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Travel Analysis Process:
A Guidebook

Guidance for Region 5 Forests to complete Travel Analysis

Table of Contents

List of Table and Figures

7-12-2012

Introduction

The national forest road system of the future must continue to provide access for recreation and resource management, as well as support watershed restoration and resource protection to sustain healthy ecosystems. In response to this direction, the Pacific Southwest Region developed the following guidance for the Travel Analysis Process (TAP) to develop a Travel Analysis Report (TAR). Agency regulations at 36 CFR 212.5(b)(1) Subpart A, Administration of the Forest Transportation System, direct the Forest Service to identify the minimum road system needed for safe and efficient travel as well as for the administration, utilization, and protection of National Forest System (NFS) lands. Further direction was provided in a letter from Leslie A.C. Weldon, Deputy Chief, National Forest System, dated March 29, 2012 (file code 2300/2500/7700).

Background

The USDA Forest Service has an extensive network of low volume roads, and has an obligation to provide safe access for multiple use, as assured through its road operations and routine maintenance. The Forest Service, as a land stewardship agency, has an obligation to protect its natural and cultural resources. The Forest Service, funded through congressional appropriations, has an obligation to spend the public's tax dollars wisely. All obligations carry statutory and regulatory requirements. The ability to balance these obligations, with decreased funding, and increasing demands from users, is a huge challenge. These obligations merge at the core issue of Travel Analysis: SUSTAINABLE ACCESS.

The TAP is a science-based process that relies on an integrated, interdisciplinary approach across multiple resource areas. Its role is to assist units in ultimately identifying and maintaining an appropriately-sized and environmentally sustainable transportation system that is responsive to ecological, economic, and social concerns. Travel Analysis is a tool, not a decision. The results are documented in the TAR, which is then used to inform future planning efforts and project level site-specific decisions that include travel management. Therefore, the TAR is not subject to the National Environmental Policy Act (NEPA) and represents an important first step towards the development of a future minimum road system (MRS). As explained in the March 29, 2012 letter, NEPA is required to determine the Minimum Road System.

Project Scope and Timeline

The scope of TAP is limited to the analysis of National Forest System Roads within the National Forest Transportation System (NFTS) at an administrative level. While this necessitates the TAP being conducted on a forest-wide scale, the resulting opportunities will provide information and suggestions for future project level decisions such as new proposed actions and forest plan revision efforts. Only through these project level actions can adjustments be made to a unit's system roads. Once the TAR is completed, the next step in identification of the MRS is to use the TAR to develop potential proposed actions to identify the MRS (from March 29, 2012 letter). These proposed actions generally should be developed at the scale of a 6th field sub-watershed or larger. Proposed actions and alternatives are subject to environmental analysis under NEPA. The TAR should be used to inform the environmental analysis.

The Regional Forester designated a steering committee and core team to provide guidance to the forests to complete TAP. The development of a uniform, streamlined approach to travel analysis

remains key to achieving this objective. Authored by the core team, this guidebook complements agency travel-analysis direction described in Forest Service Handbook (FSH) 7709.55, Chapter 20, while providing direction specific to Region 5. As an implementation tool, the guidebook allows for consistency in the process between units, yet still enables individual units to modify or build upon aspects of the process in order to meet local needs.

This guidebook is organized according to the six-step process outlined in FSH 7709.55 Chapter 20:

1. Setting up the Analysis
2. Describing the Situation
3. Identifying Issues
4. Assessing Risks, Problems, and Benefits
5. Describing Opportunities and Setting Priorities
6. Reporting
   - 6.1 List of key issues
   - 6.2 Prioritized list of risks and benefits
   - 6.3 Prioritized list of opportunities

The current Travel Analysis Process Guidebook for Region 5 is available for download at:

http://fsweb.r5.fs.fed.us/project/travelmtg/documents/subA/guidance/

Integrating TAP with Other Planning Efforts

Consistency with the Forest Plan

The TAP and the resulting TAR should be consistent with existing land management plan direction. Due to a similar completion schedule and its interrelated nature, undertaking the TAP will prove useful in informing future forest plan revision (FPR) efforts by providing updated information on the forest's transportation system. For forests already underway with FPR, opportunities documented in the TAR should apply directly to the affected environment and effects analysis for the "No Action" alternative described in the forest plan environmental impact statement (EIS).

Forest Plan Revision

"Early adopter" forests in Region 5 starting FPR under the 2012 Planning Rule have an opportunity to complete the TAP concurrently with the forest plan assessment, prior to the start of subsequent NEPA analysis. Up-to-date information on system roads gleaned from the TAR can then be used in forest plan assessment, NEPA analysis, and forest plan revision. The TAR would also provide information and suggestions that will prove useful for project level decisions being completed under existing land and resource management plans while plan revision is underway; plan revision is expected to take about 3 years. The "early adopters" (Inyo, Sierra, and Sequoia) will possess detailed information on their road systems along with an earlier understanding of key issues affecting each road. Road information could be generalized for use in forest plan revision elements such as watershed assessments, wildlife analyses, fire protection strategies, and potential wilderness assessments.

Under the 2012 planning rule, the revisions will be completed in three phases – Assessment, Revision, and Monitoring. The Travel Management Rule and the 2012 Planning rule are separate regulations and are not interdependent. The completion of the Travel Analysis is not required for a plan revision. However, the Travel Analysis is expected to be useful as plans are revised. Therefore,

in order to include the most accurate and up to date information, Ecosystem Planning is recommending that the Travel Analysis be completed prior to or concurrent with the assessment of resource condition and trend that is the first phase of the plan revision process.

Table 1 on the following page displays a comparison of elements between Travel Analysis Process and Forest Plan Revision.

Watershed Condition Framework

The Watershed Condition Framework (WCF) can be integrated with the travel analysis process in several ways:

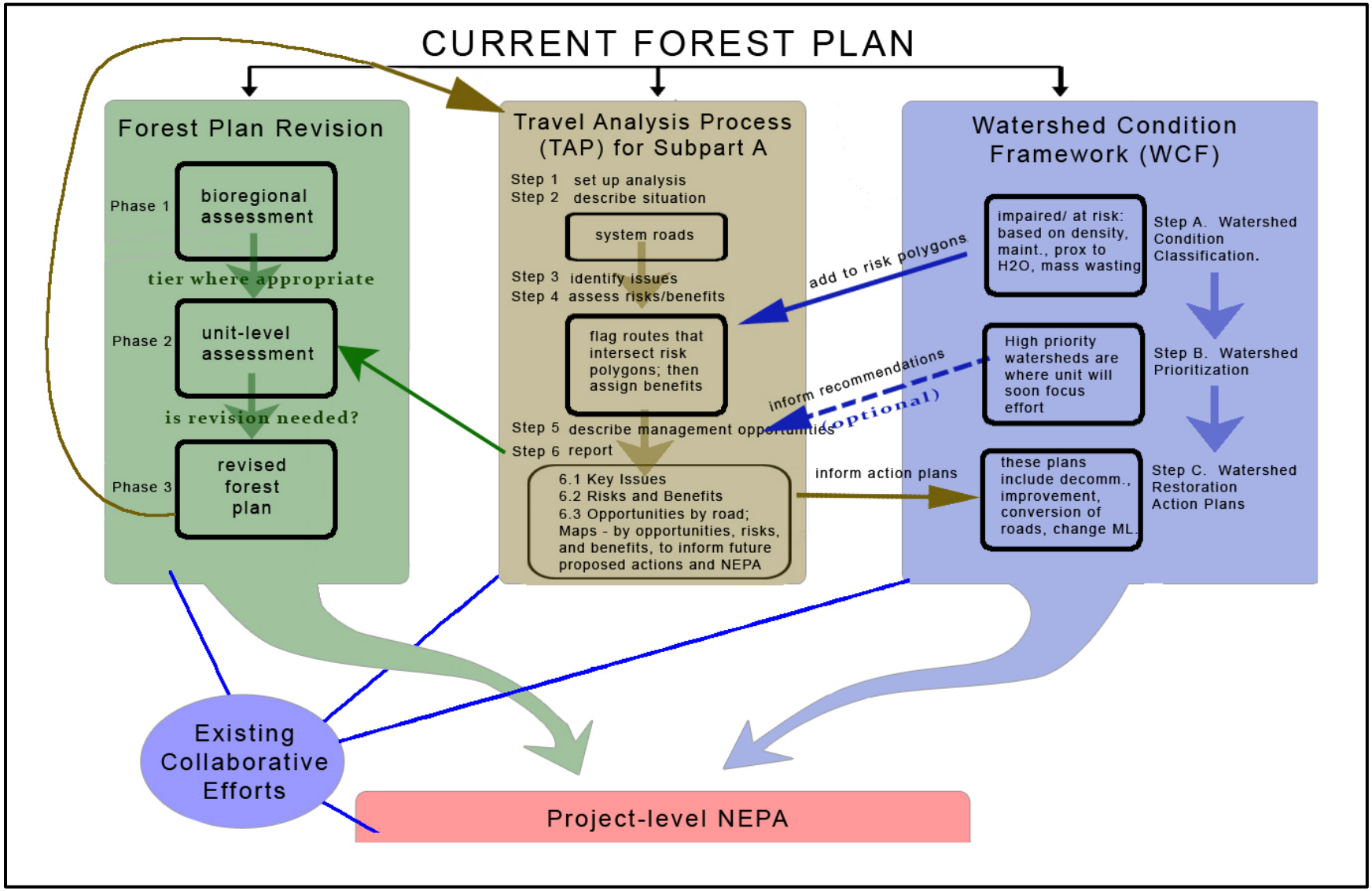
The final watershed ratings produced under Step A – Watershed Condition Assessment – show where there is a heightened concern for cumulative watershed effects. In addition, the road attributes that go into Step A will show where roads may be the specific cause for concern. The results of travel analysis and the opportunities identified for road improvement work would feedback into the development of projects for the Watershed Restoration Action Plans – Step C in the WCF. The priority watersheds from Step B in WCF would indicate priority areas for road related restoration.

Please refer to Figure 1 on page 9 for a graphical representation of the relationships between Travel Analysis and other planning efforts.

TABLE 1: Comparison of TAP and FPR.

ELEMENT	TRAVEL ANALYSIS PROCESS	FOREST PLAN REVISION
Policy and Direction	▪ Travel Management Rule ▪ 36 CFR Part 212	▪ Planning Rule ▪ 36 CFR Part 219
Process	▪ Interdisciplinary, science-based	▪ Interdisciplinary, science-based
Timeframe	▪ 1 year	▪ 3 years
Scope	▪ Roaded NFS lands ▪ Non-NFS lands within or adjacent to administrative boundaries, in context with access to NFS lands	▪ Roaded and un-roaded NFS lands ▪ Non-NFS lands (cumulative effects analysis)
Analysis	▪ TAR is not subject to NEPA ▪ Comparatively more detailed examination of potential impacts of roads on resources. ▪ Comprehensive view of road network	▪ Subject to NEPA ▪ Programmatic analysis of major resource areas ▪ FPR Assessments limited to identification of existing roads infrastructure (i.e., “No Action” alternative). ▪ Plan analysis will include alternatives
End Result	▪ Travel Analysis Report (no decision) ▪ Forest-wide information and opportunities for future changes to road system	▪ Record of Decision, EIS, Forest Plan ▪ Focuses on 5 strategic decisions ▪ No Travel Management actions ▪ Forest-wide programmatic decisions
Public Involvement	▪ Focuses solely on identification of stakeholder issues and concerns related to road system	▪ Involves identification of stakeholder issues and concerns related to all resource areas at a programmatic scale

FIGURE 1. Relationship of TAP to other planning efforts



Step 1 | Setting up the Analysis

Roles and Responsibilities

As indicated in the Introduction, the Regional Forester established a Steering Committee to oversee the execution of TAP, region-wide. The committee's responsibilities were to: 1) approve the overall process for TAP; 2) ensure that unit TAPs are proceeding according to the Regional Forester's timeframe; and 3) serve as arbiters for proposed changes to the established TAP process or analysis content.

Working directly for the Steering Committee, the Core Team's responsibilities included: 1) design and distribution of the TAP methodology and associated risk benefit analysis; 2) development and testing of TAP tools and guidance materials; and 3) assistance to units, on an as-needed basis. The charter for these teams is included as Appendix A, "Subpart A Charter."

At the unit level, staff specialists are expected to form forest TAP teams. The composition of each unit's TAP team will be determined by Forest Supervisors. At a minimum, these teams must be interdisciplinary, able to identify local issues, evaluate risk and benefit, as well as apply metrics and thresholds in a simple GIS analysis. These teams' responsibilities include: 1) identification of local issues and risk/benefit indicators not addressed in the guidance materials; 2) conducting the TAP on their respective units; and 3) completion of the TAP report. (Current contacts for each unit are listed in Appendix J, "TAP Coordinator Roster."

Data Sources

The unit analyses are to be completed using corporate data *already in existence*. Due to the broad scale of this analysis and timeframe limitations, the collection of new geospatial data (road location, location of resources, etc.) as part of this process is not encouraged. Corporate INFRA and SDE Transportation datasets for roads must be used as the baseline.

Roads Analysis Process has been replaced by Travel Analysis Process per FSM 7710 – Travel Planning, and the forest travel analysis team should refer to the Travel Analysis Process frequently (Forest Service Handbook (FSH) 7709.55, Chapter 20) for direction not covered in this guidebook.

Besides corporate data, additional data or information that could be useful in the analysis:

- Forest's current Land and Resource Management Plan and amendments; Northwest Forest Plan and other regional plans, as applicable
- The entire text of the current Travel Management Rule 36 CFR 212 (November 2005)
- Travel Management FEIS, ROD, and appeals/resolutions
- Identification of routes brought into forest roads and trails system under Travel Management FEIS in compliance with Subpart B of Travel Management Rule
- "Promises" or assurances from Travel Management FEIS and Record of Decision that refer to future Travel Analysis (or Subpart A), and responses to comments in the DEIS/FEIS.
- Comments, maps, and databases displaying public areas of interest and concern from Subpart B effort
- Implemented CMLG and HTAP project work, and other projects since the Record of Decision for Subpart B FEIS.
- Forest Roads Analysis Report (ca. 2002-2003), and associated maps and appendices
- Existing road logs, and records of maintenance, reconstruction, and improvements
- Identification of future vegetation and timber management with roaded access needs.

- Identification of future fire suppression and fuels management and associated roaded access needs.
- Road Management Objectives (RMO's) for all current NFSR roads; older hard copies where electronic copies aren't entered into I-web. RMO's document the intended purpose of an individual road in providing access to implement the land and resource management plan as well as decisions about applicable standards for the road
- Available data on unauthorized roads that are currently prohibited for use by motorized vehicles, for potential decommissioning or addition to the system
- Current and planned special use permits and mining claims utilizing roads, system or otherwise
- Existing easements, private access, right-of ways.
- Outstanding access needs
- Motorized trails locations, including dual system use, for analysis in context
- Other road systems and their locations, for analysis in context

In addition to the Forest's Road Core Data:

The Regional Office will prepare spreadsheets with road core data upon request; the forest can then convert the tabular data into spatial format for review, validation, and/or further analysis. Forests should be aware that some types of change to data must first be supported by NEPA decisions, or other documentation that supports the changes. For example, "correcting" a road's operational maintenance level from ML-2 to ML-3, or ML-2 to ML-1, results in a change to how the road is operated and managed. This type of change must be preceded by NEPA. Changing from ML-4 to ML-3 may not require NEPA.

