

Step 4—Assessing Benefits and Risks of the Existing Road System

Development of Risk/Benefit Assessment Questions

Public comments and resource issues previously identified in road analyses completed for the Forest Plan (1986), proposed Forest Plan revision (2006), and for various projects (1990s-2000s) were examined to develop a preliminary set of questions to assess the risks and benefits of roads. They were then refined for this travel analysis.

The following risk and benefit questions will be used to assess the values and potential impacts of specific road segments across the Forest. This information will be used to help identify and prioritize opportunities to change the Forest road system.

The analysis questions are designed to quantify the level of environmental risk and benefit for specific road segments. The interdisciplinary team eliminated questions that were duplicative and combined questions that had the same overall intent.

Benefit Analysis Questions

Access Questions

Benefit Question 1 (BQ1)

Does the road provide access to private or other non-National Forest Service lands?

Background

By law (Alaska National Interest Lands Conservation Act [ANILCA]), the Forest Service cannot deny or eliminate reasonable legal access to private lands completely surrounded by NFS lands. Each inholding must have reasonable access by at least one route. A private road permit or easement may be granted to the private land owner, who then has the primary jurisdiction of the road and is responsible for its maintenance. In cases where an easement is granted to a county or other public road agency, the road would no longer be a National Forest System Road (NFSR) and subject to this assessment.

Tools/Data Resources

- Lands Status Records System (LSRS)
- INFRA Roads Module
- Administrative boundary for land ownership.

Available Values/Definitions

- 5 = Yes – the road provides access to private or non-NFS lands
- 0 = No – the road does not provide access to private or non-NFS lands

Benefit Question 2 (BQ2)

Does the road provide access to Forest Service administrative facilities?

Background

Administrative sites represent an investment, either by the Forest Service or partners, such as other governmental entities. Eliminating access to these facilities may reduce or eliminate the value of the investment. It is important to know if roads or trails provide the only access to such investments. Consider sites such as administrative sites, fire lookouts, cabins, stream gages, communication sites, etc.

Tools/Data Resources

- Administrative facilities site map and spatial data
- INFRA Roads Module
- Administrative boundary for land ownership.

Available Values/Definitions

- 5 = Yes – the road accesses an administration site or non-recreation improvements.
- 0 = No – developed administration facilities or non-recreation improvements are accessed by the road.

Benefit Question 3 (BQ3)

Is the road the primary access to areas or sites under a long-term special use permit authorization?

Background

Access via system roads may be necessary to allow the customer and/or special use authorization holder to access areas authorized for long-term use including, but not limited to, ski hills, utility corridors, range allotments, mineral leases, and areas requiring recreation-related permits that do not include a developed site.

Tools/Data Resources

Forest Service Activity Tracking System (FACTS) activity layer/ Timber Information System (TIM)/Special Use Permit (SUP) locations and boundaries

Special Uses Data System (SUDS) database

- Local knowledge of recreation and lands SUP administrator.
- INFRA Roads Module
- Administrative boundary for land ownership.

Available Values/Definitions

If available, overlay locations of all designated areas currently under a special use authorization on the roads/trails layer using GIS. Examine the proposed routes to the designated sites and render a value rating according to the following scale:

- 5 = Road provides only access to designated area under a special use authorization
- 0 = Road access not necessary to designated areas under special use authorization

Vegetation Management Questions

Benefit Question 4 (BQ4)

Does the road provide access for vegetation management on suitable lands?

Background

Activities designed to reduce hazardous fuels, restore ecosystem function, improve forest health and provide wood commodities for societal uses often require multiple entries over a period of time (10 years+). Sufficient access to successfully implement these activities should be considered, as well as NFMA requirements following treatment.

Tools/Data Resources

- Forest Plan Suitable Base lands
- INFRA Roads Module
- Administrative boundary for land ownership.

Available Values/Definitions

- 5 = Yes –the road provides direct access to suitable lands
- 0 = No –the road does not provide access to suitable lands

Benefit Question 5 (BQ5)

Does the road allow continuing access to conduct on-going research related to silviculture, forest health and climate change?

Background

There are a variety of ecological studies that exist on NFS land. Some have been in place for over 50 years and rely on periodic re-measurements. Access to these studies is critical in order to maintain their integrity. In some cases the road is actually a part of the study so eliminating it would have impacts as well. Future studies should be designed with travel management in mind or incorporate the possibility that long-term road access may not be realistic.

Tools/Data Resources

- Forest Plan management areas (e.g. Research Natural Areas)
- Lolo Tree Improvement Activities Layer
- FACTS Activity Layer
- FHP Risk Map NRS active and needed research data bases
- FHP Risk rating
- TIM /NRIS
- INFRA Roads Module
- Administrative boundary for land ownership.

