

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

FOREST HARVEST TRAILS AND LANDINGS
(Acre)
CODE 655

DEFINITION

Laying out, constructing and using forest harvest trails and landings.

PURPOSES

To allow for removal of a forest product while minimizing onsite and off-site damage to resources.

CONDITIONS WHERE PRACTICE APPLIES

On forested areas where harvest operations are scheduled.

CRITERIA

Timing and use of equipment will be commensurate with site and soil conditions to maintain site productivity and minimize soil erosion, displacement and compaction.

Harvest trails and landings will be of a size, gradient, number and location to accomplish tree removal and transport while minimizing adverse onsite and off-site impacts. Adverse impacts include, but are not limited to, accelerated erosion, riparian zone degradation, stream channel and streambank damage, or unacceptable damage to vegetation or habitat.

Slash, debris and vegetative material left on the site after harvesting will not present an unacceptable fire or pest hazard or interfere with the intended purpose.

Water bars, rolling dips and other drainage measures for trails shall be of sufficient size, intervals and gradient for adequate drainage and erosion control.

Trails and landings shall be sufficiently revegetated to control erosion.

Comply with applicable laws and regulations, including the state's Best Management Practices (BMPs).

Designing Stream Crossings

There are three methods for crossing natural drainageways: fords, culverts, and bridges. Factors influencing the appropriate crossing include construction and maintenance costs, equipment and supplies available, debris potential, stream size, expected road use and life, foundation conditions, and position of the road relative to the stream.

1. Stream crossing activities which are in conjunction with a Timber Harvest Plan (THP) will meet standards established in the Forest Practice Rules. This will also include California Fish and Game Code Section 1601 and 1603 compliance.
2. Stream and water crossings shall be designed to accommodate runoff from a 50 year frequency storm.
3. Locate crossings at stream reaches showing signs of stability as evidenced by well vegetated banks, absence of bank cutting, absence of meander, and areas of exposed bedrock.
4. Sediment traps or drainage diversions must be placed above water crossings to reduce sediment entering streams and drainageways.
5. Watercourses that support fish shall utilize drainage structures that allow for the unrestricted passage of fish.

Fish passage will be planned for when selecting location, date of installation, and type of structure or crossing. To allow for fish passage:

 - a. Provide resting pools just above and below obstacles
 - b. Keep individual jumps as low as possible as specified for the species and/or from Department of Fish and Game personnel.

- c. Keep water depth and speed within the fish's ability to swim.
 - d. Avoid sudden changes in water velocity.
6. Installation of circular, arched, or elliptical corrugated metal pipe shall comply with construction specification 587A - Structure For Water Control - Corrugated Metal Pipe. Wherever possible the center of the fill section shall be filled to an elevation slightly lower than the sides. In case of a plugged culvert or blow out only the culvert and fill area will be removed instead of a portion of the road.

CONSIDERATIONS

Assure safe ingress and egress to site.

Locate landings and trails to preserve the aesthetic quality. Police landings and trails to remove refuse and garbage.

Trails may be closed for erosion control, safety and liability, and reduced maintenance costs.

Landings and trails may be used for wildlife food and cover plantings.

Planning considerations

As a part of the conservation planning process, the landowner's objectives, values, and land capabilities need to be discussed to determine whether or not a woodland enterprise is desired by the landowner. This planning must be done before there is any real need for the application of woodland techniques.

Erosion control based on soils data should be a major consideration in any forest harvesting operation. In addition to the requirements specified in the California Forest Practice Rules, attention should be given to incorporating access roads and critical area planting to minimize soil loss as predicted by soil loss equations.

Roads, skid trails and landings have been identified as major sources of sediment from forest land. Consider the following measures for soil protection: (1) maintaining a high level of organic matter on the soil surface; (2) seeding/mulching disturbed areas in a timely fashion; (3) limiting concentration of water, (4) not locating roads and landings in slide areas; (5) reducing water energy at culvert outlets; (6) keeping stream crossings to a minimum and (7) maintaining adequate stream side buffers.

Access roads should be located along ridge tops and upper one-third of the slope. Avoid or minimize road construction in the riparian zone. Avoid construction on slopes exceeding 60 percent. Timely maintenance should be incorporated into operation plans to minimize the potential for high rates of erosion which can occur the first few years after construction.

