

RECOMMENDED FORESTRY

BEST
MANAGEMENT
PRACTICES

FOR

Louisiana



Water quality is the principal goal of Best Management Practices, as illustrated by this Cardinal flower (Lobelia cardinalis L.) in central Louisiana. Cardinal flowers thrive in clean, wet areas such as creek bottoms and bogs. Although the leaves are moderately poisonous to ingest, native Americans value them as an external treatment for rheumatism and swelling. (Photo by Jeff Zeringue)

ABOUT THE MANUAL |

THIS MANUAL WAS FIRST PRINTED in 2000 and reprinted the following year after a combined effort of foresters, soil scientists and engineers to develop a valuable educational tool for managing Louisiana's valuable forest and water resources. Members of the Louisiana Forestry Association worked cooperatively with the Louisiana Department of Environmental Quality and the Louisiana Department of Agriculture and Forestry to produce this manual.

In 2015, the manual was updated, with the original goal of compliance with the Clean Water Act and the Protection of the Louisiana Waters Act. By then, the compliance of Recommended BMP standards had achieved 95 percent.

In 2021, the most recent figures available at the printing of this latest update, statewide BMP compliance was 97 percent.

This guide of the state's non-regulatory Best Management Practices has been well-used. As of 2020, more than 9,000 people have attended Master Logger training classes that includes field implementation in Recommended Best Management Practices using this book.

We are proud to continue these efforts and the accomplishments that have been made because of it. We also look forward to a bright future for Louisiana's forest environment.

2022



SUSTAINABLE
FORESTRY
INITIATIVE
LOUISIANA

SFI-01125





LOUISIANA DEPARTMENT OF AGRICULTURE & FORESTRY
MIKE STRAIN DVM
COMMISSIONER



April 11, 2022

Please accept this correspondence as confirmation of the Louisiana Department of Agriculture and Forestry, Office of Forestry, approval of the proposed updates to the Louisiana Best Management Practices (BMP) manual. Members of our staff have reviewed the draft of the document with two areas of focus.

First, to consider if the document addresses Best Management Practices in Louisiana forestry. And secondly, to determine if the recommended practices in the manual align with the field survey and rating system criteria used in the periodic BMP assessments. We have concluded that the proposed updates adequately address both areas.

While I understand that creating a document that satisfies the interests of all entities is a very difficult task, I believe the proposed BMP manual update to be in the best interest of Louisiana forestry and those associated with the industry. Thank you for allowing our employees to share thoughts and concerns throughout this process and for the dedication and work associated with this project.

Sincerely,

A handwritten signature in blue ink, appearing to read "Wade Dubea".

Wade Dubea
Louisiana State Forester

JOHN BEL EDWARDS
GOVERNOR



CHUCK CARR BROWN, PH.D.
SECRETARY

State of Louisiana
DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL ASSESSMENT

May 2, 2022

The LDEQ Nonpoint Source Pollution Program (NPS) administers the Clean Water Act Section 319 efforts in Louisiana, along with its state and federal partners. NPS is a significant type of pollution to Louisiana waters, and needs to be addressed in order to protect and restore designated uses, such as recreation and fish and wildlife propagation, to state waterbodies. To this end, LDEQ NPS participated in the creation of the original forestry BMP manual to promote practices that mitigate nonpoint runoff from silviculture, and supports the 2022 update to the "Recommended Forestry Best Management Practices for Louisiana."

Thank you for the opportunity to review the updates, and for addressing our comments. We expect the manual will benefit water quality in the state.

Sincerely,

Crisalda Adams

Crisalda Adams, Manager
NPS Pollution Control & Aquifer Evaluation and Protection Section
Office of Environmental Assessment, Water Planning and Assessment Division

USING THE MANUAL |

THIS MANUAL IS WRITTEN TO BE A PRACTICAL FIELD GUIDE for forest landowners, logging contractors, professional foresters and others working in the forest industry, to ensure water quality is protected during forestry operations. It sets forth the voluntary guidelines and procedures to be followed for forestry activity and describes the federally mandated Best Management Practices (BMPs) for forestry operations in wetlands. Each chapter covers specific aspects of managing the forest and identifies important best management practices to minimize risk to water quality.

This manual is divided into four key sections:

■ **Voluntary guidelines**, pages 3-29: Key forestry activities, such as harvesting, road building, chemical use and prescribed burning, are covered and the BMPs associated with that activity are described.

■ **Mandatory guidelines**, pages 36-48: Discusses working in forested wetlands and describes federally mandated BMPs applicable to forest operations in wetlands. Forest operations that occur in and close to the Louisiana Natural and Scenic Rivers System also are covered.

■ **Glossary**, pages 54-58: Covers important definitions often used in forest management and water protection.

■ **Appendices (recommended examples & tools)**, pages 59-90: Provides informative figures, tables and descriptions of key BMPs previously described.

RECOMMENDED FORESTRY BEST MANAGEMENT PRACTICES FOR LOUISIANA

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INTRODUCTION

COMMERCIAL FORESTS OCCUPY more than 49 percent, or 14.9 million acres, of the land in Louisiana. Forest ownership here is similar to other southern states. At 64 percent, a majority of the forest land is in nonindustrial private ownership; 26 percent owned by forest industry and the remaining 10 percent held by public agencies.

Forestry annually contributes more than \$13 billion to the state's economy. If Louisiana is to thrive economically, our forests' ability to produce goods and services must be sustained.

Forest management programs should incorporate adequate measures to provide for proper soil and water conservation. Most streams originating in or flowing through our timberlands are sources for water sup-

Section 404 Silvicultural Exemption

In forested wetlands, the Law provides an exemption for permitting under Section 404 for normal ongoing silvicultural operations, provided that the 15 federally mandated best management practices, hereinafter referred to BMPs, are followed.

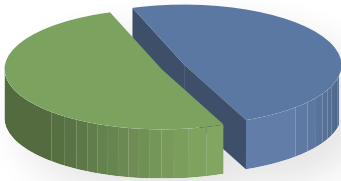
plies, recreation, and other uses.

Louisiana contains more than 126,000 miles of rivers and streams, almost 1.5 million acres of lakes and reservoirs, more than 9.6 million acres of woody emergent/herbaceous wetlands and more than 3.2 million acres of estuaries. The Clean Water Act of 1972 (Public Law 92-500) and its amendments mandate water quality sufficient to provide "fishable" and "swimmable" waters. It requires that all waters of the United States will be protected from degradation. This includes, but is not limited to headwater creeks, rich bottomland hardwoods, and permanently flooded cypress-tupelo areas.

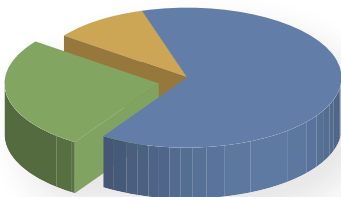
The scope of legal jurisdiction was expanded in 1977 by amendments redefining protection to include the waters of the United States and their adjacent wetlands. This protection, under Section 404, specifies that anyone engaging in activities impacting waters and wetlands is required to secure a permit before proceeding, unless exempted.

Amendments to the Clean Water Act in 1987 required the Louisiana Department of Environmental Quality to assess the quality of water in the state and report its findings to Congress every two years. Under Section 319 of the amended act, the state was also charged with addressing pollution carried

Status of Louisiana Forests & Lands



- Louisiana Commercial Forestland – 49%
- All other Louisiana lands – 51%



- Non-industrial private lands – 64%
- Forest industry lands – 26%
- Public agency lands – 10%



Private landowners, who own most of Louisiana’s forest lands, should know that the use of BMPs is important for timber buyers and loggers.

to water bodies by rainfall runoff. This type of pollution is called nonpoint source pollution. It differs from point source pollution that originates from identifiable locations such as end-of-pipe discharges from an industrial facility or city sewage treatment plant.

Most of the early efforts to clean up water pollution were directed toward point sources. Thus, most of what is left to work on is pollution caused by nonpoint sources. Louisiana uses a cooperative, nonregulatory approach to address forestry nonpoint pollution statewide; primarily through the use of voluntary forestry practices described in this manual.

With support from the U.S. Environmental Protection Agency, and in partnership with the Louisiana Department of Agriculture & Forestry (LDAF) and the Louisiana Department of Environmental Quality (LDEQ), the Louisiana Forestry Association (LFA) developed this manual. It is a guide for forest landowners, logging contractors and the forest industry. It sets forth voluntary guidelines and procedures to ensure water quality protection during forestry operations. The goal in meeting state and federal water quality standards is necessary to provide clean water for present and future generations.

PLANNING FOREST OPERATIONS

THOUGHTFUL PLANNING is the first and likely most critical step in the success of forest operations. It involves several interrelated processes carried out over an extended period of time on an area that could include varying topography, soil conditions and other characteristics. Each process might take from days to months to complete. Persons involved in forest operations must comply with numerous laws and regulations. Best management practices (BMPs) are recommended operational guidelines to minimize environmental impacts and protect water quality. Planning is required to incorporate BMPs into a forest operation. The plan should maximize efficiency, minimize traffic, preserve soil integrity and protect water quality.

There are two stages of planning — preliminary planning and on-the-ground application. A *preliminary plan* is commonly prepared by an appropriate resource professional prior to conducting any operation. This plan includes considerations for meeting plan objectives with consideration for special areas such as fragile soils on steep slopes and stream crossings that might require special treatment.

On-the-ground application can be complex and detailed. It is prepared prior to beginning the operation and should include recommendations on roads, traffic routes, streamside management zones, stream crossings, log decks and the schedule of activities. Every person on a logging crew should be aware of the plan and understand their part in carrying it out.

Requirements may differ from tract to tract. For example, does the tract have a stream that requires a streamside management zone? Is there a steep sandy hill on the tract that favors choosing chemical site preparation with hand planting instead of

mechanical site preparation followed by machine planting?

Thinking about the following five topics will help select the correct way to accomplish needed forest operations. Pre-existing roads, stream crossings, log decks and other infrastructure likely will have significant impact on how a tract will be laid out and harvested.

The planning process should consider these points to protect water quality:

- *The tract topography* — Steep slopes will affect the position of roads and skid trails.

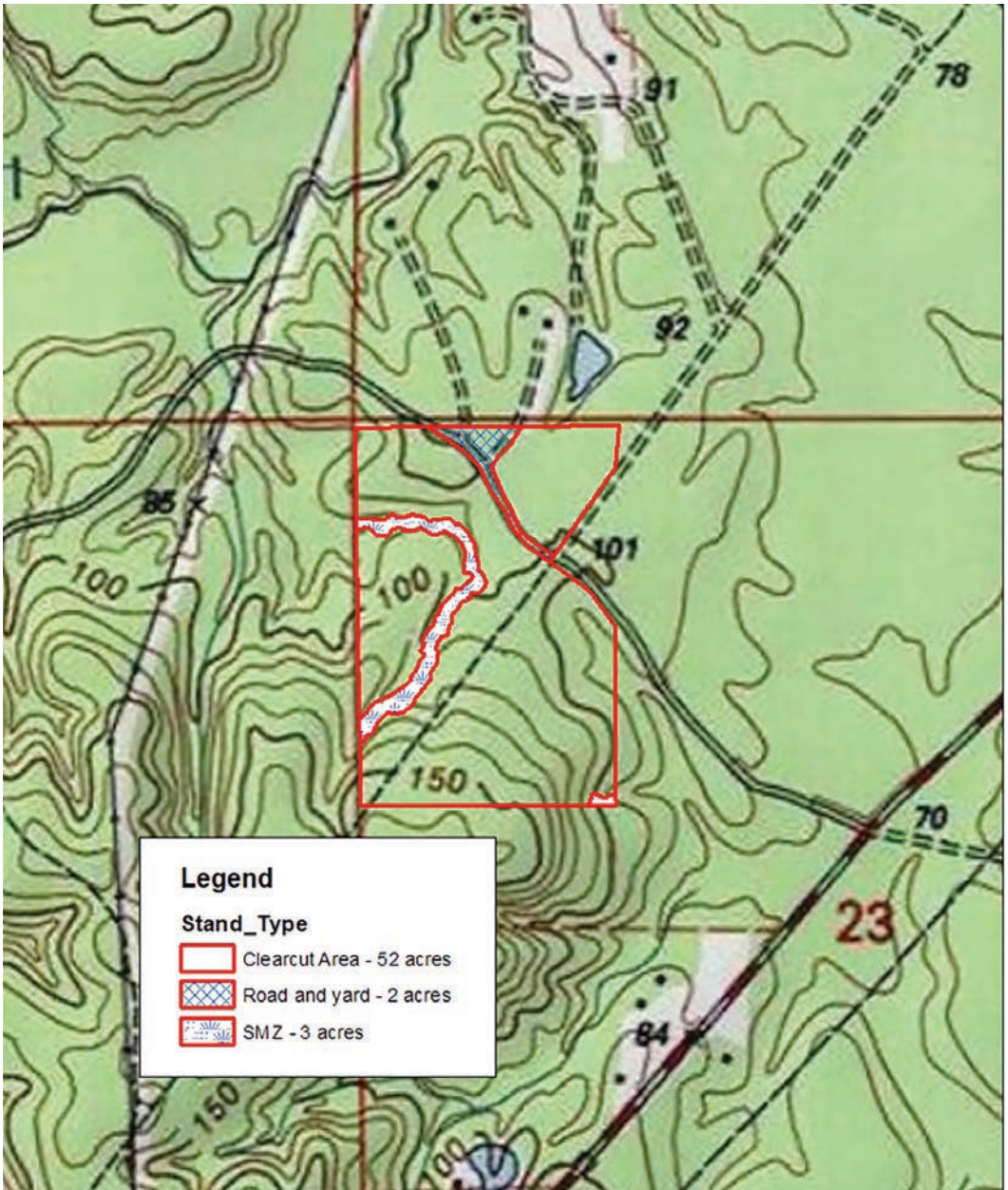
- *The tract soil conditions* — Well-drained ridgetops are good locations for log decks and hold up better in wet weather. Lower, wetter areas should be targeted for dry weather when rutting risks are minimized.

- *The tract hydrology* — Well-drained rolling topography tends to be “flashy” and moves water quickly. Flat, poorly drained sites are likely to be swampy and wet for extended periods

- *The applicable laws and regulations affecting logging* — Wetlands have their own set of silvicultural BMPs. Louisiana’s Scenic Rivers also have some regulatory protections. Lastly, some parishes and communities might have local laws to consider.

- *Wildlife, recreation & aesthetics* — The landowner’s objectives for wildlife and recreation might affect how an operation is completed. For example, are there food plots, hunting stands or ATV trails to consider?

Several tools are available to the harvest planner. Some of these are explained in Appendix II (page 73).



This topographical image provided shows how some companies use tools to aid in mapping out plans for a timber harvest.

OVERVIEW

A FOREST ROAD SYSTEM is made up of a mix of permanent and temporary roads that connect the forest land to existing public roads. They provide forest access for such activities as land management, fire protection, recreation and timber harvesting. Forest roads that are properly located, well-constructed and adequately maintained will protect local waters from forest activities. Roads on steep slopes, erodible soils or stream crossings hold the greatest potential for degrading water quality. In wetlands, forest roads must comply with 15 mandatory BMPs. See page 36.

PERMANENT ROADS

BMPs for Location & Planning



- Use of tools such as soil surveys, topographic maps, LIDAR, aerial photographs and satellite imagery can help achieve preferred road location and construction results.
- Design a permanent road system to meet long-term objectives rather than simply to access individual sites. Numerous temporary road projects have more environmental impact than one well-designed road system.
- Stabilize or reconstruct existing roads where significant erosion problems exist. Retire roads where repair is impractical.
- Safety should always be considered with road design, location of intersections and access points to public roads.
- Minimize the number of stream crossings.
- Cross streams on straight segments and as close to a right angle as possible.
- Culverts, pipes and bridges should be installed to allow for passage of aquatic species.
- Locate roads on the best available sites, avoiding excessive slope.
- All suitable excavated material should be used for the construction of the road, when possible. This may include soil removed from ditches during construction or maintenance.
- After road building or maintenance, exposed soil that is in or adjacent to the SMZ and subject to excessive erosion should be mulched, revegetated or otherwise stabilized.

Note: Additional planning assistance may be obtained from the USDA Natural Resources Conservation Service (NRCS).

AVOID



- Using streamside management zone (SMZ) for road locations or traffic areas.
- Locating roads adjacent to SMZs.
- Locating roads where water tends to collect.
- Leaving spoil piles in SMZ or adjacent to stream crossing.

BMPs for Construction



- *Salvage merchantable timber prior to clearing the right-of-way.*
- *Stumps, logs, slash and other organic debris should not be covered with fill material or incorporated into road beds unless the corduroy road construction technique is used.*
- *Minimize the amount of soil on the road banks or roadsides that is exposed to soil erosion. To minimize problems, mulch, revegetate or otherwise stabilize these areas as they are created.*
- *Functional water diversion structures should be installed at the same time roads are constructed. Drainage water should be dispersed onto the undisturbed forest floor when possible. Soil from parallel and lateral ditches may be incorporated as material for the road bed and drainage structure.*
- *Road bank slopes should be a 2:1 ratio. Seeding, mulching, or other stabilizing means should be used to reduce the potential for erosion.*
- *Plan for periods of heavy rain during road construction by including temporary waterbars, turnouts or other structures to direct water runoff.*

BMPs for Drainage



- *Ditches, culverts, dips, and wing (lateral) ditches should be installed at the time of construction of the roadway. Ditches should be adequately sized and sloped to ensure discharge to forest floor and to allow for maintenance equipment access.*
- *The roadbed should be designed to drain at all times by using crowning, ditching, culverts and waterbars.*
- *Ensure that culverts, water turnouts, and broad-based dips empty road runoff onto the undisturbed forest floor.*
- *All culverts, permanent or temporary, should be of adequate size to carry the water flow anticipated during heavy rains. (See CULVERT SIZE CHART, Page 66).*
- *Culverts shall be maintained to ensure the existing flow of surface water is not compromised.*

PERMANENT ROADS



Lateral ditches shown here are often used for drainage on permanent forest roads.



A permanent culvert of adequate size is installed on this forest access road.

PERMANENT ROADS

Note: Some of the most common mistakes in road construction and maintenance are shown below.

BMPs for Water Crossings



- Stream crossings should be constructed to minimize the disturbance to stream banks and existing stream channels.
- Minimize use of equipment in the stream channel.
- Fills and earth embankments used as bridge approaches should be stabilized to minimize erosion by using headwalls, wing walls, rip-rap, and other suitable material.
- Excess material and woody debris from road construction should be cleared from streams and drainage ways.
- Bridges and culverts should not constrict clearly defined stream channels and allow for passage of aquatic species.
- Temporary stream crossings should be removed once they are no longer needed.

