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Guidelines for Storing and Decommissioning Roads

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Cover photos, from left to right—Prism treatment, entrance treatment using boulders as barriers, entrance treatment using a berm, prism treatment.

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Guidelines for Storing and Decommissioning Roads

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Introduction

The Forest Service, an agency of the U.S. Department of Agriculture, strives to protect and enhance watersheds and provide a transportation system necessary for management and utilization of National Forest System (NFS) lands. Reducing environmental impacts of roads through decommissioning of unneeded roads, or storage of roads that do not have an immediate need, helps meet resource restoration goals. The primary reasons to undertake road decommissioning and road storage treatments are to:

- Restore disturbed lands to a more natural state by restricting motor vehicle use
- Facilitate vegetation regrowth
- Reduce landslide potential
- Reduce erosion
- Restore aquatic and terrestrial habitat
- Reduce or eliminate maintenance costs

This guide describes the differences between decommissioned and stored roads, illustrates effective road decommissioning and road storage treatments, and provides information to consider when determining which treatments to use for the purposes of planning and implementing road decommissioning and road storage activities.

The objective of this Forest Service guidebook is to educate road managers, line officers, and resource specialists, as well as partners and cooperators, on how to effectively store NFS roads and decommission unneeded roads.

The guidance in this document is not all inclusive and should be applied as appropriate.

Road Decommissioning Versus Road Storage

Road Decommissioning

The objectives of road decommissioning are:

- To eliminate all motorized use
- To stabilize, restore, and vegetate unneeded roads to a more natural state
- To enhance NFS lands (Forest Service Manual [FSM] 7734)

Decommissioning of unneeded system and nonsystem roads is often essential to effectively implement best management practices and to meet resource restoration goals. Decommissioning system roads that are no longer needed at the forest, watershed, or project level removes these roads from the transportation inventory. Decommissioning nonsystem roads, which have no known future needs, stabilizes and restores disturbed areas to a more natural state. Decommissioned roads are not available for future motorized use.

There are a wide range of treatment techniques available to decommission unneeded roads. Decommissioning can be as simple as physically blocking an entrance or as extensive as completely eliminating the entire road by restoring natural contours and vegetating all disturbed areas. Watershed analysis or travel analysis may provide useful information to determine what treatment, or combination of treatments, would be appropriate for specific locations.

In some situations, physically blocking the entrance will meet decommissioning objectives. In others, restoring natural contours is necessary. Climate, geology, topography, soil types, road standards, and current uses are factors to consider when determining how to best accomplish stabilization and restoration objectives.

Road Storage

The objectives of road storage are:

- To eliminate all motorized use while providing basic custodial maintenance
- To prevent damage to adjacent resources
- To preserve the road for future use

Placing roads in storage that have future needs, but no current needs, rather than decommissioning them meets these objectives. NFS roads that are not in use for periods of 1 year or more are Operational Maintenance Level 1 roads (Forest Service Handbook [FSH] 7709.59 62.32) while they are in storage.

Treatments for storing roads range from no ground-disturbing activities to removing drainage structures. Watershed analysis or travel analysis may provide useful information to determine what treatment, or combination of treatments, would be appropriate for specific locations.

Stored roads with a high potential to impact natural resources may warrant more intensive treatments, such as removal of culverts or prism modification. It may be appropriate to store roads that have minimal potential to impact natural resources with less intensive treatments, such as blocking the road entrance, installing waterbars, and seeding disturbed areas. Selecting appropriate treatments for road storage requires consideration of existing and future use, potential resource impacts, length of time the road is in storage, cost to implement treatments, and available funding.

The cost of reopening stored roads is also an important factor in selecting storage treatments. For example, if the stored road will be used on a somewhat frequent basis, it might not be appropriate to select intensive and costly treatments, such as removing culverts. Generally, road storage is most effective when using a combination of several treatments.

Comparison of Decommissioned and Stored Roads

Treatments for storing roads are often similar to treatments for decommissioning roads. The result may even look the same on the ground, especially at the entrance. On the other hand, there are some treatments for decommissioning roads, such as restoring natural contours, which are not appropriate for storing roads. The next section of this guidebook provides more information on various treatments. Table 1 summarizes some of the similarities and differences between decommissioned and stored roads.

Table 1—Comparison of decommissioned and stored roads.