Available Values/Definitions

- 5 = Yes – the road provides direct access to a research related study site
- 0 = No – no known research site is accessed.

Recreation Questions

Questions related to other access benefits may indirectly provide recreation benefits.

Benefit Question 6 (BQ6)

Does the road access a trailhead, developed recreation site or designated recreation area?

Background

Certain recreation sites represent agency capital or labor investments. To maintain the value of these sites and for the public to receive value from these areas, access must be provided.

Tools/Data Resources

- GIS roads layer
- Developed Recreation INFRA Database
- INFRA Roads Module
- Land Management Plan Management Areas.

Available Values/Definitions

- 5 = Yes – road is necessary to access developed trailheads or recreation sites/areas
- 0 = No – no developed sites/areas are accessed by the road.

Wildfire Hazard Response Questions

Benefit Question 7 (BQ7)

Does the road provide access for vegetation management treatments that effect wildfire impacts to Wildland Urban Interface (WUI) areas?

Background:

Treatments designed to reduce hazardous fuels, restore ecosystem function, and improve forest health all aide in reducing impacts from wildland fire to communities. Restoring and maintaining resilient landscapes is a primary factor in the “National Cohesive Wildland Fire Management Strategy” (2009). These treatments often require multiple entries and limited access can significantly increase costs. Access to successfully implement these activities should be considered as well as follow up treatment requirements such as NFMA compliance.

Tools/Data Resources

- Fire Management Unit 1 (FMU 1) as defined in LNF Fire Management Plan
- INFRA Roads Module

- Administrative boundary for land ownership.

Available Values/Definitions

Fire Management Unit 1 is defined as wildland urban interface and was developed with a 1 mile buffer surrounding other ownership adjacent to NFS lands. Examine the segments of road in context of where they are adjacent or intersect wildland urban interface (FMU1).

- 5=Road provides access to NFS lands adjacent to WUI areas, high value
- 0=Road does not access NFS lands adjacent to WUI, low value

Benefit Question 8 (BQ8)

Does the road provide access ingress/egress for wildland urban interface areas?

Background

Roads aid suppression operations in numerous ways, evacuation routes, response times and tactical operations. Roads can increase firefighter and public safety during initial attack and emerging fires by providing an anchor point, escape routes, lookout locations, and staging areas. These and other operational aspects of roads can mitigate exposure to hazards in the fire environment for both the emergency responders and the public. Reducing risk to firefighters and the public is the first priority in every fire management activity this a core value in the “National Cohesive Wildland Fire Management Strategy” (2009).

Tools/Data Resources

- Fire Management Units (FMU) 1 WUI and FMU 2 Accessible Lands as identified in the Lolo NF Fire Management Plan.
- INFRA Roads Module
- Administrative boundary for land ownership.

Available Values/Definitions

FMU 1 is defined as wildland urban interface and was developed as a 1 mile buffer surrounding other ownerships adjacent to NFS lands. Fire management unit 2 is defined as accessible lands and was developed as NFS lands that had existing access established and a variety of land management opportunities exist. Examine the segments of road in context of where they are adjacent to or intersect FMU1 and continue access into FMU2, prioritize areas where alternate access routes do not exist.

- 5= Road intersects or is adjacent to FMU 1 and continue to provide access to FMU2, high value
- 0= Road does not interact with FMU 1 and does not provide access to FMU2, low value

Risk Analysis Questions

Aquatic Ecology Questions

Forest transportation systems have the potential to impact water quality, aquatic habitat, and aquatic biota. Impacts can be highly variable and may include mass wasting, sediment delivery, loss of woody material,

channel and riparian encroachment, and/or blockage of aquatic organism passage. The spatial and temporal magnitude are strongly driven by the proximity of roads to stream networks and/or unstable soils. Therefore, the following analysis questions are meant to focus on the location of roads in relation stream networks and other water bodies, and 303(d) waters.¹ The degree of aquatic organism blockage is also addressed.

Risk Question 1 (RQ1)

What is the road length within 150 feet of the stream² network and/or other water bodies?

Background

Roads in close proximity to water bodies can have a wide range of direct and indirect effects on riparian ecosystems, water quality, and aquatic habitat. Roads that parallel streams have the potential to effect floodplain function, riparian vegetation, stream temperature, and are a common source of sediment. Roads within 150 feet may have direct impacts on channel morphology which can lead to a variety of other impacts.

