Cultural and Paleontological Resources

Key Points

- The BLM can reduce or eliminate effects to cultural and paleontological resources through systematic and thorough cultural and paleontological resource inventories.
- Implementation of Alternative A is the least likely to result in potential adverse effects to cultural and paleontological resources from timber harvest because it has the fewest acres of timber harvest in the first decade; and from public motorized travel use because it has the largest acreage designated as *closed* for public motorized access within the decision area.
- Implementation of Alternative D is the least likely to result in potential adverse effects to cultural and paleontological resources from road construction and livestock grazing because it includes the least amount new road construction and eliminates all livestock grazing.

Summary of Notable Changes from the Draft RMP/EIS

The BLM has adjusted the model from Gnomon Inc. by using different parameters than were used in the Draft RMP/EIS to calculate more accurately the areas with a high probability for finding cultural resources in western Oregon. For this analysis, the BLM redistributed the values for slope and distance to water to reflect more accurately the archaeological landscape in western Oregon. The BLM also added a temporal aspect to the comparison of the alternatives and the Proposed RMP to depict more meaningfully the potential effects from timber harvest by modeling probability zones against the first decade of timber harvest. The BLM also added a discussion of the potential effects on cultural resouorces from livestock grazing.

The BLM has revised the analysis on paleontological resources and present it as an 'issue considered but not analyzed in detail' because the small quantity of localities within the planning area did not allow for a meaningful analysis of effects.

Issue 1

How would BLM land management actions affect cultural resources across the decision area under each alternative?

Summary of Analytical Methods

Each BLM district in the decision area provided Gnomon Inc. with cultural site and survey information, which Gnomon Inc. then digitized. The BLM synthesized this digitized information in the sections below. The BLM used a model created by Gnomon Inc. for the purposes of forecasting the likelihood for cultural resources to occur within the decision area. The model used two key factors to determine the relative probability that cultural properties would be present within any given acre in the decision area. The two factors used were slope and the distance to perennial water. Archaeological data in western Oregon shows that past human activity most often took place on level ground and near freshwater sources, as revealed by the location of archaeological sites across the landscape (USDI BLM 2014a). For the model, the BLM assigned values between 0 and 50 to different slope breakpoints as well as to the distance to water breakpoints (**Table 3-17**). The breakpoints for distance to water represent discrete sets of distance in meters along a range from 0 to > 500. Similarly, the breakpoints for degrees of slope represent discrete sets of slope degrees that range from 0 to > 20. The BLM assigned the breakpoints based on previously

recorded site data by looking at which value ranges in each dataset were most associated with site presence. The model then calculated total values between 0 and 100 for the entire decision area and subsequently assigned a probability based on that value (**Table 3-18**). More details of the modeling methodology are in Ingbar *et al.* (2014).

Table 3-17. Values for slope and distance to water break points

Slope (Degrees)	Value	Distance to Water (Meters)	Value
0–10	50	0–100	50
11–20	25	101–250	25
> 20	0	251–500	12
		> 500	0

Table 3-18. Total value scores and corresponding probability

Total Value Score (Sum of Slope Value and Distance to Water Value)	Probability Zone
51–100	High
26–50	Medium
0–25	Low

The model placed each of the 2.5 million acres of BLM-administered lands in the decision area into one of three categories: high, medium, or low probability for finding cultural resources (**Table 3-19**). Then, for each alternative and the Proposed RMP, the BLM overlaid these three categories with the acreage of timber harvest in the first decade. The BLM calculated acres of timber harvest in the first decade for each probability category to determine which alternatives or the Proposed RMP are most likely to create the potential for disturbance of cultural resources (**Table 3-8**). This portion of the analysis focused on potential effects from timber harvest because of the associated ground disturbance, and timber harvest levels vary substantially by alternative and the Proposed RMP. The acreage of timber harvest in first decade was used as a surrogate for the total acreage potentially affected.