Data entries or corrections in INFRA, if any at this point, must be made carefully by a user with RTE_MGR role or higher, following current Travel Routes Data Dictionary Business Rules and Protocols. Reasons for corrections, and type of correction, if allowed, should also be entered into the Record of Events as a "Change Attribute", with "Remarks" filled out to track what was changed, and why.

Step 2 | Describing the Situation

TAP teams must articulate current conditions of their transportation system. This narrative should be based on the following:

- Current Land and Resource Management Plan, including amendments;
- Current Road Management Objectives;
- Baseline description of existing transportation system, and
- Review and validation of previous analyses accomplished during Subpart B or other road analysis processes and forest planning endeavors.

Regardless of when or how they were added to the transportation system, all National Forest System Roads (NFSR) are included in this process. Existing road risk/benefit information from previous analyses (including analysis performed during Subpart B) should be incorporated into the TAP along with any watershed- or landscape-level road recommendations. In addition, recommendations from analyses performed at the project-level may also be relevant. The TAP team should also comb the Motorized Travel Management FEIS, ROD, and supporting documents to track statements made in reference to Subpart A and/or travel analysis.

This type of 'cross-walking' enables teams to set the context for the analysis and tier conclusions made during the TAP to past related efforts. Information and recommendations gathered from these prior planning endeavors should undergo a validation exercise to ensure findings are consistent with current conditions and management direction. To validate recommendations from previous analyses, determine whether conditions have changed in a way that would warrant a new analysis and perhaps, a different recommendation.

Applying Datasets

While the quality and accuracy of existing GIS and INFRA datasets varies among Region 5 forests, the TAP must rely on existing corporate library of spatial features and attribute records. Limited resources and condensed timeframes preempt forests from embarking on additional data collection efforts in support of the TAP. Gaps or errors in INFRA datasets can be useful in identifying opportunities for changes to the road system.

Creating the TAP Geodatabase

To select a roads baseline for the analysis, join the "Roads" GIS feature data class to INFRA's "Road Core" table, and then query for roads using the parameter [system]=NFSR

Remember, the starting analysis dataset is the system as it exists right now (as entered in our current corporate data). Other roads are not included, whether they are unauthorized routes not analyzed during Subpart B, roads since converted to trails as a result of Subpart B, or trails (motorized or non-motorized).

The columns that come with the INFRA table can be hidden or made visible; deleted; or augmented depending on the individual TAP team's needs. As long as the GIS routes are not broken during the analysis, the working dataset can always be re-joined to any INFRA table at any time. INFRA is the corporate dataset, and any work must be able to be rejoined in the end back to INFRA.

Step 3 | Identifying Issues

Identification of key issues helps set the framework for Step 4 in the travel analysis process: analyzing road risks and benefits. All units should address key resources affected by NFTS roads, including recreation, wildlife, hydrology, heritage, aquatics, and botany. In addition to these primary resource categories, individual forest TAP teams should also consider the effects of individual roads on wildland fire management, safety, wilderness, and inventoried roadless areas, as well as forest-specific resources. The DEIS and FEIS, along with public comments from the Travel Management EIS effort provides another source of forest-specific issues for consideration and analysis.

Public Engagement

While TAP teams may develop an initial summary of resource issues, public participation efforts will most certainly yield additional ones. By involving the public in this process, forest units will gain a more thorough understanding of existing conditions and issues while simultaneously demonstrating to the local community and stakeholders a commitment to transparency in the TAP.

The Forest Supervisor will determine the manner and extent to which its TAP team will engage the public. Appendix G provides communication tools along with Key Messages, Talking Points, and Frequently Asked Questions (FAQs). These materials complement travel analysis policy as described in the Forest Service Handbook 7709.55, Chapter 20.

Next Steps

Once issues are identified, TAP teams should consider their potential effects on a road by road basis. For example, a popular road to a scenic overlook may pose a threat to an adjacent cultural resource. Simultaneously, the same road may be the only means of accessing this popular sightseeing spot. Identifying these heritage and recreation issues on a specific road provides a platform on which to build a risk-benefit analysis of that road and the greater transportation system. Every road in the forest's transportation system, regardless of when it became part of the system, must be analyzed, including roads in storage, and those with restricted use (i.e., administrative use only, or limited public access).

The following section offers guidance in performing a road risk/benefit analysis.

Step 4 | Assessing Risks, Problems, and Benefits

How do TAP teams weigh risks against benefits in order to make a recommendation on an individual road or the forest's transportation system as a whole? While some parts of this analysis, especially risks to resources, are broad enough to be relatively standard among forests, some issues identified at the local level will generate significant discussion. In addition, identification of benefits provided by individual forest roads will come from local knowledge and input.

Methodology

The standard risk/benefit analysis method described here is not designed to make a final determination on the status of specific roads. Only the TAP Team, together with public input, can derive a potential opportunity for a road. The multitude of possible combinations of resources, indicators, metrics, and thresholds are beyond the capabilities of any automated GIS model or toolset. This basic risk/benefit analysis method is simply a science-based tool that can assist the forest in identifying transportation system opportunities.

The method described in this guidebook is considered the minimum required level of analysis. Some steps of this analysis are simple enough to be automated using GIS geoprocessing models. Using GIS, roads are flagged if they intersect with risk polygons, lines, or points, and/or if they are assigned benefits; the parameters are based in science and public engagement; each road's risks and benefits are documented. Other, more sophisticated GIS analysis methods and more robust toolsets exist and are available to forest TAP teams. Each team, however, must decide whether they possess the time and skills necessary to explore these alternate approaches.

The Core Team evaluated some of these alternative methods and found that these advanced toolsets largely depend on specially-prepared input datasets and require that roads be divided into segments to allow for a network analysis. Moreover, they often rely on assumptions about the predominance of strictly destination-based travel and, by creating information for multiple sections of the same road, drive the analysis to a scale that is inconsistent with the rest of TAP. As a result, the Core Team has not included any of these more robust analytical approaches in this guidebook because of the added level of complexity, impact on units with limited skillsets or time, data preparation workloads, and loss of ability to connect the working dataset to INFRA tables.

TAP teams that identify a need to expand the GIS toolset and which have the capacity to do so are encouraged to pursue these methods. These alternative approaches, however, should be accomplished by modeling and modifying the manual steps described in this guidebook or by evaluating existing toolsets developed by others. No model is given preference for use.

Relating Risks and Benefits to Resource Issues

When evaluating risks and benefits as part of this analysis, TAP teams should lend equal consideration to both. The following sample scenarios, listed by resource category, demonstrate how individual roads often include elements of both risk and benefit.

- Recreation: A road can pose a risk to quiet, non-motorized recreation and wilderness character. Alternately, the same road can be beneficial if it provides a recreational experience or access to a particular recreation destination.

- Wildlife: A road can pose risks of disturbance and disconnection to wildlife resources. However, roads can provide access for beneficial wildlife habitat management activities.
- Cultural/Heritage: A road can facilitate access for damage, vandalism, or theft of cultural resource sites. Alternately, the road may provide necessary access to traditional gathering areas. Some roads unto themselves represent culturally significant travelways.
- Aquatics: A poorly designed or maintained road can place water quality and associated species at risk. Simultaneously, it can also provide access for crews who replace and maintain culverts and other beneficial water management infrastructure.
- Botanical: A roads can have an adverse effect when it facilitates the spread of noxious weeds and invasive species or provides access for unauthorized collection of desirable species. At the same time, the roads may provide beneficial access to researchers and land managers.
- Wildland Fire: A road can deliver an arsonist into the woods and yet enable fire personnel to respond quickly.
- Socioeconomics: A road requires resources for maintenance and administration, yet it also contributes to a variety of economic interests (ie. timber harvest, tourism, etc.).
- Safety: A road increases opportunities for traffic accidents and also improves emergency response times.