Tools/Data Resources

- National Hydrography Dataset (NHD)
- INFRA Roads Module
- Administrative boundary for land ownership

Available Values/Definitions

- 5 = Road is among top 1/3 of greatest total distance within 150 feet of the stream² network or water bodies
- 0 = Road is among bottom 1/3 of total distance within 150 feet of the stream network or water bodies

High, moderate, and low values would be generated using Jenks Natural Breaks, as opposed to an arbitrary threshold number. It essentially minimizes variance within groups and maximizes variance among groups.

Risk Question 2 (RQ2)

What are the total number of stream crossings?

Background

Road-stream crossings have been shown to be major source of risk. Crossings are a common source of sediment, pose a potential for failure, and are potential barriers to aquatic organism passage. Sum the number of intersections between the road and stream network for a total number of stream crossings.

Tools/Data Resources

- NHD
- INFRA roads module

¹ As defined by the 2012 303(d) list of sediment-impaired waters.

² Include perennial, intermittent, and ephemeral.

- Administrative boundary for land ownership

Available Values/Definitions

- 5 = Roads among the top 1/3 of greatest number of stream crossings
- 0 = Roads among bottom 1/3 of total number of stream crossings.

High, moderate, and low values would be generated using Jenks Natural Breaks, as opposed to an arbitrary threshold number. It essentially minimizes variance within groups and maximizes variance among groups.

Risk Question 3 (RQ3)

Does the road create barriers to aquatic organism passage (i.e., habitat fragmentation)?

Background

Road-related structures, mostly in the form of culverts, can create barriers to fish passage. These structures may also inhibit the movement of amphibians.

Tools/Data Resources

- Culvert inventory data from NRIS Aquatic Surveys, R1 Fish Barrier Database, Lolo NF Access Database.
- NHD
- INFRA Roads Module
- Administrative boundary and land ownership

Available Values/Definitions

- 5 = >0.5mile upstream from barrier
- 3 = <0.5 mile upstream from barrier
- 0 = Barriers not present

Terrestrial Ecology Category Questions

Forest transportation systems have the potential to impact terrestrial resources such as Wildlife, Plants and Soils. Roads can directly impact wildlife mortality due to vehicle collision, indirectly through facilitated access for hunting and trapping, and cumulatively through habitat loss and reduced connectivity. Direct impacts to soils can occur by placement on unstable soils and may be exacerbated by slope. Roads provide pathways for the spread of non-native invasive plant species (NNIP) into sensitive habitat and management areas. NNIP infestations may impact soils stability and reduce wildlife habitat.

Risk Question 4 (RQ4)

Do sections of land on the Lolo National Forest have excessive open (> 3mi/ mi²) and total (>4 mi/mi²) road densities?

Background

Many road effects can be mitigated through the use of yearlong or seasonal road closures; however, some effects still remain along closed road systems. Given this, roads can be categorized into open yearlong, open seasonally and closed yearlong to better differentiate the effects of roads on wildlife species.

Yearlong open roads would have the greatest impacts whereas roads closed year round would have the least. This approach could be modelled from the Grizzly Bear Access Management Guidelines which look at Open and Total Road densities by season across a given area.

Tools/Data Resources

- Roads GIS layer
- Forest Plan Management Areas, grizzly bear subunits, or GAs with road density standards for wildlife species.
- INFRA Roads Module
- Administrative boundary and land ownership

Available Values/Definitions

- 5 = High – road is in a section with open or total road densities out of threshold indicated above AND adjacent section(s) have road densities above threshold.
- 3 = Med - road is in a section with open or total road densities out of threshold indicated above AND adjacent section(s) do not have road densities above threshold.
- 1 = Low - road is not in a section with open or total road densities out of threshold indicated above AND adjacent section(s) do not have road densities above threshold.

For the Forest Level analysis, we could use the section as the analysis unit and utilize 3 seasons – Spring (4/1 – 6/30), Summer/Fall (7/1 – 11/30) and Winter (12/1 – 3/31). There is a more specific issue of the types of habitats affected by roads (knowing that some habitats are more important than others) but this is a question that can be dealt with at a more project specific level.

Risk Question 5 (RQ5)

Does the road pass through high priority non-native invasive plants for control and management?

Background

Roads can be vectors for the introduction and spread of NNIS. The extent of infestation along roads is an index of both the extent of current infestations, and the potential for future spread. Well established populations of NNIS that inhabit a relatively small area are good candidates for a control and management strategy.

Tools/Data Resources

- FACTS NNIS database
- NRIS NNIS database

- Wildlife and Fisheries Reporting Program (WFRP) report
- INFRA Roads Module
- Administrative boundary and land ownership

Available Values/Definitions

- 5 = Road passes populations of high priority non-native invasive plants for control and management (refer to state-specific list of NNIS)
- 0 = No high priority populations of non-native invasive plants are present along the road prism.

