ Non-Point source pollution is described as any pollution that is created from an activity which has no particular permanent location. Examples are: Timber harvesting, farming, site preparation, mining, etc.



- SECTION I -

STREAMSIDE MANAGEMENT ZONES

Areas adjacent to perennial (ever flowing) or intermittent (wet-weather) streams and ponds or lakes require special management in forestry operations. These "zones" are the prime areas where non-point source pollutants enter our water resources. They are known as Streamside Management Zones (SMZ). Special care and sometimes restricted activity are necessary in these areas.

The SMZ is divided into two parts: (1) primary, and (2) secondary. Figure 2 shows the recommended width of each by region.

PRIMARY SMZ

✓ BMPs RECOMMENDED

- 1. Any type of cutting practice, including clearcutting. $\frac{1}{}$
- 2. The cabling out of any timber.
- 3. Hand planting or direct seeding.

X PRACTICES TO BE AVOIDED

- 1. Wheeled or tracked vehicles of any kind.
- 2. Leaving trees or tops in water.
- 3. Roads or trails of any kind, unless absolutely necessary.
- 4. Fire.
- 5. Any type of mechanical site preparation or machine planting.
- 6. Portable sawmills and log decks.
- 7. Aerial application of any pesticides or herbicides.

SECONDARY SMZ

✓ <u>BMPs RECOMMENDED</u>

- 1. Any type of cutting practice, including clearcutting.
- 2. Careful use of wheeled or tracked vehicles.
- 3. Roller chopping.
- 4. Fire.
- 5. Any type of planting which does not remove the forest floor or expose mineral soil.

X PRACTICES TO BE AVOIDED

- 1. Roads or trails of any kind, unless absolutely necessary.
- 2. Portable sawmills and log decks.
- 3. Harrowing, root raking, or bulldozing.
- 4. Gully leveling, unless immediately seeded and mulched.

 $\frac{1}{2}$ Clearcutting is unacceptable in the Primary SMZ in the Mountains, if it affects the water temperature to the extreme that it would threaten a trout environment (see thermal pollution in Glossary).

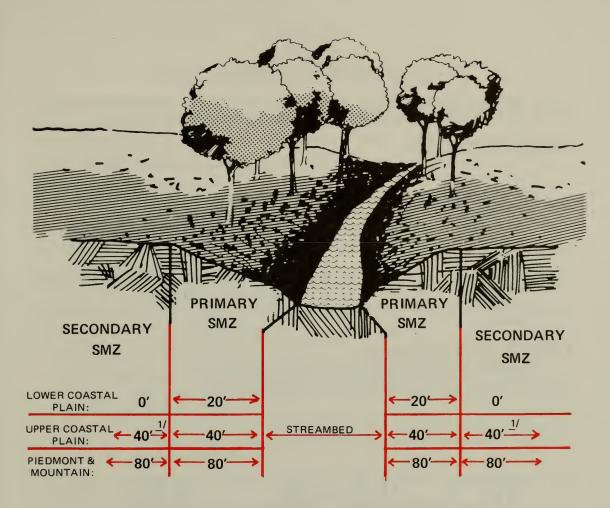


Fig. 2 - Streamside Management Zones and Their Widths by Region



Fire is acceptable in the Secondary SMZ but not in the Primary SMZ.

 $\frac{1}{1}$ Does not apply to bottomlands in this region.

-SECTION II -

STREAM CROSSINGS

The crossing of streams should be avoided if at all possible. In most situations, advanced planning will reduce or eliminate the number of crossings necessary.

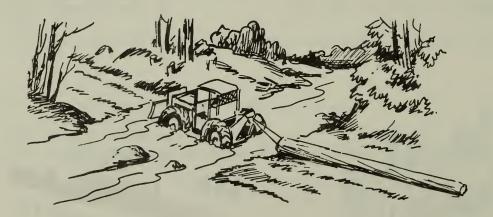
✓ BMPs RECOMMENDED

- 1. Properly sized culverts should be used in small streams (usually 200-acre or less watershed, depending on geographic region) (Table 1).
- 2. Well constructed bridges should be used over large streams (200+ acre watersheds, depending on geographic region.)
- 3. Fords should be made only at right angles to the stream where stream banks and bottoms are hard and relatively level. These crossings should be made only on a temporary basis.
- 4. All approaches to stream crossings, whether temporary fordings or permanent roads, should be made at gentle grades of slope (about 3 percent).
- 5. Soil around all culverts and bridges should be stabilized with mulch and seed (Table 2).