Topic	Decommissioned road	Stored road
National Forest System road	Not needed. Not part of the national forest road system.	Needed for future use. Part of the national forest road system in Maintenance Level 1 status.
Treatment objectives	Return land to a more natural state by eliminating all current and future road use without the use of gates. Mitigate current and future resource impacts.	Preserve the integrity of the road for future use and reduce maintenance cost by eliminating current road use with physical barriers. Mitigate current and future resource impacts.
Signage	No route marker. Travel management signs may be appropriate when additional emphasis to eliminate use is needed.	Vertical route marker not prominently displayed at the entrance. Travel management, warning, and regulatory signs may be appropriate for emphasis and safety.
Traffic management strategy	Not applicable.	**Prohibit** is the appropriate strategy during the period of storage.
Maps	Not shown on maps for public use.	Not shown on the motor vehicle use map. May be shown on visitor maps if clearly distinguished as roads prohibited to motorized uses.
Future use	Not available for future motorized use.	Available for future use when not in Maintenance Level 1 status. Placed in storage for periods exceeding one year.
National Environmental Policy Act (NEPA)	NEPA decisions are site specific. Consult NEPA specialist.	NEPA decisions are site specific. Consult NEPA specialist.
Road management objective	Decommission.	Long-term storage (Maintenance Level 1 status).

Treatments for Road Decommissioning and Road Storage

The most appropriate treatments for decommissioning or storing roads depend on existing road conditions, road standards, topography, and type of construction. Not all roads are constructed with ditches, shoulders, fills, or surfacing material. Roads that evolved through use have minimal travelways and most likely lack fill slopes or drainage features such as ditches.

Decommissioning and storing roads requires a change in road management objectives and maintenance prescriptions. The management objective is no longer to keep the road open and maintained for motorized uses but to minimize impacts to natural resources. To meet this objective, the road is treated to prevent motor vehicle use, restore hydrological functions, reduce environmental impacts, and reduce or eliminate the need for road maintenance. The categories of treatments for road decommissioning and road storage are:

- Road entrance
- Drainage
- Prism
- Vegetation

Selecting appropriate treatments depends on many factors, such as restoration goals, current use, future use, and available funding. The most effective decommissioning or storage often results from a combination of treatments. For example, in some locations, effective road decommissioning may warrant blocking the entrance, removing culverts, scarifying and seeding, and removing fills. In other locations, simply blocking the road entrance will meet decommissioning objectives.

Because the objectives of both road decommissioning and road storage are to eliminate motorized use and reduce impacts to natural resources, some treatments are the same. **However, treatments that do not preserve the road for future use are not appropriate for road storage.**

There are a number of treatments available for road decommissioning and storage. The following sections describe road entrance, drainage, prism, and vegetation treatments to achieve road decommissioning and storage objectives.

Road Entrance Treatments

The objective of road entrance treatments is to physically prevent motor vehicles from entering the road. Treatments range from doing nothing to barricading and recontouring the entrance so that the road is physically blocked and less visible. Generally, entrance treatments have relatively low costs. Design, construction, and maintenance of any entrance treatment that controls access must meet the need without creating a hazard and should account for winter and summer use as well as motorized and nonmotorized trail uses.

Table 2 summarizes road entrance treatments for decommissioning and storing roads. The table provides examples and guidance for selecting and implementing road entrance treatments. The intent of this information is to stimulate ideas and is not all inclusive or prescriptive. Figures 1 through 8 illustrate examples of road entrance treatments.

Table 2—Road entrance treatment summary.

Treatment	Description	Considerations	Relative cost	Typical equipment
Non-ground-disturbing	Allow road entrance to return to more natural condition by natural means. Remove all unnecessary entrance signs, including route markers and regulatory signs. Install appropriate travel management signs.	No traffic or safety concerns at road entrance. Low risk for resource impacts. Current use is minimal. Entrance can be easily revegetated in a short or reasonable amount of time.	$	None.
Barriers	A closure device (other than a gate) that physically blocks motor vehicles. Examples include: berms, boulders, slash, logs, waterbars, and guardrails.	Road has current use. Barrier mitigates safety concerns. Protect treatment investments. Entrance has not or will not revegetate in a reasonable amount of time.	$	
Recontour	Restore road entrance to a more natural topography by recontouring to provide a more acceptable physical appearance.	Reestablishing natural drainage patterns is a priority. Maintaining effective physical barriers is difficult. Visual quality is a concern.	$$	

Figure 1—Entrance treatment, non-ground-disturbing. *Non-ground-disturbing treatments are most effective when vegetation can reestablish quickly and terrain does not allow for easy encroachment by motorized vehicles. The fallen tree in this photo effectively blocks motor vehicle access while the native vegetation becomes established. After applying this treatment, a stored road would not need significant work to reopen for intermittent access.*