AVOID



- Improperly sized culverts (too small).
- Poor location (wet spot, loose soil).
- Insufficient number of wing ditches.
- Steep hills (more than 10 percent grade).
- Use of fill material taken from SMZ to cover culvert.
- Improperly maintained road crown.
- Plugged culverts.
- Leaving erodible soils unstabilized.
- Leaving ditches clogged with logging debris.
- Inadequate soil compaction or "set-up" time before heavy use.

Note: Proper maintenance of permanent access roads is of vital importance to logging and land management activities. Road systems should be kept in serviceable condition to minimize erosion by rainfall runoff and vehicle use.

BMPs for Road Maintenance



- *The road surface should be crowned or outsloped to handle surface runoff and minimize erosion of the roadbed.*
- *Ditches, wing ditches, and culverts should be kept free of logging debris or other obstructions to allow unrestricted passage of water. Siltation should be removed from ditches and wing ditches through periodic maintenance.*
- *Exposed soil subject to excessive erosion should be mulched, revegetated or otherwise stabilized if natural revegetation will not suffice.*
- *Trees adjacent to permanent roads should be trimmed or cut back to allow maximum sunlight on the road surface.*
- *Trees, brush or other obstructions should be periodically removed from ditches.*
- *When road is retired, access should be restricted. The road should be stabilized and should be periodically inspected to ensure its integrity.*

Exemption for Roads in Wetlands



Road construction for silvicultural purposes in jurisdictional wetlands does not require a permit because of this silvicultural exemption. However, to qualify for silvicultural exemption, the road construction must comply with 15 mandatory BMPS for forested wetlands. See FOREST WETLANDS, Page 30.

TEMPORARY ROADS

Temporary roads often incorporate many of the same principles as permanent installations, but not the same degree of refinement and permanence. For example, the need exists to disperse water from temporary roads when conditions are wet, just as with permanent roads.

BMPs for Construction



- Existing ridge lines should be used where possible.
- Stream crossings should be designed to prevent restrictions of high water flows during harvest operation.
- Temporary roads may require installation of underlayment, such as rock, gravel or mats, to operate equipment across soft or unstable areas.
- Cross streams as close to right angles as is practical.
- Temporary roads should be closed and stabilize stream banks, ditches and roads.
- Clean out all temporary stream crossings.
- Maintaining or closing temporary roads as the operation progresses prevents erosion and minimizes downtime.

AVOID



- Roads located directly up or down steep slopes.
- Turning water onto erodible soils unless additional protection from erosion is used.
- Creating channels during use and maintenance.

TEMPORARY ROADS



Installation of temporary bridges like this metal one can be used on temporary forest roads.



A log bridge is one way a temporary crossing can be made.

TEMPORARY ROADS



Temporary roads should be closed and stabilized after use.

TIMBER HARVESTING |

PRE-HARVEST PLANNING

HARVESTING OPERATIONS cause a temporary disturbance in the forest. Pre-harvest planning is critical to ensure that operations are conducted in a manner, which minimizes impact to water quality.

Note: During harvest design, careful planning and the use of BMPs will minimize soil disturbance and protect water quality.



BMPs for Planning

- *Identification and delineation of sensitive areas such as SMZs, wetlands, fragile soils, and steep slopes.*
- *Use of aerial photographs, timber stand maps, topographic maps, and / or GIS and soil surveys to aid in locating log decks or “sets,” skid trails, and access roads.*
- *The timing and type of harvest depends on soil moisture (hydrology), topography, soil type and soil conditions.*
- *The application of stabilizing or surfacing materials to roads; for example, stone or mats applied to potential trouble spots before the operation begins.*
- *Wildlife and wildlife habitat – How will my silviculture activities impact wildlife and wildlife habitat, including the protection of threatened, endangered and rare species?*

STREAMSIDE MANAGEMENT ZONES

A streamside management zone (SMZ) serves as a natural filter of vegetation adjacent to a natural or manmade water body. These zones, also called riparian zones, reduce erosion by both slowing the flow of surface water runoff and increasing water filtration. These water bodies may include streams, rivers, bayous, and lakes. To protect water quality, extra precautions may be necessary in carrying out some forest practices.

The key objective of SMZs is to protect the quality of water on forest lands by the following:

- Maintaining a vegetative filtration strip.
- Providing an adequate canopy of forest cover along all perennial streams to protect normal water and shade conditions.
- Minimizing forest soil erosion by maintaining the appropriate amount of residual ground cover or forest cover under various soil and slope conditions.

When timber is harvested within the SMZ, care should be taken not to compromise the objective of the SMZ.

SMZs should be provided on perennial and intermittent streams and other water bodies. This includes spring heads, oxbows, upland flats, and drains bordered by steep or erodible slopes. Any existing drainage structures that over time have come to resemble natural drains are also included.

A perennial stream is one that has a well-defined channel and flows year-round except during periods of extreme drought, when they retain pools of water. Intermittent

streams have seasonal flow and a continuous well-defined channel. Ephemeral streams flow during and for a few hours or days after periods of heavy rain and the stream channel is less recognizable than either perennial or intermittent streams.

Streams designated as scenic rivers will be managed in accordance with state law.

See LOUISIANA'S NATURAL AND SCENIC RIVER SYSTEM, page 48.

SMZ width is dependent on watershed characteristics and the risk of erosion in the SMZ and adjacent area. The risk is increased by sandy soil, steep grade, large watershed size or increasing stream width.

SMZ widths are measured from the top of each bank and established on each side of the stream. Determination of SMZ width should be site-specific and should be made by foresters or other qualified professionals. SMZ width may need to be more than the minimum depending on specific site conditions. Soil type, slope gradient, vegetation cover, volume flow, and stream classification should be taken into consideration when designing each SMZ.

BMPs for Streamside Management



- *Along perennial streams, timber can be harvested carefully within a SMZ provided that the filtering effects of the SMZ are not compromised.*
- *Take precautions to protect the remaining timber within the SMZ.*
- *Do not remove trees from banks, beds or steep slopes if removal will destabilize soil and degrade water.*

• *Permanent residual tree cover is not required along intermittent and ephemeral streams if vegetation and organic debris are left in place to prevent erosion and protect water quality.*

- *SMZs along perennial and intermittent streams should be delineated prior to harvesting.*
- *Plan harvests to minimize stream crossings.*
- *Locate stream crossings where stream impacts are likely to be minimal.*
- *Locate roads, skid trails, fire lanes, and logging sets outside the SMZ.*
- *To minimize damage, limit harvesting in SMZs and sensitive forested wetlands during abnormally wet periods.*
- *Consider using wide-tire skidders, forwarders, cable skidders, and tracked equipment to minimize soil disturbance in an SMZ.*
- *Construct stream crossings to minimize stream bank and channel disturbance.*
- *Cross streams at right angles when practical.*
- *Consider using portable bridges for temporary stream crossings.*

AVOID



- *Skidding across perennial or large intermittent streams, except over an adequately designed crossing.*
- *Excessive skidding within an SMZ.*
- *Logging debris in the stream.*
- *Mechanical site preparation or machine planting.*
- *Log decks.*
- *Broadcast application of any pesticide.*

NOTES: RECOMMENDATIONS FOR EPHEMERAL DRAINS

Although SMZ are not required for ephemeral drains, certain practices are recommended.

- *Avoid discharge runoff directly into an ephemeral stream*
- *Mechanical site preparation and machine planting should not disturb the channel*
- *Minimize logging debris in well-defined channels.*
- *Minimize rutting*
- *Avoid blocking the flow of water.*
- *Minimize the number of crossings.*

STREAMSIDE MANAGEMENT ZONES

Recommended minimum SMZ widths

<u>Stream type</u>	<u>SMZ width</u>	<u>MRC</u>
Perennial	50 feet	(Minimum Residual Cover) Minimum 50BA
Intermittent	35 feet	(See bullet points below)

- Residual cover made up of ground cover (litter layer, grasses, small shrubs) and canopy cover (woody vegetation generally greater than 5 feet tall) adequate to prevent erosion and protect water quality.
- When residual ground cover and canopy cover is not adequate to prevent erosion and protect water quality, overstory vegetation should be left to meet that purpose.



Merchantable timber can be harvested from an intermittent stream, leaving adequate ground cover and canopy cover to protect water quality and prevent erosion.

STREAMSIDE MANAGEMENT ZONES



An effective SMZ provides adequate canopy of forest cover along all perennial streams to protect normal water and shade conditions.



SMZs provide water filtration of ground cover on ephemeral areas.

TIMBER HARVESTING |



TIMBER HARVESTING

FELLING & SKIDDING TECHNIQUES

AVOID



- Sensitive areas and fragile soils.
- Skidding straight up or down steep slopes.
- Long, steep skids.

Lay out skid trails on slopes at an angle to break up the grade.

- Water draining down skid trails
- Skidding in a stream channel even when temporarily dry.
- Skidding across perennial or intermittent streams unless it is done with a properly constructed temporary crossing.
- Excessive rutting within SMZs.
- Using existing skid trails if further use will cause excessive soil disturbance.

BMPs for Felling



- Use of tools such as soil surveys, topomaps and aerial photos.
- When possible, trees should be directionally felled away from water bodies.
- Remove tops and limbs which have fallen into perennial and intermittent streams as a result of harvesting. (Note: Logging debris and slash can be used in ephemeral stream channels to minimize erosion.)
- Inspect all stream courses to be sure they are free from excessive logging debris.

BMPs for Skidding



- Use soil surveys, aerial photographs, and topographic maps to help locate skid trails.
- Use the smallest number, width and length of skid trails needed to log the area effectively.
- Use waterbars, wing ditches, or other appropriate practices to slow and disperse water runoff. Construct water bars to divert water rather than block it.
- Keep stream crossings to a minimum.
- Cross streams at right angles and in straight sections of the stream, when practical.
- Scatter logging slash on wetter areas of skid trails to prevent rutting.
- Keep skidder loads light in sensitive areas to reduce rutting and protect drainage integrity.
- Stabilize skid trails or erodible bare ground by using waterbars, logging slash, or other appropriate water diversions.
- Upon completion of skidding, remove all temporary fill material from stream beds. Stabilize the stream banks and approaches.
- Harvesting equipment should be appropriate for site conditions at the time of harvest.

TIMBER HARVESTING

LANDINGS, LOG DECKS & SETS

Landings, log decks and sets are temporary locations where logs are assembled for temporary storage, loading and transportation

BMPs for Landings



- *Make sets no larger than necessary and only as many sets as necessary.*
- *Locate sets on firm, well-drained ground away from streams.*
- *Locate log sets on a slight slope (less than 5%) for drainage whenever possible.*
- *Locate sets so skidding will have a minimal impact on the natural drainage pattern.*
- *Locate sets where skidding will avoid road ditches, sensitive sites, and excessive slopes.*
- *Stabilize bare areas subject to erosion.*

AVOID



- *Locating log decks in SMZs or other sensitive areas.*
- *Locating log decks where they might result in skidding through sensitive areas.*

BMPs for Revegetation



IV, Page 85

- Re-establish vegetation on temporary roads, drainage systems, side slopes, back slopes, skid trails or landings following significant soil disturbances when natural revegetation will not occur in time to prevent erosion. See *Revegetation Of Disturbed Areas* in Appendix

EQUIPMENT MAINTENANCE & LITTER



Logging trash should always be removed.

BMPs for Equipment Maintenance & Litter



- Perform all maintenance away from riparian areas.
- Capture all coolants, oils, fuels, etc., and dispose of waste properly.
- Repair leaks immediately.
- Properly dispose of all trash associated with harvesting.

AVOID



- Burning or burying litter and trash associated with harvesting.



Machine planting is one of the ways landowners reforest land after harvest.

SITE PREPARATION & REFORESTATION |

GENERAL METHODS

RAPID REGENERATION OF FOREST LAND following final harvest or natural disaster is both economically and environmentally important. Any increase in erosion, water yield, and storm flow coming from a logged site diminishes rapidly as the site revegetates.

Root systems remain in place many years after trees are cut and provide soil stability which reduces the risk of erosion. Trees also intercept water and impede storm water runoff. Many sites require some type of treatment to accomplish quick and effective regeneration of desirable tree species, or to reduce some undesired effects of harvesting.

BMPs for Site Preparation & Reforestation



- *Clearly define SMZs and other areas to be excluded before beginning site preparation activities.*
- *Ripping, shearing, windrowing, and mechanical planting should follow the contours of the land to reduce potential erosion hazard.*
- *On steep slopes or highly erosive soils avoid intensive site preparation. Use herbicides, hand tools, and / or prescribed fire, but be aware that extremely hot fires may significantly increase erosion potential.*
- *Hand plant steep, erodible sites as soon as possible after final harvesting and site preparation.*
- *Where accelerated erosion is likely, use methods which leave logging debris and other natural forest litter scattered over the site.*
- *Minimize moving soil into windrows and piles.*
- *Crossings should be removed and stream banks and approaches should be stabilized.*
- *Appropriate planning should be done so that soil disturbance, compaction, and displacement is minimized.*
- *In order to minimize erosion, fire breaks should have water control structures properly installed and maintained.*
- *Site preparation activities should not enter SMZs and cross stream channels.*
- *Provide water outlets on bedded or furrowed areas at locations that will minimize movement of soil. Discharge water onto a vegetative surface.*

AVOID



• *Damage to existing water control devices (i.e. culverts, wing ditches). Site preparation and planting equipment should avoid crossing or turning around in roads,*

and ditches and wing ditches. Damages should be repaired in a timely manner.

- *Intensive mechanical site preparation on steep slopes or on sites that have high potential for erosion.*
- *Constructing windrows which will funnel surface runoff into perennial, intermittent or ephemeral streams.*
- *Blocking any drainage with beds, windrows or similar structures.*

Two major problems associated with site preparation include soil erosion and potential sedimentation from runoff. Primary factors contributing to accelerated erosion from runoff are percent of the area with exposed soil, type of soil, degree of slope and ground cover.

Techniques used for site preparation should be based on soils, slope, condition of the site, natural vegetation, crop tree species and cost. Soils with a shallow surface layer generally have limited capacity to absorb water and are more likely to erode. Steeper slopes provide more rainwater runoff velocity, and thus energy, to erode soils. Ground cover helps hold soil in place and dissipates some of the energy of rainfall.



Ripping, shearing, windrowing and mechanical planting should follow the contours of the land to reduce potential erosion hazard.

FERTILIZATION & PESTICIDES

PESTICIDES, including both herbicides and insecticides, are valuable tools in maintaining a healthy forest. The use of herbicides, rather than mechanical site preparation methods is recommended on erodible sites to protect water quality. Insecticides can be used to control certain insect infestations where outbreaks are localized provided care is taken to minimize use in SMZs.

Pesticides and fertilizers may be used to enhance tree growth. They can be applied safely with ground and air equipment, provided that care is taken and application is in accordance with label instructions and applicable state and federal laws.

Proper planning, training and conscientious execution of the plan are keys to safe use of silvicultural chemicals.

Note: These guidelines are intended to complement state or local regulations relating to the sale, transportation and use of chemicals.



BMPs for Chemicals

- *Follow label directions and applicable federal, state and local laws in the storage, transportation, handling and application of all chemicals.*
- *Know each chemical's characteristics. Know also topography, soils, drainage, weather, and other potential site hazards that might be important for preventing water pollution during application.*
- *Water for mixing with chemicals should be carried to the field in water-only tanks. The danger of getting a chemical into a ground or surface water supply must be avoided. An anti-siphon device is essential in the water intake to prevent backflow. Chemical mixing should only be done at the application site.*
- *Mix chemicals and clean tanks only where possible spills will not enter streams, lakes, or ponds. Do not mix chemicals or clean / flush tanks near wellheads.*

CONTINUED, NEXT PAGE

BMPs for Chemicals cont.



• Carefully plan ground and aerial application to avoid direct and indirect entry of chemicals into streams and impoundments. Special care should be taken when chemicals are used in the SMZ. Realize that significant portions of the SMZ will probably be left untreated. Leave well-marked buffer zones between target area and surface water.

- Treatment area boundaries should be clearly delineated on the ground or through GPS or similar other appropriate technologies that can help with more precise applications.
- Chemicals must not be applied when stream pollution is likely to occur through aerial drift or runoff.
- Use spray equipment that is capable of immediate shut-off.
- Where feasible, utilize injection or stump treatment herbicide methods in areas immediately adjacent to open water.
- If a spill should occur, construct a containment dike around it. Use absorbent material such as kitty litter, sawdust or soil to soak up material. Keep the spill from flowing into streams or bodies of water. Some spills will require notifying appropriate authorities.
- All empty pesticide containers must be disposed of in accordance with label requirements.
- Clean equipment in a location where chemicals will not enter any stream, lake or pond.

AVOID



• Applying pesticides and fertilizers directly to water bodies such as streams, lakes or swamps unless specifically prescribed and approved for aquatic management.

- Broadcast application of pesticides within SMZs.
- Applying any herbicide adjacent to the SMZ that would damage trees in the SMZ or enter a stream.
- Exceeding maximum labeled rates of chemicals.
- Applying chemicals to vegetation protecting eroded slopes, gullies, drainages and other fragile areas subject to erosion.
- Leakage of chemicals from equipment used for transporting, storing, mixing or applying chemicals.

Other Resources for Landowners



Need more information? Contact Agricultural & Environmental Sciences at the Louisiana Department of Agriculture & Forestry, 225-952-8100.



Always be aware of potential water pollution before applying chemicals through aerial drift.

PRESCRIBED BURNING

PRESCRIBED FIRE IS AN IMPORTANT and useful silvicultural tool. It can be used to prepare a site for planting by reducing logging debris or to prepare a seedbed for seed fall. Prescribed fire can also be used in established stands for silvicultural purposes, wildlife habitat improvement and hazard reduction. A major concern of forest management is the effect of prescribed fire on surface runoff and soil erosion.

Studies have shown that properly planned and conducted prescribed burning has a minimal impact on water quality in the South. Most problems associated with prescribed burning can be eliminated with proper planning, awareness of changing weather conditions, and

compliance with Louisiana's Voluntary Smoke Management Guidelines (*copies can be obtained from the Louisiana Office of Forestry by downloading from the LDAF website, <http://www.ldaf.state.la.us/wp-content/uploads/2016/05/LA.-Voluntary-Smoke-Mgmt-Nov.-2014-Guidelines.pdf>*). For most flat, sandy soils there is little danger of soil erosion; however, in steeper topography there is a greater chance for soil movement. When a prescribed fire becomes too hot, the entire surface layer (humus) can be consumed, exposing the underlying mineral soil to erosion and increasing surface runoff.

BMPs for Prescribed Burning



- Site prep burns on steep slopes or highly erodible soils should only be conducted when they are absolutely necessary and should be of low intensity. Time prescribed fires so that the moisture level of the forest floor prevents the entire humus layer from being burned.

level of the forest floor prevents the entire humus layer from being burned.

