Public and Private Cooperation in the Provision of National Forest Roads

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The U.S. Department of Agriculture Forest Service, a public lands and natural resources management agency, manages one of the world's largest transportation systems for extraction of resources by the private sector and for access to public recreational and private land holdings within national forests. Much of the land within the exterior boundaries of national forests is still privately owned, which results in a patchwork of public and private lands and a problem of accessibility to these land parcels. There is an established tradition of public and private cooperation in resources development and in the provision of transportation in national forests. The national forests transportation system includes approximately 321,000 mi of roads, foot trails, air fields, aerial tramways, waterways, and cableways. Low-volume roads make up most of the system. The objective of this research is to examine the legislative history, policies, and administrative requirements of the Forest Service for cooperative public and private finance, construction, and maintenance of national forest roads. The policies and requirements may be applicable to rural road systems in other regions of the world.

The U.S. Department of Argiculture Forest Service, a public lands and natural resources management agency, manages one of the world's largest transportation systems for use, protection, development, and management of national forest lands, including providing access to the private sector for natural resources extraction and to the public for recreational activities. The national forests contain 87 million acres of commercial forests and 41 million acres of rangeland. The forests also contain 2.5 million acres of surface water (*1*, pp. 3-1–3-3). Much of the land within the exterior boundaries of national forests is still privately owned. These public and private land and water resources support commercial timber harvesting, mining of energy and nonenergy minerals, commercial ranching, fishing and trapping, and an assortment of public outdoor recreational activities, such as boating, camping, hunting, snowmobiling, and skiing. There is a tradition of public-private cooperation in resource development and in transportation of goods and services.

The entire Forest Service transportation system includes approximately 343,000 mi of roads, foot trails, air fields, aerial tramways, waterways, and cableways. The predominant part of the transportation system is low-volume roads. Most of these roads are located in the western United States in national forests and a few national grasslands. National forest roads often carry fewer than 100 vehicles per day and traffic volumes vary significantly by season and use. Of the 343,000 mi of roads, 19 percent are currently closed to all traffic, 31 percent are maintained for passenger car use, and 50 percent are maintained for high-clearance (including two- and four-wheel drive) vehicles (*2*, p. 32).

The Forest Service plans, builds, and maintains road systems on which types of users and traffic vary considerably. The hauling of forest products and minerals, use by recreationists, use by landowners within or near national forests, and administrative use make up the bulk of traffic on forest roads. In situations in which the Forest Service and other public road agencies both have jurisdiction, local commerce, busing of school children, and mail delivery traffic may also occur.

The agency is responsible for various resource outputs and land uses that are heavily influenced by their location vis à vis national forest roads (*3*, p. II-3). To meet the various demands on its road systems and to meet resource management objectives, the Forest Service has relied extensively on cooperation with the private sector in the provision of roads.

The objective of this research is to examine the legislative history, policies, and administrative requirements of the USDA Forest Service in cooperative public-private finance, construction, and maintenance of national forest roads. Because the economies of rural areas in general are natural resource–based, Forest Service policies and requirements may be applicable to the provision of other rural road systems in developed and developing countries.

LEGISLATIVE HISTORY OF NATIONAL FOREST ROADS

The establishment of the national forests of the United States came about with the enactment of what was commonly referred to as the Creative Act of 1891 (*4*, p. 5). The act empowered the President of the United States to set apart into forest reserves those public lands in any state or territory bearing forests. The national forests in the western United States were created from the abundant land still in federal ownership. In the East and the South, however, little public land remained. Private forest lands were heavily logged, and by 1900 the federal government recommended to Congress the establishment of a national forest purchase program. In 1911 Congress passed the Weeks Law enabling the purchase of "forested, cutover or denuded lands within the watersheds of navigable streams. . . ." (*4*, p. 19). In 1924 legislation allowed the federal government to purchase land for timber production on national forests (*5*, p. 15).