Figure 2—Entrance treatment, barrier, berm. *Barriers such as berms prevent motor vehicles from accessing the road and facilitate the establishment of vegetation. Consider placing a series of berms at an entrance if a single berm is not effective. Construct berms without posing hazards such as holes, vertical slopes, or fixed objects such as boulders or logs that are not visible from the entrance. The drawing in figure 3 provides details for a properly constructed berm.*

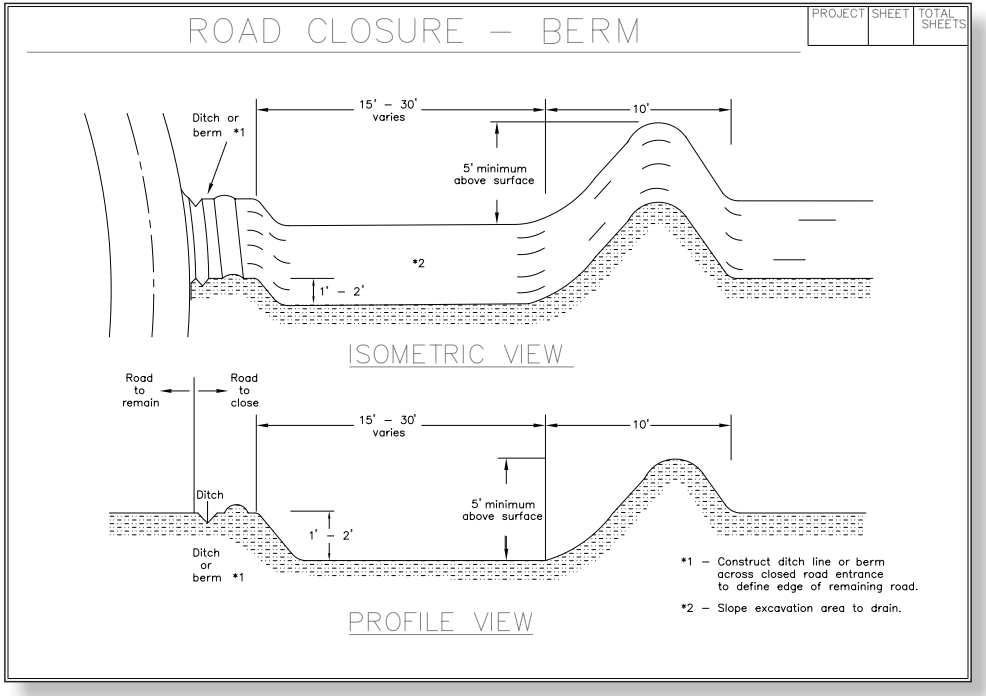


Figure 3—Entrance treatment, barrier, berm. *The design, construction, and maintenance of a berm for controlling access must meet the need without creating a hazard and should account for winter and summer use as well as motorized and nonmotorized trail uses.*

Figure 4—Entrance treatment, barrier, berm. *The primary purpose of berms is to prevent motorized access. However, strategic placement of berms enhances drainage and maximizes the effectiveness of other natural barriers such as trees or boulders. Install barriers at entrances after completing all other drainage, prism, or vegetation treatments along the length of the road.*

Figure 5—Entrance treatment, barrier, boulders, and logs. *Native materials such as boulders or logs prevent motor vehicle use while blending in with the surrounding landscape. When physical barriers alone are not adequate or when vegetation is slow to establish, use regulatory signs until the entrance is less visible.*

Figure 6—Entrance treatment, barrier, slash. *Scattering slash across the road prevents motorized use until native vegetation becomes established. Placing the slash beyond the entrance can be more effective because it camouflages the road for a distance. Using onsite vegetative materials to generate slash is more cost effective than hauling nonlocal material and reduces the risk of contamination by invasive species.*

Figure 7—Entrance treatment, barrier, guardrail. *Physical closure devices such as guardrails prohibit all motorized use. This treatment is most appropriate for a stored road because the road prism is not disturbed and remains intact for future uses.*

Figure 8—Entrance treatment, recontour. *This photo shows remnants of a road that was decommissioned by recontouring the entire road, beginning from the highway and continuing for the entire length of the road. Seeding and natural vegetation provides a more acceptable appearance and disguises the road. Generally, recontouring entire roadbeds as shown in this example is not appropriate for storing roads.*

Drainage Treatments

Drainage features transport water under or off roadways. These include culverts, bridges, low-water crossings, fords, waterbars, drain dips, and outsloped or insloped road prisms. The objective of treating drainage features is to prevent resource damage, eliminate the need for future drainage maintenance, and in some places, to improve aquatic organism habitat. The treatments range from non-ground-disturbing to removing all drainage structures and restoring natural drainage patterns. Generally, drainage treatments have moderate to high costs.