Table 3-19. Distribution of all acres within the decision area by probability zone

Probability Zone	Decision Area (Acres)
High	491,971
Medium	900,781
Low	1,086,104

Additionally, the BLM considered the risk of disturbance to cultural resources from road construction by comparing the mileage of new road construction in the first decade by alternative and the Proposed RMP. The BLM used new road construction miles as a factor because of the associated ground-disturbance. The BLM also considered potential effects from public motorized access designations. In comparing the potential effects of the alternatives' public motorized access designations on cultural resources, the BLM assumed that *open* areas are the most likely to cause unintended disturbance of cultural resources from public motorized travel activities, while such disturbance is much less likely in *limited* areas and very

unlikely in *closed* areas. Lastly, the BLM considered potential effects to cultural resources from acres available to livestock grazing by alternative and the Proposed RMP.

As described below, this analysis considered the potential for effects from timber harvest, new road construction, public motorized access designations, and livestock grazing, but also assumed that pre-disturbance surveys will prevent effects in most instances.

Certain cultural resource types do not adhere to the parameters of the model as described. Sites such as rock shelters, trails, mines, traditional cultural properties, and sacred sites may not fall within areas deemed High probability by the model. BLM archaeologists are keenly aware of the difficulty of predicting the location of such sites. BLM archaeologists use resources such as tribal consultation and background research (e.g., literature, maps, and photos) to aid in identifying the location of these types of sites.

It is important to note that events and actions by others that the BLM cannot specifically predict (e.g., wildfire and looting) may also negatively affect cultural resources.

Although the BLM has some site-specific and anecdotal information about illegal public motorized travel activities, the BLM does not have a basis for predicting the location or effects of any widespread or systematic illegal public motorized travel activities. In addition, much of the decision area has physical limitations to potential illegal public motorized travel activities, including dense vegetation, steep slopes, and locked gates. Terrain, vegetation, and a greater amount of open spaces in most of the interior/south can lead to degradation and erosion in a greater proportion than the coastal/north where vegetation is denser and terrain is steeper. However, the BLM lacks a basis for characterizing current illegal public motorized travel activities or forecasting potential illegal public motorized travel activities in the future under any of the alternatives and the Proposed RMP at this scale of analysis. In this analysis, the BLM assumed that members of the public participating in motorized travel recreation would operate vehicles consistent with BLM decisions about public motorized travel opportunities.

The Planning Criteria provides more detailed information on analytical assumptions, methods and techniques, and geographic and temporal scales, which is incorporated here by reference (USDI BLM 2014b, pp. 41–43). The analytical methods described above differ from those set out in the Planning Criteria. BLM annual reporting over the last 7 years spurred this change in analysis. The annual reports state that the implementation of project activities inadvertently damaged very few sites (i.e., two). Conversely, the BLM and project proponents discovered 641 sites prior to implementation of project activities, and the BLM applied mitigation measures to avoid adverse impacts to these sites. Predicting the numbers of sites within each physiographic province, as the BLM described in the Planning Criteria, does not show the effects to cultural resources. Without more accurate data that includes all effects to sites through inadvertent discovery, the BLM must assume that it will conduct adequate and thorough cultural resource inventories prior to ground-disturbing activities and that these inventories will result in the avoidance of damage to cultural resources in nearly all cases. Regardless, it is still useful to understand how the alternatives and the Proposed RMP vary among the activities most likely to affect cultural resources as well as the distribution of timber harvest across the three probability categories.

Background

While the public discover sites incidentally (e.g., while hiking on BLM-administered lands) and the BLM discovers sites occasionally through project implementation, the primary mechanism for identifying cultural resources is through inventories conducted by trained archaeologists. BLM archaeologists plan and implement cultural surveys in a strategic manner focusing on areas with a high probability to yield

cultural resources. The Analysis of the Management Situation (USDI BLM 2013) contains a synthesized explanation of cultural resources in Oregon.