Assigning Risks to Roads

Regional specialists developed a series of risk indicators, metrics, and reasonable thresholds for each resource category. Appendix E, "Resource Risk Indicators" describes these in detail. At a minimum, the following six risk categories will be applied to this risk/benefit analysis using existing data and an interdisciplinary approach. Through this process of assigning risk via resource category, the TAP team will be able to track, query, and display all roads based on their potential resource risks.

It is important to note that assigning a potential risk does not automatically mean a road is "unneeded" or that it will receive a particular recommendation. Risk is only one factor that the TAP team considers and must be viewed in the greater context.

Suggested Regional Risk Categories, as described in Appendix E (forests should add more risk categories as needed. More categories add complexity, but additional complexity may be necessary for a better display of the risk combinations unique to a particular forest):

- Recreation
- Wildlife
- Cultural/Heritage
- Watershed and Aquatics
- Fire
- Botanical

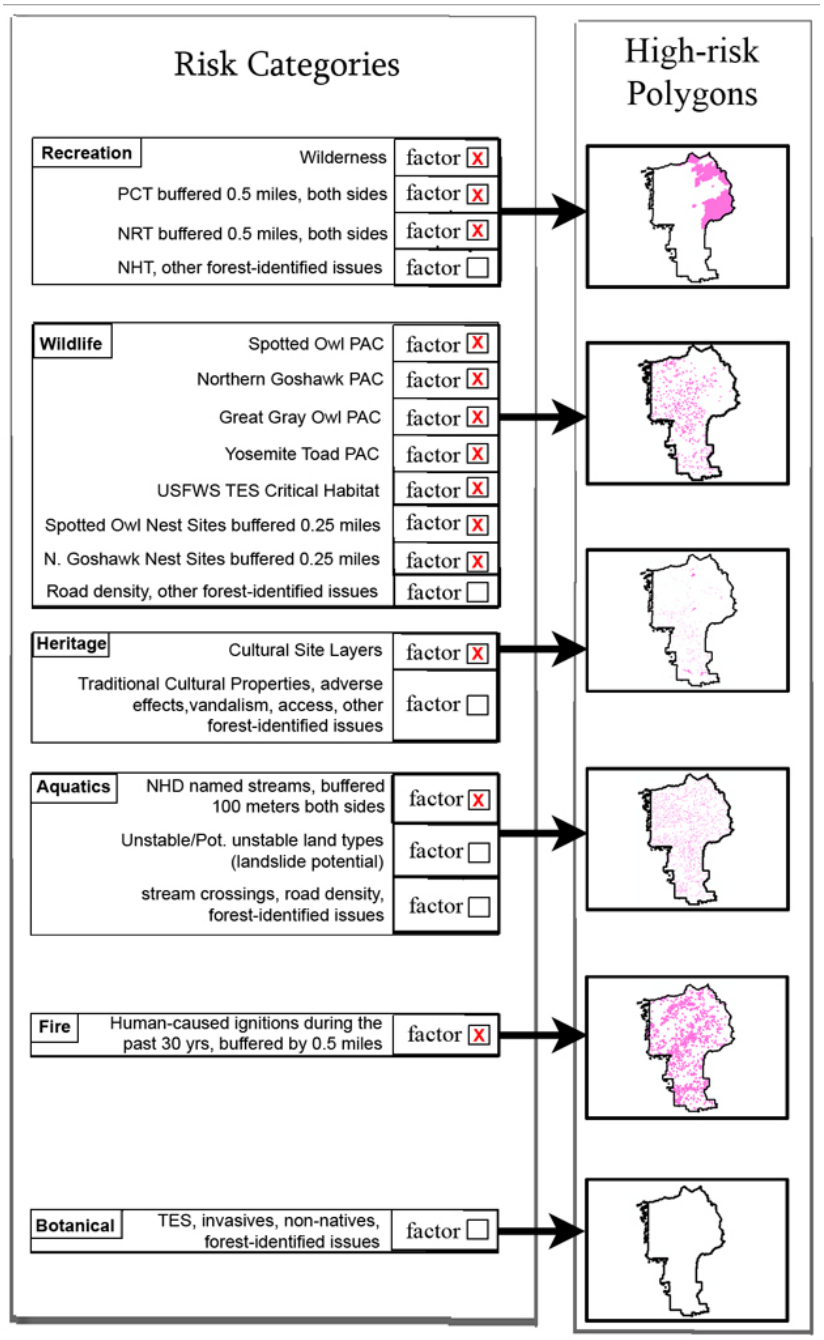
Datasets

Each risk category relies on different data sets, often in unique formats (points or lines) and resolutions (scales at which data layers were derived). A sequence of simple geoprocessing steps (such as buffering and clipping), and the addition of table columns for each risk category, enables the TAP team to produce risk-derived polygons that will be used to flag roads. The forest TAP team is expected to extract areas of resource concern from other corporate data layers, as described below. By then

flagging roads that intersect with the resulting polygons in each risk category, the initial coarse-scale risk identification is complete. This data-driven approach enables the bulk of the process to be semi-automated using a model.

At any time, the analysis dataset can still be joined to INFRA, because the GIS routes are preserved in their entirety. At any time, the working layer's table can be exported, and columns can be hidden or made visible according to specific reporting needs. Figure 2 below lists an example of parameters used and the resulting polygons. Corporate data from the Stanislaus National Forest were used to produce the graphic.

FIGURE 2. Using indicators within risk categories to create "High-risk Polygons."



Example

HOW THE TRAVEL ANALYSIS REPORT GIS MODEL CREATES HIGH RISK POLYGONS FOR EACH RISK CATEGORY

Based on Appendix E – Resource Risk Factors

Risk Category: Recreation

Model uses Wilderness layer, and 0.5 mile buffer of national trails (NRT and NHT) and PCT. Forest can add any recreation-risk layers unique to their forest.

Risk Category: Wildlife

Model uses PACS and 0.25 mile buffer of nest site layers for several selected species, USFWS TES Critical Habitat layer, and CA DFG's Essential Connectivity (ECA) and Natural Landscape Blocks (NLB-gen) layers (from their California Essential Habitat Connectivity Project geodatabase). Forest can add any wildlife-risk layers unique to their forest.

Risk Category: Heritage

Model uses cultural site polygon layer, 10 meter buffer of cultural site point and polygon layers, and Traditional Cultural Properties (TCP) layer. Forest can add any heritage-risk layers unique to their forest.

Risk Category: Watershed and Aquatics

Model uses several Watershed Condition Framework (WCF) layers, and a meadows layer. Forest can add any watershed- or aquatic-risk layers unique to their forest.

Risk Category: Human-caused Fire

Model uses Fire Origins layer, selects only those points that were human-caused and occurred within the last 30 years, and buffers them by 0.5 mile. Forest can add any fire-risk layers unique to their forest.

Risk Category: Botanical

Model uses NRIS layers out of EDW that indicate areas that are critical for sensitive/rare species, areas that have known noxious, non-native, and/or invasive species. Forest can add any botanical-risk layers unique to their forest.

Performing the Analysis

Once all of the high-risk polygons have been created, the TAP team can perform the analysis. To do this, overlay the roads of interest (corporate GIS roads layer joined with INFRA records) over the polygon layer. Next, select and affirmatively attribute the roads that intersect with each risk category. The resulting GIS table will look something like Figure 3 on the next page.