Table 3 summarizes the drainage treatments for decommissioning and storing roads. Most of the treatments in table 3 are applicable for either; however, decompaction and subsoiling are appropriate only for decommissioning. The table provides examples and guidance for implementing drainage treatments. The intent of this information is to stimulate ideas, and is not all inclusive or prescriptive. Figures 9 through 18 illustrate examples of drainage treatments.

Table 3—Drainage treatment summary.

Treatment	Description	Considerations	Relative cost	Typical equipment
Non-ground-disturbing	No physical work done on the ground.	Existing drainages are functioning and have low risk for resource impacts.	None.	None.
Waterbar	Diverts surface waterflow off of the roadway to reduce erosion.	To prevent concentrated flow of water on roadway. To provide drainage where relief culverts have been removed.	$	
Reestablish natural drainage crossings	Reestablish natural drainage crossings that were altered by road construction or maintenance.	To reduce risk of landslides and erosion.	$$	
Outslope prism	Fill ditches, flatten fill slopes, round shoulders, remove berms, and outslope the roadway to allow for natural side slope drainage.	To disperse flow and reduce or eliminate concentration points.	$$	
Remove relief culvert	Remove relief culvert and associated ditches, inlets, and outlets, and replace with outsloped prism and waterbars.	Where there is potential culvert failure. To reduce risk of landslides and erosion. To reduce risk of ditch degradation. Most appropriate for decommissioning or storing roads for an extended time period.	$$	

Treatment	Description	Considerations	Relative cost	Typical equipment
Remove live stream culvert	Remove culvert and recontour site.	When existing culvert is insufficiently sized. Where there is potential for culvert failure. To reduce negative impacts from culverts that restrict flow. To reduce negative impacts to aquatic organisms.	$$$	
Remove at-grade drainage features	Remove open top culvert and replace with outsloped prism and waterbars, or recontour.	Where there is potential culvert failure. To reduce risk of landslides and erosion.	$$$	
Remove major structures such as large culverts and bridges	Remove structure and recontour site.	To remove insufficiently sized, deficient, or unsafe structures. To reduce negative impacts from structures that restrict flow. To reduce negative impacts to aquatic organisms. To eliminate inspection requirements.	$$$	
Scarify roadway	Break up and loosen compacted roadway. Generally 4 to 6 inches in depth.	To reduce surface water velocity and disperse runoff. To establish vegetation.	$	

Treatment	Description	Considerations	Relative cost	Typical equipment
Decompact or subsoil roadway	Break up and loosen compacted roadbed. Generally 6 to 24 inches or more in depth.	To allow infiltration of rainwater and improve natural runoff patterns. To restore groundwater movement through the roadbed. To enhance vegetative root growth.	$$	
Scatter slash	Scatter slash on roadway, cut and fill slopes, and other disturbed areas.	To reduce water velocity and concentration points. To allow infiltration of rainwater.	$	
Remove ford crossing	Remove constructed features, reestablish drainage, and recontour site.	To improve and enhance drainage to reduce risk of erosion. To eliminate restricting flow that negatively impacts the stream. To reduce negative impacts to aquatic organisms. To remove insufficiently sized, deficient, or unsafe structures.	$$	

Figure 9—Drainage treatment, waterbar. *Waterbars divert surface water across the road. Construct waterbars so they are functional with little to no future maintenance.*

Figure 10—Drainage treatment, reestablish natural drainage crossings. *Constructed roads often intercept natural drainages and divert water with roadside ditches and other constructed features. Removing these diversions restores natural drainage patterns. This reduces the potential for resource damage and eliminates the need for future drainage maintenance. Reestablishing the natural direction of flow and adding erosion control mats, as shown in the photo above, stabilizes the area.*

Figure 11—Drainage treatment, outslope prism. *Filling ditches, flattening fill slopes, rounding shoulders, and outsloping roadways restores natural side slope drainage patterns without concentrating water. These photos show a drainage treatment where placing woody material over the outsloped prism reduces surface water velocity and encourages infiltration.* The photo on the left has been edited for clarity.

Figure 12—Drainage treatment, remove relief culvert. *Consider removing relief culverts when there is the potential for plugging, landslides, and ditch degradation due to unmaintained drainage features. When removing relief culverts, construct waterbars in their place. Leadout ditches can help restore natural drainage patterns, and riprap armor helps to stabilize the area. Construct waterbars so they are functional with little or no future maintenance.*

Figure 13—Drainage treatment, remove live stream culvert. *Completely removing live stream culverts can prevent resource damage resulting from unmaintained or undersized drainage features. To restore stream functionality, it may also be necessary to rechannel and recontour drainages and stabilize banks with erosion control mats, mulch, or other native material.*

Figure 14—Drainage treatment, remove live stream culvert. *Removing live stream culverts and stabilizing disturbed areas with native materials within the drainage, as shown in the photos above, stabilizes the drainage and simulates a more natural stream bottom.*

Figure 15—Drainage treatment, remove major structures. *Structures that negatively impact water quality, aquatic organisms, or public safety, are high priority for removal, especially for road decommissioning. Carefully consider replacement costs and long-term access needs before removing structures on stored roads. After structure removal, recontouring the site is often necessary to achieve resource restoration objectives.* These photos have been edited for clarity.