Cultural resource inventories are primarily project driven and conducted in support of management activities such as timber harvest, recreation management, aquatic restoration, and road construction, in compliance with Section 106 of the National Historic Preservation Act. The BLM complies with the National Historic Preservation Act through the State Protocol with the Oregon State Historic Preservation Office (USDI BLM 2015) as directed by the National Programmatic Agreement (USDI BLM 2012). In addition, each district undertakes a strategic and proactive survey strategy in compliance with Section 110 of the National Historic Preservation Act. Section 110 surveys focus on inventorying pieces of land deemed to have high probability for yielding cultural resources; Section 110 surveys are not project-related. These areas are determined using the cultural resource model described in the Analytical Methods section above.

Affected Environment

According to current district records, there are 2,468-recorded cultural sites on BLM-administered lands in the decision area. Since most of BLM-administered lands remain un-inventoried, it is very likely that there are far more undocumented cultural sites.

The following tables provide a snapshot of cultural resources and inventories on BLM-administered lands in the decision area. **Table 3-20** illustrates that the BLM has inventoried 10.5 percent of the decision area for cultural resources. These acres only reflect class III-intensive field surveys, as conducted per BLM Manual 8110.21C (USDI 2004). With 89.5 percent of the decision area considered unsurveyed, the BLM anticipates that inventories would continue for the near future in compliance with Sections 106 and 110 of the National Historic Preservation Act.

Table 3-20. Summary of acres of cultural resource inventories on BLM-administered lands

Administrative Boundary	Inventoried Lands (Acres)	Total Lands (Acres)	Inventoried Lands (Percent)
Coos Bay District	3,430	324,236	1.0%
Eugene District	4,801	311,064	1.5%
Klamath Falls Field Office	155,258	214,084	72.5%
Medford District	78,782	806,675	9.8%
Roseburg District	14,977	423,640	3.5%
Salem District	2,441	399,157	0.6%
Decision Area	**259,689**	**2,478,856**	**10.5%**

It is notable that the Klamath Falls Field Office, which is within the Eastern Cascades Slopes and Foothills physiographic province, has completed inventory of over 72 percent of their land base due to multiple large-scale projects (e.g., vegetation management and fuels treatments) where contractors surveyed thousands of acres at a time. Therefore, surveys have covered more acres across all probability zones in this region. Additionally, the parameters modeled for analysis (slope and distance from perennial water) do not reflect the cultural landscape of this area as well as it does in the rest of the planning area. Perennial water is not as pervasive in this area as it is in the coastal/north portion of the planning area; therefore, the model categorizes most of the landscape as Medium. In general, this area is considerably flatter and less vegetated than the forested areas of the coastal/north portion of the planning area. Distance

to water would be less a hindrance in flatter terrain with less vegetation, therefore one would expect there still to be a high number of sites in Medium probability as modeled.

Table 3-21 illustrates the relationship between the total acres of cultural resource inventories conducted and numbers of sites recorded within the three probability zones. Medium probability areas have by far the most acres of inventory and the most sites. This may be attributed to a slight discrepancy in how the model predicts probability such as is explained above regarding the Eastern Cascades Slopes and Foothills physiographic province. Within the Eastern Cascades Slopes and Foothills physiographic province, the BLM conducted two-thirds of the inventories on Medium probability ground leading to the recording of a greater number of sites in Medium probability than High probability. How archaeologists conduct cultural inventories on the ground could account for the high inventory counts in Medium probability zones. In the model, areas with less than 10 percent slope but greater than 500 meters distance from water are categorized as Medium probability. In practice, archaeologists would inventory all acres with less than 10 percent slope unless the area was a small isolated parcel.