Within the exterior boundary of national forests a great deal of land, a nationwide average of approximately 20 percent, is in private ownership (*6*, p. 3995). In some of the western states, square mile sections of land may alternate in federal and private ownership in a checkerboard pattern as a result of the railroad land grants made in the latter part of 19th century. In the eastern and southern states, national forests contain rela-

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tively more land in private ownership. The southern national forests, for example, contain 23.7 million acres of which 12.3 million are in government ownership and the rest are in private ownership *(6)*. One southern national forest, the Uwharrie in North Carolina, has only 20 percent of its land in government ownership (*5*, p. 201).

Until 1962 owners of land within national forests were regarded as having statutory right of access to those lands by way of federally owned land. However, the administrative mechanism for granting access was cumbersome and legally tenuous. The U.S. Department of Justice determined that authority to grant access over national forest lands to private land parcels did not explicitly exist (*7*, p. 3996). This situation made negotiations difficult between the Forest Service and private landowners in the granting of permanent access rights over each other's lands to their respective land parcels. Private owners wanted a statutory guarantee of access to private lands, particularly when the Forest Service wanted such access to public lands.

In 1964 the National Forest Roads and Trails Act provided explicit authority to the Secretary of Agriculture to grant easements to private landowners within national forests (*7*, p. 3995). Specifically, permanent or temporary easements could be given for road rights-of-way on federally owned parcels. Also, private landowners could be granted the right to use national forest roads on federal and nonfederal parcels as well.

As part of the recognized need for increased access to national forest lands, the act also provided for the construction of access roads to a standard that would serve the long-term needs of all users of national forests. These roads were called maximum economy roads. The construction of these roads could be financed through *(a)* appropriated funds, *(b)* payments from or credits against purchase price to purchasers of national forest timber and other products, *(c)* cooperative financing with other public agencies or private groups, or *(d)* a combination of all of these methods (*7*, p. 3998).

Before the enactment of the Road and Trails Act, purchasers of forest resources built roads as part of the cost of removing those resources and the Forest Service built roads for its own resource management duties. There was no legal basis for cooperative provision of roads to serve the needs of all users.

When the act was before Congress, the Forest Service requested authority to require timber and other product purchasers to pay for roads at the maximum economy road standard rather than the minimum standard required for removal of the product. That request was rejected by Congress. The act in its final form stipulated that if a higher standard is required for uses other than removal of timber or other products from a particular sale, that sale shall not bear the cost of the higher standard (*7*, p. 3999). Thus federal government appropriations or other road user payments would have to be used to build the higher standard road.

PLANNING OF FOREST SERVICE ROADS

In 1976 the U.S. Congress enacted the National Forest Management Act, which requires each national forest to develop an integrated land and resource management plan every 15 years. The management plan is the basis for each national forest's management program, including the transportation system plan. The management plans and programs are guided by nationally established goals and locally established issues of resource production and protection, environmental quality, and social and economic impact. These plans identify the potential for resource outputs and examine management program alternatives for production of resources. The management program alternatives are analyzed in terms of maximizing certain resource objectives within various environmental and financial constraints.

Transportation system planning is used to determine the national forest road system needed to meet the resource output objectives of the management program. Roads management planning includes economic analyses of projects and establishment of road standards, facility construction, maintenance, and operational levels needed to meet the resource output objectives (*8*, p. 7). Roads on the national forest system are generally of two types: temporary and permanent. A temporary road is one that is used for a short time to haul a resource. Temporary roads are usually obliterated after resource haul or closed until the road is needed for another haul. A permanent road may be used for resource hauls as well as for long-term management of resources or recreational activities. Permanent roads are those needed by the agency for a year or more to manage the resources in a forest.

FUNDING OF NATIONAL FOREST ROADS

Forest Service cooperation with other public and private bodies occurs in the development and use of forest resources and in the provision of roads needed to support commercial and public activities. The Forest Service is often involved in cooperative road work and ownership with other jurisdictions when such work or joint ownership is essential to providing access to national forests or other lands managed by the Forest Service. The agency and state, county, or local jurisdictions often agree cooperatively on finance, construction, reconstruction, and maintenance of roads, according to the amount and types of use *(9)*. The cooperators agree formally to obtain satisfactory jurisdictional status *(10)*. The advantage of joint government ownership and cooperative management of roads is that the costs of roads are better allocated among types, origins, and destinations of use.

