Appendix A Risk and Value Assessment Methods

Watershed Risk Method

Questions addressed by this indicator

AQ (1) Changes in hydrology, AQ (2,3) Generation of surface erosion and mass wasting, AQ (4,5) Road-stream crossing effects on stream channels and water quality; and potential for pollutants, AQ (6) Hydrologic connectivity, AQ (7) Downstream beneficial uses, AQ (8) Wetlands, AQ (9) Road effects on streams, floodplains, wood, and AQ (11) Road effects on riparian

Description of rating

The watershed risk rating is an evaluation of key factors controlling or influencing the impact of roads on watershed function. The rating is based on a summation of six factors directly or indirectly related to watershed processes and/or predictive of watershed response to roads. All ratings are numerically assigned using 1=LOW, 2=MODERATE, and 3=HIGH road effect on specific process or function.

Analysis factors

Factor 1 – Surface Erosion Potential: this factor predicts surface erosion potential of each road segment and was derived from the Surface Type on the Deferred Maintenance Calculator spreadsheet. Paved (ASP and BIT) roads = 1, graveled and improved roads (AGG and IMP) = 2, and native surface roads (NAT) = 3.

Factor 2 – Mass Erosion Potential: this factor indicates potential for mass failure either as shallow-rapid landslide, slumping, or debris torrent, and was derived from the Landtype Association (LTA) map (draft, 2002) for the Blue Mountains (developed by Cordilleran Services Inc., Bob Ottersburg , Contractor). Mass erosion hazard ratings were assigned to LTAs by the Forest Soil Scientist Craig Busskohl. The road layer was intersected with the LTA layer using GIS. Roads intersecting only Low hazard LTAs = 1, roads intersecting Moderate hazard landtypes =2, and roads intersecting High hazard landtypes = 3. MAP is in Craig workspace- do we want to include in doc?

Factor 3 – Slope Position/Peak Flow Potential: this factor, predictive of potential to intercept subsurface flow, accelerate runoff and increase erosion and flooding potential, was derived graphically from the road segment slope position and aspect, using GIS with 1:24000 digital topographic base maps. Road segments on ridgetops = 1, road segments in midslope positions, on east or north-facing slopes = 2, road segments in midslope and/or valley-bottom positions on west or south aspects, north of 45 degrees 15 minutes Latitude = 3.

Factor 4 – Riparian Proximity: this factor indicates road segments that intersect stream-riparian areas. The stream layer was buffered using the stream class attribute. Stream classes were used to determine Riparian Habitat Conservation Areas (RHCAs from PACFISH) and indicate beneficial use, as follows: Stream Class 4 = intermittent streams, were buffered 100 feet slope distance each side of stream; Stream Class 3 = perennial, non fish-bearing streams, buffered 150 feet slope distance each side of the stream; and Stream Class 1 and 2 = perennial, fish-bearing streams, buffered 300 feet slope distance each side of the stream. The stream layer was variable buffered using the above distances, and the road layer was intersected with the buffered streams layer. Roads not intersecting RHCAs = 0, roads intersecting only Class 4 RHCA = 1, roads intersecting Class 3 RHCA = 2, and roads intersecting RHCA 1 and/or 2 = 3.

Factor 5 – Road-Stream Crossings: this factor is an estimate of the number of perennial road-stream crossings on the road segment and is indicative of the relative potential of the road segment to divert the stream, and/or potential for fill failure (plug and fail). This factor was derived graphically in GIS using the road layer and 1:24000 digital

topographic base maps with the streams layer. The number of road-stream crossings were estimated along each segment. No crossing = 0, 1 crossing = 1, 2 crossings = 2, more than 2 crossings = 3.

Factor 6 – Watershed Condition Rating: this factor was derived from the Umatilla National Forest Watershed Prioritization (2002) watershed condition class. Condition Classes are defined as follows:

Class 1 watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. The drainage network is generally stable. Physical, chemical, and biological conditions suggest that soil, aquatic, and riparian systems are predominantly functional in terms of supporting beneficial uses.

Class 2 watersheds exhibit moderate integrity relative to their natural potential condition. Portions of the watershed may exhibit an unstable drainage network. Conditions suggest that soil, aquatic, and riparian systems are at risk in being able to support beneficial uses.

Class 3 watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. A majority of the drainage network may be unstable. Conditions suggest that soil, aquatic, and riparian systems do not support beneficial uses.

Watershed condition classes were assigned using a series of indicators (roads, harvest, intact riparian, mass wasting) and values (water quality status, public water supply, partnerships) at the watershed scale (5th Field HUC). Road segments entirely within Class 1 watersheds were assigned a rating = 1, roads all or partly within Class 2 watersheds = 2, roads all or partly within Class 3 watershed = 3.

This factor is considered a "cumulative effects" indicator of overall watershed condition and the relative potential for individual road segments to contribute to overall watershed conditions (change condition class).

Scope of analysis

The Umatilla National Forest manages or shares management of approximately 4,876 miles of public road (all operational maintenance levels). Of this total, the watershed risk analysis was conducted on 1,425 miles, or 29 percent of the classified road system. The analysis focused on Forest Service jurisdiction roads, operational maintenance level 3-5, and included "collector" and "arterial" roads that together form the "backbone" road system (HOW DEFINED?). As such, this provides a limited view of the true watershed risk posed by the entire road system. The effects of all Forest roads were generally considered using road density analysis, and through the Watershed Condition rating factor (cumulative effects).

The analysis focused on rating individual road effects on watershed processes, in a watershed context.

Scale

The scale of the analysis was Forest-wide, with some consideration for watershed context and cumulative effects through reference to the Watershed Condition rating.

Application

Results from the analysis are applicable at the Forest and watershed scales, and provide general information on potential watershed risk of the individual, rated road segments.

Analytical tools and information needs

GIS Road Analysis (OPML 3,4,5, & Arterial/Collectors) coverage (ompl.shp)

Watershed Prioritization-Watershed Condition Composite Map

Stream coverage

Landtype Association coverage

Watershed HUC layer

1:24000 Digital Raster Graphic coverages

Results

1,424 miles of Forest roads, divided into 493 road segments, were rated using the 6 factors previously described. Road segment lengths varied from .001 to 29.8 miles, with an average of 2.9 miles (standard deviation of 3.4 miles). Overall watershed rating scores ranged from 4 to 17 with an average score for all segments of 10. A summary of risk rating categories shows 45 percent of the total segment length rated high risk, 33 percent moderate, and 22 percent low risk (Table 1). High risk road segments were longer on average than the total indicating longer road segments are more likely to pose a risk to watershed based on increased potential for multiple risk factors.

Table 1. Summary of Watershed-Road Risk Ratings

Composite Rating of Watershed-Road Risk	Number of Road Segments	Percent	Miles of Road	Percent	Average Segment Length
High (>12)	123	25	636	45	5.2
Mod (9-13)	195	40	470	33	2.4
Low (<9)	175	35	318	22	1.8
TOTAL	493	100	1424	100	2.9

Data and Analysis Limitations

The analysis was conducted using available data to approximate road-watershed hazards and is a reasonable estimate of actual road-watershed interactions for the scale of the analysis. There was no field verification of ratings, for example, the estimated number of road-stream crossings is likely an underestimate of the actual number. The ratings were also simplified for analytical purposes. For example, a High mass wasting potential rating was assigned if any portion of a road segment fell with a High hazard landtype. Further verification of individual risk factors and overall ratings is advised for watershed and project-scale analysis.

Watershed Risk Rating

Individual factor scores were numerically combined for a total Watershed Risk score. Combined scores were assigned an overall risk rating descriptor of "Low", Moderate" or "High". Risk ratings represent the general likelihood, or probability, of a road segment affecting watershed processes. In general, low ratings in most or all factors resulted in a "Low" overall risk of the road segment impacting some aspect of watershed function. In contrast, high ratings in multiple factors resulted in a "High" risk to watershed function, although the overall rating gives no indication of which specific watershed process or function is likely being impaired. Individual factor ratings must be examined in more detail to make this determination.

Combined score

A score was assigned to each road segment for each of the six analysis factors. Individual factor scores ranged from 0 to 3, with 0=no risk, 1= low risk to watershed, 2= moderate risk, and 3= high risk. Combined scores ranged from 4 to 17, with an average score of 10.

Factor	Range	Low	High
1. Surface erosion potential	1-3	1	3
2. Mass erosion potential	1-3	1	3
3. Slope position/Peak flow potential	1-4	1	3
4. Riparian proximity	0-3	0	3
5. Road-Stream crossings	0-3	0	3
6. Watershed Condition rating	1-3	1	3
Total possible range		4	18

Overall Ratings

After scores were tallied, each road segment was rated low, medium, or high and assigned an overall rating of risk to watershed. Segments with the higher scores represented a higher risk to watershed and those with a relatively low score were a low risk to watershed. The total score and corresponding rating are identified on the following table.

Total Score	Watershed Risk Rating
4 - 8	Low
9 - 12	Medium
13 - 18	High

Aquatic Species Risk Method

Questions potentially addressed

AQ (10) How and where does the road system restrict migration and movement of aquatic organisms? What aquatic species are affected and to what degree? AQ (12) How and where does the road system contribute to fishing, poaching, or direct habitat loss for at-risk aquatic species? AQ (13) How and where does the road system facilitate the introduction of non-native aquatic species? AQ (14) To what extent does the road system overlap with areas of exceptionally high aquatic diversity or productivity or areas containing rare or unique aquatic species or species of interest?

Description of indicator

The method assesses the affect of the road system on aquatic species and habitat with regards to road location and road density. The intent is to identify the risk to habitat, fish and other aquatic species in relation to the analysis elements.

Analysis elements

Four elements were selected to evaluate the affect of the road system and the risk to aquatic species and habitat. The elements used for the analysis are Endangered Species Act (ESA) listed aquatic species count, fish passage at road crossings, highest quality aquatic habitat, and riparian proximity. These elements were selected to describe relative risks of road system affects to aquatic species and their habitats. Each road segment received a score based on the location of the road segment relative to the element and the associated risk to habitat, species movement, or the species. Score of one meant low risk to aquatic species and habitat and a score of three meant high intensity and a high risk to species and habitat. The riparian proximity element had a possible zero value if the road segment did not intercept a stream channel.

ESA Listed Aquatic Species Count

The intent of this element is to characterize the risk to ESA listed aquatic species for each road segment. The location of the segment was compared to the number of ESA listed fish species within the watershed as mapped in the Umatilla National Forest Watershed Prioritization Version 10.04.02, Figure 7-3. Road segments identified as passing through a watershed with 3 listed fish species were considered a high risk to adversely affect and given a score of three. A moderate level of risk was assigned if the watershed contained two listed fish species and resulted in a score of two. A low level of risk was associated with road segments contained in watersheds with one or no ESA listed fish and scored as one.

Fish Passage Barrier

Providing up and downstream passage of aquatic species through road crossings at a broad range of stream flows is important to both anadromous and resident fish populations as well as vertebrate and invertebrate wildlife. In 2001, the Umatilla NF completed a survey of fish passage at road crossings that helps answer the question of how the road system effects the movement up and down streams of aquatic organisms on the Forest. The intent of this element is to characterize the road segment affect on aquatic species movement. Road segments crossing fish bearing streams three or more times or blocking access to 0.3 miles of fish habitat were considered a high risk to affect fish and other aquatic species and scored as three. Two or fewer road segment crossings of fish bearing streams and culverts blocking access to fewer than 0.3 miles of habitat was scored two. Road segments with no fish bearing stream crossings or with crossings that meet stream simulation design standards were low risk of adversely affecting fish and aquatic organism movement and scored one.

Stream Proximity

The intent of this element is to characterize the risk to aquatic species from loss of floodplain habitat and filter capacity when the road segment is close to the stream. For this assessment, risk to aquatic species was rated high,

with a score of three, if a portion (10% or more) of the road segment is within 100 feet of a fish-bearing stream. The road was considered moderate risk to aquatic species if a portion (10% or less) of the road segment is closer then 300 feet to a fish-bearing stream. Each segment was scored a two. If no portion of the road segment or less than 10 percent of the segment distance is within 300 feet of a fish bearing stream a low risk score of one was assigned.

Risk to highest quality fish habitat

The risk to highest quality aquatic habitats was evaluated high risk receiving a score of three if the road segment is within or passes through a portion of a watershed mapped as highest quality fish habitat on the Forest in the Umatilla NF Watershed Prioritization Version 10.04.02 Figure 7-1. A moderate risk was scored two if a portion of the road segment is within the floodplain of occupied stream habitat of ESA listed aquatic species. A road segment not near occupied ESA listed aquatic species habitat or habitat mapped as aquatic refuge habitat in Watershed Prioritization, Figure 7-1 was ranked low risk to highest quality aquatic habitat with an assigned score of one.