Table 3-21. Summary of acres of cultural resource inventories and recorded sites by probability zone

Probability Zone	Inventoried Lands (Acres)	Recorded Sites (Number)	Total Lands (Acres)	Inventoried Lands (Percent)	Ratio of Sites Identified Per Inventoried Acres
High	61,284	1,029	491,971	12.5%	60:1
Medium	139,975	1,167	900,781	15.5%	120:1
Low	58,430	272	1,086,104	5.4%	215:1
Decision Area Totals	**259,689**	**2,468**	**2,478,856**	**10.5%**	**105:1**

Table 3-21 shows that one site is identified for every 60 acres in High probability zones, 120 acres in Medium probability zones, and 215 acres of Low probability zones on average. Had the BLM applied different modeling parameters to the Eastern Cascades Slopes and Foothills physiographic province, there would likely be a stronger difference between probabilities of the number of sites identified per number of acres surveyed. However, the model has calculated the number of sites identified per acres of survey at levels that match documented observations within the planning area (See **Table 3-17** and **Table 3-18** for modeling values).

Table 3-22 shows the distribution of site types across the districts. Ground-disturbing activities may be more or less likely to damage sites depending on the site type and activity type. The term 'prehistoric site' generally refers to archaeological sites that Native Americans occupied prior to European contact (generally prior to 1770); in the decision area, most prehistoric sites are subsurface. Approximately 56 percent of the recorded sites in the decision area are prehistoric. 'Historic sites' refer to both subsurface and above ground sites, including structures that date from the contact period up to the recent historic period (generally 1770 to 50 years ago). Multicomponent sites are sites that date to multiple occupation periods and include both prehistoric and historic components. Ground-disturbing activities are more likely to affect subsurface sites inadvertently due to the lack of visibility of artifacts on the surface, especially in the densely vegetated landscape that composes a large majority of the lands administered by the BLM in the decision area.

Table 3-22. Distribution of site types

District/ Field Office	Prehistoric (Sites)	Historic (Sites)	Multicomponent (Sites)	Unknown (Sites)	Totals (Sites)
Coos Bay	30	24	1	1	56
Eugene	132	15	-	-	147
Klamath Falls	760	284	62	61	1,167
Medford	148	492	22	6	668
Roseburg	250	34	14	-	298
Salem	67	62	3	-	132
Totals	**1,389**	**911**	**102**	**68**	**2,468**

Table 3-23 shows the last known condition of all the recorded sites in the decision area. The BLM monitors recorded sites to assess their condition over time and note impacts that affect the integrity of the site such as erosion, looting, weathering or from the implementation of BLM actions. The BLM categorizes the largest percentage of sites as 'unknown' (39 percent); the lack of a known site condition is likely due to the large amount of subsurface prehistoric sites within the decision area. Without subsurface testing and evaluation of these sites, it is hard, if not impossible, to assess the level of intact deposits (soil and cultural materials) within the site. The BLM has determined that less than 1.5 percent of recorded sites have been destroyed. There are 37 percent of the sites in excellent or good condition and 22 percent in fair or poor condition.

Table 3-23. Conditions of recorded sites within the decision area

Site Condition	Recorded Sites (Count)	Recorded Sites (Percent)
Excellent	232	9.4%
Good	693	28.1%
Fair	256	10.4%
Poor	282	11.4%
Destroyed	34	1.4%
Other	11	0.4%
Unknown	960	38.9%
Totals	**2,468**	**100%**

Environmental Consequences

Under all alternatives and the Proposed RMP, the BLM would conduct adequate and thorough cultural resource inventories in advance of 'federal undertakings' and in accordance with Oregon BLM and Oregon State Historic Preservation Office Protocol (2015). The BLM anticipates avoiding or mitigating impacts to the vast majority of cultural resources through: (1) identification of cultural resources and potential impacts through inventory; and (2) applying appropriate mitigation measures.