Figure 16—Drainage treatment, scarify roadway. *Scarifying the roadway involves breaking up and loosening compacted road surfaces to a depth of approximately 4 to 6 inches. This allows for infiltration of rainwater, improves natural runoff patterns, and helps reestablish natural vegetation. Native material such as rocks and woody debris remaining on the roadway provide some camouflaging materials and help discourage motorized use.*

Figure 17—Drainage treatment, decompact or subsoil roadway. *Roadway decompaction is significantly more intense than roadway scarification. Generally, decompacted roadways are loosened to a depth of 6 to 24 inches. The intent is to restore groundwater movement by removing the compacted road surface that is a barrier to subsurface flow. Applying mulch to the road surface as shown in these two photos helps reduce erosion and reestablish vegetation. Decompaction and mulching should occur simultaneously to ensure adequate access without disturbing treated areas.*

Figure 18—Drainage treatment, scatter slash. *Scattering slash on roadways and disturbed areas reduces velocity and concentration of water from runoff, reducing erosion potential. In this photo, the scattered slash provides extra bank protection within the drainage and camouflages the roadway.*

Prism Treatments

A road prism includes the roadbed and cut or fill slopes. The objective of treating the road prism is to modify, reduce, or remove prisms from the landscape in order to stabilize the area, reduce erosion, and improve drainage. Road prism treatments for road decommissioning range from non-ground-disturbing to intensive recontouring of the prism to more natural conditions. Generally, prism treatments have high costs relative to other treatments.

Table 4 summarizes the road prism treatments for decommissioning and storing roads. Many of the treatments in this category are generally for decommissioning roads but are also for stabilizing unstable prisms of stored roads. The table provides examples and guidance for implementing prism treatments. It is intended to stimulate ideas, and is not all inclusive or prescriptive. Figures 19 through 22 illustrate examples of prism treatments.

Table 4—Prism treatment summary.

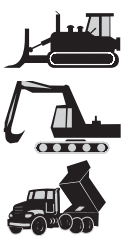
Treatment	Description	Considerations	Relative cost	Typical equipment
Non-ground-disturbing	No physical work done on the ground.	When there is low risk for future resource impacts from the existing prism.	None.	None.
Stabilize fills	Stabilize portions of fill that are unstable by modifying slopes to reduce risk of erosion or failure.	Use on fills prone to instability due to unstable soils and terrain. When protecting live streams or sensitive habitat is a priority.	$	
Partial fill removal	Place portions of embankment fill in previously excavated areas and recontour to blend into natural slopes.	To enhance revegetation. When restoration of natural slope hydrology is a priority. To enhance or restore aesthetics of disturbed areas.	$$	
Restore natural contour (full recontour)	Remove or replace embankment material in areas where excavation occurred during construction to restore original topography.	When visual quality is a very high priority. To enhance or restore aesthetics of disturbed areas. To enhance revegetation. When restoration of natural slope hydrology is a priority.	$$$	

Figure 19—Prism treatment, stabilize fills. *Stabilizing fills by knocking them down or flattening them modifies the road prism to eliminate motor vehicle use. This stabilizes areas that are most susceptible to erosion or failure. Road fills on the entire length of the road may not need treatment. Focus efforts on areas with the most potential for mass failures or impacts to water or sensitive habitats. Applying slash, seed, or mulch on disturbed areas may facilitate revegetation and aid in stabilizing fills prone to instability. This treatment is appropriate for road decommissioning and small sections of road storage.*

Figure 20—Prism treatment, partial fill removal. *Partial removal of fills stabilizes and restores natural slope hydrology by placing embankment fill in previously excavated areas. This treatment is most appropriate when visual quality and natural resource production are a high priority. In this photo, cut slopes are still visible, but not prominent. Blending fill slopes into the natural environment by placing logs and slash over disturbed areas not only makes fill slopes less visible, but also facilitates revegetation. This treatment is appropriate for road decommissioning, but not for road storage, because the road prism has been removed.*