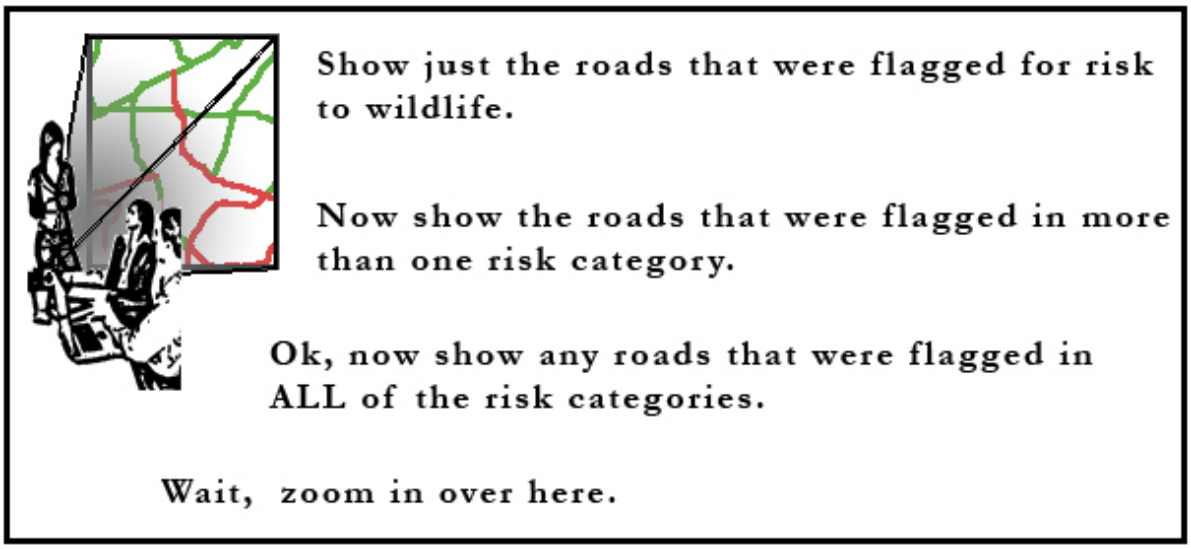
FIGURE 3. Example of table showing roads flagged for intersecting high-risk areas.

road #	risk 1	risk 2	risk 3	risk 4	risk 5	risk 6	risk 7
N2S04	X				X		
N3683		X	X	X	X		X
4S06	X			X	X	X	
5S075	X					X	X

At this point, all roads in the routed GIS roads layer have been flagged according to the risk category polygons they intersect. Note that the roads are still intact; they can still be joined with INFRA tables to determine jurisdiction, status, maintenance level, and any other linear events and/or access travel management (ATM) entries as needed. Also, this is an excellent opportunity to update electronic Road Management Objectives with current risk factors. (There is some uncertainty about the current capability to capture milepost/BMP node in GIS - don't sweat it for now). The same opportunity exists when assigning benefits.

Breaking the spatial GIS routes for network analysis—or maintaining a working spreadsheet not linked to the tables in GIS—are approaches that are NOT ENCOURAGED. If a forest decides to break the routes, they do so at their own risk. TAP teams should avoid approaches that result in multiple parallel databases that need to be continually reconciled. GIS, and the working dataset, can be used dynamically throughout the analysis, as illustrated in Figure 4.

FIGURE 4. Possible dynamic use of GIS by TAP team.



Assigning Benefits to Roads

Unlike risks, identification and assignment of benefits must take into account values identified by the TAP team as well as those generated at the local level through public engagement. As such, it is one part of the TAP that cannot be easily automated. There are, however, multiple approaches to assessing what benefits both the TAP team and the public associate with particular forest roads.

Road Benefits

The Core Team has developed a series of benefit categories for TAP teams to consider in their risk/benefit analysis. Forests are encouraged to identify additional categories as needed. It is important to note that a potential value or benefit does not automatically mean a road is "needed". The forest may want to locally define the terms "needed" and "wanted". The overall benefits and risks will be considered in context with surrounding roads and motorized trails to determine if a road with potential value or benefit is needed. For example, in areas of high density, several roads may serve the same purpose and each of them may have a potential value or benefit. When considered in relation to nearby roads, however, only one or two of these roads may actually be needed to meet that purpose.

- Recreation: The road itself can be a popular recreational destination (such as a loop or scenic byway) or can lead to a recreation destination, facility, or activity (hunting, hiking.)

- Heritage: A road can be an important cultural resource, such as an emigrant road, historic wagon trail, or other early transportation path where use is consistent with value. A road can also provide access to traditional plant gathering areas or areas of spiritual and ceremonial importance to Native American tribes.

The next set of benefits can actually be grouped under one main benefit: Administrative

- Required Access: A road can provide legal access to private property, access for authorized uses (range allotment, utilities, communications, recreation residences, administrative sites, special uses, and fire and emergency access/egress). When evaluating access provided by NFTS roads, TAP teams should consider access provided by non-NFTS roads (state, county, private, and homeowner associations).

- Wildland fire management: In general, any road is beneficial to wildland fire management. A road can provide access to fire management personnel as well as serve as fire lines for both wildfires and prescribed fires. A road can also provide egress for the public if evacuation is required.

- Vegetation Management: Existing road access is usually a factor in contracts and planning for vegetation and fuels management. An efficient, maintained road system can lower treatment or harvesting costs.

- Botanical: A road may enable researchers and land managers to work in an otherwise remote location.

- Restoration: Road access can facilitate cost effectiveness for active ecological restoration. Consider road access to areas identified in Watershed Restoration Action Plans and unit planning to meet the Regional Forester's expectations for increasing the rate and pace of ecological restoration.

Example

APPLYING INDICATORS TO ASSESS BENEFIT OF A ROAD

Utilization

- Has known use or destination, including but not limited to: dispersed campsite, overlook, staging area, motorized or non-motorized trail, viewpoint, swimming hole, hunting, etc.
- Is located within defined OHV management areas
- Connects to a road added to the NFTS in Subpart B, depending on whether or not other roads access the same road
- Is located in an area with low total road density that provides a semi-primitive motorized experience
- Is important for tribal uses
- Has a scenic, aesthetic, therapeutic or spiritual value, access to wilderness

Administration

- Accesses authorized uses of NFS land: road has value or benefit. Example: grazing allotment or recreation residence(s)
- Provides legal right of access: road has value / benefit
- Provides access to NFS facilities: road has value / benefit
- Is needed for management: potential value/benefit. Examples: wildlife improvements; ecological restoration, vegetation management, botanical conservation efforts

Socioeconomic

- Provides economic value to local communities through tourism and support services
- Is critical for rural residential development

Protection

- Is located within WUI (CWPP)
- Is located in area with high fuel loading, frequent history of fire, etc.
- Provides access for protection of critical resource, e.g. old forest, historic or cultural site

Safe and efficient travel/Life-sustaining

- Serves as key connector, efficient traffic flow
- Provides alternate emergency egress road for developed area

Road Management Objectives

Road Management Objectives (RMOs) may also prove useful in assigning benefits to the transportation system. RMOs are values in an INFRA field that list a road's purpose. Unfortunately, there is not a high level of consistency in the requirement for and application of the RMO module among forests. More information regarding preparation of RMOs can be found in Appendix F, "Road Management Objectives." If a forest TAP team finds their unit's RMO data to be useful, it should be used to inform the documented benefits in the TAP report. Otherwise, this TAP, once completed, should be used to update RMOs. Ideally, the RMO's can be updated concurrent with the analysis of benefits, similar to identification of risk factors not documented in the RMO.