The relationships between the Forest Service and private firms in the financing and management of roads are of even greater significance than is cooperation with other jurisdictions. The Forest Service does build national forest roads from appropriated funds, but purchasers of timber and other forest resources for commercial purposes are authorized to build and maintain roads as well *(11)*. Purchasers of national forest timber or extractors of other resources pay for those resources either through a competitive bid process, as in the case of timber, or through set fees and royalties, as in the case of minerals mining. Under most circumstances, the purchaser or extractor incurs the cost of a temporary road used only to haul out a resource.

Permanent roads on the national forest road system are funded from three sources: *(a)* the Purchaser Credit Program, through which timber purchasers build roads in exchange for

timber; *(b)* the Purchaser Election Program, which allows small purchasers to use timber payments to compensate the Forest Service for road construction; and *(c)* the Forest Road Program, through which roads are built with appropriated government funds (*2*, p. 31).

Timber purchasers receive "credit" for the cost of road work, subject to the terms of a timber sale contract, if the road is to be actively used by the agency for national forest management purposes. The purchaser credit may consist of a sum deducted from the timber purchase amount. In effect the agency exchanges timber assets for road assets. Purchasers are required to build only the minimum standard of road needed to harvest and remove timber or other products, subject to environmental regulations *(12)*. If a road of a higher design standard can be achieved without increasing the total transport cost (construction, hauling, and maintenance) for a sale, the higher standard road may be required of the purchaser.

When the Forest Service requires a relatively high-standard road for future resource protection or administrative purposes, the Forest Service may construct all or part of the road with government funds or may enter into a cooperative agreement with the purchaser. In the latter case the Forest Service may construct a road with a combination of purchaser credit and government funds or furnish the materials or funds to the purchaser for construction. Sometimes the minimum-standard road is still prohibitive for the profitable harvesting and removal of timber by a purchaser. Government funds or materials may be contributed to the purchaser to build the road so

TABLE 1 ROAD AND BRIDGE CONSTRUCTION AND RECONSTRUCTION BY STATE (FY 1983)

State, Territory, or Commonwealth[a]	From Appropriated Funds			By Timber Purchasers		
	Roads (mi)	Bridges (No.)	Cost ($ 000s)	Roads[b] (mi)	Bridges (No.)	Cost ($ 000s)
Alabama	17.5	1	1,270.0	29.1	0	468.0
Alaska	71.2	33	23,396.5[c]	60.3	14	8,153.7
Arizona	47.2	3	6,193.9	285.9	0	3,047.3
Arkansas	39.0	0	3,904.2	151.9	0	4,587.8
California	206.1	11	42,208.7	885.8	6	28,364.5
Colorado	55.1	6	8,847.5	163.5	0	1,269.3
Florida	.2	0	710.0	54.5	0	786.0
Georgia	5.8	0	2,893.2	39.6	0	530.0
Idaho	179.3	18	24,019.9	470.1	6	6,322.0
Illinois	0	0	358.8	6.1	0	88.3
Indiana	4.5	0	939.8	1.1	0	20.2
Kentucky	33.8	0	1,845.0	38.7	0	333.0
Louisiana	18.3	0	1,715.0	74.0	0	1,341.0
Maine	0	1	129.0	0	0	0
Michigan	42.8	2	2,213.5	51.2	0	213.2
Minnesota	58.1	3	4,929.6	46.8	0	279.0
Mississippi	0	0	899.0	136.2	0	1,572.0
Missouri	34.1	0	1,817.9	37.6	0	177.6
Montana	344.2	14	27,291.9	615.8	3	6,030.9
Nevada	0	1	417.1	0	0	0
New Hampshire	0	5	456.7	16.8	0	190.6
New Mexico	12.4	0	4,311.9	219.0	0	2,540.0
New York	0	0	0.8	0	0	0
North Carolina	65.1	11	4,088.9	88.5	0	1,794.0
North Dakota	0	0	216.6	0	0	0
Ohio	0	0	19.9	2.4	0	33.8
Oklahoma	6.9	0	301.0	6.7	0	464.0
Oregon	261.4	10	39,468.0	1,198.7	0	39,973.1
Pennsylvania	5.8	0	840.3	23.1	0	353.1
Puerto Rico	0	0	71.0	0	0	0
South Carolina	14.5	2	1,155.0	106.3	0	1,602.0
South Dakota	33.0	1	1,792.6	92.0	0	468.5
Tennessee	35.0	5	1,595.0	42.5	0	525.0
Texas	0	0	1,108.0	83.4	0	2,021.0
Utah	54.3	6	5,991.4	57.6	0	418.9
Vermont	5.1	1	653.4	.8	0	26.4
Virginia	108.0	2	4,715.9	67.0	0	385.0
Washington	135.0	11	19,326.2	431.5	0	15,256.3
West Virginia	37.6	0	2,609.4	16.1	0	229.8
Wisconsin	79.5	2	4,467.2	31.3	0	175.0
Wyoming	5.3	5	3,541.7	100.0	0	1,772.2
Total	2,016.1	154	252,731.4	5,732.8	29	131,812.5