Scale

Data would be useful at multiple scales from sub basin to sub watershed.

Utility

This information helps to establish a baseline of affects resulting from the current road system. It would be useful in setting priorities for restoration to reduce the risk to aquatic species habitat.

Analytical tools and information sources

GIS road analysis coverage (ompl.shp)

Fish Passage at Road Crossings Assessment Access Database for the Umatilla National Forest

Results

The risk to highest quality habitat factor was scored high for 46 percent of the total road segments assessed. The overall risk to aquatic species was scored high for 33 percent of the total road segments assessed.

Aquatic Species Risk Factor

RISK RATING:

Scores are combined and assigned a risk factor for aquatic species.

Combine score

A score was assessed for each road segment based on the four analysis elements. Element scores ranged from 1 – 3, with a three meaning a high risk to aquatic species and one a low risk. The riparian proximity element score of zero was assigned to road segments that did not intercept a stream channel and had no portion within 300 feet of a fish-bearing stream. To meet the objective of the process and arrive at one rating for each segment, scores were tallied for each segment. Scores ranged from 4 – 12.

Risk factor

After scores were tallied, they were ranked from high to low and given a rating of high, medium, or low risk to terrestrial wildlife. Segments with the higher scores represented a higher risk to wildlife and those with a relatively low score were a low risk to wildlife. The total score and corresponding rating are identified on the following table.

Total Score	Aquatic Species Risk Rating
4 - 5	Low
6 - 8	Medium
9 - 12	High

Terrestrial Wildlife Risk Methods

INDICATOR 1:

Terrestrial species and their habitats.

Questions potentially addressed

TW (1) What are the direct and indirect effects of the road system on terrestrial species habitat? TW (4) How does the road system directly affect unique communities or special features in the area.

Description of indicator

The indicator assesses the affect of roads with regards to terrestrial wildlife habitat, unique habitat communities, and sensitive habitats for selected threatened, endangered, sensitive, and management indicator species. The intent is to identify the risk of the roadway in relation to the analysis elements.

Analysis elements

Six elements were identified to evaluate the affect of the roadway on terrestrial wildlife. The elements used for the analysis were Watershed Prioritization-terrestrial wildlife composite, winter range, elk calving areas, lynx habitat, meadows, and riparian habitat. These elements were selected to represent a broad array of wildlife species and terrestrial habitats as well as unique habitats across the Forest. Each element was evaluated on its proximity to the roadway; a road segment received a score if the feature occurred within 660 feet (0.125 miles) of the roadway. A score of one meant the segment was a low risk to terrestrial wildlife and a three was a high risk to wildlife with respect to the feature. If a feature occurred beyond 660 feet from the road segment, it received a zero value.

Watershed Priority-Terrestrial Wildlife Composite

The intent of this element is to characterize the broad-scale condition of habitat and terrestrial species across the Forest. The Watershed Prioritization-Terrestrial Wildlife Composite Rating (Umatilla NF 2002) is used for this evaluation. The Wildlife Composite Rating identifies habitat restoration action/activities needs and opportunities, a high need for restoration in the watershed resulted in a high rating. Composite ratings were based on two variable, habitat abundance (Wisdom et al, unpublished) and disturbance departure (Hann et al, in press) for each watershed on the Forest. The assumption used for this analysis was that a high restoration need/opportunity equated to a high score, relative to terrestrial wildlife risk. The risk to wildlife is directly and indirectly associated with past and present activities in the watershed. The road system was and is an integral part of the resultant and ongoing impacts to wildlife. A high restoration need in the Wildlife Composite Rating was translated to a high risk to wildlife or a value of three. A moderate need for restoration equated to a moderate risk to wildlife or a value of two and a low restoration need was a low risk to wildlife. Segments that crossed multiple watersheds received the watershed rating where most of the road segment occurred.

Winter range

The intent of this element is to identify and score the level of risk the road segment has to big game winter range. Winter range (RMEF 1999) within 660 feet of a road segment is considered to have a low risk or a score of one, a moderate risk or a score of two occurs when winter range is within 150 feet (near or adjacent) of the road segment. If the road segment occurs within the winter range or most of the segment runs through winter range, it has a high risk or a score of three. When it is not certain what the score should be or there is a choice between the amounts of risk, the higher score will be chosen for the segment.

Calving area

The intent of this element is to identify and score the level of risk the road segment has to elk calving areas. Calving areas (RMEF 1999) within 660 feet of a road segment is considered to have a low risk or a score of one; a moderate risk or a score of two occurs when a calving area is within 150 feet (near or adjacent) of the road segment. If the road segment occurs within or most of the segment runs through calving area, it has a high risk or a score of three.

When it is not certain what the score should be or there is a choice between the amounts of risk, the higher score will be chosen for the segment.

Lynx habitat

The intent of this element is to identify and score the level of risk the road segment has to lynx habitat. If the road segment is within 660 feet (near or adjacent) of primary or secondary lynx vegetation the road segment is considered to have a low risk or a score of one, a moderate risk or a score of two occurs when the segment is within or mostly through secondary lynx vegetation. If the road segment occurs within or mostly through primary lynx vegetation, it has a high risk or a score of three. When it is not certain what the score is or there is a choice between amounts of risk, the higher score will prevail for the segment. Segments that crossed multiple vegetative types will receive the value where most of the road segment occurred.

Meadow habitat

The intent of this element is to identify and score the level of risk the road segment has to meadows (moist/wet/dry). Meadows within 660 feet of a road segment is considered to have a low risk or a score of one, a moderate risk or a score of two occurs when a meadow is within 150 feet (near or adjacent) of the road segment. If the road segment occurs within or most of the segment runs through meadow, it has a high risk or a score of three. When it is not certain what the score should be or there is a choice between the amounts of risk, the higher score will be chosen for the segment.

Riparian habitat conservation areas

The intent of this element is to identify and score the level of risk the road segment has to riparian habitat. Stream buffers are based on PacFish recommendations for riparian habitat conservation area (RHCA) for Class 1-4 streams. Class 1 & 2 streams have a 300 foot buffer, class 3 streams a 150 foot buffer and class 4 streams are buffered 50 feet. Road segments that intersect a 300-foot buffer (class 1&2 streams) are considered to have a high risk or a score of three, a moderate risk or a score of two occurs when the segment intersects a 150-foot buffer (class 3 stream). If the road segment intersects a 50-foot buffer, it has a low risk or a score of one. Road segments that do not intersect a RHCA have a zero value and no risk to wildlife. Road segments that cross multiple buffers receive the value of largest buffer the road segment intersected.

Nest trees

The intent of this element is to identify the road segments that have Bald eagle (BE), osprey (O), or goshawk (G) nest near the road. Road segments that contained a nest were noted.

Scale

This indicator will be useful at multiple scales. The Watershed Priority-Terrestrial Wildlife Composite element maybe limited to the Sub basin and Forest scales. Habitat and disturbance data would need updating to apply this indicator at the watershed and project scale. The remaining elements are most useful at the Forest and watershed scale. Current data can be carried over for watershed analysis but should be updated as needed.

Utility

A broad scale and fine scale assessment of the direct and indirect effects of the road system on terrestrial wildlife. This information would be most useful in establishing a baseline of affects resulting from the current road system. It would be useful in setting priorities for restoration to reduce the risk to terrestrial wildlife.

Analytical tools and information needs

GIS Road Analysis (OML 3,4,5, & Arterial/Collectors) coverage (ompl.shp)

Watershed Prioritization-Terrestrial Wildlife Composite Map

Big game winter range coverage (Measure and Prioritize (MAP) coverage, RMEF Elk Habitat Project; converted to a workable coverage (or_win.shp and wa_win.shp))

Elk calving area coverage (Measure and Prioritize (MAP) coverage, RMEF Elk Habitat Project; converted to a workable coverage (or_op.shp and wa_op.shp))

Lynx habitat coverage (lyxhab802.shp)

Meadows from vegetative coverage (EVG/PI vegetation data base)

Stream buffers, coverage (class1234.shp)

Bald eagle, peregrine falcon, osprey, and goshawk nest site near (660 feet (0.125 miles)) a roadway. Consult District personnel

Results

- A high risk rating for Watershed Prioritization occurred on 41 percent of roads analyzed. Thirty-eight percent of the roads analyzed received a moderate risk rating across the Forest. The majority of high ratings occurred in 11 watersheds ((HUC5) Upper Touchet River, Upper Tucannon River, Pataha Creek, Asotin River, Grande Ronde River/Rondowa, Grande Ronde River/Cabin Creek, Meacham Creek, Birch Creek, Upper Camas Creek, Big Creek, and Lower John Day River/Kahler Creek) from a probable 29 watersheds on Forest.
- The highest risk rating (20%) for Big Game Winter Range occurred on the south end of the Forest. The highest proportion of high ratings occurred in six watersheds (Birch Creek, NF John Day River/Big Creek, Big Creek, NF John Day River/Potamus Creek, Wall Creek, and Lower John Day River/ Kahler Creek) out of a probable 29 on Forest. Over half (57%) of the roads analyzed do not pose a risk to winter range habitat.
- Conflicts between roads and calving areas occurred on a small percentage of roads analyzed. High and moderate risk was limited to a small portion of 10 watersheds (Rhea Creek, Upper Willow Creek, Upper Butter Creek, NF John Day River/Potamus Creek, Lower Camas Creek, Upper Camas Creek, Lookingglass Creek, Upper Tucannon River, Pataha Creek and Asotin Creek) from probable 29 watersheds on Forest. Most (87%) of the roads analyzed do not pose a risk to calving areas.
- Risks associated with lynx habitat occurred primarily (22%) on the north end of the Forest. The high risk rating on the south end occurred only on the NF John Day Ranger District. Most of the high ratings occurred in 10 watersheds (Upper Touchet River, Pataha Creek, Asotin River, Mill Creek, Upper Walla Walla, Grande Ronde River/Rondowa, Lookingglass Creek, Upper Umatilla River, NF John Day River/Big Creek, Big Creek, and Desolation Creek) out of a probable 29 watersheds on Forest. Over half (59%) of the roads analyzed do not pose a risk to lynx habitat.
- Risk associated with meadow habitat occurred on 65 percent of the roads analyzed. Thirty-seven percent of the roads analyzed on the Forest were rated high. The amounts of high-risk roads were similar on the north (17%) and south (20%) ends of the Forest for meadow habitat analysis element.
- Risk associated with riparian habitat occurred on all but 12 percent of the roads analyzed. Forty-six percent of the roads analyzed on the Forest were rated high. The majority of roads (34%) with a high risk rating for riparian habitat occurred on the south end of the Forest. Most of the high ratings occurred in 10 watersheds (Upper Tucannon River, Lookingglass Creek, Upper Camas Creek, NF John Day River/Big Creek, Desolation Creek, Granite Creek, Big Creek, Lower Camas Creek, NF John Day River/Potamus Creek, and Wall Creek) out of a probable 29 watersheds on Forest.

Data Limitation

Habitat attribute (meadow, subalpine fir, grand fir, etc.) used to identify analysis elements (meadow, lynx habitat) were based on a compiled vegetative database. The vegetative coverage included EVGPI (photo interpretation), stand exams from Heppner, Pomeroy, and Walla Walla Districts, Pomeroy harvest coverage (PMHARV_UPD), and the current PVEG (Potential Vegetation) coverage. An ARC and ARCView processes were used to combine coverage and data into a single vegetation cover for the Forest. The vegetative layer database was reviewed by

Districts but not field verified, so the coverage may be appropriate but not completely accurate. In addition, some of the coverage and data is 10-15 years old, and may not be an accurate representation of the present vegetative condition on some site. However, even with these limitations, this is the "best" data available to conduct habitat analysis.

When a road segment received a score (0-3), it did not necessarily mean risk occurred for the full length of the segment. Because of the limited time to complete the analysis and the scale of the analysis (broad), segments were not further subdivided when the risk to wildlife changed. In most cases, the score reflected the highest risk rating for the largest portion of the segment. For example, an 8-mile road segment with a score of 3 may only have 4 miles of high risk (3), 1 mile of moderate risk (2), and 3 miles of low risk (1). The more detailed and accurate analysis (fine scale) would be appropriate in a watershed or project assessment to pinpoint and identify specific areas of high, moderate, and low risk.

INDICATOR 2:

Road system intensity

Questions potentially addressed

TW (1) What are the direct and indirect effects of the road system on terrestrial species habitat? TW (2) How does the road system facilitate human activities that affect habitat? TW (3) How does the road system affect legal and illegal human activities (including trapping, hunting poaching, harassment, road kill, or illegal kill levels)? What are the effects on wildlife species?