Figure 21—Prism treatment, restore natural contours. *Restoring natural contours involves removing embankment material and placing it in excavated areas to remove the entire road prism from the landscape. This involves blending the cut slopes, fill slopes, and travelway into the natural topography. Use of native material camouflages decommissioned roads and prevents motor vehicle use until vegetation is established. In terrain where it is difficult to establish vegetation after recontouring is complete, physical barriers along the length of the roadway, and not just at the entrance, may help to discourage motor vehicle use. In drier climates, a fully recontoured prism can take a very long time to blend into the adjacent landscape. This treatment is appropriate for road decommissioning, but not for road storage, because the road prism has been removed. These two photos show fully successful road decommissioning treatments, even with the lack of vegetation in the photo on the right.*

Figure 22—Prism treatment, restore natural contours. *Full recontouring that restores natural slope hydrology often requires intensive excavation with heavy equipment. Because this treatment can be expensive, the sequencing of all treatments is especially important. For example, implementing vegetation, drainage, or entrance treatments simultaneously with recontouring ensures adequate access without disturbing treated areas. This treatment is appropriate for road decommissioning, but not for road storage, because the road prism has been removed.*

Vegetation Treatments

The objective of vegetation treatments is to prevent resource damage, eliminate motor vehicle use, and return areas disturbed by road construction to a more natural state. Establishment of vegetation aids in stabilizing the area and reduces soil erosion. Techniques range from non-ground-disturbing to scarifying and seeding road prisms to transplanting native vegetation and applying fertilizer. Generally, vegetation treatments have low to moderate costs relative to other treatments.

Table 5 summarizes the vegetation treatments for restoring disturbed areas by facilitating vegetative growth. The table provides examples and guidance for implementing vegetation treatments. The intent of this information is to stimulate ideas, and is not all inclusive or prescriptive. Figures 23 through 30 illustrate examples of vegetation treatments.

Table 5—Vegetation treatment summary.

Treatment	Description	Considerations	Relative cost	Typical equipment
Non-ground-disturbing	Allow road to return to more natural condition through natural revegetation.	Low risk for resource impacts. Current use is minimal. Roadway can be easily revegetated in a short or reasonable amount of time.	None.	None.
Scarify/decompact roadway	Break up and loosen compacted road surface. Generally 4 to 6 inches in depth.	To reduce surface water velocity and disperse runoff. To retain moisture to induce revegetation. Where vegetation will not establish on compacted road surface.	$$	
Scatter slash and brush	Scatter slash and brush on disturbed areas.	To reduce surface water velocity and disperse runoff. To retain moisture to induce revegetation. When camouflaging the road is a priority.	$$	
Transplant	Transplant native plants on disturbed areas.	When aesthetics are a concern. To discourage motor vehicle access. To establish native vegetation.	$$$	

Treatment	Description	Considerations	Relative cost	Typical equipment
Seeding	Apply seed on disturbed areas.	To reduce and prevent erosion. To establish vegetation.	$	
Mulch	Apply mulch on seeded or disturbed areas.	To reduce and prevent erosion. To establish vegetation. Short-term erosion prevention is needed. Enrich or insulate the soil for seed germination.	$	
Fertilize	Apply fertilizer on seeded or disturbed areas.	To establish vegetation by enhancing soil conditions.	$	

Figure 23—Vegetation treatment, non-ground-disturbing. *In some locations, simply allowing the natural vegetation to grow in disturbed areas meets decommissioning or storage objectives. Where unauthorized vehicle use is prevalent, adding entrance treatments may provide time for vegetation to establish.*

Figure 24—Vegetation treatment, scarify/decompact roadway. *Roadway scarification allows water to infiltrate and therefore facilitates revegetation. Revegetation can occur through natural regeneration or by applying seed. Boulders and other native materials help disguise the road and prevent motor vehicle use until vegetation is established.*

Immediate Results

Long-term Results

Figure 25—Vegetation treatment, scatter slash and brush. *Applying slash and brush reduces surface water velocity and allows water to infiltrate. These photos demonstrate vegetation treatments where slash and brush, in conjunction with prism scarification, stabilized the area and eliminated motor vehicle use until native trees regenerated within the old roadway.*

Figure 26—Vegetation treatment, scatter slash and brush. *Dropping trees across the roadway accomplishes road decommissioning objectives by eliminating motor vehicle use. Some prism scarification of heavily compacted roadways may accelerate revegetation by encouraging infiltration of water. Scarify prisms, scatter slash, and conduct drainage work concurrently as equipment works its way out of an area.*

Figure 27—Vegetation treatment, transplant. *Transplanting native trees and seeding disturbed areas can help the area look more natural by camouflaging roadways, berms, or other ground disturbances when aesthetics are a concern. Transplanted native plants also discourage motor vehicle access while the area recovers.*