SOURCE: *Report of the Forest Service, Fiscal Year 1983*. Forest Service, U.S. Department of Agriculture, 1984, Table 50, p. 133.

[a]States not listed had no Forest Service road programs in 1983.
[b]Does not include 662 mi turned back to Forest Service for construction.
[c]Includes $19,735 of Tongass Timber Supply Fund.

that the purchaser may incur a normal appraised profit *(13)*. This public financial assistance for the private-sector harvesting of timber on public lands has been the subject of much public and political debate *(14*, p. A17). The purposes cited for such assistance are to help maintain timber industry–dependent communities or to facilitate resource management (e.g., removal of climax tree species or opening land to public recreational activities).

Most road construction and reconstruction projects provide access to timber sale areas. Timber purchasers built 5,733 mi of roads in FY 1983 in national forests, whereas the Forest Service built 2,016 mi with appropriated funds (Table 1). The cost of purchaser-built roads was just over half as much as that of the appropriated roads. In FY 1985 purchaser credit and election programs constructed 2,566 mi and reconstructed 3,618 mi of roads in national forests at a cost of $117 million or approximately $19,000 per mile. Appropriated funds were used to construct 757 mi and reconstruct 1,101 mi at a cost of $67.1 million or approximately $36,000 per mile (2, p. 31). Purchaser roads consistently have cost less to build because of efforts to reduce road design standards for resource hauls.

Roads built with appropriated funds are usually used for public access to outdoor recreational sites and must be of a standard conducive to public comfort and safety. Appropriated funds are allocated approximately 33 percent for road and bridges construction and 66 percent for engineering support, such as survey, design, inspection, and program management (2, p. 31).

MANAGEMENT AND MAINTENANCE OF ROADS

When roads already exist for a planned timber sale, the agency must analyze the current traffic situation to determine if the additional timber traffic can be accommodated. Purchasers may be required to reconstruct or improve the existing roads to accommodate the additional traffic. Traffic management measures, such as time restrictions or temporary road closure to general traffic, may be instituted for short-term traffic impacts *(15)*. For example, if public recreational use is high during one season, timber hauling may be restricted and vice versa. Road closure is the most extreme management step and the agency must coordinate that with other jurisdictions, the general public, and private landowners. Roads may be closed, when there is no need for a road for a certain period, to protect public safety and resources and to maintain the investment in the road.