After benefits have been assigned, the GIS table might look like Figure 5, after 'benefit' columns have been added and populated:

FIGURE 5. Example of table showing roads flagged for providing benefits.

road #	risk 1	risk 2	risk 3	risk 4	risk 5	risk 6	risk 7	benefit 1	benefit 2	benefit 3
N2S04	X				X				X	
N3683		X	X	X	X		X			
4S06	X			X	X	X		X		
5S075	X					X	X		X	X

See Figure 6 on page 23 for a snapshot view of the mechanics of the Travel Analysis process: flow of identifying Risk Categories, overlay with Road Core Data in a spatial view, and tabular view of flagged roads.

Economics of Maintaining Roads of the NFTS

The Forest Service has obligations to provide safe access, as assured through routine operation and maintenance; protect its natural and cultural resources; and spend the public's tax dollars wisely. All obligations carry statutory and regulatory requirements. The ability to balance these obligations, with decreased funding, and increasing demands from external groups and individuals, is a huge challenge.

As part of the risk/benefit analysis, TAP teams must also consider the economic sustainability of individual roads and of the transportation system as a whole. While a road may present fiscal liabilities (risk) in the form of recurring maintenance costs, it can simultaneously generate economic value (benefit) as a result of its popularity with OHV enthusiasts and the revenue their recreational pursuits bring to the local community. This next exercise gives a general idea of how much road maintenance on a forest is affordable today, without speculating on continuing funding trends.

Guidelines

Under the direction of Forest Service Handbook 7709.55, Chapter 20, the analysis must consider available resources for the maintenance and administration of the forest transportation system compared to, or as a percentage of, the current mileage. This examination of road system economics should take place at the appropriate scale. These considerations can be a basic derivation of the average cost per mile of a road based on its **objective** maintenance level (ML). It is important to note that the maintenance cost of a road, either individually or in relation to the entire system, does not determine the road's final recommendation.

Appendix C – R5 Economic Analysis Calculator – Annual Road Maintenance was developed to give a broad scale view of the forest's ability to sustain the unit's road system at ***objective*** maintenance levels with expected levels of funding (FSM 7712.1). The objective maintenance level is the maintenance level to be assigned at a future date considering future road management objectives, traffic needs, budget constraints, and environmental concerns. It is a reflection of the forest's land management plan direction.

Please refer to Appendix D, "TAP Economic Analysis Cibola," for another example of a TAP economic analysis. This economic analysis is not intended to serve as a template for Region 5 forests to follow but may prove useful as another tool.

Spreadsheet Calculator Tools

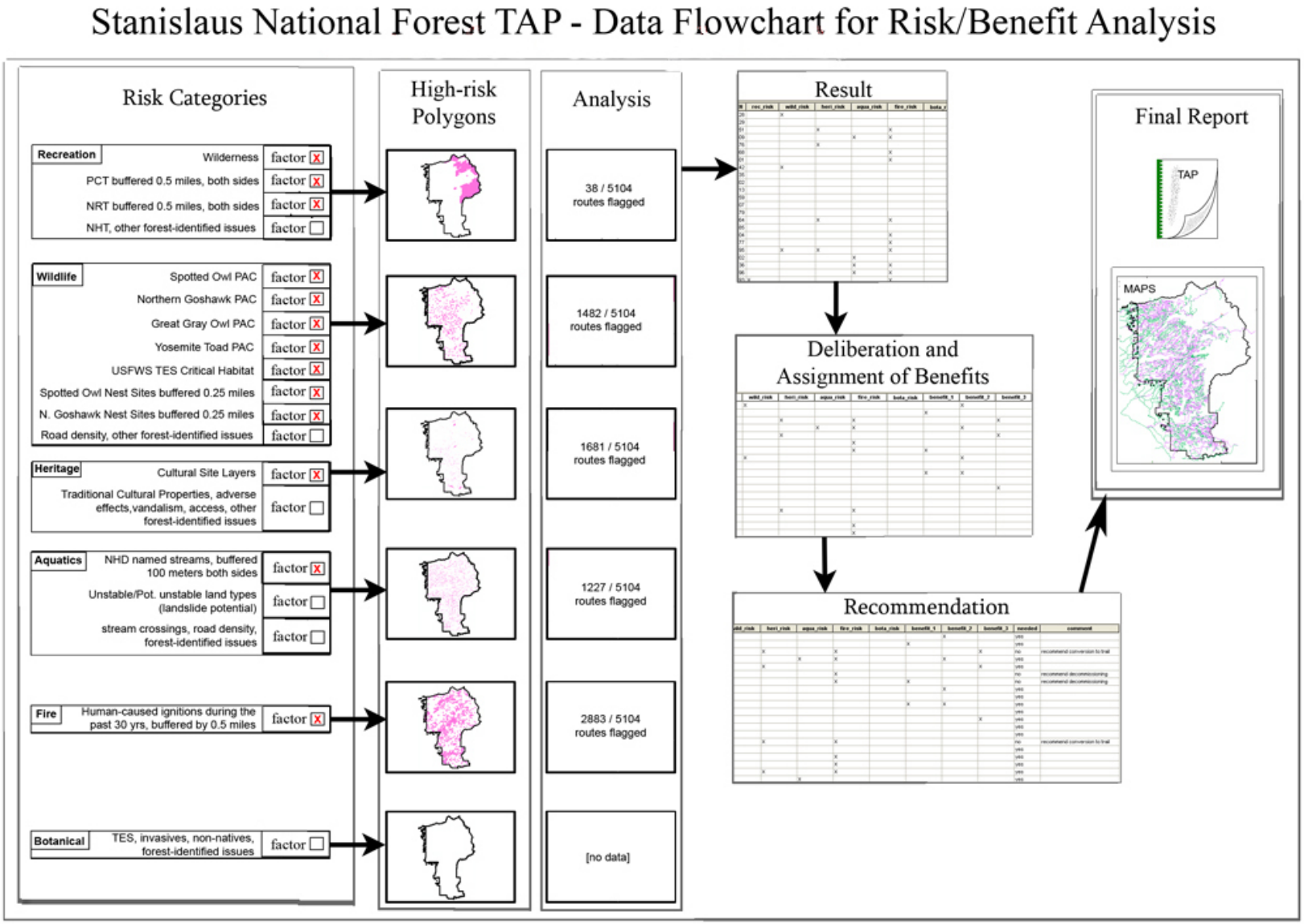
Appendix C, "Maintenance Sustainability Calculator," is a spreadsheet that can be used by TAP teams to:

- Display current Road Core data, maintenance costs, expected levels of funding, and resulting shortage/surplus, and
- Explore the economic implications of different scenarios of mileage and maintenance levels.

This calculator spreadsheet is interactive in that the shortage/surplus numbers change as the TAP team manipulates mileage totals and unit costs/maintenance cycles according to the scenarios. The spreadsheet is not, however, equipped to analyze actual costs of adding, decommissioning, converting, changing maintenance levels, or acquiring a right-of-way. Those costs would be more appropriately refined during project-specific NEPA analysis. Rather, this calculator spreadsheet serves as a tool to assist TAP teams in assessing the affordability of maintaining the forest transportation system. Region 5 Road Core Data displayed on the spreadsheets have been extracted from INFRA for the three test-bed forests. The calculator assumes that data meets required standards and follows business rules for all road modules, and includes all roads identified with the Forest Service as the Primary Maintainer, regardless of jurisdiction. Road Core Data for all forests and their customized calculator will be available upon request, along with historical funding data if available. The historical data would show actual decline in funding available for road maintenance over the past several years, and can be used to display expected trends for future funding.

The financial ability of a forest to provide safe access, while meeting all regulatory and statutory requirements, protecting the forest's natural and cultural resources, watershed quality, and meet the demands of all users is at the core of Travel Analysis. Subpart A of the Travel Management Rule requires the analysis to ultimately inform the identification of the minimum road system needed. Therefore, the results of the Maintenance Sustainability Calculator exercise are pivotal for informing the minimum road system needed.