Risk Question (RQ6)

Is the road providing access to an ecologically significant area such as wilderness, RNAs, experimental forests, and rare plant communities? (Prevention)

Background

NNIS spread is facilitated by vehicle and pedestrian passage. The presence of NNIS along roads leading to ecologically sensitive areas elevates the risk to such areas, which are often of more value to the continued survival of rare species than the general forest environment. Preventing the introduction of NNIS into such communities is usually more efficient than attempting to eliminate or control invasive plants that have become established.

Tools/Data Resources

- Administrative boundaries
- Wilderness, RNAs, experimental forests
- FACTS database
- NRIS TES plants
- State Heritage databases
- INFRA Roads Module
- Administrative boundary for land ownership

Available Values/Definitions

- 5 – Road provides direct access to or lies within an area of ecological significance, of priority NNIS control.
- 0 – Road does not provide access to areas of ecological significance.

Risk Question 7 (RQ7)

Does the road cross unstable soils?

Background

Roads crossing unstable soils are prone to mass failure, debris flows, and/or accelerated erosion.

Tools/Data Resources

- Lolo Soil Inventory
- NFS lands inventory and land types designated as sensitive
- INFRA Roads Module

- Administrative boundary for land ownership

Available Values/Definitions

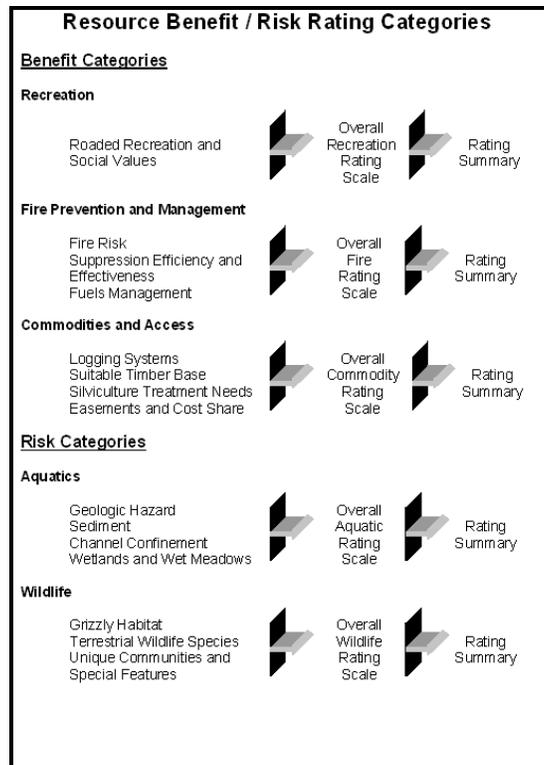
- 5 = Top 1/3 of road distance across unstable soil types
- 0 = Bottom 1/3 of road distance across unstable soil types.

High, moderate, and low values would be generated using Jenks Natural Breaks, as opposed to an arbitrary threshold number. It essentially minimizes variance within groups and maximizes variance among groups.

Summarizing Risk/Benefit Ratings

Each National Forest System Road (NFSR) will receive a “raw” score for each of the analysis questions above. Long roads will be divided into segments where they changed travel management. Risk and benefit ratings will be plotted on maps by analysis question and reviewed by the interdisciplinary team for reasonableness.

Scores for risk and benefit will be aggregated and a classification method will be used to stratify the values into low, medium, and high classes for comparison between roads. The following diagrams summarize this process:



To allow an equitable comparison between Benefits and Risks, the rating scale for each resource will be evaluated on a scale of 0 to 5, with 0 representing very “few” or “no” benefits or risks, and 5 representing very high beneficial values or “severe” negative impacts. In other words, for **Benefits**, a road segment with a low rating may “not be needed” or may meet few access needs. For **Risks**, a road segment with a low rating may be “benign” or have very few negative impacts on the resource.

By combining resource rating scores, an average Benefit/Risk rating will be developed for each road segment. For example, a combined rating of “1/5” may mean that the road has scored with relatively low benefits and very high risks. Because quantitative ratings may create a wide range of scores (*0 to 5*), and thus a more complex evaluation and ranking process, three categories (*Low, Medium, and High*) will be used to simplify the range of ratings. A matrix will then be used to display the final evaluation of each road.

ROADS ANALYSIS FINAL RATING MATRIX Benefits/Costs		
HH	HM	HL
MH	MM	ML
LH	LM	LL