Although the agency may not restrict owners' access to property within national forests, those who may use roads during restricted or closed conditions must adher to rules of use and conditions of a special permit and may have to pay a bond to repair any damage. Existing mining laws allow miners the right of entry into national forests on restricted or closed roads for mineral exploration and development. A special use permit may require them to perform maintenance or make payment for maintenance expenditures for damage caused by mining-related traffic *(16)*. In any case, commercial users are responsible for traffic-related maintenance commensurate with their uses.

The Forest Service is responsible for maintenance generated by national forest administrative and recreational activities. Levels of maintenance for a road are generally determined by the average daily traffic. The levels range from closed intermittent service roads of any standard to double-lane, paved roads that provide a high degree of user comfort and convenience (Table 2). A level of maintenance that may be required by commercial activities and would be higher than that required by administrative and recreational uses is the financial responsibility of the commercial user. Users may either maintain the roads themselves or deposit funds with the agency for such maintenance *(17)*.

SUMMARY AND CONCLUSIONS

The USDA Forest Service has a long legislative history and has developed policies and requirements for cooperative provision

TABLE 2 MAINTENANCE LEVELS

Level	Description
1	Level 1 is basic custodial care as required to protect the road investment, to see that damage to adjacent land and resources is held to a minimum. Level 1 maintenance requires an annual inspection to determine what work, if any, is needed to keep drainage functional and the road stable. This level is the normal prescription for roads that are not opened for traffic. Level 1 is to maintain drainage facilities and runoff patterns.
2	Level 2 is used on roads where management requires that the road be open for limited passage of traffic. Traffic is normally minor, usually consisting of one or a combination of administrative use, permitted use, or specialized traffic. Level 2 requires the basic care of Level 1 plus logging out, brushing out, and restoring road prism as necessary to provide passage. Also, route markers and regulation signs are to be in place and usable.
3	Level 3 is used on roads which are opened for public traffic and generally applies when use does not exceed 15 average daily traffic (ADT). ADT should be used as a guide in determining the level and not as a sole criterion. A road may receive only one or two vehicles a day for most of the year. However, during a brief period, such as hunting season, the road may receive 20 or 30 vehicles a day. Total traffic types and planned land use are important criteria for selecting the maintenance level. The road is to be maintained for safe and moderately convenient travel suitable for passenger cars.
4	Level 4 generally applies when use of a road is between 15 and 100 ADT (see comment concerning ADT under Level 3). At this level, more consideration is given to the comfort of the user. These roads are frequently surfaced with aggregate material, but some routes may be paved because of limited aggregate sources and surface replacement cost factors.
5	Level 5 is generally maintained for use of 100 ADT and greater (see comment concerning ADT under Level 3). Roads in this category include both paved and aggregate surfaces. Safety and comfort are important considerations. Abrupt changes in maintenance will be posted to warn travelers until deficiencies are corrected.

SOURCE: *Forest Service Manual*, Forest Service, U.S. Department of Agriculture, 1978, Section 7732.11—Maintenance Level.

of national forest roads. National forest management plans contain the program for private-sector development and public use of forest resources. The national forest road systems are planned to support those objectives.

The Forest Service relies heavily on private involvement and cooperation for its road systems finance and resource development efforts. Although the agency often financially assists timber purchasers to build roads, the agency claims to benefit from these roads because appropriated funds are not sufficient to build the roads needed for resource management.

Maintenance is an important road management tool that is actively used to prolong the road investment and to allocate road use among appropriate segments of a road system. With maintenance as with construction and reconstruction, the private sector plays an important role in direct provision of national forest roads.

The experience of the Forest Service in the United States provides a unique but applicable example for the provision of other rural road systems. Varied land uses, ownership patterns, and transport objectives in rural areas may complicate the application of such a model. Institutional and legal constraints to more extensive public-private cooperation in the provision of roads exist in this as well as other countries and would have to be lessened for greater cooperation in rural areas. For the public and the private sectors to properly manage and use rural resources, road systems must provide a high degree of accessibility to those resources. Road systems will likely be more responsive to the dynamics of economic activities when public-private cooperation in their provision occurs.

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