- A significant amount of soil movement can occur when preparing for prescribed burns; for example, along firebreaks. Firebreaks should have water control structures in order to minimize erosion. Locate firebreaks on contours as much as possible. Water bars should be constructed in firebreaks at frequent intervals to slow surface runoff in areas subject to accelerated erosion, such as steep grades or highly erodible sloping firebreaks.

- Site prep burning creates the potential for soil movement. All efforts should be made to keep high intensity site prep burns out of SMZs.
- Low-intensity fire in SMZs can be used to restore natural composition, and are evidenced by low char on trees, protection of the duff layer, and reduced erosion.
- Use hand tools when necessary to connect firebreak lines into stream channels.

AVOID



- Burning when conditions will cause a fire to burn too hot and expose mineral soil to erosion.
- Allowing high intensity fire to enter filter strips or SMZs.
- Burning on severely eroded forest soils where the average litter duff is less than one-half inch.

FIRE MANAGEMENT

FIRELINE CONSTRUCTION & MAINTENANCE

Fireline construction and maintenance is an essential part of forest management. A number of control practices can be implemented during fireline construction to prevent unnecessary erosion. Periodic inspection and proper maintenance can prevent potential erosion on established firelines.

BMPs for Firelines



- *Firelines should be constructed on the perimeter of the burn area. If fire is to be excluded from the SMZ, a fireline may be constructed; however, if the SMZ is to be included in the burn area, a low-intensity fire is recommended.*
- *Firelines should follow the guidelines established for logging trails and skid trails with respect to waterbars and wing ditches and should be only as wide and as deep as needed to permit safe site preparation burns.*
- *Firelines that approach a drainage should be turned parallel to the stream or include the construction of a wing ditch or other structure that allows runoff in the line to be dispersed rather than channeled directly into the stream.*
- *Firelines on highly erodible sites or other problem areas should be inspected periodically to correct erosion problems by installing dips, wing ditches, waterbars, etc., and / or by seeding. (See vegetation specifications in Appendix IV, Page 85)*

AVOID



- *Disturbing more soil surface than necessary.*
- *Connecting firelines directly into stream channels.*
- *Plowing against the contour where possible.*



A bulldozer pushes a fireline.

FIRE MANAGEMENT |

WILDFIRE

The first and foremost concern in wildfire control is to prevent damage to people and property. During wildfire suppression, fireline BMPs that slow containment efforts must take a lower priority than fire suppression. Potential problems should be corrected later.

BMPs for Wildfire



- *Stabilize and re-vegetate firelines on steep grades, areas subject to accelerated erosion or known*

sensitive areas.

- *Ensure all road surfaces are left stabilized and protected.*



Fire suppression must take top priority during wildfires. Fire line BMPs can slow containment efforts.

BENEFITS AND FUNCTIONS OF WETLANDS

Forest wetlands are environmentally sensitive areas. Special attention to the proper use of BMPs is essential if water quality is to be protected. Forest road construction has the potential to disrupt normal drainage patterns and produce sediment that may reach streams. Tree tops or other logging debris left in streams can obstruct water flow, increase erosion of stream banks, and decrease dissolved oxygen in the water. Normal wetland drainage patterns can be altered by severe rutting or by improperly constructed windrows. Excessive soil compaction caused by careless logging can reduce water infiltration, reduce soil moisture available to tree roots, and decrease site quality.

Note: The section on wetlands herein is taken from Handbook on Forested Wetlands, Forested Wetlands Workshop, August 8, 1996, Alexandria, La.

OVERVIEW

Louisiana's bottomland hardwood forests, including wetlands, are productive ecosystems with multiple functions and ecological values that can be managed for commercial timber production without compromising this valuable resource. This section deals with the management of these sites in order that they may continue to provide this ecological value. The reader should keep in mind that many sites classified as bottomlands may be wetland-like, but are not necessarily "wetlands" in the strictest legal or jurisdictional sense. Jurisdictional wetlands are found throughout the state and are not limited to obscure flooded or remote marsh areas.

Protecting ecological productivity for wetland and wetland-like sites often call for the same management techniques. These wetland BMPs address sustained timber production as one of the landowner's objectives. Timber production is recognized as a land use that is compatible with wetland protection.

Although wetlands are federally regulated,

normal forestry operations in wetlands — including but not limited to soil bedding, site preparation, harvesting and minor drainage (see note on next page) — are exempt from permit requirements under Section 404 of the Clean Water Act Amendments of 1977, as long as the activity:

- Qualifies as "normal silviculture."
- Is part of an "established" silvicultural operation.
- Does not support the purpose of converting a water of the United States to a use to which it was not previously subject.
- Follows the 15 mandatory BMPs for road construction (see *Access Systems*), and the six mandatory BMPs for site preparation (see *Site Preparation in Wetlands*).
- Contains no toxic pollutant listed under Section 307 of the Clean Water Act in discharge of dredge or fill materials into waters of the United States.

A forestry activity will require a Section 404 permit if it results in the conversion of a

wetland to a non-wetland. Landowners who wish to change land use, who feel an activity may change land use, or who are uncertain about the permit exemption status of a forestry activity should contact the U.S. Army

Corps of Engineers (USCOE). If the activity is on a farmed wetland or on agricultural land, the Natural Resources Conservation Service (NRCS) is the appropriate initial contact.

Note: *Minor drainage* refers to installation of ditches or other water control facilities for temporary dewatering of an area. Minor drainage is considered a normal silvicultural activity in wetlands to temporarily lower the water level and minimize adverse impacts on a wetland site during road construction, timber harvesting and reforestation activities. Minor drainage does not include construction of a canal, dike or any other structure which continuously drains or significantly modifies a wetland or other aquatic area.

Minor drainage is exempt from needing an individual 404 permit if it is part of an ongoing silvicultural operation and does not result in the immediate or gradual conversion of a wetland to an upland or other uses. Artificial drainage must be managed. Once silvicultural activity has been completed, the hydrology that existed prior to the activity should be restored by closing drainage channels.

NORMAL SILVICULTURAL ACTIVITIES

Normal silvicultural activities conducted as part of “established, ongoing” silvicultural operations are exempt from Section 404 Corps of Engineers permit requirements as long as the appropriate measures are implemented. Normal activities include but are not limited to road construction, timber harvesting, mechanical or chemical site preparation, reforestation, timber stand improvement and minor drainage. These mea-

asures include 15 federal mandatory BMPs for road construction and the six BMPs for silvicultural site preparation activities in forested wetlands. *Recommended Forestry Best Management Practices for Louisiana* are not required for exemption from Section 404 Corps of Engineers permit requirements; but they are **strongly** recommended to minimize nonpoint source pollution of waters of the state and / or waters of the United States.

ESTABLISHED SILVICULTURAL OPERATIONS

Established or ongoing silvicultural operations are included in a management system (not necessarily written) which is planned over conventional rotation cycles for a property or introduced as part of an established operation. An activity need not itself have been ongoing as long as it is introduced as part of an ongoing operation.

Evidence of use of the property may be used to determine whether an operation is ongoing. Examples of such evidence may include, but not be limited to:

- A history of harvesting with either nat-

ural or artificial regeneration.

- A history of fire, insect and disease control to protect the maturing timber.

- The presence of stumps, logging roads, landing or other indications of established silvicultural operations that will continue on the site.

- Explicit treatment of the land as commercial timberlands by government agencies under zoning, tax, subsidy, and regulatory programs.

- Certification under the National Tree Farm System or Stewardship Program.

ESTABLISHED SILVICULTURAL OPERATIONS

- Ownership and management by a timber company or individual whose purpose is timber production.

While past management may have been relatively non-intensive, intensification of management involving artificial regeneration and other practices can occur as part of a conventional rotation and be considered an established operation.

Although wetland regulations do not require a written forest management plan, it is in a landowner's best interest to document that operations are established, that BMPS are implemented and effective, and that activities are consistent with other Section 404 exemption criteria.

A change in ownership has no bearing on whether a forestry operation is part of an established, ongoing activity. Continuation or strict adherence to a management plan written for the previous owner is not required by Section 404 silvicultural exemptions.

Note: Forestry activities or operations require a 404 permit from the Corps of Engineers under the conditions listed in the adjacent panel.

Note: Streamside management zones or SMZs should be established and managed around the perimeter of all major drainages and open

A 404 Permit is Required!



- The activity results in the immediate or gradual conversion of a wetland to an upland as a consequence of altering the flow and circulation or reducing the reach of waters of the United States.

Changes in flow, circulation or reach of waters can be affected by permanent major drainage such as channelization or by placement of fill materials. A discharge which changes the bottom elevation of waters of the United States without converting it to dry land, does not reduce the reach of waters but may alter flow or circulation and therefore may be subject to permitting requirements.

The criteria that are used to determine if a wetland has been converted include a change in hydrology, soils and vegetation to such an extent that the area no longer qualifies as a jurisdictional wetlands, according to the Federal Manual for Delineating Jurisdictional Wetlands (1987).

- A new activity results in the change from the past, historical use of the wetland into a different use to which it was not previously subject where the flow of circulation of waters is impaired or the reach of the water is reduced. Such a change does not meet the established, ongoing requirement and causes the activity or operation to lose its exemption.

Examples of this situation are areas where tree harvesting has been the established use and the landowner wishes to convert the site for use as pasture, green tree reservoir, agriculture, real estate or aquaculture. In such cases, the landowner must first obtain a 404 permit before proceeding with the change.

- Roads and stream crossings are constructed in wetlands without following the mandatory federal BMPs.

- The area has lain idle for so long that hydrologic modifications are necessary to resume operations. This does not refer to temporary water management techniques such as minor drainage, plowing bedding and seeding which are exempt, normal silvicultural activities as long as they don't result in the conversion of wetlands to uplands. However, it does apply to reopening ditches which were once established as permanent wetland drainage structures but have lost their effectiveness for this purpose as they filled with soil and vegetation.

bodies of water contained within wetlands; for exam-

ple, mainstream courses or oxbow lakes.

FOREST WETLANDS

LEGAL DEFINITION OF WETLANDS

The U. S. Army Corps of Engineers (Federal Register, 1982) and the Environmental Protection Agency (Federal Register, 1980) jointly define wetlands as:

“Those areas that are inundated or saturated by surface or groundwater at a frequency or duration sufficient to support and, under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.”

Criteria for Delineating Wetlands



Established by the U.S. Army Corps of Engineers (USCOE)

- *Hydrophytic vegetation – Plants that have the ability to grow, effectively complete, reproduce and / or persist in anaerobic soil conditions.*
- *Hydric soils – soils that are saturated, flooded or ponded long enough during the growing season for anaerobic conditions to develop.*
- *Wetland hydrology – inundated by water sufficient to support hydrophytic vegetation and develop hydric soils.*

All three must be present under normal circumstances for an area to be identified as a jurisdictional wetland.

FOREST WETLANDS |

PLANNING IN WETLANDS

Planning for timber harvesting is an often-overlooked step in silvicultural activities. When working in wetlands or wetland-like areas, planning is essential. To facilitate planning, identify and mark the location of waterbodies and other sensitive areas using aerial photographs, topographic maps or soil surveys. (See *Appendix II, Page 73*)



Bald cypress knees, above, are speculated to provide oxygen to roots in wet conditions, to allow nutrient accumulation, and to provide buttress support. At left, an eagle fishes near a cypress swamp.



ACCESS SYSTEMS

Roads provide access for timber removal, fire protection, hunting, routine forest management activities, and other multiple use objectives. When properly constructed and maintained, roads will have minimal impact on water quality, hydrology, and other wetland functions.

MANDATORY ROAD BMPs

As mandated by Amendments to the Clean Water Act, forest roads in jurisdictional wetlands including “waters of the United States” must be constructed and maintained in accordance with the following mandatory Best Management Practices to retain Section 404 exemption status:

15 BMPs that are Federal Mandates



- 1. Permanent roads, temporary access roads and skid trails in waters of the U.S. shall be held to a minimum feasible number, width and total length consistent with the purpose of specific silvicultural operations and local topographic and climatic conditions.*
- 2. All roads, temporary or permanent, shall be located sufficiently far from streams or other water bodies (except portions of such roads that must cross water bodies) to minimize discharge of dredged or fill material into waters of the U.S.*
- 3. The road fill shall be bridged, culverted or otherwise designed to prevent the restriction of expected flood flows.*
- 4. The fill shall be properly stabilized and maintained to prevent erosion during and following construction.*
- 5. Discharges of dredged or fill material into waters of the U.S. to construct a road fill shall be made in a manner that minimizes the encroachment of trucks, tractors, bulldozers or other heavy equipment within waters of the U.S. (including adjacent wetlands) that lie outside the lateral boundaries of the fill itself.*
- 6. In designing, constructing and maintaining roads, vegetative disturbance in the waters of the U.S. shall be kept to a minimum.*
- 7. The design, construction and maintenance of the road crossing shall not disrupt the migration or other movement of those species of aquatic life inhabiting the water body.*
- 8. Borrow material shall be taken from upland sources whenever feasible.*
- 9. The discharge shall not take, or jeopardize the continued existence of, a threatened or endangered species as defined under the Endangered Species Act, or adversely modify or destroy the critical habitat of such species.*
- 10. Discharges into breeding and nesting areas for migratory waterfowl, spawning areas and wetlands shall be avoided if practical alternatives exist.*
- 11. The discharge shall not be located in the proximity of a public water supply intake.*
- 12. The discharge shall not occur in areas of concentrated shellfish populations.*
- 13. The discharge shall not occur in a component of the National Wild and Scenic River System.*
- 14. The discharge of material shall consist of suitable material free from toxic pollutants in toxic amounts.*
- 15. All temporary fills shall be removed in their entirety and the area restored to its original elevation.*

232.3 ACTIVITIES NOT REQUIRING PERMITS

Except as specified in paragraphs (a) and (b) of this section, any discharge of dredged or fill material that may result from any of the activities described in paragraph (c) of this section is not prohibited by or otherwise subject to regulation under this part.

(a) If any discharge of dredged or fill material resulting from the activities listed in paragraph (c) of this section contains any toxic pollutant listed under section 307 of the Act, such discharge shall be subject to any applicable toxic effluent standard or prohibition, and shall require a section 404 permit.

(b) Any discharge of dredged or fill material into waters of the United States incidental to any of the activities identified in paragraph (c) of this section must have a permit if it is part of an activity whose purpose is to convert an area of the waters of the United States into a use to which it was not previously subject, where the flow or circulation of waters of the United States may be impaired or the reach of such waters reduced. Where the proposed discharge will result in significant discernable alterations to flow or circulation, the presumption is that flow or circulation may be impaired by such alteration.

Note: For example, a permit will be required for the conversion of a cypress swamp to some other use or the conversion of a wetland from silvicultural to agricultural use when there is a discharge of dredged or fill material into waters of the United States in conjunction with construction of dikes, drainage ditches or other works or structures used to effect such conversion. A conversion of section 404 wetland to a non-wetland is a change in use of an area of waters of the U.S.

A discharge which elevates the bottom of waters of the United States without converting it to dry land does not thereby reduce the reach of, but may alter the flow or circulation of, waters of the United States.

(c) The following activities are exempt from section 404 permit requirements, except as specified in paragraphs (a) and (b) of this section:

(1)

(i) Normal farming, silviculture and ranching activities such as plowing, seeding, cultivating, minor drainage, and harvesting for the production of food, fiber, and forest products, or upland soil and water conservation practices, as defined in paragraph (d) of this section.

(ii)

(A) To fall under this exemption, the activities specified in paragraph (c)(1) of this section must be part of an established (i.e., ongoing) farming, silviculture or ranching operation, and must be in accordance with definitions in paragraph (d) of this section. Activities on areas lying fallow as part of a conventional rotational cycle are part of an established operation.

(B) Activities which bring an area into farming, silviculture or ranching use are not part of an established operation. An operation ceases to be established when the area in which it was conducted has been converted to another use or has lain idle so long that modifications to the hydrological regime are necessary to resume operation. If an activity takes place outside the waters of the United States, or if it does not involve a discharge, it does not need a section 404 permit whether or not it was part of an established farming, silviculture or ranching operation.

232.3 ACTIVITIES NOT REQUIRING PERMITS

(2) Maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, rip-rap, breakwaters, causeways, bridge abutments or approaches and transportation structures. Maintenance does not include any modification that changes the character, scope, or size of the original fill design. Emergency reconstruction must occur within a reasonable period of time after damage occurs in order to qualify for this exemption.

(3) Construction or maintenance of farm or stock ponds or irrigation ditches or the maintenance (but not construction) of drainage ditches. Discharge associated with siphons, pumps, headgates, wingwalls, weirs, diversion structures, and such other facilities as are appurtenant and functionally related to irrigation ditches are included in this exemption.

(4) Construction of temporary sedimentation basins on a construction site which does not include placement of fill material into waters of the United States. The term “construction site” refers to any site involving the erection of buildings, roads, and other discrete structures and the installation of support facilities necessary for construction and utilization of such structures. The term also includes any other land areas which involve land-disturbing excavation activities, including quarrying or other mining activities, where an increase in the runoff of sediment is controlled through the use of temporary sedimentation basins.

(5) Any activity with respect to which a State has an approved program under section 208(b)(4) of the Act which meets the requirements of section 208(b)(4)(B) and (C).

(6) Construction or maintenance of farm roads, forest roads, or temporary roads for moving mining equipment, where such roads are constructed and maintained in accordance with best management practices (BMPs) to assure that flow and circulation patterns and chemical and biological characteristics of waters of the United States

are not impaired, that the reach of the waters of the United States is not reduced, and that any adverse effect on the aquatic environment will be otherwise minimized. The BMPs which must be applied to satisfy this provision include the following baseline provisions:

(i) Permanent roads (for farming or forestry activities), temporary access roads (for mining, forestry, or farm purposes) and skid trails (for logging) in waters of the United States shall be held to the minimum feasible number, width and total length consistent with the purpose of specific farming, silvicultural or mining operations, and local topographic and climatic conditions;

(ii) All roads, temporary or permanent, shall be located sufficiently far from streams or other water bodies (except for portions of such roads which must cross water bodies) to minimize discharges of dredged or fill material into waters of the United States;

(iii) The road fill shall be bridged, culverted or otherwise designed to prevent the restriction of expected flood flows;

(iv) The fill shall be properly stabilized and maintained to prevent erosion during and following construction;

(v) Discharges of dredged or fill material into waters of the United States to construct a road fill shall be made in a manner that minimizes the encroachment of trucks, tractors, bulldozers, or other heavy equipment within the waters of the United States (including adjacent wetlands) that lie outside the lateral boundaries of the fill itself;

(vi) In designing, constructing, and maintaining roads, vegetative disturbance in the waters of the United States shall be kept to a minimum;

(vii) The design, construction and maintenance of the road crossing shall not disrupt the migration or other movement of those species of aquatic life inhabiting the water body;

(viii) Borrow material shall be taken from upland sources whenever feasible;

(ix) The discharge shall not take, or

232.3 ACTIVITIES NOT REQUIRING PERMITS

jeopardize the continued existence of, a threatened or endangered species as defined under the Endangered Species Act, or adversely modify or destroy the critical habitat of such species;

(x) Discharges into breeding and nesting areas for migratory waterfowl, spawning areas, and wetlands shall be avoided if practical alternatives exist;

(xi) The discharge shall not be located in the proximity of a public water supply intake;

(xii) The discharge shall not occur in areas of concentrated shellfish production;

(xiii) The discharge shall not occur in a component of the National Wild and Scenic River System;

(xiv) The discharge of material shall consist of suitable material free from toxic pollutants in toxic amounts; and

(xv) All temporary fills shall be removed in their entirety and the area restored to its original elevation.