FIGURE 6. Simplified example of TAP using corporate data from the Stanislaus National Forest. In TAP, it will be ROADS flagged in the Analysis, not ROUTES.



Step 5 | Describing Opportunities and Setting Priorities

Forest Service Handbook 7709.55 Chapter 20 directs units to identify management opportunities and priorities while formulating proposals for changes to the forest transportation system that respond to the issues, risks, and benefits identified in Steps 3 and 4. Step 5 implements this direction by responding to issues, risks, and benefits identified in the preceding steps of the Travel Analysis.

Approach

While some of these opportunities may be generated from previous analyses, the majority will result from an interdisciplinary road-by-road review of the risks and benefits identified in Step 4. Risks and benefits will be reviewed in context with the surrounding area, road density, other roads that may provide the same benefit, and relative values of the risks and benefits. Based on this road-by-road consideration of risks and benefits, the combined experience and professional judgment of the analysis team will be used to formulate proposals for changes in the forest transportation system per FSH 7709.55, Chapter 21.5

Depending on the identified issues and desired conditions, risks and benefits could range from site- or road-specific, to a broader, more general scale. For example, at the micro level, a risk might include a road that bisects critical habitat for a federally-listed species whereas a benefit might include a road that provides critical access needed for future ecological restoration activities. Conversely, at the macro level, risks and benefits might include the need to reduce overall road density or maintenance costs in a particular area or the need to provide access for a variety of dispersed recreation activities.

Possible Opportunities for Alterations to the Management of the Transportation System

The following list of examples contains potential options and describes how each one might lead to site-specific NEPA analysis and potential implementation in the future. Note that actual costs of implementing recommendations are not discussed in TAP, nor is there speculation on funding sources.

1. Change jurisdiction of the road. Opportunities may exist to pursue transferring some roads currently under Forest Service jurisdiction to another jurisdiction, such as a county or local government, or to a homeowners association. This option could result in relinquishing some or all burden of maintenance costs and liability from the Forest Service; however, it could also require an initial investment to bring the road to a designated standard prior to transfer. This opportunity lends itself to those roads where the benefit or predominant use is not forest-related.

2. Issue a use permit. A Forest Service road used primarily for access to private lands or for authorized lands special uses may be appropriate to place under a use permit (there are several types of permits) with provisions requiring the permit holder to bear the proportionate share of the maintenance cost and liability for the road. Should Forests consider this, their Lands and Special Uses department should be consulted to determine the road use authorization currently in effect, and to calculate proportionate shares.

3. Change the road's maintenance level. Several scenarios exist for this option. If the operational level of a road has declined to a lower level over time—perhaps due to lack of periodic

maintenance—it may be possible to lower the maintenance level to one that reflects the true roadway condition and type of use it receives. This could eliminate some deferred maintenance and also save in future annual maintenance costs, such as periodic blading.

a. For example, an operational maintenance level (OP ML) 4 road with aggregate surfacing has lost its surfacing over time as a result of past use. The road could be downgraded to OP ML-3, possibly reducing the need to replace the aggregate surfacing. This recommendation assumes that the new OP ML proposed for the road still reflects the Forest's maintenance objectives for intended use, does not compromise the safety of the traveling public, nor degrade watershed condition.

b. Similarly, an OP ML-5 asphalt surfaced road may have deteriorated over time to the point where the surfacing cannot be rejuvenated. The asphalt surfacing could be re-processed and replaced as aggregate surfacing, thereby reducing the maintenance level to 3. This could avoid future costs of maintaining the asphalt surfacing and pavement markings but bring additional future costs for frequent blading.

c. Opportunities may exist to convert a road to OP ML-1 if it isn't needed now, but may be needed for identifiable future access needs. This could effectively reduce the cost of annual maintenance of the road. The cost of ensuring the hydrologic stability of these roads, however, is not included in the economic calculator.

This opportunity is more complex than may first appear. A careful review of the Forest's Land and Resource Management Plan, and Road Management Objectives for each road is necessary before pursing this opportunity. Any change in the maintenance level that changes the management of the road would require NEPA, and cannot be made by simply changing data in INFRA to reflect current condition of a road. For the scenarios above, the change in the type of vehicle and traffic allowed for the reduced operating conditions may be in conflict with the current LRMP. Conversely, Travel Analysis could then inform the Forest Plan assessment and revision.

Again, such opportunities would only be appropriate if they can be accomplished without compromising the safety of the traveling public and not result in adverse effects to resources.

4. Convert the road to another use. This option should be considered if the road in question is determined to be unneeded and opportunity exists to convert it to another use where there is an identified need. For example, a road converted to a motorized or hiking trail no longer needs to be maintained as a road. This option, however, would shift the entire cost of maintaining the converted road to the trails or recreation program areas.

5. Decommission the road. If the road is considered to be not needed and no compelling need or opportunity exists to convert it to another use, then recommending the road for decommissioning might be appropriate. This would eliminate the need to expend resources on maintaining the road in the future. There are, however, costs associated with decommissioning a road that should be considered. These costs, which are not included in the economic sustainability calculator, would be included in project plans as a one-time expenditure.

6. Adjust season of use. Consider designating a wet-weather road system on your Forest. This would consist of a system of roads with surface types more resistant to erosion and resource damage, such as paved and aggregate surfaced roads. This would represent the minimal

transportation system open to travel during periods with high potential for resource damage, such as early spring snow-melt periods or late fall when significant weather events can result in wet conditions and surface damage. This could help reduce annual road maintenance costs on a limited portion of the transportation system through such surface preservation management practices. Caution is advised to be aware of hardened surfacing failure when operating vehicles on roads with saturated base conditions.

Travel Analysis provides the Forest Service an overall view of its road systems with respect to resources, risks, and benefits. Forests must scrutinize their ability to continue providing extensive access, user comfort (passenger vehicle roads only), safety, and resource protection in the face of limited road management funds.

Additional Considerations

Economic Risks and Benefits

When considering economic information, the team may conclude that it is difficult for the Agency to keep a reduced size road system, despite cost-saving measures identified in the calculator. This does not mean the corresponding percentage of system roads must be either needed or unneeded. The ratios of funds needed to funds available or shortage/surplus figures, however, should certainly be considered in the overall analysis. The Travel Analysis Report is expected to discuss the expected consequences of inadequate funding, as sustainability of the road system, and ultimately sustainable access, is directly tied to funding.

Step 4 above is not a substitute for economic analysis in terms of identified risks and benefits, or socio-economic benefits. This guidebook does not provide guidance for socio-economics analysis, but reserves that analysis for those subject to National Environmental Policy Act.

Mathematical Scoring Systems

In general, reliance on a mathematical scoring system (using multiple weights and gradients of risk and benefit to produce more automated and extensive classification of roads) or use of such a system in isolation is not recommended. Previous efforts to utilize formulas have sometimes resulted in numerical outcomes that do not reflect the situation on the ground. The risk to a particularly sensitive resource may outweigh several other resource risks combined, or the benefit of a particular road may be high enough that the road is recommended as needed even if resource risks are high.

Despite these potential pitfalls, as part of a systematic approach comprised of comprehensive datasets, GIS analysis, and interdisciplinary team review, a mathematical scoring system may prove useful. When used under these circumstances, a scoring system can help manage large amounts of complex, interrelated data, thereby reducing the time and resources required for TAP teams to analyze the transportation system as part of this process. By following up with a summary matrix, TAP teams can determine which roads require additional review in greater detail.