X PRACTICES TO BE AVOIDED

1. Temporary crossings of logs and brush topped with soil.

2. Anything which would impede the free flow of water.



- SECTION III -ACCESS ROADS AND THEIR CONSTRUCTION

Access roads, whether newly constructed or existing, create more potential for soil movement than any other activity in forest management. Advance planning of road construction is needed to minimize road grade or slope, number of spur roads, and proper location of each.

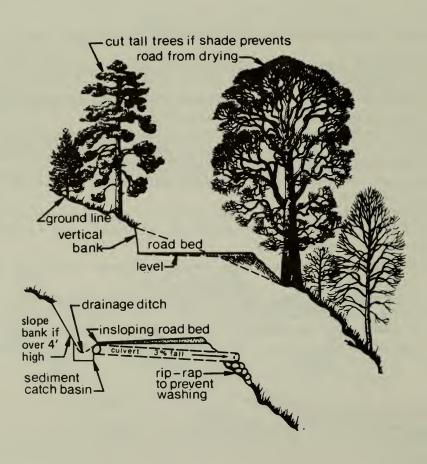
✓ BMPs RECOMMENDED

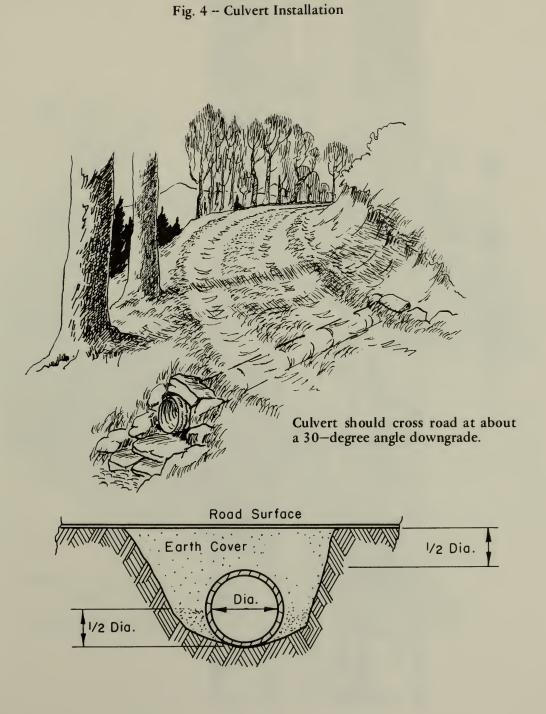
- 1. Roads located within the SMZ should have all exposed soil stabilized, preferably with mulch and seed (Tables 2 and 3).
- 2. Roads should follow the contour as much as possible.
- 3. Road grades should be kept at 5 percent or less, except where terrain requires short steep grades.
- 4. Keep roads reasonably free of obstructions and logging debris which prevents free flow of water from the road surface.
- 5. Locate roads on the sides of ridges or water divides to insure proper drainage.
- 6. Locate roads above flood plains and wet areas, if possible.
- 7. Insloping of roads should be avoided. However, some situations will require this. In these cases, the use of under road culverts positioned at a 30^o angle to insure proper inside road drainage is recommended (Fig. 3 and 4).
- 8. Construct road wide enough to handle equipment that will use the road (usually about 12 to 14 feet).
- 9. Broad based dips should be used at proper intervals to channel water off the road (Fig. 5). The bottom of these dips should be outsloped slightly (3 percent) to allow for removal of surface water.
- 10. Water bars should only be used when retiring temporary access roads and skid trails.
- 11. Water turnouts should be used at proper intervals with respect to grade (Fig. 6).
- 12. Removal of shading trees along road sides will aid in drying out road beds.
- 13. When all forestry activities are completed for that particular time, temporary access roads should be retired. This includes re-shaping, mulching, and seeding (Table 2), in combination with water bars (Fig. 7).

X PRACTICES TO BE AVOIDED

- 1. Keep road construction as far away as possible from SMZs.
- 2. Do not locate roads on tops of ridges. Water tends to collect in them, resulting in poor drainage.
- 3. Avoid constant use of soft roads during wet ground conditions.

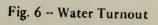
Fig. 3 -- Properly Constructed Road Cross Section





Approximate Spacing Distance Needed Between Dips (Feet) 500 300 180 140 1.1.1.1.11.11.11 SPACING: (SEE BELOW) Road Grade (Percent) 2 5 10 3% 74