(d) For purpose of paragraph (c)(1) of this section, cultivating, harvesting, minor drainage, plowing, and seeding are defined as follows:

(1) Cultivating means physical methods of soil treatment employed within established farming, ranching and silviculture lands on farm, ranch, or forest crops to aid and improve their growth, quality, or yield.

(2) Harvesting means physical measures employed directly upon farm, forest, or ranch crops within established agricultural and silvicultural lands to bring about their removal from farm, forest, or ranch land, but does not include the construction of farm, forest, or ranch roads.

(3)

(i) Minor drainage means:

(A) The discharge of dredged or fill material incidental to connecting upland drainage facilities to waters of the United States, adequate to effect the removal of excess soil moisture from upland croplands. Construction and maintenance of upland (dryland) facilities, such as ditching and tiling, inci-

dental to the planting, cultivating, protecting or harvesting of crops, involve no discharge of dredged or fill material into waters of the United States, and as such never require a section 404 permit;

(B) The discharge of dredged or fill material for the purpose of installing ditching or other water control facilities incidental to planting, cultivating, protecting, or harvesting of rice, cranberries or other wetland crop species, where these activities and the discharge occur in waters of the United States which are in established use for such agricultural and silvicultural wetland crop production;

(C) The discharge of dredged or fill material for the purpose of manipulating the water levels of, or regulating the flow or distribution of water within, existing impoundments which have been constructed in accordance with applicable requirements of the Act, and which are in established use for the production or rice, cranberries, or other wetland crop species.

Note: The provisions of paragraphs (d)(3)(i) (B) and (C) of this section apply to areas that are in established use exclusively for wetland crop production as well as areas in established use for conventional wetland/non-wetland crop rotation (e.g., the rotations of rice and soybeans) where such rotation results in the cyclical or intermittent temporary dewatering of such areas.

(D) The discharge of dredged or fill material incidental to the emergency removal of sandbars, gravel bars, or other similar blockages which are formed during flood flows or other events, where such blockages close or constrict previously existing drainageways and, if not promptly removed, would result in damage to or loss of existing crops or would impair or prevent the plowing, seeding, harvesting or cultivating of crops on land in established use for crop production. Such removal does not include enlarging or extending the dimensions of, or changing the bottom elevations of, the affected drainageway as it existed prior to the formation

232.3 ACTIVITIES NOT REQUIRING PERMITS

of the blockage. Removal must be accomplished within one year after such blockages are discovered in order to be eligible for exemption.

(ii) Minor drainage in waters of the United States is limited to drainage within areas that are part of an established farming or silviculture operation. It does not include drainage associated with the immediate or gradual conversion of a wetland to a non-wetland (e.g., wetland species to upland species not typically adequate to life in saturated soil conditions), or conversion from one wetland use to another (for example, silviculture to farming). In addition, minor drainage does not include the construction of any canal, ditch, dike or other waterway or structure which drains or otherwise significantly modifies a stream, lake, swamp, bog or any other wetland or aquatic area constituting waters of the United States. Any discharge of dredged or fill material into the waters of the United States incidental to the construction of any such structure or waterway requires a permit.

(4) Plowing means all forms of primary tillage, including moldboard, chisel, or wide-blade plowing, discing, harrowing, and

similar physical means used on farm, forest or ranch land for the breaking up, cutting, turning over, or stirring of soil to prepare it for the planting of crops. Plowing does not include the redistribution of soil, rock, sand, or other surficial materials in a manner which changes any area of the waters of the United States to dryland. For example, the redistribution of surface materials by blading, grading, or other means to fill in wetland areas is not plowing. Rock crushing activities which result in the loss of natural drainage characteristics, the reduction of water storage and recharge capabilities, or the overburden of natural water filtration capacities do not constitute plowing. Plowing, as described above, will never involve a discharge of dredged or fill material.

(5) Seeding means the sowing of seed and placement of seedlings to produce farm, ranch, or forest crops and includes the placement of soil beds for seeds or seedlings on established farm and forest lands.

(e) Federal projects which qualify under the criteria contained in section 404(r) of the Act are exempt from section 404 permit requirements, but may be subject to other State or Federal requirements.

PERMANENT ROADS

Permanent roads are constructed to provide all or nearly all-season access for silvicultural activities and are maintained regularly. Construction of permanent roads in wetlands and wetlands-like areas should be minimized.



BMPs for Permanent Roads

- *Construct and maintain permanent roads in forested wetlands according to the 15 (federally) mandatory BMPs listed opposite.*
- *Plan the access system prior to construction. Whenever possible, avoid crossing streams, sloughs, sensitive areas, etc.*
- *Consider relocating poorly designed or constructed section(s) of an established road system that may lead to degrade water quality during and after the management activity.*
- *If applicable, construct roads well before the management activity to allow roads to stabilize.*
- *Construct fill roads only when necessary. Road fills should be as low as possible to natural ground level and should include adequate cross-drains for surface water flow.*
- *Borrow pits should be located outside SMZs and jurisdictional wetlands.*
- *Stabilize soils around bridges, culverts, low water crossings, etc. When natural stabilization will not occur quickly, fill material should be stabilized with grass, rip-rap, etc.*
- *Construct fill roads parallel to water flow, where possible.*
- *Use board-road or wooden mats where needed to minimize rutting. Stream crossings should be made at right angles to the channel, when possible, and should not impede stream flow.*
- *Minimize sedimentation when installing stream crossings.*
- *Use gates or otherwise restrict unnecessary traffic on wet roads.*
- *Road ditches should not feed directly into stream channels.*

TEMPORARY ROADS AND SKID TRAILS

ROADS PROVIDE ACCESS for timber removal, fire protection, hunting, routine forest management activities and other multiple use objectives. When properly constructed and maintained, roads will have minimal impact on water quality, hydrology and other wetland functions.

BMPs for Temporary roads and Skid Trails



- *Construct and maintain temporary roads in forested wetlands according to the 15 (federally) mandatory BMPs.*
- *Favor temporary roads over permanent roads when possible. When properly constructed, temporary roads will have less impact on the hydrology of forested wetlands than permanent roads.*
- *Temporary road fill should be removed and the area restored to its original elevation upon completion of operations.*

ROAD MAINTENANCE

As mandated by Amendments to the Clean Water Act, forest roads in jurisdictional wetlands including “waters of the United States” must be constructed and maintained in accordance with the following Best Management Practices to retain Section 404 exemption status.

BMPs for Road Maintenance



- *All drainage structures should be inspected and maintained, especially following unusually heavy rains.*
- *Ditches, culverts and other water flow structures should be kept free of debris.*

HARVEST OPERATIONS IN WETLANDS

Harvesting should be done with consideration to season, stand composition, soil type, soil moisture and the type of equipment that is used. When done correctly, harvesting can benefit site productivity for future forests, improve regeneration, and benefit the overall hydrologic function of a wetland site.

BMPs for Wetlands harvest Operations



- Harvest during dry periods if possible to minimize rutting.
- Use low pressure / high flotation tires or wide tracks where possible, to minimize damage to residual stand will not occur.
- Fell trees away from watercourses if possible.
- Keep skidder loads light when rutting is evident
- During harvesting, remove any obstructions in stream channels resulting from harvesting operations.
- Limit operations on sensitive sites and in SMZs during periods of wet weather.

RUTTING

Ruts should not be present to the extent that they impede, restrict, or change natural water flows and drainages or negatively affect soil productivity. The determination of excessive rutting is highly subjective and

must be made only by a forester or other qualified individual who evaluates rutting extent, depth, soil type, direction and position, and other local factors.

FOREST WETLANDS |

SITE PREPARATION IN WETLANDS

Site preparation activities in forested wetlands for the establishment of pine plantations (1) in Louisiana may or may not require a Clean Water Act Section 404 permit.

No Permit Required



The following are circumstances where mechanical site preparation activities do not require a permit:

■ **Mechanical silvicultural site preparation (2) is a non-permitted activity in wetlands that are:**

Seasonally flooded – Characterized by surface water that is present for extended periods, especially early in growing season and is absent by the end of the season in most years but water table is often near the surface.

Intermittently flooded – Characterized by substrate that is usually exposed, but where surface water is present for variable periods without detectable season periodicity.

Temporarily flooded or saturated – Characterized by surface water that is present for brief periods during the growing season, but also by a water table that usually lies well below the soil surface for most of the season.

Historically 25% or more pine – Conducted in pine plantations and other silvicultural sites that originally or historically contained more than 25% pine in the canopy (except as listed under “permit required,” next page – circumstances which do require a permit). Examples typical of these wetlands include pine flatwoods, pond pine flatwoods and wet flats, such as certain pine-hardwood forests.

■ **The site preparation activity is conducted in a manner designed to minimize impacts to the aquatic ecosystem and are conducted according to the six BMPs (3) listed below:**

Minimize soil disturbance – Position shear blades or rakes at or near the soil surface and windrow, pile, and otherwise move logs and logging debris by methods that minimize dragging or pushing through the soil to minimize soil disturbance associated with shearing, raking, and moving trees, stumps, brush, and other unwanted vegetation

Avoid soil compaction – Conduct activities in such a manner as to avoid excessive soil compaction and maintain soil tilth.

(1) These guidelines were developed for the establishment of pine plantations and does not apply to, restrict, or require a permit for mechanical site preparation for the establishment of hardwood plantations.

(2) Mechanical silvicultural site preparation activities include shearing, raking, ripping, chopping, windrowing, piling and other similar methods used to cut, break apart, or move logging and other debris following harvesting for the establishment of pine plantations.

(3) These BMPs firmly establish that forestry site preparation activities including shearing, raking, moving logging slash, windrowing, piling, etc., are part of normal silviculture; therefore, implementation of the mechanical site preparations BMPs does not constitute “land clearing” or other non-exempt activities.

SITE PREPARATION IN WETLANDS

Limit erosion and runoff – Arrange windrows in such a manner as to limit erosion, overland flow, and runoff.

Keep logging debris out of SMZs – Prevent disposal or storage of logs or logging debris in streamside management zones (defined areas adjacent to streams, lakes, and other water bodies) to protect water quality.

Maintain natural contour and drainage – Maintain the natural contour of the site and ensure that activities do not immediately or gradually convert the wetland to a non-wetland.

Exercise water management – Conduct activities with appropriate water management mechanisms to minimize off-site water quality impacts.

Permit Required



The following are circumstances where mechanical site preparation activities require a permit:

■ A permit will be required in the following areas unless they have been so altered through past practices (including the installation and continuous maintenance of water management structures) as to no longer exhibit the distinguishing characteristics described below (see “circumstances where mechanical silvicultural site preparation activities do not require a permit” above).

Permanently flooded, intermittently exposed, and semi-permanent flooded wetlands

Permanently flooded wetlands — characterized by water that covers land surface throughout the year in all years.

Intermittently exposed wetlands — characterized by surface water throughout the year except in years of extreme drought.

Semi-permanently flooded wetlands — characterized by surface water throughout the growing season in most years and when

absent, the water table is usually at or near the land surface. Examples of these three types include cypress gum swamps, muck and peat swamps and cypress stands / domes.

Riverine bottomland hardwood wetlands

Seasonally flooded floodplains — characterized by seasonally flooded or wetter river floodplain sites where overbank flooding has resulted in alluvial features such as well-defined floodplains, bottom / terraces, natural levees, and backswamps. Surface water present for extended periods, especially early in growing season, but absent by end of the season in most years, but water table often near land surface. Field indicators include water-stained leaves, drift lines and water marks on trees.

Hardwoods dominant — hardwoods dominate the canopy but do not include sites where more than 25% of canopy is pine.

Poorly drained soils — soil characteristics include listed hydric soils that are poorly drained or very poorly drained.

Non-riverine forest wetlands – Are rare, high-quality, wet forests with mature vegetation; located on the southeastern coastal plains, with hydrology dominated by high water tables representing two forest community types.

Non-riverine wet hardwood forests — poorly drained mineral soil interstream flats (comprising 10 or more contiguous acres), typically on the margins of larger peatland areas, seasonally flooded or saturated by high water tables, with vegetation dominated (greater than 50% of basal area per acre) by swamp chestnut oak, cherrybark oak, or laurel oak alone or in combination.

Non-riverine swamp forests— very poorly drained flats (comprising 5 or more contiguous acres), with organic soils or mineral soils with high organic content, seasonally to frequently flooded or saturated by high water tables, with vegetation dominated by bald cypress, pond cypress,

SITE PREPARATION IN WETLANDS

swamp tupelo, water tupelo or Atlantic white cedar alone or in combination.

The term “high quality” refers to generally undisturbed forest stands, whose character is not significantly affected by human activities such as forest management. Non-riverine forest wetlands dominated by red maple, sweetgum, or loblolly pine alone or in combination are not considered to be of high quality, and do not require a permit.

Tidal freshwater marshes – Wetlands regularly or irregularly flooded by freshwater with dense herbaceous vegetation, on the margins of estuaries or drowned rivers or creeks.

Maritime grasslands, shrub swamps and swamp forests – Barrier island wetlands in dune swales and flats; underlain by wet, murky or sandy soils, vegetated by wetland herbs, shrubs and trees.

Four other wetland types in addition to the five above – white cedar swamps, Carolina bay wetlands, low pocosin wetlands and wet marl forests – require a permit for mechanical silvicultural site preparation, but are not normally found in Louisiana.

Note: Pine plantations that have already been established in the nine wetland types are grandfathered and not subject to the above prohibition. Thus, if a pine plantation already exists in the wetland types, no permit will be required for mechanical site preparation in order to continue pine plantation management on that site. Further, it is important to note that the above prohibition against mechanical site preparation in the above wetlands does not preclude pine management all together. Pine management can occur as long as the pine trees can be established consistent with the other clearly exempt activities including, harvesting, minor drainage, seeding, plowing and cultivating.

BMPs for Pine Wetlands



- *Site preparation in forested wetlands, as outlined under Permanently flooded wetlands above, should be conducted according to the six BMPs listed under **Riverine bottomland hardwood wetlands on page 45.***

AVOID



- *Permanently flooded, intermittently exposed and semi-permanent flooded wetlands.*
- *Riverine bottomland hardwood wetlands*
- *Non-riverine forest wetlands.*
- *Tidal freshwater marshes.*
- *Maritime grasslands, shrub swamps and swamp forests.*

FOREST WETLANDS

REFORESTATION IN WETLANDS

Reforestation in wetlands is not much different from regenerating uplands, with regard to water quality; the main factors to consider are the sites' potential for erosion and sedimentation, and for hydrology.

FOREST CHEMICALS IN WETLANDS

Use of chemical treatment should be limited within an SMZ because of their pollution potential. Application of pesticides, including herbicides, should be made by injection or directly. Forest fertilizer should be applied in such a manner (such as rate, time or frequency of application) 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 an SMZ or the water it protects. Care also should be taken in areas adjacent to an SMZ to prevent the drift, spill, seepage or wash of chemicals into the SMZ or watercourse.

BMPs for Chemicals in Wetlands



- Follow all label instructions to the letter. Be aware that some chemicals are labeled for use in wetlands and some are not.

- Conduct applications by skilled and, if required, licensed applicants.

- Identify and establish buffer areas for moving surface waters, especially for aerial applications.

AVOID



- Do not allow spray or rinse water to enter SMZs.



LOUISIANA'S NATURAL & SCENIC RIVERS

OVERVIEW

THE LOUISIANA NATURAL AND SCENIC RIVERS SYSTEM is one of the nation's largest, oldest, most diverse and unique state river protection initiatives. It currently includes 59 streams, rivers, bayous, tributaries, stream complexes and segments thereof, totaling more than 3,000 miles in length. Additions or deletions to the Scenic River system are made by the Louisiana Legislature.

The system was proposed in the late 1960s and adopted on July 29, 1970, with the Louisiana Natural and Scenic Rivers Act, which outlined requirements for a stream to be included. It also established a regulatory program and empowered the Secretary of the Louisiana Department of Wildlife and Fisheries (LDWF) to administer the system through regulation and permitting.

Effective Jul 27, 1988, the Legislature created a Scenic River task force, mandated to update the Act, set policy and establish regulations for full implementation, and oversee planning for system management by the LDWF.

SENSITIVE ACTIVITIES

The following activities are prohibited, require a permit, or are exempted adjacent to or within 100 feet of the low-water mark of a Scenic River:

Prohibited activities – Certain activities which drastically alter the natural and scenic qualities of streams in the system are prohibited by the State of Louisiana.

- Channelization
- Channel realignment
- Clearing and snagging
- Impoundments
- Commercial clearcutting within 100 feet of the low-water mark

SCENIC RIVER PERMIT REQUIREMENTS

Activities requiring permit – Any other activity that may have a direct, significant ecological impact on the river must be permitted by the LDWF. In addition, four other agencies – the Department of Environmental Quality, Department of Agriculture and Forestry, Department of Culture, Recreation and Tourism, Office of State Parks, Office of State Lands and the Office of State Planning – review permit applications. Activities which must be permitted, for example, include but are not limited to:

- Bridge, pipeline and powerline crossings
- Prospective drilling
- Signs or other forms of outdoor advertising
- Structures and buildings
- Bulkheads, houseboats, piers, docks and ramps
- Point source discharges
- Land development adjacent to the river
- Aerial applications of pesticides and fertilizers to fields adjacent to scenic streams.
- Water withdrawals
- Use of a motor vehicle or other wheeled or tracked vehicle on a designated system stream, except for permitted uses, and direct crossing by immediately adjacent landowners, lessees or other persons whom have written permission from the landowner to access adjoining tracts of land, for non-commercial activities in a manner that does not directly and significantly degrade the

ecological integrity of the stream. Written permission must be in the person's possession and include the landowner's contact information.

Contact the LDWF Scenic Rivers Program for permitting information.