Description of indicator

The indicator assesses the affect of the road system on wildlife habitat with regards to traffic volume and road density. The intent is to identify the risk to habitat in relation to the analysis elements.

Analysis elements

Two elements were selected to evaluate the intensity of the road system and the risk to terrestrial wildlife habitat. The elements used for the analysis are traffic level and open road density. These elements were selected to present a perspective on cumulative effects and to highlight risks associated with wildlife movement and disturbance. Each road segment received a score based on the intensity of the element and the associated risk to wildlife habitat. Score of one meant low road intensity and a low risk to terrestrial wildlife and a score of three meant high intensity and a high risk to terrestrial wildlife. If an element had zero intensity, the road segment received a zero value.

Traffic level

The intent of this element is to characterize the traffic level/use level for each road segment. The level of use or volume was based on the judgment and experience of District Road Managers and District biologist. Road segments identified as having a high volume of traffic or high use were considered a high risk to terrestrial wildlife and given a score of three. A moderate level of use was considered a moderate risk to terrestrial wildlife and resulted in a score of two. A low use level was translated to low risk to wildlife and scored as one.

Open road density

The intent of this element is to characterize open road density in the area of the road segment. Road density is an indicator of the cumulative effects of the road system on terrestrial wildlife. For this assessment, road density was calculated using a "Moving Windows Program" developed by the Region (USDA Forest Service Memo, 1997). The road analysis coverage was overlaid on the road density coverage and each segment was scored. If the road segment occurs within a high-density area or most of the segment runs through a high area, the risk to terrestrial wildlife is high and is scored as a three. If the road segment occurs within a moderate-density area or most of the segment runs through a moderate area, the risk to terrestrial wildlife is moderate and is scored as a two. Segment within or through low-density areas were considered a low risk to terrestrial wildlife and given a score of one. A zero score is given to roads occurring in areas with a zero road density.

Open Road Density (Mi./SqMi.)	Risk to Terrestrial Wildlife	Score
0	None	0
0.1 – 0.5	Low	1
0.6 – 1.0		
1.1 – 1.5	Medium	2
1.6 – 2.0		
2.1 – 2.5	High	3
2.6 – 3.0		
>= 3.1		

Scale

Data would be useful at multiple scales from subbasin to subwatershed. Data can be clipped from the coverage or aggregated at the appropriate scale.

Utility

A broad scale and fine scale assessment of the direct, indirect, and cumulative effects of the road system on terrestrial wildlife habitat. This information establishes a baseline of affects resulting from the current road system. It would be useful in setting priorities for restoration to reduce the risk to terrestrial wildlife habitat.

Analytical tools and information sources

GIS road analysis coverage (ompl.shp)

Traffic levels/use levels for road segments, consultation with District.

All open roads (open, seasonally opened, no trails (Justopenroads.shp and O_dens.shp))

Results

- A high or moderate risk associated with traffic level/use occurred on 67 percent of the roads analyzed on the Forest. Thirty-eight percent of the roads were rated high. The majority of high-risk roads (23%) occurred on the south end of the Forest. The amounts of moderate-risk roads were the same for the north (15%) and south (15%) ends of the Forest.
- A high risk to wildlife occurred on 72 percent of the roads associated with a high open road density. A moderate risk occurred on 25 percent of the roads in the analysis. The majority of high-risk roads (41%) occurred on the south end of the Forest. Most of the high ratings occurred in eight watersheds (Pataha Creek, Asotin Creek, Lookingglass Creek, Upper Camas Creek, Lower Camas Creek, Wall Creek, Upper Rock Creek, and Lower John Day River/Kahler Creek) out of a probable 29 watersheds on Forest.

Data Limitation

When a road segment received a score (0-3), it did not necessarily mean risk occurred for the full length of the segment. Because of the limited time to complete the analysis and the scale of the analysis (broad), segments were not further subdivided when the risk to wildlife changed. In most cases, the score reflected the highest risk rating for the largest portion of the segment. For example, an eight-mile road segment with a score of 3 may only have 4 miles of high risk (3), 1 mile of moderate risk (2), and 3 miles of low risk (1). The more detailed and accurate analysis (fine

scale) would be appropriate in a watershed or project assessment to pinpoint and identify specific areas of high, moderate, and low risk.

Open road density is based on data with in the INFRA database identifying roads closed with a designate CFR. Open roads include roads (not trails) that were open any season or length. The database may not accurate reflect "closed" road segments.

Terrestrial Wildlife Risk Factor

RISK RATING:

Scores are combined and assigned a risk factor for Terrestrial Wildlife.

Combine score

A score was assessed for each road segment based on the eight analysis elements. Element scores ranged from 0 – 3, with a three meaning a high risk to terrestrial wildlife and one a low risk to wildlife. An additional point (one) was given to road segments that contained a nest site near the road. To meet the objective of the process and arrive at one rating for each segment, scores were tallied for each segment. Scores ranged from 2 – 22, with the majority of segments (66%) having 9-14 points.

Risk factor

After scores were tallied, they were ranked from high to low and given a rating of high, medium, or low risk to terrestrial wildlife. Segments with the higher scores represented a higher risk to wildlife and those with a relatively low score were a low risk to wildlife. The total score and corresponding rating are identified on the following table.

Total Score	Terrestrial Wildlife Risk Rating
2 - 8	Low
9 - 12	Medium
13 - 22	High

Scale

Data would be useful at multiple scales from sub basin to sub watershed. Data can be clipped from the coverage or aggregated at the appropriate scale.

Utility

A broad scale and fine scale assessment of the direct, indirect, and cumulative effects of the road system on terrestrial wildlife habitat. This information establishes a baseline of affects resulting from the current road system. It would be useful in setting priorities for restoration to reduce the risk to terrestrial wildlife habitat.

Analytical tools and information sources

GIS road analysis coverage (ompl.shp)

Traffic levels/use levels for road segments, consultation with District.

All open roads (open, seasonally opened, no trails (Justopenroads.shp and O_dens.shp))

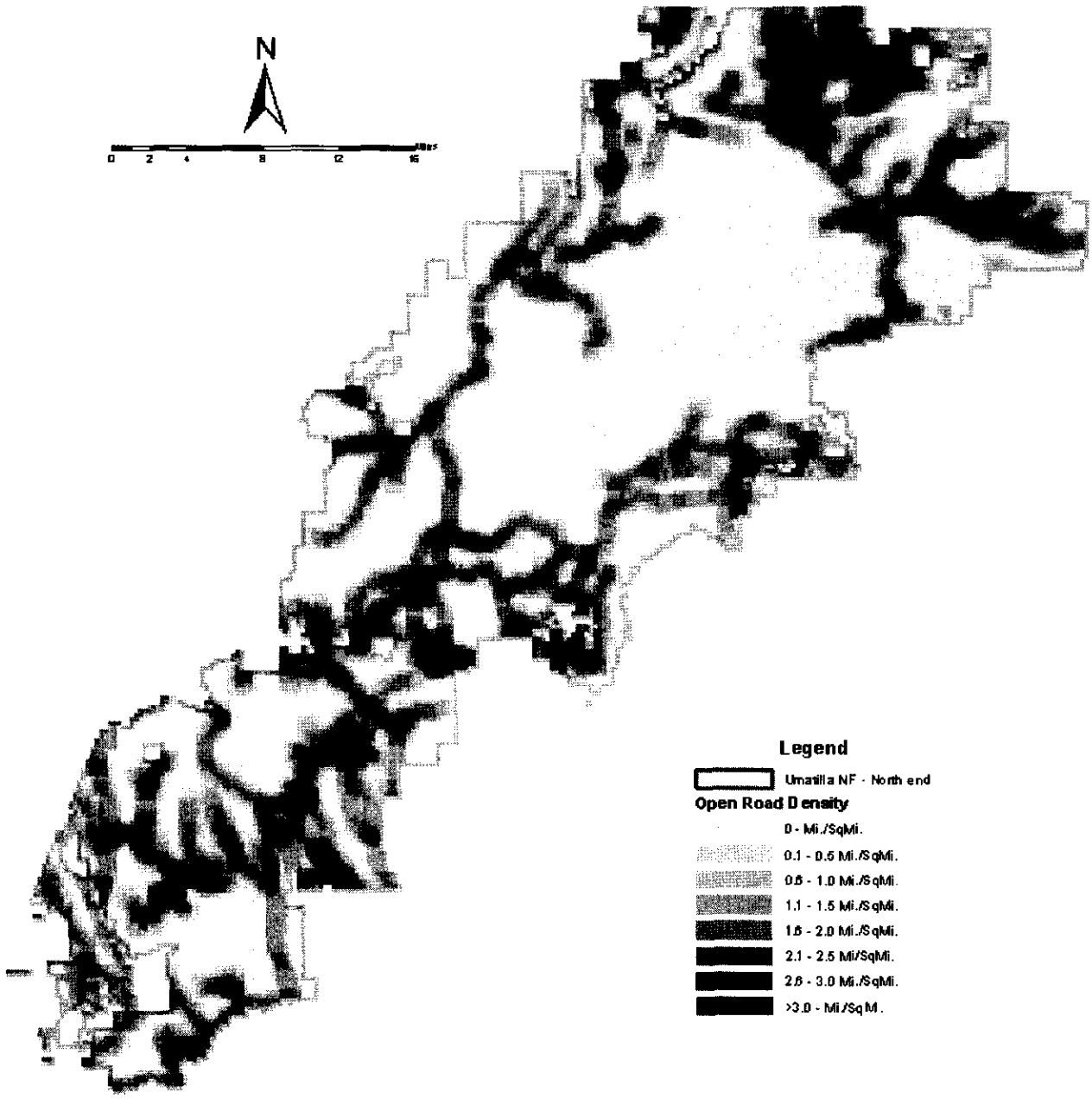
Results

- Approximately, 794 miles of road (175 segments) were considered a high risk to terrestrial wildlife; 551 miles (258 segments) were rated as moderate risk to wildlife and 78 miles (60 segments) had a low risk to wildlife.
- A high or moderate Terrestrial Wildlife Risk (combined) occurred on ninety-four percent of the roads analyzed across Forest.
- Fifty-six percent of the roads were rated high.
- The majority of high-risk roads (31%) occurred on the south end of the Forest.
- The amounts of moderate-risk roads was similar on the north (17%) and south (21%) ends of the Forest.
- Most of the high ratings occurred in 13 watersheds (Upper Touchet Creek, Upper Tucannon, Pataha Creek, Asotin Creek, Grande Ronde River/ Rondowa, Lookingglass Creek, Birch Creek, Upper Camas Creek, NF John Day River/Big Creek, Desolation Creek, Big Creek, NF John Day River/Potamus Creek, and Lower John Day River/Kahler Creek) out of a probable 29 watersheds on Forest.

Road Analysis

Open Road Density for Operational Maintenance Levels 2, 3, 4 and 5

12/16/2002



Noxious Weed Risk Method

Questions addressed by this indicator

EF (2) Road effects on introduction and spread of exotic plants, especially noxious weeds.

Description of rating

For each road segment, noxious weed risk was evaluated by four key factors that control or strongly influence the introduction, spread, and impact of noxious weeds. These include: (1) seed availability and consequences of further spread (areal extent of existing weed infestations for high and low risk weed species), (2) habitat potential (vegetation and climatic conditions), and (3) spread potential (level of grazing activity). Data sources used in the model incorporate GIS coverages and databases of current (2001) noxious weed inventories, Forest transportation layer, grazing allotments, existing vegetation, and potential vegetation groupings.

Analysis factors

Factor 1: Likelihood and consequences of noxious weed establishment and spread along a road corridor based on seed availability and the type of weed species present. High risk weed species include those that are: (a) highly competitive, (b) have a high potential for rapid increase in population size and long distance dispersal, and (c) are difficult to control. Low risk weed species are those that are present on the Forest but are a low priority for treatment due to their ubiquitous nature, as well personnel and funding constraints. The weed risk category for each inventoried species on the Forest is displayed in Table 2:

Table 2. Weed risk category for inventoried species.