Fig. 5 - Broad Based Drainage Dips



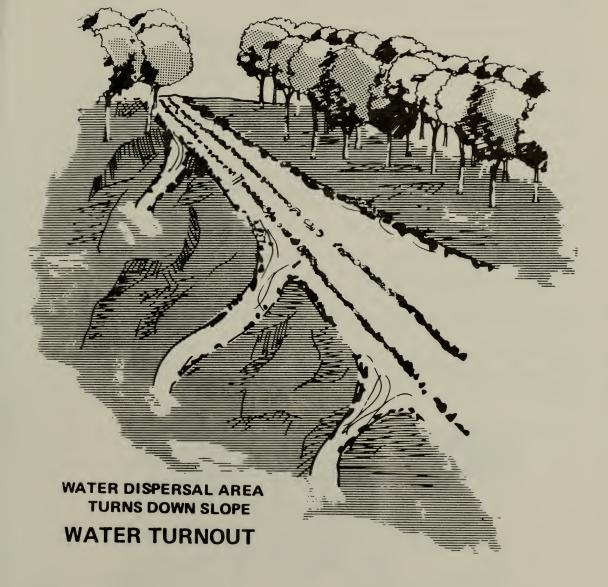
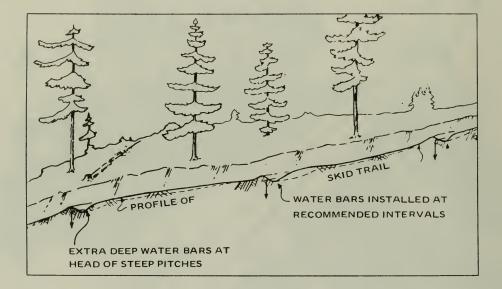


Fig. 7 - Profile of Abandoned Skid Trail Showing Water Bars



Approximate Distance Needed Between Water Bars
(Feet)
400
245
125
78

- SECTION IV -

TIMBER HARVESTING

Timber harvesting activities pose little threat to water quality when care is taken to prevent or minimize erosion and sedimentation.

✓ BMPs RECOMMENDED

- 1. Timber harvesting within the SMZs should abide by practices pointed out in Section 1.
- 2. Skidding on steep slopes should be done on a gradual grade, rather than straight up the slope (primarily Piedmont and Mountain Regions).
- 3. Alternate skidding between several different skid trails instead of using only one primary trail. This will result in a minimum of soil exposure and disturbance.
- 4. Leave logging debris on exposed soil, dry washes, and at points of concentrated drainage from skid trails and roads.
- 5. Temporary culverts should be used when crossing streams with harvesting equipment. These culverts can be pulled out after logging operations are complete.
- 6. Log decks should only be large enough to handle necessary loading activities.
- 7. Log decks should be located on stable, well drained areas, well away from streams and ponds.
- 8. Log decks located in the Piedmont and Mountain Regions should be site prepared and seeded when harvesting operations have been completed. (May apply to Coastal Plain Region on certain sites, depending on slope and drainage characteristics.
- 9. Portable sawmills should be located at least 300 feet away from any stream or body of water.
- 10. Provisions should be made at lunch sites and sawmill setups for disposal of human wastes and garbage.

XPRACTICES TO BE AVOIDED

- 1. Do not service logging equipment where it will have an impact on water quality.
- 2. Sawdust and mill waste should not be discharged into streams and lakes.
- 3. Temporary crossings made from logs piled into streams should not be used, as they are usually not removed following harvesting thus causing stream channel blockage.



- SECTION V -

SITE PREPARATION

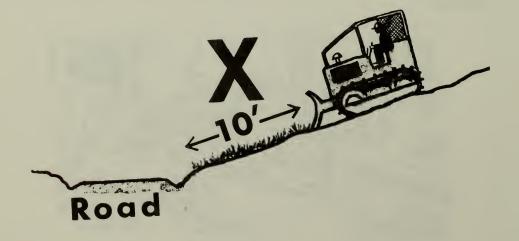
Site preparation, for the purpose of forest regeneration, is a basic silvicultural tool in Georgia where control of competing vegetation and reduction of logging debris are necessary. Several site preparation procedures, however, should be of concern when considering water quality.

✓ BMPs RECOMMENDED

- 1. Analyze and plan the site preparation job, taking into account all aspects of the Streamside Management Zones (Section I).
- 2. All bulldozing, Vee-blading, K-G blading, and root raking should disturb as little soil as possible.
- 3. Use drum choppers, herbicides, or prescribed burning on highly erodible soils.
- 4. When windrowing, debris should be oriented on the contour. Breaks should be left in the windrows to allow safe access for fire control or other activities.
- 5. Only dry washes may be filled in with debris.
- 6. Construction of planting beds should be done on the contour.

X PRACTICES TO BE AVOIDED

- 1. Do not pile debris in live or wet-weather streams.
- 2. Avoid all heavy site preparation (K-G blading, root raking, disking, etc.) on slopes greater than 20 percent.
- 3. On slopes, do not site prepare land up to the edge of roads and roadside ditches. Leave a natural buffer strip (10+ feet) to catch soil particles going to or from road areas.