Table 3-24 shows the acreage of timber harvest activities by each alternative and the Proposed RMP as modeled for the first decade, along with timber harvest distribution across the probability zones. Overall, Alternative A, which has the smallest Harvest Land Base, would have the lowest potential for disturbance to cultural resources from timber harvest; it has the lowest total acreage of timber harvest and the lowest acreage of harvest in high probability zones. Alternative C would have the highest potential for

disturbance from timber harvest, with both the highest total acreage of timber harvest and the highest acreage of timber harvest in High probability zones. The Proposed RMP would have the third lowest potential for disturbance from timber harvest for both the total acreage of timber harvest and the acreage of timber harvest in High probability areas.

Table 3-24. Acreage of timber harvest for the first decade in each probability zone

Alternative/ Proposed RMP	Low (Acres)	Medium (Acres)	High (Acres)	Totals (Acres)
No Action	60,733	56,891	37,770	155,395
Alt. A	36,532	33,825	21,425	91,782
Alt. B	70,945	58,297	33,523	162,765
Alt. C	72,724	65,403	38,570	176,696
Alt. D	61,442	49,519	28,190	139,151
PRMP	65,846	54,603	30,949	151,398

Table 3-25 shows that the total mileage of new road construction, which generally corresponds with the total acres of timber harvest (**Table 3-24**). The No Action alternative and Alternative C would have the greatest potential for the disturbance of cultural resources through new road construction, while Alternatives A and D have the lowest potential for this type of disturbance. The Proposed RMP has the third lowest potential for disturbance through new road construction compared to the alternatives.

Table 3-25. Total mileage of new road construction

Alternative/ Proposed RMP	New Road Construction (Miles)
No Action	637
Alt. A	299
Alt. B	531
Alt. C	699
Alt. D	240
PRMP	437

For all action alternatives and the Proposed RMP, the BLM would apply interim management guidelines for public motorized travel activities until implementation-level travel management planning is completed (**Appendix Q**). On the majority of the BLM-administered lands, public motorized travel activities would be *limited* to existing roads and trails (see Trails and Travel Management **Table 3-218**). None of the action alternatives or the Proposed RMP has lands designated as *open* for public motorized access. This differs from current practices and the No Action alternative, in which there are 319,661 acres of land designated as *open*. Due to this change, the BLM would expect a reduction in inadvertent effects to cultural resources from public motorized travel activities under all action alternatives and the Proposed RMP. In accordance with current policy, the BLM is deferring implementation-level transportation management planning until after completion of these RMPs. All areas identified as *limited* for public motorized access would have completed Travel Management Plans within 5 years of completion of these RMPs. Route designation would occur as part of implementation-level travel management planning, and the BLM would consider affects to cultural resources in compliance of Section 106 of the National Historic Preservation Act. The Trails and Travel Management section of this chapter and **Appendix Q** contain more information on transportation management planning.

There are multiple activities associated with livestock grazing that cause effects to cultural resources. Impacts can come from congregation of livestock around watering or salting locations, the creation of trails, livestock movements (e.g., rubbing, trampling, and crushing), and fence construction. Creating trails, post-holing from hooves, hoof shearing, and trampling also cause erosion of the soil which can indirectly effect cultural resources by exposing them, which leaves them more susceptible to weathering, looting, or further trampling by livestock. The No Action alternative would have the largest potential for the disturbance of cultural resources based on available livestock grazing allotments, while Alternative D has no potential for this type of disturbance. Alternatives A, B, and C, would all have equal potential for disturbance from livestock grazing, and the Proposed RMP would have a slightly less potential from livestock grazing by making an additional four allotments unavailable. **Table 3-26** shows the number of available authorized livestock grazing allotments, associated acres, and animal unit months (AUMs, the number of cow/calf pair permitted per month based on available forage).