Prioritization

Opportunities for changes to the existing transportation system may be prioritized by the forest analysis team based on severity of identified risks, urgency, and forest priorities. Per the Travel Management Rule (CFR 212.5(b)(2)), TAP teams should give priority to identifying roads for decommissioning where those roads pose the greatest risk to public safety or natural resources. In some cases, where a road is

currently managed well and deemed needed by the TAP team, identifying opportunities for change may not be necessary and therefore rated as a low priority.

Findings

The opportunities resulting from the interdisciplinary analysis should be displayed in a table showing risks, benefits, opportunities, and, if desired, priority for further action, as shown below in Figures 7 and 8 below. Please note that any process for determining priority is completely at the Forest TAP teams' discretion. The final set of opportunities can inform the process to later identify the minimum road system for the forest per the Travel Management Rule (36 CFR 212.5).

FIGURE 7. Example of table showing recommendations & additional fields. (R=Risk, B=Benefit)

Road #	R1	R2	R3	B1	B2	B3	B4	Opportunities	Priority
N2S04	x	X		X				Reduce to ML1	L
N3683		x	x					Decommission	H
4S06	x		x			x		Convert to trail	M
5S075	x			X	x		X	Grant right-of-way	M
4S28				X	x		X	-	-

FIGURE 8. Example of a table showing more uses of an "opportunities" field.

	BENEFITS			RISKS				
Road #	Dispersed Recreation	Special Use	Additional Benefits	Aquatic	Noxious Weeds	High Density	Additional Risks	Opportunities
2S091	X				x	X		Convert to trail; weed treatment
1S27				X		X		Decommission
N4622	X					X		
1N035	X	x		x		x		Stabilize stream crossing

Figure 8 "Opportunities" also displays suggested repairs. It's tempting to go to solutions for a road with risks, but don't spend much time on suggested repairs or mitigations. Remember, this is a broad scale analysis to identify opportunities, not project fixes, so identifying "Weed Treatment" is getting too far into the weeds for this effort.

Example

A TRAVEL ANALYSIS PROCESS (TAP) SCENARIO

A forest analysis team is reviewing roads in a watershed with a high density of roads. Risks and benefits have been assigned, and the team is considering the opportunity for change, if any, for each road:

- Three of the roads have a benefit rating for dispersed recreation
- One has a benefit rating for a special use authorization
- All have a risk rating for high density
- Two of them have a risk rating for aquatic resources
- One has a risk rating for heritage resources (see Figure 8 above).

The analysis team identifies a need to reduce density in the area based on the stated risk. They also see a need to provide some level of access for dispersed recreation as well as a need for access to an authorized special use. In reviewing these four roads, all located in the same area, they determine that they can reduce road density while still providing access for the special use and dispersed recreation.

Converting 2S091 to a trail reduces the footprint of the road and reduces the cost of maintaining the forest transportation system while still providing for some level of access. Keeping it in the system will also help to provide a diversity of dispersed recreation opportunities. The noxious weed issue can be addressed through treatment of the weed occurrence.

Road 1S27 is identified as a candidate for decommissioning as no benefits were identified for this road. In addition, it contributes to the high density issue and the cost of maintaining the forest transportation system as well as poses some risk to aquatic resources.

Roads N4622 and 1N035 are potentially identified as roads to be retained as part of the minimum road system in spite of the high density and aquatic risks. This will provide access for dispersed recreation and access to the special use site. The high road density risk is reduced by recommending 2S091 and 1S27 as unneeded, while the aquatic risk can be reduced by stabilizing a stream crossing per the aquatic resource specialist's recommendation.

Inclusion of statements such as those above in the TAR is optional; they are not required by the Travel Analysis process, yet they may be helpful to inform future proposals for action. Additionally, the TAP team may discover other expanded uses such as future administrative use.

Step 6 | Reporting

Once the analysis is complete and opportunities have been exposed, the Forest TAP team is ready to prepare the report. The report should outline the methodology used to reach its recommendations including a description of public engagement outcomes and reference to relevant Agency policy and direction. In addition to describing the process that was used, it should also include suggested road opportunities along with appropriate tables and figures. See Appendix K for a completed TAR.

Tables

The team may elect to divide the master table into separate tables based on road type, recommendation, or another factor. As the tables will illustrate the specific risks and benefits associated with each road, they will be instrumental in clarifying how the team arrived at its recommendations: using a defendable combination of science, GIS, and on-the-ground knowledge. The tables should correspond and cross reference with the maps produced.

Maps

The maps used in the TAP report should have a consistent look and feel between R5 units. The purpose of the maps is to clearly display current system roads, the recommended minimum transportation system, and those roads identified by the interdisciplinary team as 'unneeded'. For more guidance on designing the maps, please refer to Appendix I, "Map Guidance for Final TAP Report".

For more guidance on organizing the report, please refer to Appendix H , "TAP Report Format." It may also prove helpful for TAP teams to explore examples from other units that have already completed the process successfully. With the publication and dissemination of this package, a unit completes the Travel Analysis Process.

Some suggestions for maps include display of roads by:

1) Opportunity category (Change Maintenance Level, Decommission, Conversion, Change Jurisdiction, Realignment with concurrent decommission, etc.)
2) Overlay of all opportunities to show areas with high potential for changes
3) Risk category (Wildlife[1], Watershed[2], Wildfire, Cultural[3], Botany, etc.)
4) Overlay of all risk categories to show areas with highest risks
5) Benefit category (Recreation, Administrative, Social, Spiritual, Cultural, etc.)
6) Overlay of all benefit categories to show areas with most benefits
7) High cost to maintain roads
8) Passenger vehicle only roads
9) High clearance vehicle roads
10) Roads with needed access or to secure necessary right of way
11) Display by priority

Scale of each map may be at the forest, district, or watershed level, depending on detail and complexity.

[1] May be further differentiated by species, TSE, that are unique to a forest, etc.
[2] Includes soil and aquatic organisms
[3] Subject to restrictions for disclosure of information

List of Appendices

The following appendices are available at:

http://fsweb.r5.fs.fed.us/project/travelmtg/documents/subA/guidance/

Appendix A: Region 5 – Subpart A Steering Committee and Core Team Charter
Describes the purpose of designating teams at the regional level.

Appendix B: Region 5 Estimated Timeline to Complete Travel Analysis
Contains estimated schedules for a Forest's completion of TAP.

Appendix C: Maintenance Sustainability Calculator Instructions
Instructions for interactive calculator tool. Displays relationship of anticipated funding for annual maintenance with respect to percentage of NF road system sustainable based on mileage and objective maintenance levels of NFS roads. Calculator itself is an excel spreadsheet.xlsm

Appendix D: Sample Economic Analysis (from Cibola NF – Mountainair Ranger District)
Provides an example of an adequate economic analysis from Region 3.
Link to website: http://fsweb.r3.fs.fed.us/eng/transportation/travel_management/TAP.html

Appendix E: Resource Risk Indicators
Contains all of the Risk Category papers from the resource specialists, including Recreation, Wildlife, Heritage, Watershed, Aquatics, Fire, and Botany.

Appendix F: Road Management Objectives
Provides direction and guidance for forests and their RMOs.

Appendix G: Guidance for Communication and Public Engagement
(Key Messages and Talking Points, FAQ's, etc.

Appendix H: TAP Report Format
Provides guidance for formatting and organizing the final document (in progress).

Appendix I: Map Guidance for final TAP Report
Provides guidance for map production and distribution

Appendix J: Roster of Contacts
Lists the primary points of contact for all Region 5 TAP teams.

Appendix K: Link to Travel Analysis Report by Lake Tahoe Basin Management Unit
http://www.fs.usda.gov/detail/ltbmu/maps-pubs/?cid=FSM9_046480 . Once you are at the website, scroll down to Publications (Administrative 2012).