- SECTION VI -

REFORESTATION

Reforestation includes hand and machine planting and direct seeding. Hand planting and direct seeding pose no threat to water quality; therefore, BMPs are not necessary.

Since some exposure of mineral soil occurs with machine planting, there is a slight concern for erosion.

✓ BMPs RECOMMENDED

1. Machine plant on the contour if at all possible.

2. Refer to Streamside Management Zone (Section I) regarding machine planting in these areas.





- SECTION VII -

FOREST PROTECTION

(PRESCRIBED BURNING, FIRE LINES, AND CHEMICAL FIRE RETARDANTS)

PRESCRIBED BURNING

Prescribed fire is a very useful silvicultural tool when used properly. Poor planning and weather conditions can cause too much heat in a prescribed burn, completely destroying the humus layer, exposing the soil to erosion.

✓ BMPs RECOMMENDED

1. Carefully plan and execute the use of prescribed fire in forestry situations while observing the weather conditions.

FIRE LINES

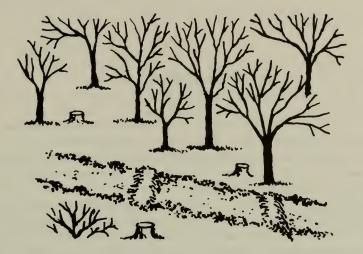
✓ BMPs RECOMMENDED

- 1. Pre-suppression firebreaks should be located on the contour as much as possible.
- 2. When grades over 5 percent develop, water bars should be placed in firebreak lines, if possible, at frequent intervals to slow the water and disperse it (Fig. 8).
- 3. Since wildfire suppression lines are made in the stress of emergency, implementation of BMPs should be left to the discretion of the landowner.

CHEMICAL FIRE RETARDANTS

Because of the limited use of chemical fire retardants in the state of Georgia, no BMPs are recommended.

Fig. 8 - Water Bars in Firebreak



-SECTION VIII -

CHEMICAL TREATMENT

(PESTICIDES, HERBICIDES, AND FERTILIZERS)

Use of chemical treatment should be limited within the SMZ because of their pollution potential. Pesticides (including herbicides) should be made by injection or directed application. Forest fertilizer should be applied in such a manner (rate, time, frequency of application, etc.) to prevent soil or water pollution. If state and federal laws regarding the proper use of silvicultural chemicals are adhered to, and manufacturers label directions followed; the judicious use of chemicals should not jeopardize the SMZ or the water it protects. Care should also be taken in areas adjacent to the SMZ to prevent the drift, spill, seepage, or wash of chemicals into the SMZ or water course.

APPENDIX

-GLOSSARY-

<u>Access Road</u> - A temporary or permanent woods road over which timber is transported from a felling site to a public road. Also known as a haul road.

- <u>Bedding</u> A site preparation technique whereby a small ridge of surface soil is formed to provide an elevated planting or seed bed. It is used primarily in wet areas to improve drainage and aeration for seedlings.
- Best Management Practices (BMPs) A practice, or combination of practices, that is determined after problem assessment and examination of alternatives, to be most effective, practical means of preventing or reducing the amount of pollution generated by non-point sources to a level compatible with water quality.
- <u>Broad-Based Dip</u> Also called a rolling dip, this is a surface drainage structure specifically designed to tip water out of a dirt road while vehicles maintain normal haul speeds.
- <u>Buffer Strip</u> A barrier of permanent vegetation established or left undisturbed downslope from disturbed forest areas to filter out sediment from runoff before it reaches a watercourse.
- <u>Chopping</u> A mechanical treatment whereby vegetation is concentrated near the ground and incorporated into the soil. Chopping may be used to facilitate burning or to increase the organic component of the surface soil.
- <u>Clearcutting</u> A silvicultural system in which all merchantable trees are harvested over a specified area in one operation.
- <u>Commercial Forest Land</u> Forest land bearing or capable of bearing timber of commercial character, currently or prospectively available, and not withdrawn from such use.
- <u>Contour</u> An imaginary line on the surface of the earth connecting points of the same elevation. A line drawn on a map connecting points of the same elevation.
- <u>Culvert</u> Either a metal or concrete pipe, or a constructed box-type conduit, through which water is carried under roads.
- Dry Wash A stream bed that carries water only during and immediately following rainstorms.
- Erosion The process by which soil particles are detached and transported by water, wind, and gravity to some downslope or downstream point.

Felling - The process of cutting down standing trees.