Activities exempted from regulation by the act

– While clearcutting of trees for commercial purposes within 100 feet of the low-water mark is prohibited, removal of a portion of the trees is allowed as follows:

■ Selective harvesting – The selective harvesting of trees for commercial purposes is exempt under the following definition: the removal of trees, either as single scattered individuals or in small groups at relatively short intervals, resulting in openings generally less in width than the height of the dominant trees. Repeated indefinitely, selective harvesting ensures

the continuous establishment of reproductions and an unevenly aged stand adequate to encourage and maintain stream shading and stream bank integrity.

■ The cutting of trees for the control of disease or insects and invasive species.

■ The harvesting of timber for personal use by the person who owns or leases the property

Permits are not required for harvesting trees adjacent to Scenic Rivers, as outlined above, provided that prior notification is given to the Louisiana Office of Forestry and the LDWF Scenic Rivers Program.

Disposal of trees or tree tops into a Scenic River is a violation of both the State Water Pollution Control Act and the Scenic Rivers Act. The riparian landowner is liable for a violation of this nature regardless of who actually placed the trees or tops into the stream.

BMPs for Natural & Scenic Rivers



ACTIVITIES REQUIRING PERMIT

- Bridge, pipeline and powerline crossings
- Bulkheads, piers, docks and ramps

- Point source discharges
- Sand and gravel mining
- Prospective mining
- Land development adjacent to the river
- Aerial applications of pesticides and fertilizers to fields adjacent to scenic streams.

ACTIVITIES REQUIRING NOTIFICATION OF THE LOUISIANA OFFICE OF FORESTRY AND THE LDWF SCENIC RIVERS PROGRAM

- Selective harvest in 100-foot buffer
- Cutting trees for insect and / or disease control and invasive species
- Harvesting trees for personal use

AVOID



PROHIBITED BY THE STATE OF LOUISIANA

- Channelization
- Channel realignment
- Clearing and snagging
- Impoundments
- Commercial clearcutting of timber within 100 feet of the low-water mark
- Use of a motor vehicle or other wheeled or tracked vehicle on a designated system stream, except for permitted uses, and direct crossings by immediately adjacent landowners, lessees or other persons who have written permission from the landowner to access adjoining tracts of land, for non-commercial activities in a manner that does not directly and significantly degrade the ecological integrity of the stream. Written permission must be in the person's possession and include the landowner's contact information.



The map of Natural & Scenic Rivers is updated periodically, the last time on Dec. 11, 2019. It is always best to first check the state's website, www.wlf.louisiana.gov/page/scenic-rivers-descriptions-and-map.

- 1. Abita River** (St. Tammany Parish): from its headwaters to its entrance into the Bogue Falaya River
- 2. Amite River** (East Feliciana Parish): from the Louisiana-Mississippi state line to LA Hwy 37
- 3. Barnes Creek:** from LA Hwy 27 to the Calcasieu River in Allen and Beauregard parishes
- 4. Bashman Bayou** (St. Bernard Parish): from its origin to Bayou Dupre
- 5. Bayou Bartholomew** (Morehouse Parish): from the Louisiana-Arkansas state line to Dead Bayou
- 6. Bayou Bienvenue** (St. Bernard Parish): from Bayou Villere to Lake Borgne
- 7. Bayou Cane** (St. Tammany Parish): from its headwaters to Lake Pontchartrain
- 8. Bayou Chaperon** (St. Bernard Parish): from its origin to its end
- 9. Bayou Chinchuba** (St. Tammany Parish): from the West Causeway approach south to Lake Pontchartrain
- 10. Bayou Cocodrie** (Concordia Parish): from Wild Cow Bayou to Little Cross Bayou
- 11. Bayou Cocodrie** (Rapides and Evangeline parishes): from US Hwy 167 to the Bayou Boeuf-Cocodrie Diversion Canal
- 12. Bayou D'Arbonne** (Union and Ouachita parishes): from the Lake D'Arbonne dam to its entrance into the Ouachita River
- 13. Bayou D'Loutre** (L'Outre; Ouachita and Union parishes): from the Louisiana-Arkansas state line to the bayou's entrance into the Ouachita River
- 14. Bayou Des Allemands** (Lafourche and St. Charles parishes): from Lac Des Allemands to Lake Salvador
- 15. Bayou Dupre** (St. Bernard Parish): from the Lake Borgne Canal to Terre Beau Bayou
- 16. Bayou Kisatchie** (Natchitoches Parish): from its entrance into Kisatchie National Forest to its entrance into Old River
- 17. Bayou La Branche** (St. Charles Parish): from its source to where it drains into Lake Pontchartrain
- 18. Bayou LaCombe** (St. Tammany Parish): from its headwaters to Lake Pontchartrain
- 19. Bayou Liberty** (St. Tammany Parish): from its designation at Horseshoe Island Road to Bayou Bonfouca
- 20. Bayou Trepagnier** (St. Charles Parish): from Norco to where the bayou joins Bayou La Branche
- 21. Beckwith Creek:** from its headwaters to the west fork of the Calcasieu River in Beauregard and Calcasieu parishes
- 22. Big Creek** (Grant Parish): from Hwy 167 to the creek's entrance into Little River
- 23. Black Lake Bayou** (Red River, Winn, and Bienville parishes): from the Webster-Bienville parish line to Black Lake in Natchitoches Parish
- 24. Blind River** (St. James, Ascension, Livingston, and St. John parishes): from its origin in St. James Parish to its entrance into Lake Maurepas
- 25. Bogue Chitto River** (Washington and St. Tammany parishes): from the Louisiana-Mississippi state line to the river's entrance into the Pearl

River Navigation Canal

26. Bogue Falaya River (St. Tammany Parish): from its headwaters to LA Hwy 437 in St. Tammany Parish

27. Bradley Slough (Bayou; St. Tammany Parish): all of that portion of the slough within the boundaries of St. Tammany Parish

28. Bundicks Creek (Vernon, Beauregard, and Allen parishes): from its headwaters to Bundicks Lake and from Bundicks Lake to Whiskey (Ouiska) Chitto Creek

29. Calcasieu River (Vernon and Rapides parishes): from LA Hwy 8 east through Vernon Parish and all of that portion of the river within the boundaries of Rapides Parish

30. Calcasieu River (Allen, Jefferson Davis, and Calcasieu parishes): from the mouth of the Whiskey (Ouiska) Chitto River in Allen Parish, south through Jefferson Davis Parish, and to the river's intersection with Ward Eight Park in Calcasieu Parish

31. Comite River (East Feliciana and East Baton Rouge parishes): from the Wilson-Clinton Hwy (Hwy 10) in East Feliciana Parish to the entrance of White Bayou in East Baton Rouge Parish

32. Corney Bayou (Claiborne and Union parishes): from the Louisiana-Arkansas state line to Corney Lake and Corney Lake Dam to Lake D'Arbonne

33. Dorcheat (Dauchite) Bayou (Webster Parish): from the Arkansas state line to the bayou's entrance into Lake Bistineau

34. Drake's Creek (Vernon Parish): from Lookout Road to the creek's confluence with Whiskey (Ouiska) Chitto Creek in Vernon Parish

35. Fish Creek (Grant Parish): from its origin near Williana to its entrance into Little River

36. Hickory Branch (Beauregard and Calcasieu parishes): from its headwaters to the west fork of the Calcasieu River

37. Holmes Bayou (St. Tammany Parish): all of that portion of the bayou within the boundaries of St. Tammany Parish

38. Lake Borgne Canal (St. Bernard Parish): from the Forty Arpent Canal to Bayou Dupre

39. Little River (Rapides, Grant, Catahoula, and LaSalle parishes): from the juncture of Dugdemonna and Castor Creek to the river's entrance into Catahoula Lake

40. Middle Fork of Bayou D'Arbonne (Claiborne and Union parishes): from its origin near LA Hwy 2 Alternate to Lake D'Arbonne

41. Morgan River (St. Tammany Parish): from its juncture with the Porters River to its reentry into the West Pearl River

42. Ouachita River (Morehouse and Union parishes): from the north bank of Bayou Bartholomew at its intersection with the Ouachita River to the Arkansas state line

43. Pearl Creek (Vernon Parish): from LA Hwy 111

to the creek's entrance into the Sabine River

44. Pirogue Bayou (St. Bernard Parish): from Bayou Dupre to New Canal

45. Pushepatapa Creek (Washington Parish): from where East Fork and West Fork join near the state line to where the creek breaks up prior to entering the Pearl River

46. Saline Bayou (Bienville, Winn, and Natchitoches parishes): from its origin near Arcadia to LA Hwy 156 in Winn Parish

47. Saline Bayou (Catahoula and LaSalle parishes): from Saline Lake to Larto Lake

48. Six Mile Creek (Allen and Vernon parishes): includes the East and West Forks and beginning at the boundary of Fort Polk Military Reservation (Lookout Road) and extending south through Vernon and Allen parishes to the creek's entrance into Whiskey (Ouiska) Chitto Creek

49. Spring Creek (Rapides Parish): from Otis to Cocodrie Lake in Rapides Parish

50. Tangipahoa River (Tangipahoa Parish): from the Louisiana-Mississippi state line to the river's entrance into Lake Pontchartrain

51. Tchefuncte River and its tributaries (Washington, Tangipahoa, and St. Tammany parishes): from its origin in Tangipahoa Parish to its juncture with the Bogue Falaya River; tributaries include Beech, Champagne, Clark, Cowpen, Cypress, Hornsby, Horse, Mary, McClothlin, Mile, Rattlesnake, Savannah, Smith, Soap and Tallow, and Timber branches and Flower Bayou, Pruden, St. Paul's, Simpson and Tantella creeks in St. Tammany Parish; Black, Bull, and Reedy branches and Snow and Taylor creeks in Tangipahoa Parish; Catca, Gorman, North and South Carson creeks in Washington Parish; and all other direct tributaries of the Tchefuncte.

52. Tchefuncte River (excluding any tributaries; St. Tammany Parish): from the Bogue Falaya River to Lake Pontchartrain

53. Ten Mile Creek (Rapides, Allen, and Vernon parishes): from the boundary of Fort Polk Military Reservation (Lookout Road) through Vernon Parish and all of that portion of the creek within the boundaries of Rapides and Allen Parishes

54. Terre Beau Bayou (St. Bernard Parish): from Bayou Dupre to New Canal

55. Tickfaw River (St. Helena Parish): from the Louisiana-Mississippi state line to LA Hwy 42

56. Trout Creek (LaSalle Parish): from its origin near Hwy 8 to its entrance into Little River

57. West Pearl River (Washington and St. Tammany parishes): from the state line to the river's entrance into Lake Borgne

58. Whiskey (Ouiska) Chitto Creek (Vernon, Beauregard, and Allen parishes): from the boundary of Fort Polk Military Reservation (Lookout Road) to its entrance into Calcasieu River

59. Wilson Slough (Bayou; St. Tammany Parish): within the boundaries of St. Tammany Parish

LOUISIANA'S NATURAL & SCENIC RIVERS

NOTIFICATION OF COMMERCIAL HARVESTING

LOUISIANA OFFICE OF FORESTRY (LOF) and
LOUISIANA DEPARTMENT OF WILDLIFE AND FISHERIES
NOTIFICATION OF COMMERCIAL HARVESTING
ADJACENT TO NATURAL AND SCENIC RIVERS

A. Date LOF notified _____

B. Name of designated Natural or Scenic River _____

C. Landowner _____

D. Location (please provide map):

Parish _____ Section _____

Township _____ Range _____

E. Estimated date operation will begin _____

F. Estimated date operation will end _____

G. Person notifying LOF: 1. Name _____

2. Phone No. _____

3. Email address: _____

H. LOF person receiving notice _____

I. Inspecting forester _____

J. Date inspected _____

K. Retain this form in district office files and send copy to:

Department of Wildlife & Fisheries
Scenic Rivers Program Coordinator
2000 Quail Drive Room 432
Baton Rouge LA 70808
Fax: 225-765-2625

Louisiana Department of Agriculture & Forestry
Forestry Program Manager, Forest Management
5825 Florida Blvd Suite 6000
Baton Rouge LA 70806
Fax: 225-922-1356

TERMS OF FOREST MANAGEMENT

Access road – A temporary or permanent access route for vehicular traffic.

Barriers – An obstruction, intended to restrict access to a specific location.

Bedding – A site preparation technique, whereby a small ridge of soil is formed as an elevated planting or seedbed.

Best management practices (BMPs) – Forest management practices, developed to minimize or prevent non-point source water pollution.

BMPs, 15 Mandatory – See page 36.

Borrow pit – An area that has been excavated for earthen material.

Broad-based dip – A surface drainage structure specifically designed to drain water from an access road while allowing vehicles to maintain normal travel speeds.

Buffer strip – A relatively undisturbed section of forest adjacent to an area requiring special attention or protection such as a stream or lake.

Canopy Cover – Trees, shrubs and other plants generally greater than 5 feet in height that have crown structure adequate to provide shade to the forest floor. Also referred to as crown cover.

Channel – A natural stream which conveys surface runoff water within well-defined banks.

Chemical site preparation – The use of herbicides to control plant competition to prepare an area for the establishment of a future forest either by artificial or natural means.

Chopping – The flattening of vegetation remaining after harvest in order to concentrate it near the ground. Clearcutting – The total removal of a merchantable tree crop from an area.

Contour – An imaginary line on the surface of the earth connecting points of the same elevation.

Contour line – A line drawn on a map connecting points of the same elevation.

Corduroy– Placing small poles side by side, perpendicular to the roadway, usually over a mat of woody vegetation.

Culvert – Pipe made of metal, plastic, or other suitable material; usually installed under roads to transmit water

Cut and fill – Process of leveling uneven surfaces by moving earth from high areas (“cut”) to low areas (“fill”).

Disking – Tilling soil to enhance site preparation.

Ditch – An artificial narrow channel (generally less than 15 feet wide) dug to provide drainage.

Diversion ditch – A drainage depression or ditch built across a slope to divert surface water.

Ephemeral stream – Small depressions in the terrain commonly referred to drains, draws or ephemeral channels that may or may not have a well-defined channel, and which generally carry runoff only in response to storm flow following heavy rains.

TERMS OF FOREST MANAGEMENT

Erosion – The detachment and transportation of soil particles.

Filter strip – A vegetated area of land separating a water body from forest management activities. Similar to buffer strip.

Firebreak (fire lane) – Naturally occurring or man-made barriers to the spread of fire.

Fireline – A barrier used to stop the spread of fire, constructed by removing fuel or rendering fuel inflammable using water or fire retardant.

Ford – A natural or hardened stream crossing suitable for shallow streams with stable bottoms.

Forest practices – An activity related to the growing, protecting, harvesting, and processing of forest tree species.

Forestry – The science, the art and the practice of managing and using for human benefit the natural resources that occur on and in association with forest lands.

Grade – The slope of a road, usually expressed as a percent.

Ground cover – Organic matter, such as leaf litter, pine straw, logging debris, grasses or other vegetation, generally less than 3 feet high, covering mineral soil.

Gully – An eroded channel at least 12 inches deep.

Harvesting– The removal of merchantable tree crops from an area.

Herbicide – Any chemical or mixture of chemicals intended to prevent the growth of or promote the removal of targeted trees, bushes, and/or herbaceous vegetation.

High-flotation equipment – See low ground pressure equipment definition.

Humus layer – The top layer of the soil formed by the decay of organic matter.

Intermittent stream – A watercourse that flows in a well-defined channel during wet seasons of the year, but not the entire year.

Jurisdictional wetlands – Areas subject to the regulations of the Clean Water Act of 1987; generally, concave or low-lying topographic forms that collect, store, or flow water frequently enough to favor a majority of plants that are adapted to saturated soil conditions.

Lake – An impoundment which has water supplied by and drainage provided by a perennial stream.

Lateral ditch – A water turnout designed to move water from the roadway or road side ditch. Also see, diversion ditch and wing ditch.

Log deck – A centralized work area where logs are collected for temporary storage, trimmed and merchandised, and loaded on trucks for transportation to receiving mills.

Logging – The felling and transportation of wood products from the forest to a delivery location.

Logging debris – The unutilized and generally unmarketable accumulation of woody material, such as limbs, tops, and stumps, that remains after timber removal.

Low ground pressure equipment – Machinery that exerts less ground pressure than traditional equipment through the use of tracks or other method designed to spread their weight over a larger area.

Mineral soil – The layer of earth composed of sand, silt, and clay, in varying amounts, with less than 20% organic matter.

TERMS OF FOREST MANAGEMENT

Mulching – Covering an area loosely with some material to prevent erosion and facilitate revegetation. Straw, bark, hay, or fine wood materials are common mulches.

Natural channel – A watercourse created by the water moving over land.

Natural regeneration – The regeneration of a forest that either uses existing trees as a source of seed or encourages sprouting from stumps or roots.

Non-point source pollution – Pollution which is not traceable to any discrete or identifiable facility (e.g. a pipe, or “point”).

Nutrients – Mineral elements in the forest ecosystem such as nitrogen, phosphorus, and potassium. They can be present naturally or may be added to the forest environment as fertilizer.

Organic matter – Particles of vegetative material in the water, necessary for aquatic health, but can cause water quality problems when excessive.

Outfall protection – A rip-rap or aggregate placed at the outlet of a culvert or water-control device to protect that area from erosion

Outsloped road – A road along a hill constructed so that the water will flow across the road toward its downhill side.

Oxbow – A natural impoundment, generally U-shaped, formed when a river channel changes course.

Perennial stream – A watercourse that flows continuously in a well-defined channel throughout most of the year.

Permanent road – A forest access road that serves as the main artery in a network of roads and receives periodic maintenance to assure its continued utility.

Pesticides – Any chemical substance that is used to control undesirable insects, diseases, vegetation, animals, or other forms of life.

Point source pollution – Sources of water pollution which can be traced to a specific place or location (i.e. a “point”).

Pollution – The presence in a body of water (or soil or air) of substances of such character and in such quantities that the natural quality of the environment is impaired or rendered harmful to health and life or offensive to the senses.

Pond – An impoundment that is smaller than a lake. It can be natural or man-made and generally has no flow or very little flow and may or may not have a perennial stream providing water or providing drainage.

Prescribed burning – The controlled application of fire to a predetermined area. A prescribed burn will have a planned objective such as reducing fuels, controlling competing species or wildlife conservation.

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

Residual trees – Live trees left standing after the completion of harvesting.

Rill erosion – An erosion process in which numerous small, shallow channels are formed.

Riparian – The land adjacent to and pertaining to the banks of streams, rivers, or other water bodies.

Rip-rap – large aggregate rock placed on erodible sites to reduce erosion or hold items like culverts in place.

Rutting – Depressions in the soil resulting from the passage of heavy vehicles.