Season of use, amount and kind of traffic, grade and soils also effect erosion from roads and must be considered. Surfacing the road may be a more practical solution to reduce erosion to acceptable limits from the travel way.

On steep slopes the method of road construction has a direct impact on the associated costs of erosion control. Sidecast road construction techniques and its associated costs to control erosion should be carefully weighed against the costs of trench, keyed embankment, and full bench or endhaul road construction techniques and their associated costs for erosion control.

Fire prevention and suppression to reduce the danger of wildfires is a consideration in forest land and woodland planning.

The California Forest Practice Act regulates forest management on private forest land in California. The requirements of this Act and attendant rules will be the final authority for private forest land timber harvesting activities.

Geotextile products may be utilized in a number of situations to reduce erosion, improve water quality or make impassible areas passible. Because of the cost of the materials and the requirement for proper installation these prospective sites require an onsite investigation and site specific recommendations for the use of these materials.

Avoidance by equipment of critical areas that can produce erosion control problems, including geologically fragile areas, is an essential part of forest land planning. Use of soil surveys, geological hazard maps, observing and locating known areas of mass movement, locating roadways away from water courses and steep areas can help prevent erosion and resulting sediment. Consult geologic hazards maps for slides, slips and debris flow potentials. Debris flows, also called debris avalanche, debris torrent, and mudflow, are difficult to detect in heavily forested areas. In fragile mountainous terrain ground reconnaissance may be required.

Other guidance for controlling erosion on forest and woodland is contained in local or regional guides available from a number of local, state, or federal sources.

Where concentrated flow is unavoidable a number of materials are available to slow water velocity and to divert concentrated flows. These include natural vegetation, duff areas, stumps, stable channels, or flat areas. Lopping and scattering tops and limbs and crushing, where possible, in skid trails and other disturbed areas filters sediment. Protect discharge areas by the use of stones and rocks, grass, slash, brush, logs, or anything that will reduce water velocity. (Stones and rocks are defined as anything greater than 3 inches and less than 24 inches in diameter. Observations have noted rocks and stones that are not round tend to stay in place longer than ones which are well rounded).

Water Quantity

In regions where large tracts are heavily harvested, there may be a temporary to prolonged increase in surface runoff and a decrease in infiltration.

Water Quality

This practice may cause a temporary increase in erosion rates and sediment yield due to harvesting operation. Also there may be a temporary increase in organic loading (BOD) and a temperature increase in the surface waters which will lower the dissolved oxygen content of the receiving waters. California Forest Practice Rules require restocking. If the harvested area is to be reseeded or replanted, pesticides and nutrients may contaminate surface and ground waters if these chemicals are used. Sixty percent of the tree's nitrogen content is contained in the slash.

This practice will improve the quality of surface waters by controlling erosion and reducing the amount of sediment and substances. The construction effects of a practice may have a temporary impact on surface water quality because the surface is disturbed and compacted at this time. Any runoff event which occurs at this time may transport a heavy load of sediment into the receiving waters if component practices are not applied concurrently.

Endangered Species Considerations

Determine if installation of this practice with any others proposed will have any effect on any federal or

state listed Rare, Threatened or Endangered species or their habitat. NRCS's objective is to benefit these species and others of concern or at least not have any adverse effect on a listed species.

If the Environmental Evaluation indicates the action may adversely affect a listed species or result in adverse modification of habitat of listed species which has been determined to be critical habitat, NRCS will advise the land user of the requirements of the Endangered Species Act and recommend alternative conservation treatments that avoid the adverse effects. Further assistance will be provided only if the landowner selects one of the alternative conservation treatments for installation; or at the request of the landowners, NRCS may initiate consultation with the Fish and Wildlife Service, National Marine Fisheries Service and/or California Department of Fish and Game. If the Environmental Evaluation indicates the action will not affect a listed species or result in adverse modification of critical habitat, consultation generally will not apply and usually would not be initiated. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Some species are year-round residents in some streams, such as, freshwater shrimp. Other species, such as steelhead and salmon, utilize streams during various seasons. Be aware that critical periods, such as spawning, eggs in gravels, and rearing of young may preclude activities in the stream that may directly affect the stream habitat during those periods. For example there should be no disturbance of stream gravel beds that may have eggs in them. That could include any equipment in the stream or even walking in the stream or work upstream that may result in sediment depositing in the gravel beds. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Forest Land Harvest