- Forest Chemicals Chemical substances or formulations that perform important functions in forest management, and include fertilizers, herbicides, repellents, and other chemicals.
- <u>Forest Land</u> Land bearing forest growth or land from which the forest has been removed but which shows evidence of past forest occupancy and which is not now in other use.

Forest Practice - An activity relating to the growing, protecting, harvesting, or processing of forest tree species on forest land and other aspects such as wildlife, recreation, etc.

Forest Road - An access route for vehicles into forest land.

Harrowing (Disking) - A mechanical method of scarifying the soil to reduce competing vegetation and to prepare a site to be seeded or planted.

Harvesting - The felling, skidding, loading, and transporting of timber products (pulpwood, poles, sawlogs, etc.).

Haul Road - See Access Road

Herbicide - Any substance or mixture of substances intended to prevent the growth of or destroy unwanted trees, bushes, weeds, algae, and other aquatic weeds.

Intermittent Stream - A watercourse that flows in a well defined channel during the wet seasons of the year, but not the entire year. Same as a wet-weather stream. Live Stream - See Perennial Stream.

Log Deck - Also called log landing, log yard, brow or bunching area. A place where logs or tree-length material is assembled for loading and transporting.

Logging Debris - The unutilized and generally unmarketable accumulation in the forest of woody material, such as large limbs, tops, cull logs and stumps, that

remain as forest residue after timber harvesting.

Mulching - Any loose covering of forest soil with organic residues, such as grass, straw, or wood fibers, to check erosion and stabilize exposed soil.

<u>Non-Point Source Pollution</u> - Water pollution which is: (1) induced by natural processes, including precipitation, seepage, percolation, and runoff; (2) not traceable to any discrete or identifiable facility; and (3) better controlled through the utilization of best management practices.

- Perennial Stream A watercourse that flows throughout the year or nearly so (90 percent), in a well defined channel. Same as a live stream.
- <u>Pesticides</u> Chemical materials that are used for the control of undesirable insects, diseases, vegetation, animals or other forms of life.

Prescribed Burning - The practice of using controlled fires to reduce or eliminate the unincorporated organic matter of the forest floor, or low, undesirable vegetation.

Regeneration - The young tree crop replacing older trees removed by harvest or disaster; the process of replacing old trees with young.

<u>Retirement of Road</u> - Preparing a road for a long period of non-use. Methods include mulching, seeding, installing water bars, etc.

<u>Rotation (Period)</u> - The period of time to establish, grow and harvest a crop of trees at a specified condition of maturity.

<u>Sidecast</u> - The act of moving excavated material to the side and depositing such material.

Silviculture - The science and art of growing forest crops, More particularly, the principles, theories and practices for protecting and enhancing the regeneration, growth, development and utilization of forests for multiple benefits.

<u>Site Preparation</u> - A forest activity to remove unwanted vegetation and other material, and to cultivate or prepare the soil for reforestation.

- <u>Skid</u> Short-distance moving of logs or felled trees, along the surface of the ground, from the stump to the point of loading.
- Skid Trail A temporary, non-structural pathway over forest soil to drag felled trees or logs to a log landing.

Streamside Management Zone (SMZ) - An area adjacent to the banks of streams and bodies of open water where extra precaution is necessary in carrying out forest practices in order to protect bank edges and water quality.

<u>Thermal Pollution</u> - A temperature rise in a body of water sufficient to be harmful to the aquatic life in the water.

Water Bar - A hump or small dike-type surface drainage structure, properly used only in closing abandoned roads to traffic, on firelines, and abandoned skid trails.

<u>Watercourse</u> - A stream of water; river; brook; a channel for water. Can be also used to include bodies of open water.

Watershed Area - All land and water within the confines of a drainage divide.

Water Turnout - The extension of an access road's drainage ditch into a vegetated area to provide for the dispersion and filtration of stormwater runoff.

Wet-Weather Stream - See Intermittent Stream.

Windrow - Logging debris and unmerchantable woody vegetation which has been piled in rows to decompose or be burned; or the act of constructing these piles.

Table 1.-Recommended Diameters for Corrugated Metal Culverts

Drainage Lower Upper Area Coastal Coastal (Acres) Plain Plain			Piedmont	Mountains
		– Diamet	er in Inches	
10	12	12	12	18
50	30	18	30	36
100	48	30	42	48
200	60	42	54	2(48)

Table 2.--Recommendations for Seeding, Mulching and Fertilizing Roads, Skid Trails and Disturbed Areas in Georgia