Figure 28—Vegetation treatment, seeding. *Seeding can reduce erosion and prevent resource damage with little ground disturbance. In the first photo, seeding is the only treatment needed. In the second photo, placing local native woody material over seeded areas reduces surface water velocity and encourages infiltration until vegetation is established.*

Figure 29—Vegetation treatment, mulch. *This photo illustrates the conversion of a road to nonmotorized use to meet decommissioning objectives by narrowing the travelway to eliminate motorized use. Applying mulch promotes seed germination and reduces erosion on freshly disturbed areas.*

Figure 30—Vegetation treatment, mulch. *Mulch can be particularly effective in establishing vegetation near drainages where erosion control is especially critical. These photos show the use of mulch in conjunction with other treatments to protect the drainage from erosion. After reestablishing natural drainage patterns, berms deter motorized use and the scarified and seeded travelways reduce erosion.*

Treatment Considerations

Sequence of Treatments

Careful planning of the methods and timing of treatments is important in achieving successful results and maximizing efficiencies. When access for equipment is restricted or limited, it may be necessary to apply multiple treatments at the same time as equipment works its way out.

Integrating treatments progressively from the end of the road toward the road entrance provides access and minimizes disturbance of already completed treatments. For example, scarifying, seeding, and mulching should be completed in the road segments behind the culvert before removing the culvert. Implementing treatments in a logical sequence eliminates the need for expensive manual labor due to a lack of, or limited, equipment access.

Funding

Many resource areas benefit from road decommissioning and road storage. An integrated approach to funding can help achieve restoration objectives of specific resource areas as well as contribute to overall restoration goals. Consolidating funds from multiple resource areas can increase flexibility and capacity of the field to accomplish high priority restoration work.

The benefiting function can solely fund road decommissioning and road storage activities. However, this approach does not capitalize on the benefits of leveraging multiple funding sources, including funding from external partners.

Direction in agency manuals and handbooks, as well as budget advice and program direction, provide specific guidance on appropriate funding sources for system and nonsystem road decommissioning and for road storage activities.

Costs

The costs of decommissioning and storing roads are dependent on location. Local site conditions such as availability of materials, terrain, and drainage have a significant impact on costs. Treatments can be more cost efficient when native materials such as boulders, slash, and logs are available onsite. Roads located in steep terrain and unstable soils will generally cost more to decommission or store. The treatment of live stream crossings and existing drainage features that have a high risk of failure can add significant costs. Selecting treatments that have the lowest cost and achieve objectives will maximize the use of limited resources.

National Environmental Protection Act Analysis

Line officers determine the appropriate level of public scoping and environmental analysis with input from a local team of planners, resource specialists, and road managers. Based on local conditions, this team of specialists should:

- Evaluate the site-specific concerns
- Consider all other relevant studies and analyses (such as watershed assessments, travel analysis, or cultural resource surveys)
- Determine if any of the national categorical exclusions apply

Categorical Exclusions (FSH 1909.15, Chapter 30, 28 May 2014)

Category 18 allows the restoration of wetlands, streams, and riparian areas by removing, replacing, or modifying water control structures such as, but not limited to, dams, levees, dikes, drainage tiles, ditches, culverts, pipes, valves, gates, and fencing to allow water to flow into natural channels and floodplains that restore natural flow regimes to the extent practicable.

Category 19 allows for the removal of debris and sediment following disturbance events (such as floods, hurricanes, tornados, mechanical/engineering failures, etc.) to restore uplands, wetlands, or riparian systems to pre-disturbance conditions, to the extent practicable, such that site conditions will not impede or negatively alter natural processes.

Category 20 allows for implementing restoration activities that restore, rehabilitate, and/or stabilize lands occupied by roads and trails, excluding National Forest System roads and National Forest System trails, to a more natural condition by removing, replacing, or modifying drainage structures and ditches, reestablishing vegetation, reshaping natural contours and slopes, reestablishing drainage-ways, or other activities that will restore site productivity and reduce environmental impacts.

Followup

Monitoring

Interdisciplinary teams familiar with the watershed restoration goals and objectives should develop monitoring plans for evaluating the effectiveness of decommissioning treatments. Monitoring provides feedback for evaluating the successes or deficiencies of treatments and determining if changes are necessary. Developing processes to gather information on road closure effectiveness in conjunction with other projects can improve efficiencies and costs of monitoring road closures.

Data Management

Tracking road decommissioning and road storage accomplishments and progress is integral to planning efficient and effective projects and demonstrating success in meeting restoration goals. Interdisciplinary teams and interested parties should understand current data requirements and utilize appropriate databases for planning and reporting road decommissioning and storage activities.