The Forest Practice Rules, as prescribed by the Forest Practice Act, including county rules, must be observed through a timber harvest plan prepared by a registered professional forester, and approved by the California Board of Forestry. Timber operations means the cutting or removal or both of timber or other solid wood forest products, including Christmas trees and firewood, from timber-lands for commercial purposes. This also includes construction and maintenance of roads, fuelbreaks, firebreaks, stream crossings, landings, skid trails, beds for the felling of trees, and

fire hazard abatement, but excluding preparatory work such as tree marking, surveying, or road flagging.

Discuss alternative logging practices based on erosion hazard rating for soils.

The selection of the most desirable harvest system depends on the physical condition of the timber and land resources, the economic condition of the market and the landowner, and the interpretation of the forest practice rules by the registered professional forester preparing the timber harvest plan.

Discuss the establishment of buffer zones along streams and around mountain meadows. The width of stream and lake protection zones is specified in the Forest Practice Rules.

Develop an adequate, but permanent road system keeping in mind the erosion hazard of the soils.

Discuss proper slash disposal, either by lopping and scattering, chipping, piling and burning, or by controlled burns.

Include additional practices that will minimize soil erosion and give maximum watershed protection, such as:

1. Keep maximum road grades under 8 percent on granitic soils, 10 percent on sedimentary soils and 12 percent on soils derived from basic igneous rock.
2. Keep roads out of streams bottoms as specified in the Forest Practice Rules.
3. Provide adequate road drainage.
4. Install berms or water barriers across roads when needed, but do not leave berms on edges of roads through the winter unless necessary for drainage patterns or safety.
5. Skid logs away from water courses.
6. Scatter limbs and brush on skid trails and other areas subject to soil erosion.
7. Outslope roads where this practice is feasible.

Timberlands located near the coast may be subject to the more stringent regulations prescribed in the Coastal Commission's Special Treatment Areas.

Quality of water as it comes from timberland is monitored and regulated by the Department of Water Resources through state water quality laws, and 208 non-point source legislation.

Adequate provision should be given for the

Existing soils information should be utilized for the forestry interpretations pertaining to the soils in the forest.

PLANS AND SPECIFICATIONS

Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

Specifications guide

A. Seeding of Disturbed Areas

To establish vegetation on disturbed areas such as roads, firebreaks, burned areas, skid trails and landings (See Practice Standard 342-Critical Area Planting).

B. Use of Vegetation and Slash For Erosion Control

1. Slash as Mulch (See Practice Standard 484-Mulching).
2. Filter Strips (See Practice Standard 393-Filter Strip).
3. Sediment traps

C. Water Control Measures

1. Surface drainage.
2. Rolling dips or drainage dips.
3. Water bars.
4. Relief Culverts.
5. Water and Sediment Control Basins.
6. Grade Stabilization Structures. (See Practice Standard 410-Grade Stabilization Structure).
7. Diversions.

D. Suggested Water Bar Spacing Guide

Water bar spacings are based upon the road running surface in an unsurfaced condition, the slope, and the soil factor K. Factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is based primarily on the percentage of silt, very fine sand, and organic matter (up to 4 percent) and on soil structure and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. The higher the value the more susceptible the soil is sheet and rill erosion by water.

Periodic inspections of landings and trails will be conducted with necessary repairs applied.

Table 1 - K factor greater than 0.35.

% slope	Distance (ft) Between Water Bars
0-2	500
5	200
10	100
15	75
20	50
25	40
30	35
35	30
40 +	25

Table 2 - K factor less than 0.35

% slope	Distance (ft) Between Water Bars
0-2	1000
5	400
10	200
15	150
20	100
25	80
30	65
35	55
40	50
45	45
50	40
55	35
60	30

OPERATION AND MAINTENANCE

Watercourses and water quality shall be protected during and after removal and transport of trees. Upon completion of harvest, landings and trails will be left in a stable condition.