UPPER & LOWER COASTAL PLAINS REGION PIEDMONT REGION Dates Species for Planting ^L / Rates/Acre Dates Sept. 1 Tall fescue or 25-35 lb. M Sept. 1 Tall fescue or 25-35 lb. M Nov. 15 and rye grass 15 lb. Nov. 1 "Ambro" virgata lespedeza 50-60 lb. Ju Nov. 15 and rye grass 15 lb. Nov. 1 "Ambro" virgata lespedeza 50-60 lb. Ju Nov. 15 and Abruzzi rye 1 bu. Nov. 1 Tall fescue or 25-35 lb. Ai Nov. 15 and Abruzzi rye 1 bu. Nov. 1 Tall fescue or 25-35 lb. Ai Feb. 15 and Abruzzi rye 1 bu. Mar. 1 Tall fescue and 25-35 lb. Ai Feb. 15 and Abruzzi rye 1 bu. Nov. 1 Tall fescue and 25-35 lb. Ai Feb. 15 and Abruzzi rye 1 bu. Mar. 1 Tall fescue and 25-35 lb. Ai Feb. 15 and Abruzzi rye 1 bu. Y Mar. 1 Y Mar. 12/Y Mar. 12/Y Y Y Y </th <th></th> <th></th> <th></th>			
antingL/Rates/AcreDatesSpecies for PlantingL/Rates/AcreantingL/Sept. 1Tall fescue and25-35 lb.antiagrass25-35 lb.Nov. 1"Ambro" virgata lespedeza50-60 lb.antiagrass25-35 lb.Nov. 1"Ambro" virgata lespedeza50-60 lb.antiagrass20-25 lb.Nov. 1Tall fescue and25-35 lb.ve1 bu.Mar. 12/"Ambro" virgata lespedeza50-60 lb.antiagrass20-25 lb.Mar. 12/"Ambro" virgata lespedeza50-60 lb.and Abruzzi ryetotosand Abruzzi rye1 bu.and Abruzzi ryeand Abruzzi rye25-35 lb.arss and6 lb.Mar. 1Tall fescue and25-35 lb.ata lespedezaApr. 15"Ambro" virgata lespedeza30-40 lb.ata lespedezaApr. 15Pensacola bahiagrass and25-35 lb.ata lespedezaApr. 15common bernuda grass and6 lb.ata lespedezafuly 1"Ambro" virgata lespedeza40-50 lb.ata lespedezafuly 1"Ambro" virgata lespedeza40-50 lb.ata lespedezafuly 1fororata lespedezaforforforata lespe		MOUNTAIN REGION	
25-35 lb.Sept. 1Tall fescue and unhulled sericea or 15 lb.25-35 lb. to unhulled sericea or "Ambro" virgata lespedeza25-35 lb.aahiagrass25-35 lb.Nov. 1"Ambro" virgata lespedeza50-60 lb.aahiagrass20-25 lb.Nov. 1Tall fescue and unhulled sericea or and Abruzzi ryc25-35 lb.ye1 bu.Mar. 12/"Ambro" virgata lespedeza50-60 lb.ingrass20-25 lb.Mar. 12/"Ambro" virgata lespedeza1 bu.ingrass20-25 lb.Mar. 1Tall fescue and and Abruzzi ryc25-35 lb.aas and6 lb.mar. 1Tall fescue and scarified sericea or25-35 lb.ata lespedeza30-40 lb.scarified sericea or scarified sericea or fuly 125-35 lb.ata lespedezaApr. 15Pensacola bahiagrass and scarified sericea or fuly 125-35 lb.july 1"Ambro" virgata lespedeza40-50 lb.orjuly 1"Ambro" virgata lespedeza40-50 lb.ororororor	Rates/Acre Dates	Species for Planting ^{1/} R	Rates/Acre
15 lb. Nov. 1 "Ambro" virgata lespedeza 50-60 lb. ahiagrass 25-35 lb. Nov. 1 Tall fescue and 25-35 lb. ve 1 bu. Mar. 1 2/ "Ambro" virgata lespedeza 50-60 lb. ve 1 bu. mar. 1 2/ "Ambro" virgata lespedeza 50-60 lb. ve 1 bu. mar. 1 2/ "Ambro" virgata lespedeza 50-60 lb. iagrass 20-25 lb. Mar. 1 Tall fescue and 25-35 lb. and Abruzzi ryc 1 bu. and Abruzzi ryc 1 bu. arss and 6 lb. Scarified sericea or 25-35 lb. arss and 6 lb. Apr. 15 "Ambro" virgata lespedeza 30-40 lb. ata lespedeza 30-40 lb. Apr. 15 Pensacola bahiagrass and 25-35 lb. ata lespedeza July 1 "Ambro" virgata lespedeza 30-40 lb. 0 b. apr. 15 Pensacola bahiagrass and 25-35 lb. 0 b. 0 b. o scarified sericea or July 1 "Ambro" virgata lespedeza 40-50 lb.	25-35 lb. Mar. 15	Tall fescue and 25	25-35 lb.