Common Name	Scientific Name	High Risk	Low Risk
Whitetop	Cardaria draba	X	
Spotted knapweed	Centaurea maculosa	X	
Bachelor's button	Centaurea cyanus	X	
Diffuse knapweed	Centaurea diffusa	X	
Yellow starthistle	Centaurea solstitialis	X	
Russian knapweed	Centaurea repens	X	
Leafy spurge	Euphorbia esula	X	
Dalmatian toadflax	Linaria dalmatica	X	
Yellow toadflax	Linaria vulgaris	X	
Scotch thistle	Onopordum acanthium	X	
Sulphur cinquefoil	Potentilla recta	X	
Tansy ragwort	Senecio jacobaea	X	
Medusahead	Taeniatherum caput-medusae	X	
Common tansy	Tanacetum vulgare	X	
Musk thistle	Carduus nutans		X
Canada thistle	Cirsuim arvense		X
Bull thistle	Cirsium vulgare		X
Hound's tongue	Cynoglossum officinale		X
Orange hawkweed	Hieracium aurantiacum		X
St. John's Wort	Hypericum perforatum		X

Common Name	Scientific Name	High Risk	Low Risk
Perennial pepperweed	Lepidium latifolium		X
Russian thistle	Salsola kali		X
Puncturevine	Tribulus terrestris		X
Ventenata grass	Ventenata dubia		X
Common mullein	Verbascum thapsus		X

For each road segment, the following parameters were calculated: (a) the number of noxious weed acres for high and low risk species occurring within 300' of the road, (b) the total number of infested acres occurring within 300' of the road, and (c) the percent of the road segment area (600' x no. of feet of road) infested by high and low risk noxious weeds. A composite risk rating and score for Factor 1 was calculated using the following rule set:

None: (0): No noxious weeds are present within the buffered road segment area.

Low (1): Noxious weed infestations are present within and immediately adjacent to the road segment, but are comprised only of low risk species. Road related activities are not likely to have significant consequences in terms of the establishment and spread of noxious weed species.

Moderate (5): Moderately sized infestations (< 65 acres) of high risk noxious weed species are located within or immediately adjacent to the road segment. Road related activities are likely to result in some areas becoming infested with highly undesirable plant species, even when preventative management activities are followed.

High (10): Large infestations (>65 acres) of high risk noxious weed species are located within or immediately adjacent to the road segment. Road related activities, even with preventative management actions, have a high likelihood of resulting in the establishment and spread of undesirable plants throughout the area.

Factor 2: Likelihood of noxious weed establishment and spread along road corridor based on habitat potential. For each buffered (300') road segment, the number of acres occurring in the following classes was calculated: (a) grassland, shrubland, and warm-to-dry forest (PIPO) with a canopy closure of less than 40 percent, (b) warm, dry-to-moist forested PVG's, plus warm-to-hot, dry forested PVG's with more than 40 percent canopy closure, and all meadow types, and (c) cool-to-cold and moist-to-wet forested PVG's

Low (1): Low habitat potential for noxious weed invasion and spread. Road segment vegetation dominated by cool-to-cold and moist-to-wet forested PVG's.

Moderate (5): Moderate habitat potential for noxious weed invasion and spread. Road segment vegetation dominated by warm, dry-to-moist forested PVG's, warm-to-hot, dry forested PVG's with more than 40 percent canopy closure, or meadow types.

High (10): High habitat potential for noxious weed invasion and spread. Road segment vegetation dominated by grassland, shrubland, or warm-to-dry forest (PIPO) with a canopy closure of less than 40 percent.

Factor 3: Likelihood of noxious weed establishment and spread along road corridor based on grazing related disturbances and activities. The status and score of each buffered (300') road segment was determined as follows:

Low (1): Over 50 percent of the road segment area is outside an active allotment.

Medium (5): Over >50 percent of the road segment area is in a vacant allotment.

High (10): Over >50% of the road segment area is in an active allotment.

Risk Rating Procedure

Step 1. Identify the level of likelihood or consequence of adverse effects for each of the three risk factors, and assign values according to the following rating system: Low = 1 point, Moderate = 5 points, and High = 10 points.

Step 2. A composite risk score for each road segment is calculated as adding the third factor score to the product of the first 2 factors (i.e., Factor 1 X Factor 2 + Factor 3).

Step 3. Use the value resulting in step 2 to determine the overall risk rating for each road segment:

Value	Overall Risk Rating
1 - 19	Low
20 - 60	Moderate
>60	High

Step 4. Consult with District weed specialists, and make risk adjustments based on their recommendations.

Scope of analysis

The Umatilla National Forest manages or shares management of approximately 4,876 miles of public road (all operational maintenance levels). Of this total, the noxious weed risk analysis was conducted on 1,606 miles, or 33 percent of the classified road system. The analysis focused on Forest Service jurisdiction roads (although other jurisdiction roads were also rated), operational maintenance level 3-5, and included "collector" and "arterial" roads that together form the "backbone" road system. As such, this provides a limited view of the true noxious weed risk posed by the entire road system.

Scale

The scale of the Forest-wide analysis was at the road segment level, with some consideration for watershed context and cumulative effects through reference to the Forest's Noxious Weed Watershed Risk Rating and Prioritization (2002).

Application

Results from the analysis are applicable at the Forest and watershed scales, and identify road segments and areas where noxious weed establishment and spread are most problematic. The information will be useful in setting noxious weed treatment priorities (both on- and off-Forest) and for determining where prevention and mitigation strategies are most urgently needed. For example, road maintenance activities in high risk road segments can be timed to occur outside peak weed seed dispersal periods.

Analytical tools and information needs

GIS Road Analysis (OPML 3,4,5, & Arterial/Collectors) coverage (ompl.shp)

Noxious Weed GIS Coverage and Database, 2002.

Potential and Existing Vegetation GIS coverages

Range Allotment GIS coverage

Results

All of the 553 road segments, including those outside of FS jurisdiction, were rated using the three factors described above. Noxious weed infestations were present in the vast majority (89%) of the road segment corridors. Thirty six (6%) of the road segments received a high composite noxious weed risk rating (Table 3) due to the coincidence of large sized noxious weed infestations and habitats with a high potential for spread. Of the remaining segments, 14 percent were in the moderate risk category, and 80 percent were in the low risk category (Table 1). The average length of high risk road segments was higher than other risk categories. High risk segments tend to occur adjacent to roads that access forest land from agricultural areas, specifically: Road 47 (Tucannon Rd.), 32, 62, 63, 3963, 54 (Pearson Ck. Rd.), 10 (Granite Rd.), and 53. Heppner RD had the highest number of high risk road segments (n=13) and miles (n=95), followed by Walla Walla, North Fork John Day, and Pomeroy Ranger District (Table 4).

Table 3. Summary of Watershed-Road Risk Ratings

Noxious Weed Road Risk	Number of Road Segments	Percent	Miles of Road	Percent	Average Segment Length
High	36	6	247	15	6.9
Moderate	76	14	272	17	3.6
Low	441	80	1087	68	2.5
TOTAL	553	100	1606	100	2.9

Table 4. The number and miles of road segments with a high noxious weed risk rating by Ranger District.

Ranger District	Number and Percent of High Risk Road Segments	Total Number of Road Segments	Number and Percent of High Risk Miles of Road	Total Number of Road Segment Miles
Heppner	13 (11%)	121	95 (28%)	346
North Fork John Day	8 (4%)	187	50 (8%)	609
Walla Walla	8 (5%)	170	73 (16%)	458
Pomeroy	7 (9%)	77	28 (15%)	193

Data and Analysis Limitations

The analysis was conducted using available data to approximate noxious weed risk and road-weed interactions. The ratings were simplified for analytical ease, which may have resulted in inflated risk values for some sites. For example, noxious weed plant cover was not included in the risk rating, and many large sites have low density weed populations. Moreover, the polygon size of weed infestations is not generally changed from the original recording (i.e., is not adjusted in GIS updates), even as weed treatments occur and infestations decline in size over time. On the other hand, disturbances and other factors that influence noxious weed invasions were not evaluated in the rating procedure, which may underestimate risk in some environmental settings – especially high elevation, cold/wet or shady sites.

Upland Forest Restoration Value Method

Introduction

Upland-forest restoration opportunities were analyzed using seven criteria. The analysis pertains to Umatilla National Forest lands located within 36 watersheds (5th field Hydrologic Unit Codes or HUC5s) of northeastern Oregon and southeastern Washington. Although portions of four other watersheds occur within the Umatilla National Forest boundary, they contain limited amounts of national forest lands (generally 1 acre or less) and were excluded from this analysis due to a lack of information about their condition.

The ecological literature tends to focus on the negative impact of roads. Although roads can certainly have detrimental ecological or environmental effects, they also provide positive benefits from socioeconomic and other perspectives (Lugo and Gucinski 2000). This analysis of the Umatilla National Forest's transportation system viewed roads as a value, rather than a risk, because they provide access to upland-forest sites where active-restoration treatments are needed.

Methods

Analysis criteria were selected to address forest health, changes in species composition and forest structure, and other upland-forest issues. These issues surfaced during three broad-scale, science-based assessments completed over the last decade, as described below:

- The Caraher Report, titled "Restoring Ecosystems in the Blue Mountains: A Report to the Regional Forester and the Forest Supervisors of the Blue Mountains," was released in July 1992 (Caraher and others 1992). It was prepared by a panel of resource scientists who assessed nine criteria (early seral, late seral park-like, late seral tolerant multistory, high density low vigor ponderosa pine, high density low vigor lodgepole pine, available fuels, juniper-grasslands, riparian shrub cover, and streambank stability) for all of the river basins occurring in the Blue Mountains.
- The Everett Report, titled the "Eastside Forest Ecosystem Health Assessment," was released in April 1993. It was a response to a request by U.S. House Speaker Tom Foley and U.S. Senator Mark Hatfield for a scientific evaluation of the effects of Forest Service management practices on the sustainability of forest ecosystems in eastern Oregon and eastern Washington. The Pacific Northwest Research Station published assessment findings as a series of general technical reports in 1994 and 1995 (Lehmkuhl and others 1994, and many others).
- President Bill Clinton issued this direction on July 1, 1993: "management of eastside forests will need to focus on restoring the health of forest ecosystems impacted by poor management practices of the past... The President is directing the Forest Service to develop a scientifically sound and ecosystem-based strategy for management of eastside forests. This strategy should be based on the forest health study recently completed by agency scientists [the Everett Report] as well as other studies." This direction resulted in the Interior Columbia Basin Ecosystem Management Project (ICBEMP) initiated in January 1994. ICBEMP produced broad-scale and mid-scale ecosystem assessments covering 145 million acres of federal land in seven western states. Many science reports were published by ICBEMP (Hessburg and others 1999, Quigley and others 1996, and others).

Bias for Action Assumption. Note that this upland-forest restoration analysis adopted a "bias for action" approach – it was assumed that a proactive response (active restoration) would be a more effective restoration strategy than avoidance (passive restoration). This assumption relates to the broad-scale assessments described above because they concluded that changes in forest composition and structure were often related to suppression of native disturbance processes such as wildfire and defoliating insects.

A primary focus of forest restoration is to use active management treatments to emulate the intensity, scale and pattern of historical (native) disturbance processes. The objective of restoration treatments is to address fire hazard and insect and disease susceptibility; production of timber, water, forage and other commodities (if any) is only a by-product of meeting the goals and objectives.

Restoration Analysis Criteria. These seven criteria were used to analyze upland-forest restoration opportunities for 36 watersheds occurring entirely or partly within the Umatilla National Forest:

1. **Percent of overstocked area**; rated using recently developed stocking recommendations that vary by ecological site potential (plant association). Stocking refers to how much growing space is currently occupied by trees as compared to a site's 'carrying capacity' for forest (tree) density. Carrying capacity levels were based on recommendations from recent stocking guides (Cochran and others 1994, Powell 1999, Powell 2001b).
2. **Crown fire potential**; rated using crown bulk density (CBD) thresholds that relate forest (tree) density levels to foliage volume/biomass. The CBD thresholds varied by forest cover type (Agee 1996, Powell 2001a).
3. **Percent of high density, low vigor ponderosa pine** and whether the percentage represents a departure from the historical range of variability for that vegetative condition (Caraher and others 1992).
4. **Percent of high density, low vigor lodgepole pine** and whether the percentage represents a departure from the historical range of variability for that vegetative condition (Caraher and others 1992).
5. **Opportunity to restore the old forest single stratum** structural class on dry forest sites (based on an HRV analysis of forest structural classes) (Blackwood 1998). The 'OFSS' structural class is now so rare as to be considered a threatened ecosystem of the United States (Noss and others 1995).
6. **Percent of western juniper invasion** on dry forest sites and whether the percentage represents a departure from the historical range of variability for that cover type (Morgan and Parsons 2000).
7. **Percent of ponderosa pine cover type** on dry forest sites and whether the percentage represents a departure from the historical range of variability for that cover type (Morgan and Parsons 2000).

Ratings for each criterion were derived from queries of a Forest-wide vegetation database compiled between January and July of 2001. It contains characterization information for 29,634 individual polygons; information came from a variety of sources such as interpretation of aerial photography, walk-through surveys, stand examinations, and so forth (Powell 2001c).