References

Apodaca, M.; Tippie, M.; Verde, A.M.; Barandino, V., Jr. 2012. Guidelines for road maintenance levels. Tech. Rep. 1177–1811–SDTDC. San Dimas, CA: U.S. Department of Agriculture, Forest Service, San Dimas Technology and Development Center, Technology and Development Program. 50 p.

Apodaca, M.; Tippie, M.; Verde, A.M.; Barandino, V., Jr. 2014. Guidelines for traffic management strategies. Tech. Rep. 1477–1811–SDTDC. San Dimas, CA: U.S. Department of Agriculture, Forest Service, San Dimas Technology and Development Center, Technology and Development Program. 44 p.

Moll, J.E. 1996. Road closure and obliteration in the Forest Service. 9677–1205–SDTDC. San Dimas, CA: U.S. Department of Agriculture, Forest Service, San Dimas Technology and Development Center, Technology and Development Program. <http://www.fs.fed.us/t-d/pubs/pdfimage/96771205.pdf>. (4 August 2016).

Napper, C. 2007. Road decommissioning effectiveness monitoring techniques. In: Furniss, M; Clifton, C; Ronnenberg, K., eds. Advancing the fundamental sciences: proceedings of the Forest Service national earth sciences conference. Gen. Tech. Rep. PNW–GTR–689. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. <http://stream.fs.fed.us/afsc/pdfs/Napper.pdf>. (4 August 2016).

Rivas, T. 2006. Erosion control treatment selection guide. Tech. Rep. 0677–1203–SDTDC. San Dimas, CA: U.S. Department of Agriculture, Forest Service, San Dimas Technology and Development Center, Technology and Development Program. 66 p.

Useful Websites

U.S. Department of Agriculture, Forest Service. Forest Service handbooks. <http://www.fs.fed.us/im/directives/dughtml/fsh_1.html>. (3 August 2016).

U.S. Department of Agriculture, Forest Service. Forest Service manual. <http://www.fs.fed.us/im/directives/dughtml/fsm.html>. (3 August 2016).

U.S. Department of Agriculture, Forest Service. Motorized vehicle access controls. <http://fsweb.sdtdc.wo.fs.fed.us/programs/eng/Motorized_Vehicle_Control/index.shtml>. (4 August 2016).

U.S. Department of Agriculture, Forest Service. Road decommissioning. <http://www.fs.fed.us/t-d/programs/im/road_decomission/road_decommissioning.shtml>. (4 August 2016).

U.S. Department of Agriculture, Forest Service. The national best management practices for water quality management on National Forest System lands. <http://fsweb.wo.fs.fed.us/wfw/watershed/national-bmps.html>. (3 August 2016).

U.S. Department of Agriculture, Forest Service. Travel routes road user board. <http://fsweb.r6.fs.fed.us/eng/travel_routes/user_board/>. (4 August 2016).

U.S. Department of Agriculture, Forest Service. 2009. FSH 7709.59—Road system operations and maintenance handbook, chapter 60—road maintenance. <http://www.fs.fed.us/im/directives/fsh/7709.59/7709.59_60.doc>. (3 August 2016).

U.S. Department of Agriculture, Forest Service. 2014. FSH 1909.15—National Environmental Policy Act handbook, chapter 30—categorical exclusion from documentation, 36 CFR part 220—categorical exclusions for soil and water restoration activities. <http://www.fs.fed.us/emc/nepa/includes/wo_1909_15_30.pdf>. (3 August 2016).

Library Card

Apodaca, M.; Tippie, M.; Verde, A.M.; Barandino, V., Jr.; Jones, B.; Rios, J. 2018. Guidelines for storing and decommissioning roads. Tech. Rep. 1677–1804P–NTDP. San Dimas, CA: U.S. Department of Agriculture, Forest Service, National Technology and Development Program. 56 p.

The U.S. Department of Agriculture, Forest Service, provides a transportation system necessary for management and utilization of National Forest System (NFS) lands. The Forest Service strives to protect and enhance watersheds. Reducing environmental impacts of roads through decommissioning unneeded roads, or storing roads that do not have an immediate need, helps meet resource restoration goals. This guide describes the differences between decommissioned and stored roads, illustrates effective road decommissioning and road storage treatments, and provides information to consider when determining which treatments to use for the purposes of planning and implementing road decommissioning and road storage activities.

The objective of this guidebook is to educate road managers, line officers, and resource specialists, as well as partners and cooperators, on how to effectively store NFS roads and decommission unneeded roads.

Keywords: decommissioned roads, maps, motorized use, signage, stored roads, traffic management strategy

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Notes

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