25-35 lb.Nov. 1Tall fescue and unhulled sericea or Mar. 125-35 lb.ye1 bu.to man unhulled sericea or and Abruzzi ryc25-35 lb.ye1 bu.Mar. 12/and Abruzzi ryc1 bu.mar. 1Tall fescue and scarified sericea or25-35 lb.and Abruzzi ryc25-35 lb.mar. 1Tall fescue and scarified sericea or25-35 lb.and Abruzzi ryc1 bu.mar. 1Tall fescue and scarified sericea or25-35 lb.ata lespedeza30-40 lb.Apr. 15Pensacola bahiagrass and scarified sericea orata lespedezaApr. 15Pensacola bahiagrass and to scarified sericea or25-35 lb.upuly 1"Ambro" virgata lespedeza40-50 lb.ororororororor	50-60 lb. June 1		40-50 lb.
 20-25 lb. to unhulled sericea or 1 bu. Mar. 12/ "Ambro" virgata lespedeza 50-60 lb. Mar. 1 Tall fescue and 25-35 lb. Mar. 1 Tall fescue and 25-35 lb. to scarified sericea or 30-40 lb. Apr. 15 "Ambro" virgata lespedeza 30-40 lb. oedeza Apr. 15 "Ambro" virgata lespedeza 30-40 lb. to scarified sericea or 1 bu. 25-35 lb. to scarified sericea or 1 bu. 0 or 0 or 0 br. 100 br. 120 br. 120 br. 150 br.	25-35 lb. June 1	weeping lovegrass and scarified sericea or	4 Ib.
1 bu. Mar. 1 ^{±/} "Ambro" virgata lespedeza 50-60 lb. 20-25 lb. Mar. 1 Tall fescue and 25-35 lb. 1 6 lb. to scarified sericea or 25-35 lb. 30-40 lb. Apr. 15 "Ambro" virgata lespedeza 30-40 lb. oedeza Apr. 15 "Ambro" virgata lespedeza 30-40 lb. Dedeza Apr. 15 "Ambro" virgata lespedeza 30-40 lb. ordeza Apr. 15 "Ambro" virgata lespedeza 30-40 lb. Dedeza Apr. 15 Pensacola bahiagrass and to scarified sericea or 25-35 lb. 10 ly 1 "Ambro" virgata lespedeza 40-50 lb. 0 ro or or or	to	"Ambro" virgata lespedeza 40	40-50 lb.
20-25 lb.Mar. 1Tall fescue and scarified serices or scarified serices or 30-40 lb.25-35 lb.addressingApr. 15"Ambro" virgata lespedeza30-40 lb.bedezaApr. 15Pensacola bahiagrass and 	50-60 lb. Aug. 15 ^{<i>L</i>} /		20-30 lb.
nd 6 lb. to scarified sericea or 30-40 lb. Apr. 15 "Ambro" virgata lespedeza 30-40 lb. spedeza Apr. 15 Pensacola bahiagrass and 25-35 lb. to scarified sericea or July 1 "Ambro" virgata lespedeza 40-50 lb. or or	25-35 lb. Aug. 15	Tall fescue and	40 lb.
30-40 lb. Apr. 15 "Ambro" virgata lespedeza 30-40 lb. spedeza Apr. 15 Pensacola bahiagrass and 25-35 lb. to scarified sericea or July 1 "Ambro" virgata lespedeza 40-50 lb. or or	to	unhulled sericea or "Ambro"	
Apr. 15 Pensacola bahiagrass and 25-35 lb. to scarified sericea or July 1 "Ambro" virgata lespedeza 40-50 lb. or common bermuda grass and 6 lb.	30-40 lb. Oct. 15	leza	40-60 lb.
o rensacota bantagrass and 23-33 10. scarified sericea or "Ambro" virgata lespedeza 40-50 lb. or or common bermuda grass and 6 lb.	26 26 IL 0 16		10 ID.
"Ambro" virgata lespedeza 40-50 lb. "Ambro" virgata lespedeza 40-50 lb. or common bermuda grass and 6 lb.	23-53 ID. UCT. IS	Lall rescue and	.01 66-62
Ambro Virgata lespedeza 40-50 lb. or common bermuda grass and 6 lb.	10 101		11 0 / 0
	40-50 lb. Mar. 15	-	40-60 lb.
	or an	and Abruzzi rye	1 bu.
	6 lb.	(for nurse crop)	
scarified series or	sericea or		
"Ambro" virgata lespedeza 40-50 lb.	virgata lespedeza 40-50 lb.		