TERMS OF FOREST MANAGEMENT

Rolling dip – Cross between a water bar and a broad-based dip; it has a reverse grade, but is shorter than a broad-based dip.

Salvage cut – Removal of trees that are dead, damaged or at high risk of mortality (e.g., from disease or insects) in order to utilize their wood before it is unmerchantable.

Scarify – To remove debris or brush from the forest floor and topsoil in preparation prior to natural or artificial regeneration.

Sediment – Soil material that is detached from its original location, transported, usually by water, and deposited, often in a stream or other waterbody. from its original site; the material which is deposited.

Seedbed – The soil prepared by natural or artificial means to promote the germination of seed and the growth of seedlings.

Set – (See Log deck)

Shearing – A site preparation method that involves cutting brush, trees, and other vegetation at the ground level.

Sheet erosion – The removal of a fairly uniform layer of soil from the soil surface by water runoff.

Silvicultural activities – Forest management activities, including site preparation, planting, pesticide applications, intermediate cutting, final harvest, log transportation, and forest road construction. (EPA interpretation)

Silviculture – Generally, the science and art of cultivating (growing and managing) forest crops, based on a knowledge of silvics; and more particularly, the theory and practice of controlling the establishment, composition, constitution and growth of forests. (Society of American Foresters).

Site preparation – A general term used to describe preparing of a site for reforestation.

Skid trail – A route over which logs are moved from the location where the trees were felled to a set or log deck.

Soil productivity – The output or productive capability of a forest soil to grow timber crops.

Slope – Steepness of the land expressed as a percent of vertical fall or rise.

Soil – The unconsolidated mineral and organic material on the immediate surface of the earth that serves as a natural medium for the growth of land plants.

Soil conservation – Using the soil within the limits of its physical characteristics and protecting it from unalterable limitations of climate and topography.

Stream – A permanent or intermittent flowing body of water that follows a defined course within a well-defined natural channel.

Streambanks – The boundaries of a stream which contain normal flows.

Streamside management zone (SMZ) – Buffer strips adjacent to lakes, streams, and watercourses where precautions are used to carry out forest practices in order to protect water quality.

Temporary road – A road constructed for a particular use or single operation and not intended to be used again upon completion of the operation.

Turnout – Drainage ditch which drains water away from roads. (See wing ditch)

Waterbar – A diversion dam constructed across a road or a trail to turn and disperse surface runoff in a manner which adequately protects the soil resource and limits sediment transportation.

TERMS OF FOREST MANAGEMENT

Water body – An area of standing water with relatively little or slow movement (pond, lake, bay, slough).

Watercourse – A definite channel with bed and banks within which concentrated water flows continuously or intermittently.

Water pollution – Contamination or other alteration of the physical, chemical or biological properties of any natural waters of the state, or other such discharge of any liquid, gaseous or solid substance into any waters of the state, as well, or is likely to create a nuisance or render such waters harmful or detrimental or injurious to public health, safety or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other aquatic life (EPA definition).

Water quality – A term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose.

Watershed area – All land and water within the confines of a drainage divide.

Wetlands – Geographic area characteristically supporting hydrophytic plants and soils and shows evidence of saturation or flooding during the growing season.

Windrow – Slash, residue, and debris pushed or raked into rows.

Wing ditch – Drainage ditch which drains water away from roads (also called a Turnout).

APPENDIX I: ROAD SPECIFICATIONS |

RECOMMENDATION FOR FOREST ROADS

The following is a simple list of recommended specifications for forest roads.

- Roads should follow ridges as much as possible with road grades between 2% to 10%. Grades steeper than 10% should not exceed 500 feet in length and slopes greater than 15% should not exceed 200 feet in length. By breaking or changing grade frequently, fewer erosion problems will result compared to using long, straight, continuous grades.
- On highly erodible soils, grades should be 8% or less, but grades exceeding 12% for 150 feet may be acceptable as long as measures are taken to prevent erosion. Graveling the road surface can help maintain stability.
- Intermittent or perennial streams should be crossed using bridges, culverts, or rock fords. Cross as close to a right angle to the stream as possible. Structures should be sized so as not to impede fish passage or stream flow (see pipe culvert recommended specifications, page 66; and size chart, page 62).
- Install water turnouts prior to a stream crossing to direct road runoff water into undisturbed areas. Road gradients approaching water crossings should be changed to disperse surface water at least 50 feet from the stream (except for Scenic Rivers). With the exception of stream crossings, roads should be located outside the SMZ. Distance is measured from the bank to the edge of soil disturbance, or in case of fills, from the bottom of the fill slope. (See Scenic Rivers)
- Outslope the entire width of a road where road gradient and soil type will permit. Usually inslope the road toward the bank as a safety precaution on sharp turns, steep road gradients, or slippery soils. Use cross drainage on inslope or crowned roads to limit travel distance of runoff water.
- Where roads are insloped or crowned, and gradients begin to exceed 2% for more than 200 feet, broad-based dips or rolling dips should be placed within the first 25 feet of the beginning of the incline.
- Haul roads that intersect highways should use gravel, mats or other means to keep mud off the highway.
- At culverts and dips, install rip-rap, logging debris, or other material at the outlets to absorb and spread water, if needed.
- Use logging debris, such as limbs, tops or slash as needed along roads, and sensitive areas to filter sediment.
- Ensure that the flow of water on road surfaces and ditches are maintained by keeping drainage systems open and functioning properly during logging operations.
- Inspect roads at regular intervals to detect and correct potential maintenance problems.

APPENDIX I: ROAD SPECIFICATIONS

WING DITCHES AND TURNOUTS

Definition: A water turnout, or diversion ditch constructed to move and disperse water away from the road and side ditches into adjacent undisturbed areas so that the volume and velocity of water is reduced on slopes.

Purpose: To collect and direct road surface runoff from one or both sides of the road away from the roadway and onto the undisturbed forest floor.

Conditions where practice applies: Any road or trail section where water will accumulate and accelerate. The water should be diverted onto undisturbed areas so the volume and velocity is reduced.

RECOMMENDED SPECIFICATIONS

- The wing ditch should intersect the roadside ditch line at the same depth and be outsloped to a maximum grade of 2%.

- On sloping roads, the wing ditch should leave the road ditch line at a 30- to 45-degree angle to the roadbed and be downsloped less than 2% of the natural contour.

- Wing ditches may often be needed to provide stable outlets for other water control devices such as water bars and dips, but additional turnouts may also be needed along stretches of road where water is expected to collect. The spacing of wing ditches will be determined by the topography and relief of the area. Soil texture should also be considered for wing ditch spacing. On highly erodible or sandy soils wing ditches / turnouts should be spaced closer together than on clay soils.

- Wing ditches should not feed directly into adjacent drainages, gullies or channels.

- Wing ditches should be installed or cut solidly into the soil and wide enough to allow maintenance with logging equipment, such as skidders.

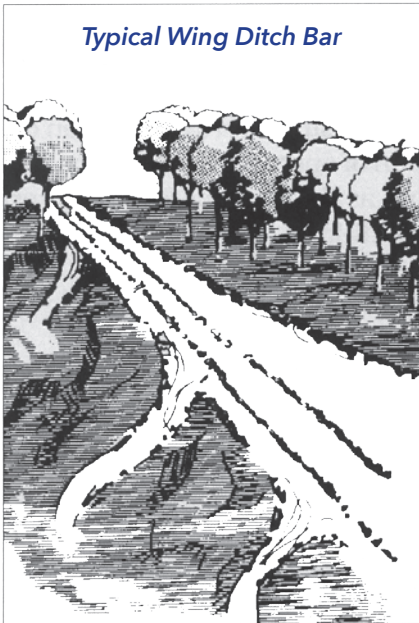
- Additional wing ditches may be necessary for erodible soils (sands and sandy loams).

Recommended Wing Ditch Spacing

	<i>Slope Range</i>	<i>Maximum Distance Between Wing Ditches / Turnouts (feet)</i>
<i>Flat</i>	2%	250
	3%	220
	4%	190
	5%	160
<i>Moderate</i>	6%	144
	7%	128
	8%	112
	9%	96
<i>Steep</i>	10%	80
	11%	60

WING DITCHES AND TURNOUTS

Basic Specifications for Water Turnout Installation



Water dispersal area turns downslope.

Purposes – To divert water from a side ditch or waterbar and disperse it onto the undisturbed forest floor.

Construction guidelines

- Locate turnouts where the natural contour will allow water to flow down and away from the roadbed.
- Construct water turnouts at a 1-2% downward slope
- Begin the ditch with its bottom at the same depth as the road ditch
- Angle the turnout away from the road
- Gradually terminate the end of the turnout so it will spread the water across the forest floor
- Do not locate turnouts that release water directly into streams or SMZs

Distance guidelines – Water turnouts or wing ditches may often be needed to provide stable outlets for other water control devices such as water bars and dips, but additional turnouts may also be needed along stretches of road where water is expected to collect.

APPENDIX I: ROAD SPECIFICATIONS

STREAM CROSSINGS

Definition: Culverts, bridges, or rock fords that allow equipment to cross intermittent or perennial streams, or drains and drainage ditches, and avoids negative impact to the stream.

Purpose: To cross streams while avoiding stream sedimentation.

Conditions where practice applies: Used for ongoing operations where streams or drainages must be crossed by logging, site preparation, road maintenance and fire suppression equipment.

RECOMMENDED SPECIFICATIONS

General

■ Aggregate or other suitable material should be laid on approaches to fords, bridges, and culvert crossings to ensure a stable roadbed and minimize sediment in the stream.

■ When necessary, stabilize road surfaces and cut and fill slopes using effective erosion control methods (seeding, commercial erosion control material, rip-rap, etc.)

■ Stream crossings will require frequent inspections during operations to determine their functional and safe condition. When needed, corrective measures should be taken immediately to restore to full functioning.

■ Remove culverts and bridges from temporary stream crossings upon completion of operations and return the crossing as closely as possible to its original condition.

Bridges

■ Bridges should be constructed with minimum disturbance to the stream bank, channel and adjacent SMZ.

■ When it is necessary to protect approaches and roadbed fills near bridges, adequate erosion protection should be provided by head walls, wing walls, rip rap, etc.

■ The use of temporary bridges may be necessary to minimize stream bank disturbances and provide a means of temporary access to critical areas when permanent structures are not warranted or needed.

Fords

■ Rock fords may be used if no practical alternative exists. Approaches, stream banks, and stream bottoms must be hard enough or sufficiently stabilized to minimize stream bottom and bank disturbance.

Basic Specifications for Culvert Design and Installation



Definitions

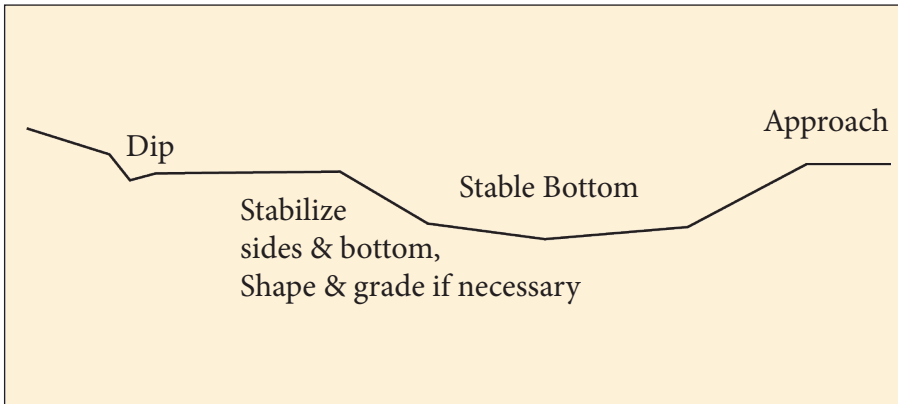
Peak runoff is the accumulated amount, in cubic feet per second, of a storm's runoff from an entire drainage area. Factors that affect runoff include vegetative cover, slopes and soils. The design guidelines included in this section are calculated on a 5-inch, 24-hour storm occurrence.

Head is the vertical column of water that is temporarily stacked over the culvert's entrance. Head provides the energy needed to force water through the culvert. The greater the head, the more water that can be forced through the pipe.

Construction guidelines

- Culverts should be placed in straight sections of stream channels.
- The approach to the stream crossing should be at right angles to the stream.
- The stream should have as straight an entrance and outlet as possible.
- For large intermittent and perennial streams, both ends of the culvert should be placed level with the streambed to allow for fish passage.
- Seat the culvert on firm ground, not fill, and compact the earth at least halfway up the side of the culvert.
- 18 inches of compacted fill over culverts is recommended.

Basic Specifications for Installation of Fords



If fords (low-water crossings) are installed

- Use stream crossings that have low banks and solid stream beds.
- Locate fords where approaches to the stream section are gradual and relatively level.
- Applications of gravel are necessary if rutting and sedimentation occurs or likely to occur.
- Make crossings at right angles to the stream and only in straight sections.
- Install wing ditches, waterbars or dips outside of the SMZ to direct water onto the undisturbed forest floor.
- Use other stream crossing methods such as culverts or bridges if sedimentation issues cannot be effectively controlled.
- Never use during high water periods.

APPENDIX I: ROAD SPECIFICATIONS

CULVERTS FOR ROADS

Definition: Pipe made of metal, plastic, or other suitable material installed under haul roads to transmit water from the road side ditch, storm runoff, seeps and drains.

Purpose: To collect and transmit water safely from side ditches, seeps or natural drains under haul roads

Conditions where practice applies: Culverts can be used for any size operation where cross drainage of water is needed. In some cases, a culvert is necessary for temporary drainage crossings. Permanent culverts should be periodically inspected for obstructions and condition.

RECOMMENDED SPECIFICATIONS

■ Pipe length should be long enough so both ends extend at least one foot beyond the side slope of fill material.

■ The culvert should be placed 1% to 2% downgrade to prevent clogging and laid so the bottom of the culvert is as close as possible to the natural grade of the ground or drain.

■ The culvert should be angled 30 to 45 degrees to the direction of the water flow.

■ Erosion protection should be provided for outflows of culverts to minimize erosion downslope or downstream of the outfall. It may also be needed on the upstream end of culverts on flowing streams. This protection can be in the form of headwalls, rip-rap, geotextile filter cloth, large stone, or prefabricated outflow and inflow devices.

■ Culverts should be firmly seated and earth compacted at least halfway up the side of the pipe. Cover, equal to a minimum of half the culvert diameter (preferably 1 foot fill per 1 foot culvert diameter), should be placed above the culvert — but never use less than one foot of cover. The distance between pipes in a multiple culvert application should be a minimum of half the pipe diameter. For example, when using two 24-inch culverts, the culverts should be set at least 12 inches apart.

Culvert Size Chart

Acres Drained	Light Soils (sands)			Medium Soils (loams)			Heavy Soils (clays)		
	Flat (%)	Mod (%)	Steep (%)	Flat (%)	Mod (%)	Steep (%)	Flat (%)	Mod (%)	Steep (%)
	0-5	5-15	15+	0-5	5-15	15+	0-5	5-15	15+
Culvert diameter in Inches									
5	18	18	18	18	18	21	21	21	24
10	18	18	18	21	24	27	27	27	36
20	18	18	18	24	27	36	36	36	42
30	18	18	18	27	30	36	36	42	48
40	18	18	18	27	36	42	42	48	
50	18	18	18	30	36	48	48	48	
75	18	21	21	36	42				
100	21	21	24	36	48				
150	21	24	24	42					
200	24	30	30	48					
250	27	30	30						
300	30	36	36						
350	30	36	42						
400	36	36	42						

APPENDIX I: ROAD SPECIFICATIONS

BROAD-BASED DIPS

Definition: A surface drainage structure designed to drain water from an access road, while allowing vehicles to maintain normal travel speeds.

Purpose: To gather surface water and direct it off the road while allowing passage of traffic.

Conditions where practice applies: Used on truck haul roads and heavily used skid trails having a gradient of 8% or less.

RECOMMENDED SPECIFICATIONS

- Installation is recommended during basic clearing and grading of new roads, but can also be installed on existing roads.

- An approximate 20-foot long, 3% reverse grade is constructed into the existing roadbed by cutting from upgrade of the dip location. • The cross drain outslope should be 2% to 3% maximum.

- An energy absorber such as rip-rap or brush should be installed at the outfall of the dip to reduce water velocity and minimize erosion.

- On some soils the dip and reverse grade section may require armoring with crushed stone to avoid rutting the road surface.

- Broad-based dips are very effective in directing surface water and moving it safely off the road. Dips should be placed across the road in the direction of water flow.

- Approximate recommended spacing table for broad-based dips.

Recommended Broad-Based Dip Spacing

	<i>Slope (%)</i>	<i>Distance Between Broad-based Dips (feet)</i>
<i>Flat</i>	2%	300
	3%	233
	4%	200
	5%	180
<i>Moderate</i>	6%	166
	7%	157
	8%	150

APPENDIX I: ROAD SPECIFICATIONS

ROLLING DIPS

Definition: Rolling dips are a cross between water bars and broad-based dips. Like broad-based dips they have a reverse grade (except it's shorter) and they direct water off the road. Like water bars they may rely on a mound of soil at the downhill side. Rolling dips should be used on roads with a steeper grade than where a broad-based dip is used.

Purpose: To direct water off the road and prevent erosion, while allowing passage of traffic.

Conditions where practice applies: Used on truck haul roads and heavily used skid trails having a gradient of 15% or less.

RECOMMENDED SPECIFICATIONS

- Installation is recommended during basic clearing and grading of new roads, but can also be installed on existing roads.

- An approximate 10 to 15-foot long, 3% to 8% reverse grade is constructed into the roadbed by cutting from upgrade to the dip location and then using cut material to build the mound for the reverse grade.

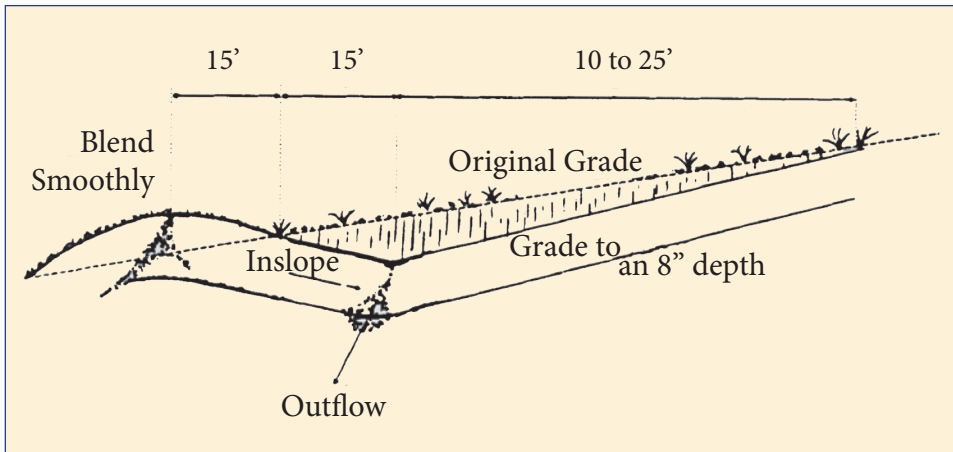
- In hills, rolling dips are located to fit the terrain as much as possible. They should be spaced according to the slope of the planned roadbed.