Most of the analyses used a technique called the "historical range of variability" (HRV). In an HRV-based analysis, current conditions are compared to a range of historical conditions, as they existed prior to significant modification or influence by Euro-Americans. Instances where current conditions deviate from the historical range (whether above or below) are of particular concern because they indicate situations that may be unsustainable, at least to whatever extent historical conditions represent sustainability.

Note that for two of the criteria, the ranges used in the HRV analysis varied by climatic regime, so each of the 36 watersheds was assigned to either a marine or mixed regime using information provided by Caraher and others (1992) (note that the mixed regime refers to areas where the climate is influenced by, or has some of the characteristics of, both the marine and continental regimes).

Restoration Analysis Ratings. The descriptive ratings (high, medium, low) were converted to a numeric score (1=low; 2=medium; 3=high) and then summed to produce a composite rating for each watershed. The 36 watershed scores were then arrayed from lowest to highest, examined by the analyst, and subjectively delineated into three groups: watersheds with low, medium, or high opportunity to apply active restoration treatments on upland-forest sites.

Roads Analysis Methods. After rating all 36 watersheds for each of the seven restoration criteria, a geographic information system was used to overlay the road segments and the watersheds. The restoration ratings associated with each watershed were then assigned to all road segments in the watershed (e.g., road segments in a watershed with a 'high' composite rating also received a 'high' rating in the upland-forest value column in the roads analysis spreadsheet).

Results

Rating results for the seven upland-forest criteria, as summarized for each road segment included in the Umatilla National Forest roads analysis spreadsheet, are provided in Table 5 at the end of this document.

Restoration Analysis Results. Of the 36 watersheds for which national forest system (NFS) data was available, 7 of them (19%) had a composite restoration rating of low. These watersheds were concentrated on the east-central side of the Umatilla National Forest, ranging from Meadow Creek on the south to Grande Ronde River/Grossman Creek on the north.

Of the 36 watersheds for which NFS data was available, 18 of them (50%) had a composite restoration rating of medium. These watersheds were distributed across the Umatilla National Forest, with pretty much an equal representation on both the south and north ends.

Of the 36 watersheds for which NFS data was available, 11 of them (31%) had a composite restoration rating of high. These watersheds were primarily concentrated on the south end of the Umatilla National Forest (North Fork John Day and Heppner Ranger Districts) although three of them were located on the north end (Pomeroy RD) – Upper Tucannon River, Pataha Creek, and Asotin Creek.

Roads Analysis Results. Of the 495 road segments having Forest Service jurisdiction, 75 of them (15%) occurred in watersheds with a composite upland-forest restoration rating of low. These road segments access areas where the opportunity and need for active restoration treatments is low.

Of the 495 road segments having Forest Service jurisdiction, 199 of them (40%) occurred in watersheds with a composite upland-forest restoration rating of medium. These road segments access areas where the opportunity and need for active restoration treatments is moderate.

Of the 495 road segments having Forest Service jurisdiction, 221 of them (45%) occurred in watersheds with a composite upland-forest restoration rating of high. These road segments access areas where the opportunity and need for active restoration treatments is high.

Active Restoration Treatments

There are a wide variety of active restoration treatments that could be used to respond to the issues addressed by this analysis. Those issues, and corresponding restoration recommendations for upland forest sites, are provided here.

1. *Many watersheds have tree density levels that threaten future sustainability of upland forests.* This issue is represented by four criteria: percent of overstocked area; crown fire potential; percent of high density, low vigor

ponderosa pine; and percent of high density, low vigor lodgepole pine. Upland forest restoration treatments that respond to this issue include:

- **Thinning** to reduce stocking levels and thereby restore sustainable forest density;
- **Pruning** (in conjunction with thinning) on sites with high crown fire potential, particularly as one option to reduce 'ladder' fuels;
- **Stewardship harvest** on sites where tree removals have potential product value (commercial thinnings, for example).

2. *Many watersheds have dry sites where forest composition and structure are inconsistent with ecosystem integrity and resilience.* This issue is represented by three criteria: opportunity to restore the 'old forest single stratum' structural class; percent of western juniper invasion; and percent of ponderosa pine cover type. Upland forest restoration treatments that respond to this issue include:

   - **Understory thinning** to convert the 'old forest multi strata' structural class back to the 'old forest single stratum' class that existed historically;
   - **Improvement cutting** in late-seral forests where ponderosa pine still exists (these sites are successionally advanced and dominated by late-seral tree species such as grand fir and Douglas-fir);
   - **Forest regeneration cutting** on dry-forest sites where ponderosa pine no longer exists (these areas are successionally advanced and no longer contain an ecologically appropriate representation of the predominant early-seral tree species on dry sites – ponderosa pine);
   - **Prescribed burning** on dry-forest sites that have an existing composition and structure that is amenable to this practice, and as a follow-up treatment in stands where thinning, pruning, stewardship harvest, or improvement cutting have created appropriate (safe) conditions for its application.

Definitions of active restoration treatments included in these recommendations are provided below (definitions are generally from Helms 1998).

1. **Forest Regeneration Cutting.** Regeneration cutting involves removal of existing trees to assist regeneration already present (cutting overstory or seed trees that compete with, or otherwise influence, an understory of seedlings and saplings), or to make future regeneration possible. If regeneration is not already present before existing trees are removed, then it becomes established from seed trees left on site or by planting tree seedlings grown in a nursery.
2. **Improvement Cutting.** Removal of less desirable trees in order to meet objectives related to species composition or vertical stand structure. Trees of undesirable species or condition are removed from the upper canopy, often in conjunction with an understory thinning. For the upland forest recommendations, improvement cutting would be applied in mixed-species stands that still have a viable component of ponderosa pine. In that context, species or trees competing with the pine would be removed; the objective is to provide additional growing space for residual ponderosa pines in order to improve their vigor, insect and disease resistance, seed production, and longevity.
3. **Prescribed Fire.** Deliberate burning of wildland fuels in either a natural or modified state, and under specified environmental conditions, in order to confine the fire to a predetermined area and to produce a fireline intensity and rate of spread that meets established resource management objectives.
4. **Pruning.** Deliberate removal of side branches (live or dead) and multiple leaders from a standing tree. Pruning is often done to improve the aesthetics or health of a forest, to reduce fuel ladders and associated wildfire risk, or to produce clear (knot free), economically valuable wood.

5. **Stewardship Harvest.** Any timber harvest treatment completed for reasons other than production of timber commodities. Timber harvest where the primary objective is to improve forest health or reduce wildfire risk by removing woody biomass is an example of stewardship harvest.

6. **Thinning.** A treatment in immature forests designed to reduce tree density and thereby improve growth of the residual trees, enhance forest health, or recover potential mortality resulting from intertree competition. Two types of thinning are recognized – commercial thinning where the trees being removed are large enough to have economic value and can be sold to a timber purchaser, and noncommercial thinning where trees are too small to be sold for conventional products and they are left on site after being cut.

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
1	10	5	A	FS	1707020204	M	H	H	L	H	L	H	H
2	10	5	A	FS	1707020202	H	H	H	H	H	L	H	H
3	10	5	A	FS	1707020202	H	H	H	H	H	L	H	H
4	480	5	L	FS	1707020202	H	H	H	H	H	L	H	H
5	481	5	L	FS	1707020202	H	H	H	H	H	L	H	H
6	1003	5	C	FS	1707020204	M	H	H	L	H	L	H	H
7	1003	5	C	FS	1707020204	M	H	H	L	H	L	H	H
8	1003	5	C	FS	1707020204	M	H	H	L	H	L	H	H
9	1003	5	C	FS	1707020204	M	H	H	L	H	L	H	H
10	1003	5	C	FS	1707020204	M	H	H	L	H	L	H	H
11	1006	5	C	FS	1707020207	H	L	H	L	H	M	H	H
12	1007	5	C	FS	1707020204	M	H	H	L	H	L	H	H
13	1007	5	C	FS	1707020204	M	H	H	L	H	L	H	H
14	1007	5	C	FS	1707020204	M	H	H	L	H	L	H	H
15	1009	5	C	FS	1707020204	M	H	H	L	H	L	H	H
16	1009	5	C	FS	1707020204	M	H	H	L	H	L	H	H
17	1010	5	C	FS	1707020204	M	H	H	L	H	L	H	H
18	1010	5	C	FS	1707020204	M	H	H	L	H	L	H	H
19	1010	5	C	FS	1707020204	M	H	H	L	H	L	H	H
20	1010	5	C	FS	1707020204	M	H	H	L	H	L	H	H
21	1011	5	C	FS	1707020204	M	H	H	L	H	L	H	H
22	1011	5	C	FS	1707020204	M	H	H	L	H	L	H	H
23	1012	5	C	FS	1707020204	M	H	H	L	H	L	H	H

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
24	1012	5	C	FS	1707020204	M	H	H	L	H	L	H	H
25	1014	5	C	FS	1707020204	M	H	H	L	H	L	H	H
26	1030	5	C	FS	1707020202	H	H	H	H	H	L	H	H
27	1031	5	C	FS	1707020202	H	H	H	H	H	L	H	H
28	1035	5	C	FS	1707020202	H	H	H	H	H	L	H	H
29	1038	5	C	FS	1707020202	H	H	H	H	H	L	H	H
30	13	5	C	FS	1707020202	H	H	H	H	H	L	H	H
31	1310	5	C	FS	1707020202	H	H	H	H	H	L	H	H
32	1310	5	C	FS	1707020202	H	H	H	H	H	L	H	H
33	1310	5	C	FS	1707020202	H	H	H	H	H	L	H	H
34	400	2	L	FS	1707020401	H	L	M	L	M	L	M	M
35	2039	2	C	FS	1707020208	H	L	H	M	H	M	H	H
36	2039	2	C	FS	1707020208	H	L	H	M	H	M	H	H
37	2039	2	C	FS	1707020208	H	L	H	M	H	M	H	H
38	2039	2	C	FS	1707020208	H	L	H	M	H	M	H	H
39	2039	2	C	P									
40	2039	2	C	P									
41	30	2	L	FS	1707020208	H	L	H	M	H	M	H	H
42	50	2	L	FS	1707020208	H	L	H	M	H	M	H	H
43	21	2	A	C									
44	21	2	A	FS	1707020207	H	L	H	L	H	M	H	H
45	21	2	A	C									
46	21	2	A	C									

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
47	21	2	A	FS	1707020208	H	L	H	M	H	M	H	H
48	21	2	A	FS	1707020208	H	L	H	M	H	M	H	H
49	21	2	A	FS	1707020411	H	M	H	L	H	L	H	H
50	21	2	A	FS	1707020208	H	L	H	M	H	M	H	H
51	21	2	A	FS	1707020411	H	M	H	L	H	L	H	H
52	21	2	A	P									
53	160	2	L	FS	1707020208	H	L	H	M	H	M	H	H
54	300	2	L	P									
55	300	2	L	FS	1707020208	H	L	H	M	H	M	H	H
56	2103	2	C	C									
57	30	2	L	FS	1707020207	H	L	H	L	H	M	H	H
58	2104	2	C	C									
59	2104	2	C	C									
60	2104	2	C	FS	1707020207	H	L	H	L	H	M	H	H
61	2105	2	C	FS	1707020207	H	L	H	L	H	M	H	H
62	2105	2	C	FS	1707020207	H	L	H	L	H	M	H	H
63	2106	2	C	FS	1707020207	H	L	H	L	H	M	H	H
64	2107	2	C	FS	1707020208	H	L	H	M	H	M	H	H
65	2107	2	C	FS	1707020208	H	L	H	M	H	M	H	H
66	2110	2	C	FS	1707020208	H	L	H	M	H	M	H	H
67	2110	2	C	FS	1707020207	H	L	H	L	H	M	H	H
68	2110	2	L	FS	1707020207	H	L	H	L	H	M	H	H
69	2115	2	C	FS	1707020208	H	L	H	M	H	M	H	H