Table 3-26. Number of available authorized livestock grazing allotments, acres, and active use

District/ Field Office	Alternative/ Proposed RMP	Allotments (Number)	Public Land (Acres)	Active Use (AUMs)
Coos Bay	No Action	4	544	120
	Alt. A, B, C	-	-	-
	Alt. D	-	-	-
	PRMP	-	-	-
Klamath Falls	No Action	94	203,582	13,219
	Alt. A, B, C	92	203,377	13,199
	Alt. D	-	-	-
	PRMP	92	203,377	13,199
Medford	No Action	91	285,920	12,000
	Alt. A, B, C	50	156,926	9,372
	Alt. D	-	-	-
	PRMP	46	156,926	9,372
Totals	**No Action**	**189**	**490,046**	**25,339**
	Alt. A, B, C	**142**	**366,231**	**22,787**
	Alt. D	**-**	**-**	**-**
	PRMP	**138**	**360,303**	**22,571**

Issues Considered but not Analyzed in Detail

How would land management actions affect paleontological resources?

The BLM does not maintain a central or consolidated dataset of paleontological resources within the decision area. Individual districts are responsible for maintaining their paleontological records as well as considering them during project planning. The BLM must assume prior to ground disturbing activities it would conduct adequate paleontological resource inventories in areas of known paleontological localities as well as in areas where geologic formations lend themselves to contain paleontological resources. The BLM assumed that these inventories would result in the avoidance of damage to paleontological resources in nearly all cases.

Paleontological resources include the fossil remains of plants (leaves and wood), vertebrates, and invertebrates. They also include the traces of animals or plants, such as the tracks or claw marks and skin impressions. Geologic processes important in the formation of fossils can also be paleontological resources. The BLM refers to fossil locations on the ground as 'localities.' Fossils are fragile and non-renewable resources, and are susceptible to damage from weathering and erosional processes as well as from the public and Federal land management activities.

The BLM is required to identify locations likely to contain vertebrate fossils or exceptional invertebrate or plant fossils on land it administers. A BLM permit system regulates the collection of vertebrate or other scientifically important fossil specimens, including trace fossils on BLM-administered lands. The primary indicator for the significance of a paleontological resource is the characteristics of the fossil locality or feature that gives it importance and value for scientific or educational use. Natural weathering, decay, erosion, and improper or unauthorized removal can damage those characteristics that make the paleontological resource scientifically important.

There are a number of geologic formations that occur across the decision area, all of which span the Mesozoic and Cenozoic Eras (approximately 213–2 million years ago). The majority of paleontological resources within these formations are invertebrates and plants. Although vertebrate fossils are relatively less common, there are isolated occurrences of vertebrate fossils that are located mostly in cave settings within the decision area. The most prominent time period represented by vertebrate fossil localities within the decision area date from the late Miocene to early Pliocene epochs (approximately 23–1.8 million years ago, while the time frames for plants and invertebrates covers the Jurassic and Tertiary periods (245–145 million years ago). Some marine mammal fossils dated from the Mesozoic epoch occur in the decision area's coastal areas. In addition, there are small samples of terrestrial mammals from the late Cenozoic epoch.

Currently, the BLM does not maintain a comprehensive database with paleontological localities mapped in the decision area. Each district and the Klamath Falls Field Office have recorded localities to varying degrees (**Table 3-27**). The recorded localities may provide a sense of the distribution of paleontological resources throughout the decision area. **Table 3-27** lists the number of paleontological localities reported by BLM in the decision area. The BLM compiled these numbers by using annual reports and querying each districts' specialists for refinement of the number of recorded or known localities, which last occurred in 2008. No new paleontological sites have been reported since 2008; therefore, these counts are considered the most accurate information available. The condition of these localities is currently unknown.

Table 3-27. Number of reported paleontological localities

District/ Field Office	Paleontological Localities (Number)
Coos Bay	19
Eugene	1
Klamath Falls	1
Medford	2
Roseburg	18
Salem	6
Totals	**47**

As described above, the BLM would avoid the majority of damage to paleontological localities under the alternatives and the Proposed RMP by conducting adequate paleontological inventories in areas of known localities or in High probability landforms prior to implementation of projects that could damage paleontological resources. Each district would implement suitable protection measures for known paleontological localities.

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