- Spacing rolling dips can be determined from the adjacent table.

Recommended Rolling Dip Spacing

	<i>Slope (%)</i>	<i>Distance Between Broad-based Dips (feet)</i>
<i>Flat</i>	2%	300
	3%	233
	4%	200
	5%	180
<i>Moderate</i>	6%	167
	8%	150
<i>Steep</i>	9%	144
	11%	136
	13%	131
	15%	127

Basic Specifications for Rolling Dip Installation



Definition – Rolling dips are a cross between water bars and broad-based dips. Like broad-based dips, they have a grade (a shorter one) and they direct water from the roadway. Like water bars, they may also rely on a mound of soil at the downhill side.

Purposes

- To direct water off the roadway while preventing excessive erosion.
- To provide cross-drainage of inside ditches

Where suitable

- On roads that will be used, not for handling constantly running water
- Can be employed on steeper grades than broad-based dips.

Construction guidelines

- Place across the road in the direction of flow.
- Outslope the dip only, not the road.
- Mound excavated material from the dip on the downhill side.
- The height of the mound should only be as high as necessary. Design the dip and mound to facilitate driving without damaging vehicles.

APPENDIX I: ROAD SPECIFICATIONS

WATERBARS

Definition: A diversion mound constructed at an angle across a road or trail to remove and disperse surface runoff.

Purpose: To direct water off a road or trail. Waterbars will prevent excessive erosion.

Conditions where practice applies: This is a practice most commonly used on temporary roads, skid trails and firebreaks, but can be used on some permanent roads.

Recommended Waterbar Spacing

	<i>Grade of Road</i>	<i>Distance Between Waterbars (feet)</i>
<i>Flat</i>	2%	250
	3%	220
	4%	190
	5%	160
<i>Moderate</i>	6%	144
	7%	128
	8%	112
	9%	96
<i>Steep</i>	10%	80
	11%	60

RECOMMENDED SPECIFICATIONS

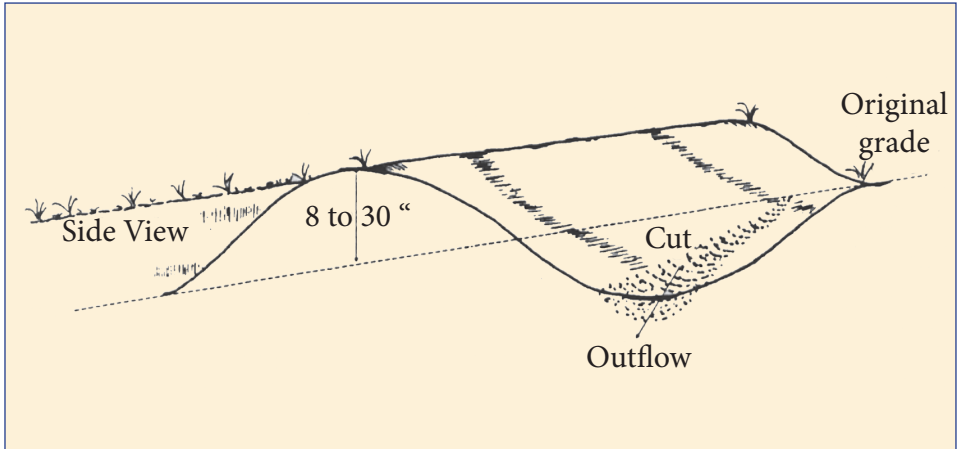
Water bars should be placed at an angle of 30 to 45 degrees to the road, fire-break or trail.

Recommended proper spacing between water bars can be determined from the table.

The outflow end of the water bar should be fully open and extend far enough beyond the edge of the road or trail to safely disperse runoff water onto the undisturbed forest floor. If this is not possible, a turnout or wing ditch may need to accompany the waterbar. The outlet should fall no more than 2%.

Specifications for water bar construction on forest roads, trails and firebreaks are site specific and should be adapted to existing soil and slope conditions.

Basic Specifications for Waterbar Installation



Purposes

- To direct and move surface water off a road, trail or firebreak.
- To divert water from an inside ditch.
- To prevent excessive erosion.

Where suitable

- Roads and trails that will have little or no traffic.
- Abandoned or retired roads, trails and firebreaks.

Construction guidelines

- Angle across the road in the downgrade direction.

- Tie the upper end into the inside ditch's bank, when present.
- Discharge water onto undisturbed forest floor.
- The interval between waterbars should be closer for erodible soils (sands and sandy loams).

Note: See the water bar spacing guidelines displayed in the small table on the opposite page. In addition to distance between water bars, consider taking advantage of factors such as slope changes, curves and presence of stable outlets.





Tree farmers practice sustainable forestry. That means they share a unique commitment to produce wood for America's needs while protecting our soil, water and wildlife resources and providing recreation from our woodlands. For more information, the Tree Farm website is www.treefarmssystem.org.

APPENDIX II: PLANNING TOOLS |

EVALUATING SLOPE

Definition: Slope is the steepness of the land expressed in percent of vertical fall. For example, a 3% slope means a three-foot change in elevation per 100 feet of horizontal distance.

Importance of slope: Slope, soil texture (sand, loam, clay) and ground cover determines how fast water will drain from an area. Steep areas may exhibit a high risk of erosion. Flat surfaces may result in saturated soils. Slope can be managed during road design and layout.

Estimating slope: Slope can be divided into three broad categories: flat, moderate and steep.

Sources of slope information:

- USGS topographic maps.
- Soil surveys.
- Soils maps.

APPENDIX II: PLANNING TOOLS |

USE OF AERIAL PHOTOS

Definition: Aerial photographs or “maps” come in many forms. Most are high altitude photos taken in a very concise and systematic manner. Unmanned Aerial Vehicles (UAVs), or drones, are also used for aerial photography.

Information provided:

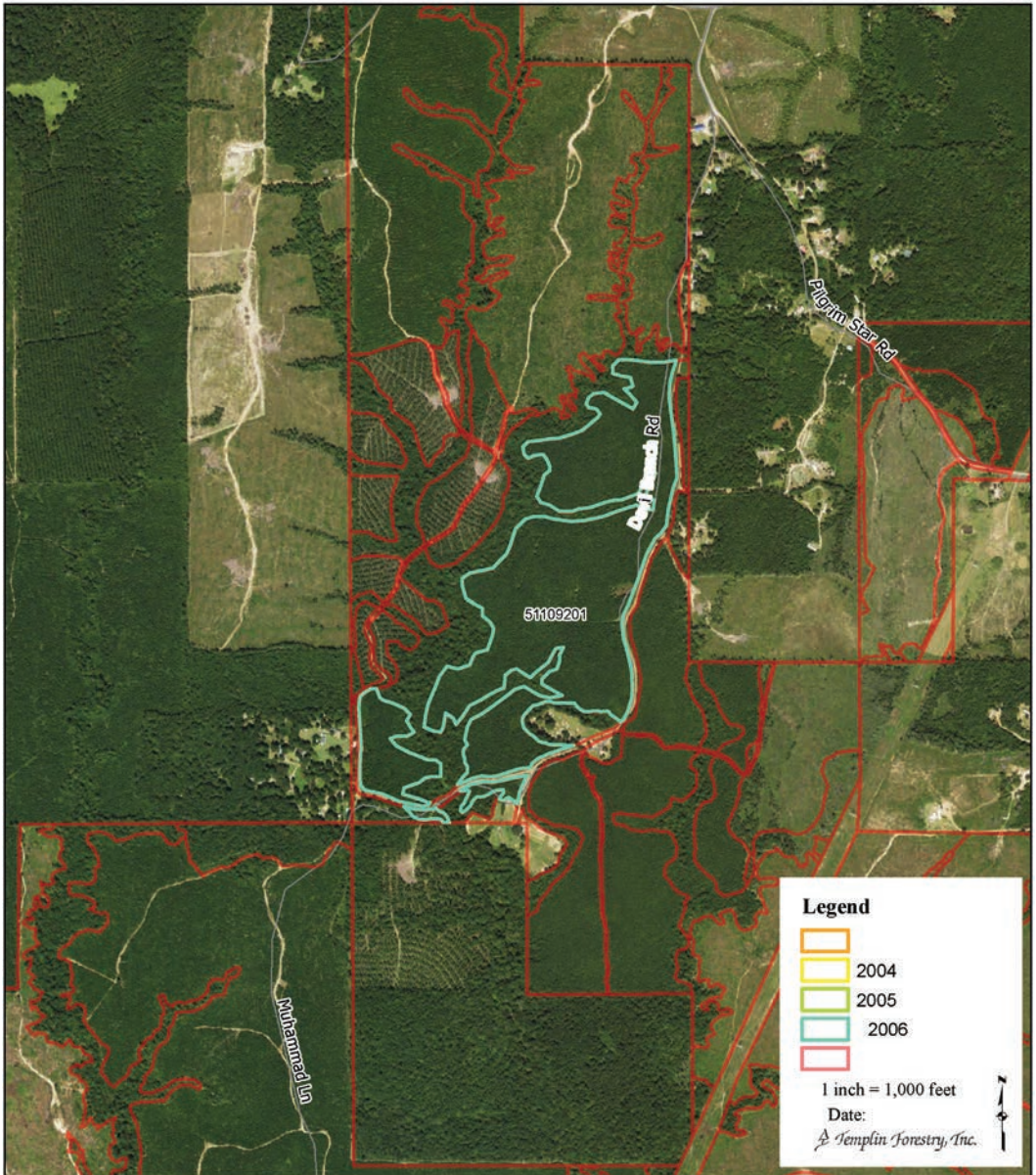
- Boundaries and timber types (for example, on aerial photos, pines appear darker than hardwoods).
- Drainage patterns.
- Roads, buildings, etc.

Scale: Aerial photos come in a variety of scales such as 1 inch = 660 feet. It is important to know the photo scale before using.

Sources for aerial photo information:

- Natural Resources Conservation Service.
- Farm Services Agency.
- Louisiana Department of Agriculture and Forestry.
- Readily available on the Internet.
- USGS.

USE OF AERIAL PHOTOS



An example of aerial photography used in forest management planning.

APPENDIX II: PLANNING TOOLS |

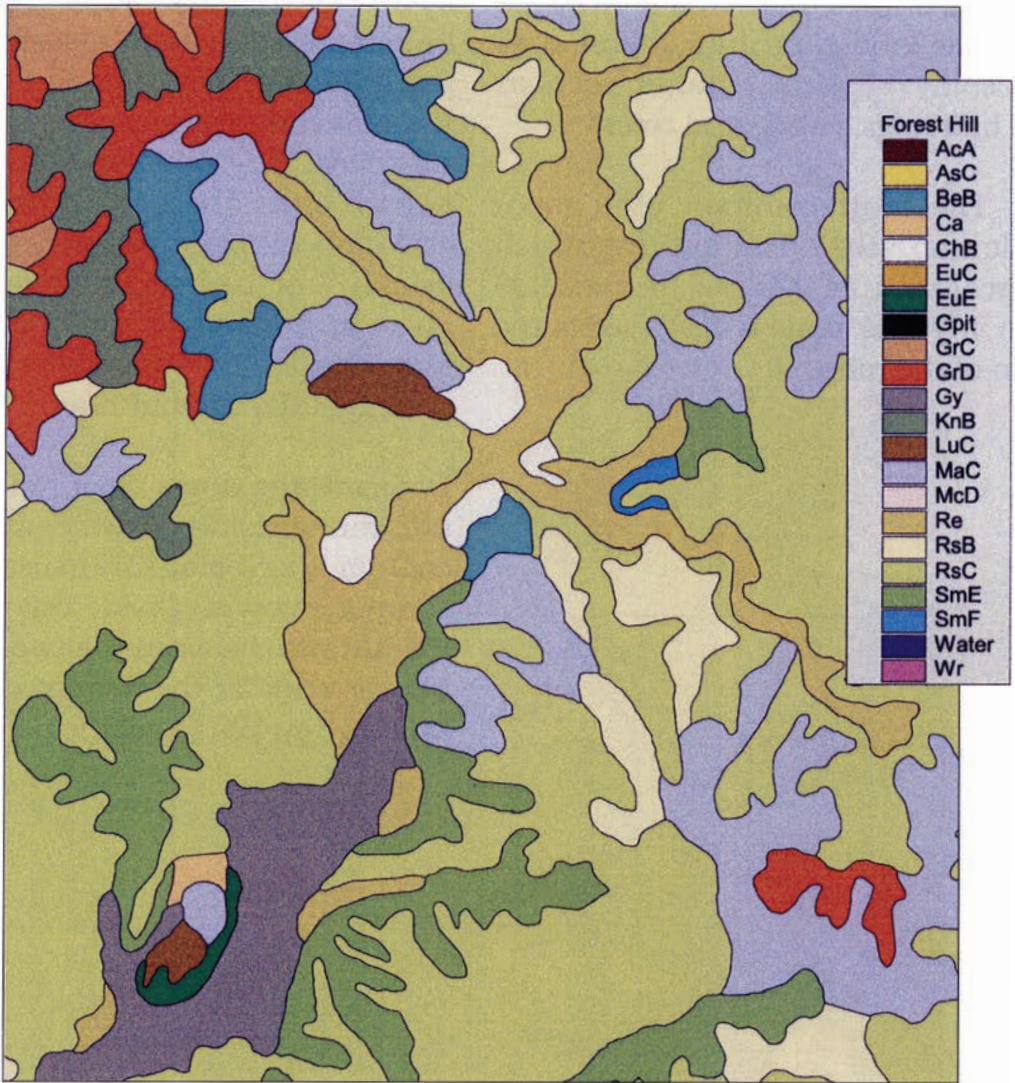
USE OF SOIL MAPS

Definition: Soils maps provide information on soil texture, drainage class and productivity. Soils are classified, mapped and published by the Natural Resources Conservation Service and can be obtained at your local NRCS office. Find out more online at websoilsurvey.nrcs.usda.gov.

Use for soil maps:

- Plan routes.
- Understand the characteristics of various soils.
- Avoid problem areas such as soils susceptible to rutting.
- Estimate soil productivity.

Soil surveys and soils maps are important planning tools, but an on-site check of the exact soil type and slope is essential.



1:24000



Base Image:
USGS 7.5' Quad, UTM Elipsoid-Clarke66

Soil maps are available in each Louisiana parish. They are available to the public at the local (USDA) Natural Resources Conservation Service (NRCS) office.

APPENDIX II: PLANNING TOOLS |

USE OF TOPOGRAPHICAL MAPS

Definition: Topographic maps or “quad sheets” are maps that show the relief of the landscape. In addition, they also display physical features such as roads, buildings, rivers, and creeks.

Scale: The most common topographic map is the U.S. Geological Survey 7.5 minute map which has a scale of 1 inch = 2,000 feet. There are several other topographic maps and representations available on-line.

Relief: Changes in elevation are shown by a series of contour interval lines. These lines represent a point’s elevation above sea level. Any point along a line is the same elevation as any other point on the same line. The closer the contour lines are to each other, the steeper the slope. The elevation distance between the lines is usually 5 or 10 feet.

Determining slope: Determine the elevation change between two points from the contour lines, being sure to use the proper contour interval. Divide this change by the distance between the two points, using the scale at the bottom of the map. Multiply by 100 to get the percent slope.

Using a topographic map to determine watershed acres: A drainage area, or watershed, is the total number of acres draining to a common point, such as a culvert, creek crossing, or bridge. Determining the acreage in the watershed is important in sizing culverts, locating stream crossings, or locating bridges. Topographic maps show changes in elevation by a series of contour lines. These lines can be used to determine which slopes drain through an area. To determine the watershed, it is helpful to remember two things:

- On hilltops, contour lines will form a small, roughly circular shape.
- On contour lines with fingerlike projections, the fingers point uphill.
- The watershed can be defined by drawing arrows in the direction of drainage to the common point.

Determining areas: After the watershed is drawn, the number of acres in the area can be estimated. For a topographic map with a scale of 1:24,000 (a 7.5 minute map) the table, left, can be used as a quick guide.

10 RULES OF CONTOUR LINES

■ Rule 1 — every point of a contour line has the same elevation.

■ Rule 2 — contour lines separate uphill from downhill.

■ Rule 3 — contour lines do not touch or cross each other except at a cliff.

■ Rule 4 — every 5th contour line is darker in color. This is an INDEX contour line.

■ Rule 5 — Contour lines are closer together in steep terrain and farther apart in flat areas.