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
70	2115	2	C	FS	1707020208	H	L	H	M	H	M	H	H
71	2115	2	L	FS	1707020208	H	L	H	M	H	M	H	H
72	2115	2	L	FS	1707020208	H	L	H	M	H	M	H	H
73	2115	2	L	FS	1707020208	H	L	H	M	H	M	H	H
74	2119	2	C	C									
75	2120	2	C	C									
76	2120	2	C	FS	1707020208	H	L	H	M	H	M	H	H
77	2120	2	C	FS	1707020208	H	L	H	M	H	M	H	H
78	2120	2	C	FS	1707020208	H	L	H	M	H	M	H	H
79	2122	2	C	FS	1707020208	H	L	H	M	H	M	H	H
80	2128	2	C	FS	1707020208	H	L	H	M	H	M	H	H
81	2128	2	C	FS	1707020208	H	L	H	M	H	M	H	H
82	2128	2	C	FS	1707020208	H	L	H	M	H	M	H	H
83	2140	2	C	FS	1707020411	H	M	H	L	H	L	H	H
84	2140	2	C	P									
85	2141	2	C	FS	1707020401	H	L	M	L	M	L	M	M
86	2141	2	C	FS	1707020401	H	L	M	L	M	L	M	M
87	2141	2	C	FS	1707020401	H	L	M	L	M	L	M	M
88	2141	2	C	FS	1707020401	H	L	M	L	M	L	M	M
89	2141	2	C	FS	1707020411	H	M	H	L	H	L	H	H
90	2142	2	C	FS	1707020411	H	M	H	L	H	L	H	H
91	2142	2	C	FS	1707020411	H	M	H	L	H	L	H	H
92	2142	2	C	FS	1707020411	H	M	H	L	H	L	H	H

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
93	2145	2	C	FS	1707020411	H	M	H	L	H	L	H	H
94	2145	2	C	P									
95	2145	2	C	P									
96	2145	2	C	FS	1707020411	H	M	H	L	H	L	H	H
97	2145	2	C	FS	1707020411	H	M	H	L	H	L	H	H
98	2145	2	C	P									
99	22	2	A	C									
100	22	2	A	C									
101	2201	2	C	P									
102	2201	2	C	P									
103	2201	2	C	P									
104	2202	2	C	FS	1707020208	H	L	H	M	H	M	H	H
105	2202	2	C	FS	1707020208	H	L	H	M	H	M	H	H
106	2202	2	C	FS	1707020208	H	L	H	M	H	M	H	H
107	2202	2	C	FS	1707020208	H	L	H	M	H	M	H	H
108	2202	2	C	FS	1707020208	H	L	H	M	H	M	H	H
109	2202	2	C	FS	1707020208	H	L	H	M	H	M	H	H
110	2202	2	C	FS	1707020208	H	L	H	M	H	M	H	H
111	2202	2	C	FS	1707020208	H	L	H	M	H	M	H	H
112	2202	2	C	C									
113	2202	2	C	C									
114	2202	2	C	C									
115	2202	2	C	C									

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
116	2202	2	C	C									
117	23	2	A	FS	1707020208	H	L	H	M	H	M	H	H
118	23	2	A	FS	1707020208	H	L	H	M	H	M	H	H
119	23	2	A	FS	1707020208	H	L	H	M	H	M	H	H
120	23	2	A	FS	1707020208	H	L	H	M	H	M	H	H
121	2307	2	C	FS	1707020208	H	L	H	M	H	M	H	H
122	2307	2	C	FS	1707020208	H	L	H	M	H	M	H	H
123	2307	2	C	FS	1707020208	H	L	H	M	H	M	H	H
124	2309	2	C	FS	1707020208	H	L	H	M	H	M	H	H
125	2309	2	C	FS	1707020208	H	L	H	M	H	M	H	H
126	24	2	A	FS	1707020208	H	L	H	M	H	M	H	H
127	24	2	A	FS	1707020208	H	L	H	M	H	M	H	H
128	24	2	A	FS	1707020208	H	L	H	M	H	M	H	H
129	2402	2	C	FS	1707020208	H	L	H	M	H	M	H	H
130	2402	2	C	FS	1707020208	H	L	H	M	H	M	H	H
131	2406	2	C	FS	1707020401	H	L	M	L	M	L	M	M
132	2406	2	C	FS	1707020401	H	L	M	L	M	L	M	M
133	2407	2	C	FS	1707020401	H	L	M	L	M	L	M	M
134	2408	2	C	FS	1707020401	H	L	M	L	M	L	M	M
135	2408	2	L	FS	1707020401	H	L	M	L	M	L	M	M
136	25	2	A	FS	1707020208	H	L	H	M	H	M	H	H
137	25	2	A	FS	1707020411	H	M	H	L	H	L	H	H
138	2513	2	C	FS	1707020401	H	L	M	L	M	L	M	M

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PiPO	Composite Rating
139	2513	2	C	C									
140	2516	2	C	FS	1707020401	H	L	M	L	M	L	M	M
141	2519	2	C	FS	1707020208	H	L	H	M	H	M	H	H
142	2519	2	C	FS	1707020208	H	L	H	M	H	M	H	H
143	3030	6	C	FS	1707010302	M	L	H	L	M	L	H	M
144	3030	6	C	FS	1707010302	M	L	H	L	M	L	H	M
145	3032	6	C	P									
146	3032	6	C	P									
147	3032	6	C	FS	1707010302	M	L	H	L	M	L	H	M
148	3033	6	C	P									
149	3033	6	C	FS	1707010302	M	L	H	L	M	L	H	M
150	31	6	A	FS	1706010404	L	L	L	L	L	L	H	L
151	31	6	A	FS	1706010404	L	L	L	L	L	L	H	L
152	31	6	A	FS	1707010302	M	L	H	L	M	L	H	M
153	31	6	A	FS	1707010302	M	L	H	L	M	L	H	L
154	31	6	A	FS	1707010302	M	L	H	L	M	L	H	M
155	31	6	A	FS	1706010409	L	L	L	L	M	L	H	L
156	31	6	A	FS	1707010301	M	L	H	L	H	L	H	M
157	31	6	A	FS	1707010301	M	L	H	L	H	L	H	M
158	31	6	A	FS	1706010409	L	L	L	L	M	L	H	L
159	31	6	A	FS	1707010301	M	L	H	L	H	L	H	M
160	31	6	A	FS	1707010301	M	L	H	L	H	L	H	M
161	31	6	A	FS	1706010411	L	L	L	L	L	L	H	L

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
162	270	6	L	FS	1707010301	M	L	H	L	H	L	H	M
163	330	6	L	FS	1707010301	M	L	H	L	H	L	H	M
164	330	6	L	FS	1707010301	M	L	H	L	H	L	H	M
165	3102	6	C	FS	1706010404	L	L	L	L	L	L	H	L
166	3102	6	C	FS	1707010302	M	L	H	L	M	L	H	M
167	3102	6	C	FS	1707010302	M	L	H	L	M	L	H	M
168	3109	6	C	FS	1707010302	M	L	H	L	M	L	H	M
169	3113	6	C	FS	1707010302	M	L	H	L	M	L	H	M
170	15	6	L	FS	1707010302	M	L	H	L	M	L	H	M
171	3116	6	C	FS	1707010302	M	L	H	L	M	L	H	M
172	3116	6	C	FS	1707010302	M	L	H	L	M	L	H	M
173	3128	6	C	FS	1707010301	M	L	H	L	H	L	H	M
174	3128	6	C	FS	1707010301	M	L	H	L	H	L	H	M
175	3130	6	C	FS	1707010301	M	L	H	L	H	L	H	M
176	3133	6	C	FS	1707010301	M	L	H	L	H	L	H	M
177	3133	6	C	FS	1707010301	M	L	H	L	H	L	H	M
178	3135	6	C	FS	1707010301	M	L	H	L	H	L	H	M
179	3145	6	C	FS	1707010301	M	L	H	L	H	L	H	M
180	3148	6	C	FS	1706010409	L	L	L	L	M	L	H	L
181	3148	6	C	FS	1706010409	L	L	L	L	M	L	H	L
182	3148	6	C	FS	1706010411	L	L	L	L	L	L	H	L
183	3150	6	C	FS	1707010301	M	L	H	L	H	L	H	M
184	3150	6	C	FS	1707010301	M	L	H	L	H	L	H	M

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
185	3150	6	C	FS	1707010301	M	L	H	L	H	L	H	M
186	3180	6	C	FS	1707010301	M	L	H	L	H	L	H	M
187	3180	6	C	FS	1706010411	L	L	L	L	L	L	H	L
188	32	6	A	FS	1707010301	M	L	H	L	H	L	H	M
189	32	6	A	FS	1707010301	M	L	H	L	H	L	H	M
190	30	6	L	FS	1707010301	M	L	H	L	H	L	H	M
191	35	6	L	FS	1707010301	M	L	H	L	H	L	H	M
192	45	6	L	FS	1707010301	M	L	H	L	H	L	H	M
193	3217	6	C	FS	1706010411	L	L	L	L	L	L	H	L
194	3217	6	C	FS	1706010411	L	L	L	L	L	L	H	L
195	3217	6	C	FS	1706010411	L	L	L	L	L	L	H	L
196	3217	6	C	FS	1706010411	L	L	L	L	L	L	H	L
197	20	6	L	FS	1706010410	L	M	L	L	M	L	H	L
198	21	6	L	FS	1706010410	L	M	L	L	M	L	H	L
199	22	6	L	FS	1706010410	L	M	L	L	M	L	H	L
200	30	6	L	FS	1706010410	L	M	L	L	M	L	H	L
201	50	6	L	FS	1707010301	M	L	H	L	H	L	H	M
202	51	6	L	FS	1707010301	M	L	H	L	H	L	H	M
203	52	6	L	FS	1707010301	M	L	H	L	H	L	H	M
204	80	6	L	FS	1707010301	M	L	H	L	H	L	H	M
205	100	6	L	FS	1707010301	M	L	H	L	H	L	H	M
206	3701	6	C	FS	1706010410	L	M	L	L	M	L	H	L
207	3701	6	C	FS	1706010410	L	M	L	L	M	L	H	L

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
208	3715	6	C	FS	1707010201	M	M	M	L	H	L	H	M
209	3718	6	C	FS	1707010301	M	L	H	L	H	L	H	M
210	3718	6	C	FS	1707010301	M	L	H	L	H	L	H	M
211	3719	6	C	FS	1707010301	M	L	H	L	H	L	H	M
212	40	6	L	FS	1707010301	M	L	H	L	H	L	H	M
213	40	6	L	FS	1707010301	M	L	H	L	H	L	H	M
214	3725	6	C	FS	1706010410	L	M	L	L	M	L	H	L
215	3725	6	C	FS	1706010411	L	L	L	L	L	L	H	L
216	3725	6	C	P									
217	3727	6	C	FS	1707010301	M	L	H	L	H	L	H	M
218	3727	6	C	FS	1706010411	L	L	L	L	L	L	H	L
219	3728	6	C	FS	1707010301	M	L	H	L	H	L	H	M
220	3734	6	C	FS	1706010411	L	L	L	L	L	L	H	L
221	3734	6	C	FS	1706010411	L	L	L	L	L	L	H	L
222	3734	6	C	FS	1706010411	L	L	L	L	L	L	H	L
223	3738	6	C	FS	1706010411	L	L	L	L	L	L	H	L
224	3740	6	C	FS	1706010411	L	L	L	L	L	L	H	L
225	100	5	L	FS	1707020207	H	L	H	L	H	M	H	H
226	100	5	L	FS	1707020203	M	M	M	L	H	L	H	M
227	101	5	L	FS	1707020207	H	L	H	L	H	M	H	H
228	102	5	L	FS	1707020207	H	L	H	L	H	M	H	H
229	105	5	L	FS	1707020207	H	L	H	L	H	M	H	H
230	110	5	L	FS	1707020204	M	H	H	L	H	L	H	H

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
231	120	5	L	FS	1707020207	H	L	H	L	H	M	H	H
232	3961	5	C	P									
233	3963	5	C	FS	1707020207	H	L	H	L	H	M	H	H
234	3963	5	C	FS	1707020207	H	L	H	L	H	M	H	H
235	3963	5	C	C									
236	3969	5	C	FS	1707020207	H	L	H	L	H	M	H	H
237	3969	5	C	FS	1707020207	H	L	H	L	H	M	H	H
238	3969	5	C	FS	1707020207	H	L	H	L	H	M	H	H
239	3969	5	C	FS	1707020207	H	L	H	L	H	M	H	H
240	3969	5	C	FS	1707020207	H	L	H	L	H	M	H	H
241	3971	5	C	FS	1707020207	H	L	H	L	H	M	H	H
242	3972	5	C	FS	1707020207	H	L	H	L	H	M	H	H
243	3972	5	C	FS	1707020207	H	L	H	L	H	M	H	H
244	3974	5	C	FS	1707020207	H	L	H	L	H	M	H	H
245	3980	5	C	C									
246	3980	5	C	FS	1707020204	M	H	H	L	H	L	H	H
247	3980	5	C	FS	1707020204	M	H	H	L	H	L	H	H
248	3986	5	C	FS	1707020305	M	L	H	L	H	H	H	H
249	3986	5	C	FS	1707020305	M	L	H	L	H	H	H	H
250	3986	5	C	FS	1707020305	M	L	H	L	H	H	H	H
251	3986	5	C	FS	1707020305	M	L	H	L	H	H	H	H
252	3986	5	C	FS	1707020305	M	L	H	L	H	H	H	H
253	3986	5	C	FS	1707020305	M	L	H	L	H	H	H	H