 $\frac{1}{2}$ / Inoculate legume seed. $\frac{2}{3}$ / Planting during this period is hazardous and may have to be repeated. $\frac{3}{3}$ / Can be used for temporary cover, June to August

NOTE: Fertilize with 800 to 1,000 lb. per acre of 6-12-12. Mulch slopes with 4,000 lb. small grain straw or 5,000 lb. hay per acre.

Table 3. --Calculation of Seed and Fertilizer Needs for Roads, Skid Trails and Disturbed Areas

A. ROADS

1. Determine acres from table below Road Surface Area Determination Table - Acres

Koad Surf	ace Are	a Deter	minatio	n lable	- Acres	
Road Length Road Width (Feet)						
(Feet)	8'	10'	12'	14'	18'	20'
50	.01	.01	.01	.02	.02	.02
100	.022	.02	.03	.03	.04	.05
250	.05	.06	.07	.08	.10	.11
500	.09	.12	.14	.16	.21	.23
750	.144	.17	.21	.24	.31	.34
1000	.18	.24	.28	.32	.41	.46
1500	.28	.34	.41	.48	.62	.69
2000	.36	.48	.56	.64	.83	.92
5000	.92	1.15	1.38	1.61	2.07	2.30
5280	.97	1.21	1.45	1.70	2.18	2.43

2. Multiply the appropriate acre figure times the pounds per acre that is recommended in seed mixtures.

B. OTHER AREAS

1. To determine acreage and pounds of seed needed for other areas such as loading decks, turnouts, etc., use the following formula:

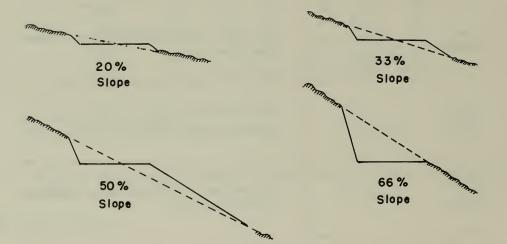
Avg. Length X Avg. Width = Square Feet Square Feet X 23 and point off 6 places. Multiply the answer times the pounds per acre as recommended in seed mixtures or amount of seed.

2. To determine fertilizer and mulch needs, use the above procedure.

SLOPE	TREATMENT
^{1/2} to 1 (200%)	These slopes sometimes hold without treatment. If the soil is unstable and sub- ject to caving, the bank must be resloped to a lower angle.
1 to 1 (100%)	Mulching and fertilization is almost always necessary.
2 to 1 (50%)	Can loosen to apply fertilizer and seed; should use light mulch on droughty soils.
4 to 1 (25%)	Can cultivate with machinery; drill in fertilizer and seed.

GUIDE FOR STABILIZING ROADBANKS-1/

 $\frac{1}{}$ This guide generally applies to roadbanks with significant height to warrant treatment. It may not be practical or necessary to seed banks or many logging roads.



TYPICAL ROAD CROSS-SECTIONS ON SIDE SLOPES OF VARYING DEGREES



For additional information regarding any aspect of this booklet, contact your local Water Quality Coordinator located in one of the following districts.

Georgia Forestry Commission

Georgia Forestry Commission Central Office P. O. Box 819 Macon, Georgia 31298-4599 1-800-GA TREES

Rome District 3086 Martha Berry Hwy., NE Rome, Georgia 30165-7708 (706) 295-6021

Gainesville District 3005 Atlanta Hwy. Gainesville, Georgia 30507 (706) 534-5454

Athens District 1055 E. Whitehall Athens, Georgia 30605 (706) 542-6880

Newnan District 187 Corinth Road Newnan, Georgia 30263-5167 (404) 254-7218

Milledgeville District 119 Highway 49 Milledgeville, Georgia 31061 (912) 453-5164

Washington District 1465 Tignall Road Washington, Georgia 30673-9802 (706) 678-2015 Americus District 243 U. S. Hwy. 19 North Americus, Georgia 31709-9717 (912) 928-1301

Tifton District Route 3, Box 17 Tifton, Georgia 31794-9401 (912) 386-3617

Camilla District P. O. Box 345 Camilla, Georgia 31730 (912) 336-5341

Statesboro District Route 2, Box 28 Statesboro, Georgia 30458-9803 (912) 681-0490

> McRae District Route 1, Box 67 Helena, Georgia 31037 (912) 868-5649

Waycross District 5003 Jacksonville Hwy. Waycross, Georgia 31503 (912) 287-4915

Urban Project 6835 Memorial Drive Stone Mountain, Georgia 30083-2236 (404) 294-3550

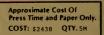


John W. Mixon Director

Frank Green Water Quality Coordinator

.

.



.