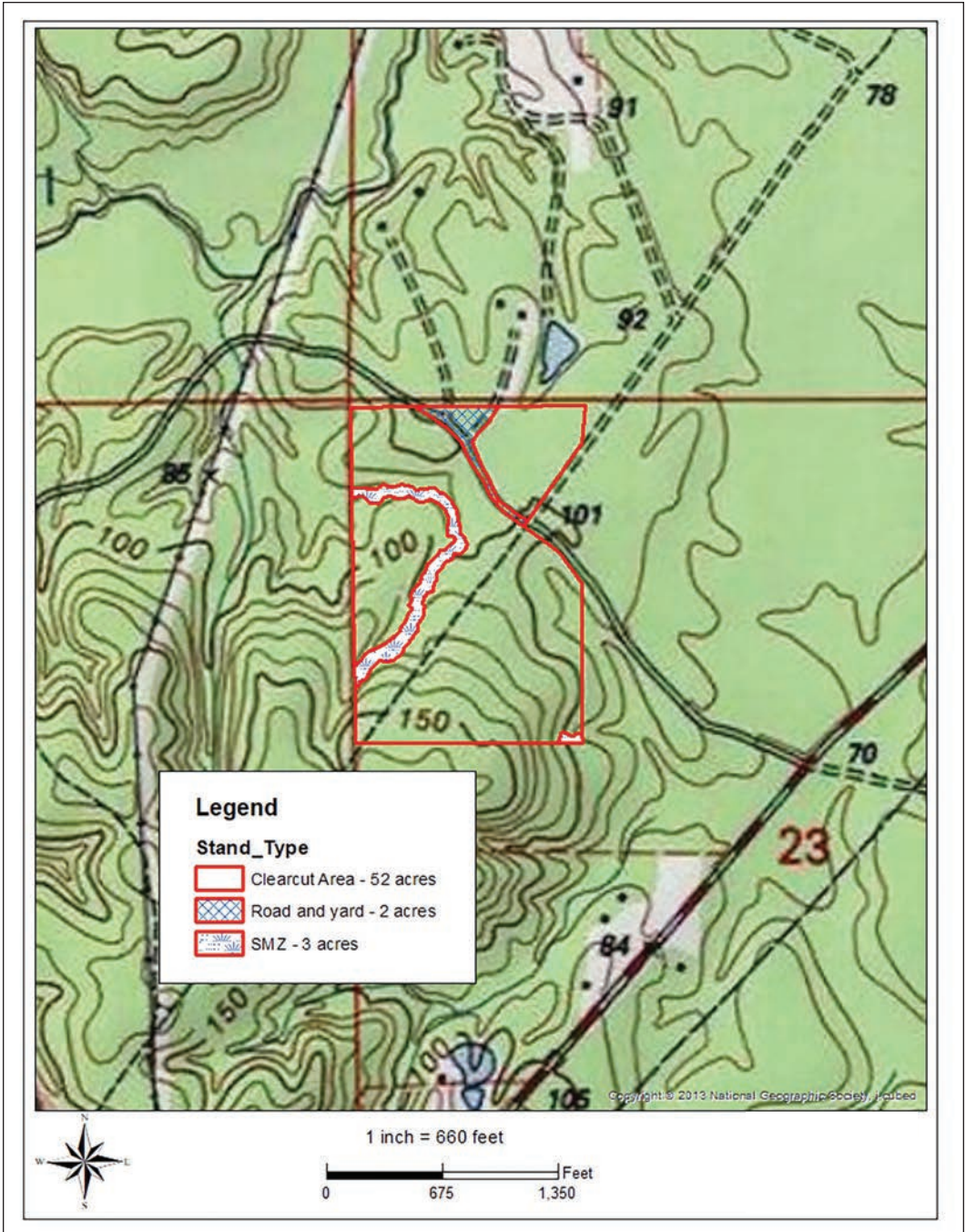
■ Rule 6 — Contour lines close to form circles (or go off the map) AND the inside of the circle is the top of a HILL.

■ Rule 7 — Closed depressions have HACHURE marks on the downhill side of a contour line.

■ Rule 8 — Contour lines create V-patterns when they cross a valley (or drainage). The tip of the V ALWAYS points uphill.

■ Rule 9 — Contour lines create V (or U) patterns when they cross a ridge. The tip or blunt end of the V or U at a ridge ALWAYS points downhill.

■ Rule 10 — Contour lines on opposite sides of a valley or ridge occur in pairs.



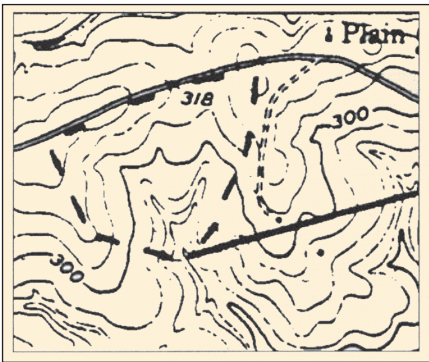
Topographical maps are available from most forestry and engineer suppliers.

APPENDIX II: PLANNING TOOLS

EVALUATION OF DRAINAGE AREA

Estimating Storm Runoff for Culvert Sizing

Sample Topographic Map



Estimation guidelines

- Using appropriate maps, estimate the drainage area for the stream crossing site.
- Using a soils map, determine if the drainage area is predominantly sandy, loamy or clayey.
- Determine the average slope class (flat, moderate or steep) of the drainage area.
- Using the table below, determine the runoff for a 5- inch, 24-hour storm for the appropriate drainage area, soil type and slope class.

Peak Runoff from a 5-inch Storm, in Cubic Feet per Second

Acres	Flat Slopes			Moderate Slopes			Steep Slopes		
	Sand	Loam	Clay	Sand	Loam	Clay	Sand	Loam	Clay
5	4	9	15	6	12	19	8	14	20
10	7	14	24	11	21	35	15	27	40
15	9	19	32	14	29	47	21	39	57
20	11	23	40	17	35	60	26	50	75
25	12	26	47	20	42	70	30	60	92
30	14	30	52	23	47	80	35	70	110
35	15	32	60	25	52	90	40	77	125
40	17	35	65	27	57	100	43	85	140
45	18	37	70	30	62	120	47	95	150
50	19	40	75	32	67	140	50	100	165
75	25	52	100	42	87	160	67	130	230
100	30	65	120	50	110	190	80	170	290



Harvesting activities should include implementation of recommended best management practices to minimize environmental impacts and protect water quality.

APPENDIX III: ROAD SURFACE AREA

DETERMINING ROAD SURFACE AREA

The following is intended as an aid to determining the surface area of roads.

■ Determine the road acreage for each segment of the road system from the Road Surface Area table given below.

■ Combine the acreage of each road segment to determine the total acreage of the entire road system.

■ Multiply the total acreage of the road system by the recommended application/acre of the appropriate revegetating material (e.g., fertilizer, seed mix, mulch, etc.) to determine the total amount of materials needed.

Guide for Determining Road Surface Area

Road Length (feet)	Road Width (feet)						
	8	10	12	14	16	18	20
	ACRES						
50	0.010	0.010	0.010	0.020	0.020	0.020	0.020
100	0.022	0.020	0.030	0.030	0.040	0.040	0.050
250	0.050	0.060	0.070	0.080	0.090	0.100	0.110
500	0.090	0.120	0.140	0.160	0.180	0.210	0.230
750	0.144	0.170	0.210	0.240	0.270	0.310	0.340
1,000	0.180	0.240	0.280	0.320	0.370	0.410	0.460
1,500	0.280	0.340	0.410	0.480	0.550	0.620	0.690
2,000	0.360	0.480	0.560	0.640	0.730	0.830	0.920
5,000	0.920	1.150	1.380	1.610	1.800	2.070	2.300
5,280	0.970	1.210	1.450	1.700	1.940	2.180	2.430

Wider road widths can be calculated by using multiples from the above table

APPENDIX III: PLANNING TOOLS

DETERMINING ROAD SURFACE MATERIAL

The following is intended as an aid to determining the surface area of other disturbed forest sites.

■ Determine the acreage of each disturbed forest site using the following formula:

$$\text{average length} \times \text{average width} = \text{total square feet}$$

$$\text{total square feet} / 43,560 = \text{acreage}$$

■ Combine the acreage of each site to determine the total acreage of all disturbed sites.

■ Multiply the total acreage of the disturbed sites by the recommended application / acre of the appropriate revegetating material, such as fertilizer, seed mix, and mulch, to determine the total amount of materials needed.

Surface Material Determination for Roads

Cubic yards of surfacing material per 100 feet of road length

Road Width, feet	Surfacing Material Thickness, inches		
	2	4	6
8	5	10	15
10	6	12	19
12	7	15	22
14	9	17	26
16	10	20	30
18	11	22	33
20	12	25	37
22	14	27	41
24	15	30	44

APPENDIX IV: REVEGETATION |

STABILIZING DISTURBED AREAS

Following road work, logging operations or the implementation of BMPs, it may be necessary to stabilize or revegetate the disturbed area to prevent excessive erosion.

Stabilizing exposed areas in a timely manner, especially on steep slopes or erodible soil, is an important step in protecting water quality and minimizing the risk of road or BMP wash-out.

Purpose: To stabilize the soil and minimize the chance of erosion.

Logging debris or slash: This is the most economical and efficient methods to stabilize an area. Distribute available logging slash over the exposed area. Small limbs and tops are better than larger materials. Compress the material to the soil by using heavy equipment.

Seed and Mulch: Exposed soil areas with a moderate to steep grade should be seeded in a timely manner. Steep areas, highly erodible soils and other areas with a high erosion potential (such as sets, skid trails, and haul roads) should be identified for stabilization.

Seeding

■ Seed mixture may be broadcast or drilled. Seeding is usually more successful in the spring and fall. Broadcast seed can be covered by dragging a chain, brush, disk, or harrow or firming with a roller or cultipacker, or by drilling to ensure seed contact with the soil.

■ The objective of seeding is to quickly establish a ground cover that will prevent erosion under most conditions. Seed selection should consider the season, the soil type, and the availability of sunlight to the area to be seeded. To get the desired results, a combination of species may be required.

■ Adapted plants — see the table, on the following pages, Seed for Revegetation in Louisiana, for a list of plants and their adaptation by soil types.

■ Planting rates and dates — see the table on the following pages, Revegetation — Planting Information.

■ When temporary cover plants such as annual, cool season crops are used, a follow-up to determine the need for permanent vegetation is needed.

■ It is recommended that a mix of grasses, herbaceous species and legumes be used.

■ Fertilizing — Apply 600 to 650 lbs. of 13-13-13 (or its equivalent) per acre to the area during seedbed preparation or at the time of planting. Care should be taken to ensure that the fertilizer does not enter a

stream. To avoid stream contamination, it is recommended that fertilizer not be applied within the streamside management zone. Fertilizer may be broadcast manually with a spreader prior to or at the time of seeding.

Examples of Native Warm-Season Grass & Native Forb (wildflower) Mixes

Species	Pounds Per Acre	Species	Pounds Per Acre	Species	Pounds Per Acre
<i>Habitat Mix:</i>		<i>Tall Grass Mix:</i>		<i>Short Grass Mix:</i>	
Big Bluestem	1.8 PLS	Big Bluestem	1.5 PLS	Little Bluestem	3.0 PLS
Indiangrass	2.0 PLS	Indiangrass	1.5 PLS	Sideoats Grama	1.0 PLS
Little Bluestem	1.5 PLS	Little Bluestem	1.0 PLS	Indiangrass	0.5 PLS
Sideoats Grama	0.5 PLS	Switchgrass	0.5 PLS	Native Forbs*	1.0
Switchgrass	0.2 PLS	Native Forbs*	1.0		
Native Forbs*	0.25				
Total	6.25		5.5		5.5

*Native forms (wildflowers) include partridge pea, Illinois bundleflower, perennial sunflowers, purple prairie clover, purple coneflower, black-eyed susan, blazing star and lance-leaved coreopsis.

Seed for Revegetation in Louisiana

Revegetation Type	Species	Sands	Loams	Clays
Annual				
Grass / Crops	Millet			
	Brown top	X	X	X
	Foxtail	X	X	X
	Pearl	X	X	X
	Ryegrass		X	X
	Oats	X ¹	X	X
	Elbon Rye	X	X	X
	Wheat	X ¹	X	X
Perennial				
Grasses	Bahia ²		X	X
	Bermuda			
	Alecia	X	X	X
	Coastal	X	X	X
	Selection 3	X	X	X
	Sheffield	X	X	X
	Common ²		X	X
	NK-37		X	X
	Tall fescue ²		X	X
	Lovegrass ²			
	Weeping	X	X	X
	Wilman	X	X	X
	Alamo switchgrass		X	X
Legumes	Singletary peas		X	X
	Hairy vetch	X	X	X
	Arrowleaf		X	X
	Subterranean clover	X	X	X

¹Not adapted to very deep sands; ²Most shade tolerant; ³Used as a temporary cover, in mixes for wildlife

STABILIZING DISTURBED AREAS

Revegetation – Planting Information

Revegetation Type and season	Species Name	Season of Growth	Planting Dates	Planting Rate / Acre
.....				
Annual				
Grass / Crops	Millet			
	Brown top	warm	4/15-8/1	40 lbs.
	Foxtail	warm	4/15-8/1	30 lbs.
	Pearl	warm	5/15-8/1	40 lbs.
	Ryegrass	cool	9/1-11/30	24 lbs.
	Oats	cool	9/1-11/30	128 lbs.
	Elbon Rye	cool	9/1-11/30	112 lbs.
	Wheat	cool	9/1-11/30	120 lbs.
Perennial				
Grasses	Bahia ²	warm	year-round ²	30 lbs.
	Bermuda			
	Alecia	warm	1/15-6/1	48 bu.
	Coastal	warm	1/15-6/1	48 bu.
	Selection 3	warm	1/15-6/1	48 bu.
	Sheffield	warm	1/15-6/1	48 bu.
	Common ²	warm	3/15-5/15	4 lbs. ¹
	NK-37	warm	3/15-5/15	4 lbs. ¹
	Tall fescue ²	cool	9/15-11/15	20 lbs. ¹
	Lovegrass ²			
	Weeping	warm	3/15-5/1	4 lbs. ¹
	Wilman	warm	3/15-5/1	4lbs. ¹
	Alamo switchgrass	warm	3/15-5/1	7 lbs. ¹
Legumes	Singletary peas	cool	9/15-11/30	70 lbs. ¹
	Hairy vetch	cool	9/15-11/30	40 lbs.
	Arrowleaf	cool	9/15-11/30	20 lbs.
	Subterranean clover	cool	9/15-11/30	20 lbs.

¹Pure live seed (% germination x % purity = pure live seed);

²Bahia can be planted year-round if planted with an appropriate cover;

³Innoculate legumes before planting. Note: Sowing rates are double normal rates to ensure maximum cover

APPENDIX V: RECOMMENDATIONS FOR WILDLIFE

RECOMMENDATIONS FOR WILDLIFE

PRIOR TO THIS REVISION, the Louisiana BMP manual has been the practical field guide for forest landowners, logging contractors and the forest industry to ensure the protection of water quality during forestry operations. Due to the manual's use throughout the state, and the fact that Louisiana's forests provide critical habitats for hundreds of species of wildlife, it was determined by the 2019 rewrite subcommittee to

Wildlife often have differing habitat requirements and no one stand type will provide conditions necessary for all species. However, there are several silvicultural techniques that can be used to help maintain wildlife diversity and enhance the quality of wildlife habitat.

Stands of differing age classes, plant species composition and other within stand habitat components, (e.g., streamside management

add a section concerning wildlife and wildlife habitat. The following wildlife BMPs are voluntary practices applied at the discretion of the landowner or other person or entity responsible for conducting silvicultural activities on the property. As such, they should not be considered as auditable criteria to meet any of the requirements stated in the three primary forest management standards (SFI®, FSC® and/or ATF®).

INTRODUCTION

zones, isolated wetlands, rock outcrops), all contribute to a heterogeneous mix of forested conditions across the landscape. We hope you find these wildlife recommendations useful. For more specific guidance please call your local extension agent, NRCS contact and/or state wildlife biologist. Further information can be found about Louisiana Department of Wildlife & Fisheries Wildlife Action Plan at www.wlf.louisiana.gov/assets/Resources/Publications/Wildlife_Action_Plans/Wildlife_Action_Plan_2015.pdf.

OVERALL PROPERTY

■ Variety is a key to supporting different types of wildlife species across your property. Forested properties that contain a variety of stand sizes and shapes, age classes, tree species, and vegetation layers will have higher wildlife diversity than landscapes comprised of uniform stand sizes, shapes, and ages. By providing a diversity of stands and varying forestry practices within these stands across your property, you can help sustain diverse and healthy wildlife populations.



Forest management naturally benefits wildlife. (Photo by USDA Forest Service)

RECOMMENDATIONS FOR WILDLIFE

■ In general, the presence or absence of most terrestrial wildlife within a given stand is based on the type of vegetation present and how it is structured. Vegetation contributes to diversity on the landscape and it provides wildlife with the basic components necessary for survival: primary production, forage, cover from adverse factors (weather/predators), and nesting/roosting habitat.

■ Retaining or adding ponds, lakes and/or wetlands will attract and provide habitat for a wide variety of wildlife including many species of fish, reptiles, amphibians and birds.

■ Removing/controlling invasive plants and animals will improve habitat conditions for native species. There are some excellent online publications to help you identify and manage/control invasive species.

■ Prescribed fire is an important management tool that you can use to improve stand

level wildlife habitat. Prescribed fire “opens” understories, which creates favorable habitat for wild turkeys, quail, fox squirrels and a variety of early successional songbird species. Prescribed fires also increase understory plant diversity by stimulating the germination of plants from reserves or seeds buried in the soil. In addition, it promotes soil fertility, keeps woody vegetation palatable and accessible to wildlife browsers (e.g. white-tailed deer), increases insect abundance and increases the production of legumes and many kinds of fruits. Also prescribed fire is an excellent way to reduce potential hazardous fuel loads on your property. Be sure to check with local laws and regulations before you conduct a prescribed fire and also check with your local forestry commission and/or NRCS office for any possible cost share opportunities.

■ Conducting a final harvest, generally a clear cut in southern pine forests, will have a significant effect on wildlife habitat. Although some wildlife species associated with older age class forests will most likely be negatively affected by a harvest (particularly if there is not similar habitat nearby), as the new forest emerges it will create habitat for species that utilize early successional habitat.

■ Varying the size and shape of clear cuts. Stands should have irregular shapes, i.e., avoid square and rectangular shaped stands as much as possible.

■ Keep it messy — leave snags (dead trees), downed tops, small trees and other structure. Nature is not tidy, and this cover can attract more species of wildlife to recently harvested stands.

■ Retention is a term commonly used to describe trees and snags (dead trees) left following a harvest. These retained trees and

snags are used by roosting bats and by many bird species for perching, foraging and nesting and when they fall they create habitat for small mammals, reptiles and amphibians. There is no recipe for how many trees to leave, the type of trees to retain, whether they should be alive or dead, or how to arrange them; however, as a general rule: the more you leave the better, clumps of retention is preferred vs isolated trees and leave a variety of trees and snags. Safety should be a primary concern when planning the distribution pattern of snags. Consider proximity to high activity areas (e.g., roads, food plots) and safety of planting crews.

■ “Soften” stand edges if possible: leave some areas adjacent to roads and stand edges to allow for a transition of vegetation that can provide escape cover, nesting sites and food for wildlife.

FINAL HARVEST

RECOMMENDATIONS FOR WILDLIFE

SITE PREP

■ Stands established without intensive chemical and mechanical site preparation generally will have more understory plant abundance and diversity. More vegetation and vegetative diversity results in more wildlife.

■ Herbicides: use only the minimal amount and type required to achieve your forest management objectives.

■ Try to favor native grasses and forbs.

THINNINGS

■ Timing: thin as soon as feasible after crown closure (e.g., when the tops of the trees grow together).

■ Spacing: heavier thinning allows more sunlight to reach the forest floor. The resulting open canopy condition will allow sun-

light to reach the forest floor, which in turn will stimulate the growth of grasses, forbs, and shrubs.

■ Conducting a prescribe fire post thinning will create open park like conditions that will be favored by many wildlife species (quail, wild turkey, Bachman's Sparrow, etc.).

STREAMSIDE MANAGEMENT ZONES (SMZs)

■ SMZs are important not only for protecting water quality but also for wildlife habitat. They can provide important travel corridors for some wildlife species and pro-

vide an important hard mast component for wildlife, i.e., oaks and hickories. To maximize wildlife diversity and abundance, the wider the SMZ the better.

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