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
254	3988	5	C	FS	1707020204	M	H	H	L	H	L	H	H
255	3990	5	C	FS	1707020305	M	L	H	L	H	H	H	H
256	40	4	A	FS	1706010705	H	H	M	M	H	L	H	H
257	40	4	A	FS	1706010706	H	M	H	H	M	L	H	H
258	40	4	A	FS	1706010706	H	M	H	H	M	L	H	H
259	40	4	A	FS	1706010603	M	L	M	H	H	L	H	M
260	40	4	A	FS	1706010603	M	L	M	H	H	L	H	M
261	40	4	A	FS	1706010607	M	L	M	L	H	L	H	M
262	12	4	L	FS	1706010706	H	M	H	H	M	L	H	H
263	40	4	L	FS	1706010706	H	M	H	H	M	L	H	H
264	140	4	L	FS	1706010706	H	M	H	H	M	L	H	H
265	185	4	L	FS	1706010705	H	H	M	M	H	L	H	H
266	185	4	L	FS	1706010303	H	M	H	H	H	L	H	H
267	200	4	L	FS	1706010303	H	M	H	H	H	L	H	H
268	215	4	L	FS	1706010705	H	H	M	M	H	L	H	H
269	4016	4	C	FS	1706010706	H	M	H	H	M	L	H	H
270	4016	4	C	FS	1706010706	H	M	H	H	M	L	H	H
271	4018	4	C	FS	1706010706	H	M	H	H	M	L	H	H
272	4018	4	C	FS	1706010705	H	H	M	M	H	L	H	H
273	4022	4	C	FS	1706010705	H	H	M	M	H	L	H	H
274	4027	4	C	FS	1706010303	H	M	H	H	H	L	H	H
275	4027	4	C	FS	1706010303	H	M	H	H	H	L	H	H
276	4030	4	C	FS	1706010705	H	H	M	M	H	L	H	H

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
277	4030	4	C	FS	1706010705	H	H	M	M	H	L	H	H
278	20	4	L	FS	1706010705	H	H	M	M	H	L	H	H
279	4038	4	C	FS	1706010607	M	L	M	L	H	L	H	M
280	4038	4	C	FS	1706010607	M	L	M	L	H	L	H	M
281	4038	4	C	FS	1706010607	M	L	M	L	H	L	H	M
282	4039	4	C	FS	1706010603	M	L	M	H	H	L	H	M
283	4039	4	C	FS	1706010607	M	L	M	L	H	L	H	M
284	4039	4	C	FS	1706010607	M	L	M	L	H	L	H	M
285	41	4	A	FS	1706010303	H	M	H	H	H	L	H	H
286	41	4	A	FS	1706010303	H	M	H	H	H	L	H	H
287	42	4	A	FS	1706010706	H	M	H	H	M	L	H	H
288	125	4	L	FS	1706010706	H	M	H	H	M	L	H	H
289	4206	4	C	FS	1706010303	H	M	H	H	H	L	H	H
290	4206	4	C	FS	1706010303	H	M	H	H	H	L	H	H
291	4206	4	C	FS	1706010303	H	M	H	H	H	L	H	H
292	43	4	A	FS	1706010303	H	M	H	H	H	L	H	H
293	43	4	A	FS	1706010302	M	H	M	L	L	L	H	M
294	43	4	A	FS	1706010303	H	M	H	H	H	L	H	H
295	62	4	L	FS	1706010303	H	M	H	H	H	L	H	H
296	4302	4	C	FS	1706010303	H	M	H	H	H	L	H	H
297	4302	4	C	FS	1706010303	H	M	H	H	H	L	H	H
298	4302	4	C	FS	1706010303	H	M	H	H	H	L	H	H
299	4304	4	C	FS	1706010302	M	H	M	L	L	L	H	M

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
300	4305	4	C	FS	1706010302	M	H	M	L	L	L	H	M
301	4305	4	C	FS	1706010302	M	H	M	L	L	L	H	M
302	4305	4	C	FS	1706010302	M	H	M	L	L	L	H	M
303	44	4	A	FS	1706010303	H	M	H	H	H	L	H	H
304	44	4	A	FS	1706010303	H	M	H	H	H	L	H	H
305	44	4	A	FS	1706010303	H	M	H	H	H	L	H	H
306	45	5	C	FS	1707020204	M	H	H	L	H	L	H	H
307	45	5	C	FS	1707020305	M	L	H	L	H	H	H	H
308	46	4	A	FS	1706010705	H	H	M	M	H	L	H	H
309	46	4	A	FS	1707010203	M	M	M	L	M	L	H	M
310	46	6	A	FS	1707010203	M	M	M	L	M	L	H	M
311	300	4	L	FS	1706010603	M	L	M	H	H	L	H	M
312	301	4	L	FS	1706010603	M	L	M	H	H	L	H	M
313	4608	4	C	FS	1706010705	H	H	M	M	H	L	H	H
314	4608	4	C	FS	1706010705	H	H	M	M	H	L	H	H
315	4610	4	C	FS	1706010705	H	H	M	M	H	L	H	H
316	4610	4	C	FS	1706010705	H	H	M	M	H	L	H	H
317	4610	4	C	FS	1706010705	H	H	M	M	H	L	H	H
318	4620	4	C	C									
319	4620	4	C	FS	1706010705	H	H	M	M	H	L	H	H
320	4620	4	C	FS	1706010705	H	H	M	M	H	L	H	H
321	4625	4	C	FS	1707010203	M	M	M	L	M	L	H	M
322	4625	4	C	FS	1707010203	M	M	M	L	M	L	H	M

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
323	47	4	A	FS	1706010705	H	H	M	M	H	L	H	H
324	47	4	A	FS	1706010705	H	H	M	M	H	L	H	H
325	160	4	L	FS	1706010705	H	H	M	M	H	L	H	H
326	160	4	L	FS	1706010705	H	H	M	M	H	L	H	H
327	165	4	L	FS	1706010705	H	H	M	M	H	L	H	H
328	165	4	L	FS	1706010705	H	H	M	M	H	L	H	H
329	4712	4	C	FS	1706010705	H	H	M	M	H	L	H	H
330	4712	4	C	FS	1706010705	H	H	M	M	H	L	H	H
331	40	4	L	FS	1706010705	H	H	M	M	H	L	H	H
332	4713	4	C	FS	1706010705	H	H	M	M	H	L	H	H
333	4713	4	C	FS	1706010705	H	H	M	M	H	L	H	H
334	4713	4	C	FS	1706010705	H	H	M	M	H	L	H	H
335	20	4	L	FS	1706010705	H	H	M	M	H	L	H	H
336	52	5	A	C									
337	52	5	A	FS	1707020201	M	H	L	H	M	L	H	M
338	52	5	A	FS	1707020201	M	H	L	H	M	L	H	M
339	440	5	L	FS	1707020203	M	M	M	L	H	L	H	M
340	995	5	L	FS	1707020201	M	H	L	H	M	L	H	M
341	5209	5	C	FS	1707020206	H	M	M	L	H	L	H	M
342	5209	5	C	FS	1707020206	H	M	M	L	H	L	H	M
343	5209	5	C	FS	1707020206	H	M	M	L	H	L	H	M
344	5212	5	C	FS	1707020203	M	M	M	L	H	L	H	M
345	5225	5	C	FS	1707020203	M	M	M	L	H	L	H	M

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
346	5225	5	C	FS	1707020201	M	H	L	H	M	L	H	M
347	5226	5	C	FS	1707020205	H	M	M	L	H	L	H	M
348	5226	5	C	FS	1707020205	H	M	M	L	H	L	H	M
349	5226	5	C	FS	1707020203	M	M	M	L	H	L	H	M
350	20	5	L	FS	1707020205	H	M	M	L	H	L	H	M
351	53	2	A	C									
352	53	2	A	FS	1707020207	H	L	H	L	H	M	H	H
353	53	5	A	FS	1707020206	H	M	M	L	H	L	H	M
354	53	5	A	FS	1707020206	H	M	M	L	H	L	H	M
355	140	5	L	FS	1707020206	H	M	M	L	H	L	H	M
356	140	5	L	FS	1707020206	H	M	M	L	H	L	H	M
357	155	2	L	FS	1707010401	H	M	L	M	H	L	H	M
358	5305	5	C	FS	1707020206	H	M	M	L	H	L	H	M
359	5308	5	C	FS	1707010309	H	H	H	H	H	L	M	H
360	5308	5	C	FS	1707010309	H	H	H	H	H	L	M	H
361	5308	5	C	C									
362	5308	5	C	C									
363	5308	5	C	C									
364	5309	5	C	FS	1707020206	H	M	M	L	H	L	H	M
365	5311	5	C	FS	1707020206	H	M	M	L	H	L	H	M
366	5311	5	C	FS	1707020206	H	M	M	L	H	L	H	M
367	5312	5	C	FS	1707020206	H	M	M	L	H	L	H	M
368	5314	5	C	FS	1707020206	H	M	M	L	H	L	H	M

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
369	5314	5	C	FS	1707020206	H	M	M	L	H	L	H	M
370	5314	5	C	FS	1707020206	H	M	M	L	H	L	H	M
371	5316	5	C	FS	1707020206	H	M	M	L	H	L	H	M
372	5316	5	C	FS	1707020207	H	L	H	L	H	M	H	H
373	5316	5	C	FS	1707020207	H	L	H	L	H	M	H	H
374	5318	5	C	FS	1707020206	H	M	M	L	H	L	H	M
375	5320	5	C	FS	1707020207	H	L	H	L	H	M	H	H
376	5320	5	C	FS	1707020207	H	L	H	L	H	M	H	H
377	60	5	L	FS	1707020207	H	L	H	L	H	M	H	H
378	5321	2	C	FS	1707020207	H	L	H	L	H	M	H	H
379	5322	2	C	FS	1707020207	H	L	H	L	H	M	H	H
380	5322	2	C	FS	1707020207	H	L	H	L	H	M	H	H
381	5326	5	L	C									
382	5326	5	C	C									
383	5326	5	C	FS	1707010309	H	H	H	H	H	L	M	H
384	5327	5	C	FS	1707020206	H	M	M	L	H	L	H	M
385	5327	5	C	FS	1707020207	H	L	H	L	H	M	H	H
386	5327	5	C	FS	1707020206	H	M	M	L	H	L	H	M
387	290	5	L	FS	1707020206	H	M	M	L	H	L	H	M
388	290	5	L	FS	1707020206	H	M	M	L	H	L	H	M
389	5350	2	C	FS	1707020207	H	L	H	L	H	M	H	H
390	5370	2	C	FS	1707020208	H	L	H	M	H	M	H	H
391	5380	2	C	FS	1707020208	H	L	H	M	H	M	H	H

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
392	54	5	A	FS	1707010306	H	L	H	M	H	L	H	H
393	54	5	A	FS	1707010306	H	L	H	M	H	L	H	H
394	54	5	A	FS	1707020205	H	M	M	L	H	L	H	M
395	54	5	A	FS	1707020205	H	M	M	L	H	L	H	M
396	500	5	L	FS	1707020205	H	M	M	L	H	L	H	M
397	5411	5	C	FS	1707010306	H	L	H	M	H	L	H	H
398	5411	5	C	FS	1707010306	H	L	H	M	H	L	H	H
399	5412	5	C	FS	1707010306	H	L	H	M	H	L	H	H
400	5412	5	C	C									
401	30	5	L	FS	1707020205	H	M	M	L	H	L	H	M
402	5415	5	C	C									
403	5415	5	C	C									
404	5415	5	C	FS	1707010306	H	L	H	M	H	L	H	H
405	5417	5	C	FS	1707020206	H	M	M	L	H	L	H	M
406	5417	5	C	FS	1707020206	H	M	M	L	H	L	H	M
407	5417	5	C	P									
408	5417	5	C	FS	1707020206	H	M	M	L	H	L	H	M
409	5417	5	C	P									
410	5417	5	C	FS	1707020206	H	M	M	L	H	L	H	M
411	5420	5	C	C									
412	5420	5	C	C									
413	5425	5	C	FS	1707020205	H	M	M	L	H	L	H	M
414	5425	5	C	FS	1707020205	H	M	M	L	H	L	H	M

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
415	5425	5	C	FS	1707020205	H	M	M	L	H	L	H	M
416	5425	5	C	FS	1707020205	H	M	M	L	H	L	H	M
417	5425	5	C	FS	1707020205	H	M	M	L	H	L	H	M
418	5425	5	C	P									
419	5425	5	C	FS	1707020206	H	M	M	L	H	L	H	M
420	5425	5	C	P									
421	5425	5	C	FS	1707020205	H	M	M	L	H	L	H	M
422	5425	5	C	P									
423	5427	5	C	FS	1707010306	H	L	H	M	H	L	H	H
424	5427	5	C	FS	1707010306	H	L	H	M	H	L	H	H
425	5427	5	C	FS	1707010306	H	L	H	M	H	L	H	H
426	5427	5	C	FS	1707010306	H	L	H	M	H	L	H	H
427	5427	5	C	FS	1707010306	H	L	H	M	H	L	H	H
428	5427	5	C	FS	1707010306	H	L	H	M	H	L	H	H
429	5428	5	C	FS	1707020205	H	M	M	L	H	L	H	M
430	5435	5	C	FS	1707020205	H	M	M	L	H	L	H	M
431	5435	5	C	FS	1707020205	H	M	M	L	H	L	H	M
432	5440	5	C	FS	1707020205	H	M	M	L	H	L	H	M
433	5445	5	C	FS	1707020205	H	M	M	L	H	L	H	M
434	5445	5	C	FS	1707020205	H	M	M	L	H	L	H	M
435	5445	5	C	FS	1707020205	H	M	M	L	H	L	H	M
436	5448	5	C	FS	1707020205	H	M	M	L	H	L	H	M
437	5448	5	C	FS	1707020205	H	M	M	L	H	L	H	M

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
438	5450	5	C	FS	1707020205	H	M	M	L	H	L	H	M
439	5450	5	C	FS	1707020205	H	M	M	L	H	L	H	M
440	55	5	A	FS	1707020203	M	M	M	L	H	L	H	M
441	55	5	A	FS	1707020203	M	M	M	L	H	L	H	M
442	5505	5	C	FS	1707020203	M	M	M	L	H	L	H	M
443	5505	5	C	FS	1707020203	M	M	M	L	H	L	H	M
444	5505	5	C	FS	1707020204	M	H	H	L	H	L	H	H
445	5506	5	C	FS	1707020203	M	M	M	L	H	L	H	M
446	5506	5	C	FS	1707020203	M	M	M	L	H	L	H	M
447	5506	5	C	FS	1707020203	M	M	M	L	H	L	H	M
448	5507	5	C	FS	1707020203	M	M	M	L	H	L	H	M
449	5507	5	C	FS	1707020203	M	M	M	L	H	L	H	M
450	5507	5	C	FS	1707020203	M	M	M	L	H	L	H	M
451	5507	5	C	FS	1707020203	M	M	M	L	H	L	H	M
452	5507	5	C	FS	1707020203	M	M	M	L	H	L	H	M
453	5507	5	C	FS	1707020203	M	M	M	L	H	L	H	M
454	5507	5	C	FS	1707020203	M	M	M	L	H	L	H	M
455	5507	5	C	FS	1707020205	H	M	M	L	H	L	H	M
456	5510	5	C	FS	1707020203	M	M	M	L	H	L	H	M
457	5510	5	C	FS	1707020203	M	M	M	L	H	L	H	M
458	5730	5	C	C									
459	5730	5	C	FS	1707010309	H	H	H	H	H	L	M	H
460	5730	5	C	FS	1707010309	H	H	H	H	H	L	M	H

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
461	11	5	L	FS	1707020206	H	M	M	L	H	L	H	M
462	70	5	L	FS	1707020205	H	M	M	L	H	L	H	M
463	240	5	L	FS	1707020205	H	M	M	L	H	L	H	M
464	5916	5	C	FS	1707020205	H	M	M	L	H	L	H	M
465	5916	5	C	FS	1707020205	H	M	M	L	H	L	H	M
466	62	6	A	FS	1706010410	L	M	L	L	M	L	H	L
467	62	6	A	FS	1706010601	L	L	L	L	M	L	H	L
468	290	6	L	FS	1706010603	M	L	M	H	H	L	H	M
469	6206	6	C	FS	1706010603	M	L	M	H	H	L	H	M
470	6206	6	C	FS	1706010603	M	L	M	H	H	L	H	M
471	6206	6	C	FS	1706010603	M	L	M	H	H	L	H	M
472	6208	6	C	FS	1706010603	M	L	M	H	H	L	H	M
473	6208	6	C	FS	1706010603	M	L	M	H	H	L	H	M
474	6209	6	C	FS	1706010603	M	L	M	H	H	L	H	M
475	6209	6	C	FS	1706010603	M	L	M	H	H	L	H	M
476	6209	6	C	FS	1706010603	M	L	M	H	H	L	H	M
477	6212	6	C	FS	1706010601	L	L	L	L	M	L	H	L
478	6212	6	C	FS	1706010601	L	L	L	L	M	L	H	L
479	6213	6	C	FS	1706010601	L	L	L	L	M	L	H	L
480	6213	6	C	FS	1706010601	L	L	L	L	M	L	H	L
481	6214	6	C	FS	1706010601	L	L	L	L	M	L	H	L
482	6214	6	C	FS	1706010603	M	L	M	H	H	L	H	M
483	6217	6	C	FS	1706010603	M	L	M	H	H	L	H	M

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
484	6217	6	C	FS	1706010603	M	L	M	H	H	L	H	M
485	6219	6	C	FS	1706010603	M	L	M	H	H	L	H	M
486	6219	6	C	FS	1706010601	L	L	L	L	M	L	H	L
487	6222	6	C	FS	1706010601	L	L	L	L	M	L	H	L
488	6230	6	C	FS	1706010601	L	L	L	L	M	L	H	L
489	6230	6	C	FS	1706010601	L	L	L	L	M	L	H	L
490	6230	6	C	FS	1706010601	L	L	L	L	M	L	H	L
491	6231	6	C	C									
492	6231	6	C	FS	1706010601	L	L	L	L	M	L	H	L
493	6231	6	C	C									
494	6231	6	C	FS	1706010410	L	M	L	L	M	L	H	L
495	6232	6	C	FS	1706010410	L	M	L	L	M	L	H	L
496	6234	6	C	FS	1706010601	L	L	L	L	M	L	H	L
497	6234	6	C	FS	1706010601	L	L	L	L	M	L	H	L
498	6234	6	C	FS	1706010601	L	L	L	L	M	L	H	L
499	6234	6	C	FS	1706010601	L	L	L	L	M	L	H	L
500	6235	6	C	FS	1706010410	L	M	L	L	M	L	H	L
501	6236	6	C	FS	1706010410	L	M	L	L	M	L	H	L
502	63	6	A	FS	1706010410	L	M	L	L	M	L	H	L
503	63	6	A	FS	1706010410	L	M	L	L	M	L	H	L
504	63	6	A	FS	1706010410	L	M	L	L	M	L	H	L
505	63	6	A	C									
506	63	6	A	C									

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
507	31	6	C	FS	1706010410	L	M	L	L	M	L	H	L
508	6306	6	C	FS	1706010410	L	M	L	L	M	L	H	L
509	6307	6	C	FS	1706010410	L	M	L	L	M	L	H	L
510	6308	6	C	FS	1706010410	L	M	L	L	M	L	H	L
511	64	6	A	FS	1706010410	L	M	L	L	M	L	H	L
512	64	6	A	FS	1706010410	L	M	L	L	M	L	H	L
513	64	6	A	FS	1706010410	L	M	L	L	M	L	H	L
514	64	6	A	FS	1706010410	L	M	L	L	M	L	H	L
515	64	6	A	FS	1706010410	L	M	L	L	M	L	H	L
516	64	6	A	FS	1706010410	L	M	L	L	M	L	H	L
517	64	6	A	FS	1706010410	L	M	L	L	M	L	H	L
518	64	6	A	FS	1706010410	L	M	L	L	M	L	H	L
519	64	6	A	FS	1707010202	M	L	M	L	H	L	H	M
520	64	6	A	FS	1707010202	M	L	M	L	H	L	H	M
521	64	6	A	FS	1707010202	M	L	M	L	H	L	H	M
522	64	6	A	FS	1707010203	M	M	M	L	M	L	H	M
523	250	6	L	FS	1706010410	L	M	L	L	M	L	H	L
524	650	6	L	FS	1707010203	M	M	M	L	M	L	H	M
525	650	6	L	FS	1707010203	M	M	M	L	M	L	H	M
526	6401	6	C	FS	1707010201	M	M	M	L	H	L	H	M
527	6401	6	C	FS	1707010201	M	M	M	L	H	L	H	M
528	50	6	L	FS	1707010201	M	M	M	L	H	L	H	M
529	51	6	L	FS	1707010201	M	M	M	L	H	L	H	M

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
530	6403	6	C	FS	1706010410	L	M	L	L	M	L	H	L
531	6403	6	C	FS	1706010410	L	M	L	L	M	L	H	L
532	6403	6	C	FS	1706010410	L	M	L	L	M	L	H	L
533	6403	6	C	FS	1707010201	M	M	M	L	H	L	H	M
534	6403	6	C	FS	1707010201	M	M	M	L	H	L	H	M
535	120	6	L	FS	1706010410	L	M	L	L	M	L	H	L
536	6406	6	C	FS	1706010410	L	M	L	L	M	L	H	L
537	6411	6	C	FS	1706010410	L	M	L	L	M	L	H	L
538	6413	6	C	FS	1706010410	L	M	L	L	M	L	H	L
539	6413	6	C	FS	1706010410	L	M	L	L	M	L	H	L
540	6415	6	C	FS	1706010603	M	L	M	H	H	L	H	M
541	6415	6	C	FS	1706010603	M	L	M	H	H	L	H	M
542	6415	6	C	FS	1706010410	L	M	L	L	M	L	H	L
543	6436	6	C	FS	1707010203	M	M	M	L	M	L	H	M
544	6436	6	C	FS	1707010203	M	M	M	L	M	L	H	M
545	6437	6	C	FS	1707010203	M	M	M	L	M	L	H	M
546	65	6	A	FS	1707010202	M	L	M	L	H	L	H	M
547	65	6	A	FS	1707010202	M	L	M	L	H	L	H	M
548	65	6	A	FS	1707010202	M	L	M	L	H	L	H	M
549	65	6	A	FS	1706010603	M	L	M	H	H	L	H	M
550	6511	6	C	FS	1707010202	M	L	M	L	H	L	H	M
551	6511	6	C	P									
552	6512	6	C	FS	1707010201	M	M	M	L	H	L	H	M

Table 5: Upland-forest restoration ratings by road segment, Umatilla National Forest roads analysis.

Row Num	Road Num	RD	Func. Class	Juris-diction	HUC5	Forest Density	Crown Fire	Low Vigor Ponderosa	Low Vigor Lodgepole	Restore OFSS	JUOC on Dry UF	Restore PIPO	Composite Rating
553	7350	5	C	FS	1707020202	H	H	H	H	H	L	H	H

The 'Row Num' column provides the row number of a road segment in the spreadsheet used for the Umatilla National Forest roads analysis.

The 'Road Num' column provides the road number (label) for a road segment; note that one road generally occurs as multiple segments in the roads analysis spreadsheet.

The 'RD' column provides the Ranger District number for a road segment (2=Heppner, 4=Pomeroy, 5=North Fork John Day, 6=Walla Walla).

The 'Func. Class' column provides the functional class for each road segment (A=arterial, C=collector, L=local).

The 'Jurisdiction' column provides the jurisdiction (political entity) having management authority over the road segment (C=county, FS=Forest Service, P=private).

The 'HUC5' column provides the code for the 5th field hydrologic unit code (watershed) in which the road segment occurs; upland-forest restoration ratings for each HUC5 were also applied to all road segments occurring in a HUC5.

The 'Forest Density' column shows the rating (high, medium, low) for the 'percent of overstocked area' criterion.

The 'Crown Fire' column shows the rating (high, medium, low) for the 'crown fire potential' criterion.

The 'Low Vigor Ponderosa' column shows the rating (high, medium, low) for the 'percent of high density low vigor ponderosa pine' criterion.

The 'Low Vigor Lodgepole' column shows the rating (high, medium, low) for the 'percent of high density low vigor lodgepole pine' criterion.

The 'Restore OFSS' column shows the rating (high, medium, low) for the 'opportunity to restore the old forest single stratum' criterion.

The 'JUOC on Dry UF' column shows the rating (high, medium, low) for the 'percent of western juniper invasion' criterion.

The 'Restore PIPO' column shows the rating (high, medium, low) for the 'percent of ponderosa pine cover type' criterion.

The 'Composite Rating' column provides an overall rating (high, medium, low) derived from the scores of the seven restoration criteria combined.