FINDING OF NO SIGNIFICANT IMPACT

PETER CREEK ALLOTMENT #00100 LIVESTOCK GRAZING PERMIT RENEWAL

DOI-BLM-OR-L050-2012-0014-EA

The Bureau of Land Management, Lakeview District, Lakeview Resource Area (BLM), has analyzed several alternative proposals related to renewing term grazing permit number 3601503 and maintaining or improving one range improvement project for the Peter Creek Allotment. The allotment is located about 15 miles northeast of Christmas Valley, Oregon, and encompasses approximately 14,440 acres (including 13,800 acres of BLM-administered lands). An environmental assessment (EA) was prepared that analyzed the potential direct, indirect, and cumulative environmental impacts of four alternatives (see attachment). The alternatives analyzed included No Action (continue current grazing), Reduced Season, Renew Grazing Permit and Modify Existing Pipeline, and No Grazing (see pages 2-5 of attached EA).

The Council on Environmental Quality (CEQ) regulations state that the significance of impacts must be determined in terms of both context and intensity (40 CFR 1508.27). The context of the proposed project is the Juniper Mountain grazing allotment (0515). For this reason, the analysis of impacts in the attached Environmental Assessment (EA) is focused appropriately at this scale. The CEQ regulations also include the following ten considerations for evaluating the intensity of impacts:

1) Would any of the alternatives have significant beneficial or adverse impacts (40 CFR 1508.27(b)(1)?
( ) Yes (X) No

Rationale: Based on the analysis contained in the attached EA, none of the four alternatives would have either significant beneficial or adverse impacts on the human environment. There are no prime or unique farmlands, wetlands, riparian areas, water quality, wild horse management areas, wild and scenic rivers, significant caves, designated wilderness areas, wilderness study areas, other areas with wilderness characteristics, ACEC/RNAs, or hazardous waste sites located in the project area. No measureable impacts would occur to climate, low income or minority populations, air quality, floodplains, land tenure, or mineral and energy resources (pages 9-12).

Potential impacts to soils, biological soil crusts, upland vegetation, wildlife, special status species, livestock grazing management, native American concerns, cultural resources, recreation, visual resources, or social and economic values, and anticipated by the various alternatives have been analyzed in detail within Chapter 3 of the attached EA and found not to be significant (pages 12-38).

2) Would any of the alternatives have significant adverse impacts on public health and safety (40 CFR 1508.27(b)(2)? ( ) Yes (X) No

Rationale: None of the four alternatives analyzed in detail in the attached EA would have significant impacts on public health or safety because the project area is not located near any populated rural or urban area. For this reason, there would also be no impacts to low income or minority populations (Table 4, page 9). Further, there are no known hazardous waste sites in the project area (Table 5, page 10). There would be no measureable impacts to air quality within and surrounding the project area (Table 4, page 9). There are no perennial streams or drinking water sources located in the project area (Table 4, page 9).

3) Would any of the alternatives have significant adverse impacts on unique geographic characteristics (cultural or historic resources, park lands, prime and unique farmlands, wetlands, wild and scenic rivers, designated wilderness or wilderness study areas, or ecologically critical areas (*ACECs, RNAs, significant caves*)) (40 CFR 1508.27(b)(3)? ( ) Yes (X) No

Rationale: There are no park lands, prime or unique farmlands, wetlands or riparian areas, wild and scenic rivers, significant caves, designated wilderness areas, WSAs, or ACEC/RNAs located in the project area (Table 4, page 9).

4) Would any of the alternatives have highly controversial effects (40 CFR 1508.27(b)(4)? ( ) Yes (X) No

Rationale: The BLM has extensive expertise planning, analyzing impacts, and implementing range management actions such as those proposed by the four alternatives addressed in the attached EA. The potential impacts of these range management actions on soils, biological soil crusts, upland vegetation, wildlife, special status species, livestock grazing management, native American concerns, cultural resources, recreation, visual resources, or social and economic values can be reasonably predicted based on existing science and professional expertise. The attached EA analyzed these impacts (pages 12-38). The nature of these impacts is not highly controversial, nor is there substantial dispute within the scientific community regarding the nature of these effects.

The public has been given an opportunity to review and comment on the analysis of effects. The BLM is not currently aware of any potential highly controversial effects, as defined under 40 CFR 1508.27(b)(4), but will review any comments received and address any substantive comments prior to signing this FONSI.

5) Would any of the alternatives have highly uncertain effects or involve unique or unknown risks (40 CFR 1508.27(b)(5)? ( ) Yes (X) No

Rationale: The BLM has extensive expertise planning, analyzing impacts, and implementing range management actions such as those proposed by the four alternatives addressed in the attached EA. The potential impacts of these range management actions on soils, biological soil crusts, upland vegetation, wildlife, special status species, livestock grazing management, native American concerns, cultural resources, recreation, visual resources, or social and economic values can be reasonably predicted based on existing science and professional expertise. The attached EA analyzed these impacts (pages 12-38). The nature of these impacts is not highly uncertain nor does it involve unique or unknown risks.

6) Would any of the alternatives establish a precedent for future actions with significant impacts (40 CFR 1508.27(b)(6)? ( ) Yes (X) No

Rationale: The BLM has extensive expertise planning, analyzing impacts, and implementing range management actions such as those proposed by the four alternatives addressed in the attached EA. None of the alternative actions represents a new, precedent-setting range management technique or would establish a precedent for future similar actions with potentially significant effects.

7) Are any of the alternatives related to other actions with potentially significant cumulative impacts (40 CFR 1508.27(b)(7)? ( ) Yes (X) No

Rationale: Based on the analysis contained within the Cumulative Effects section of Chapter 3 of the attached EA, none of the four alternatives would have significant cumulative effects within the project area, even when added to the effects of other past, present, and reasonably foreseeable future actions (pages 34-38).

8) Would any of the alternatives have significant adverse impacts on scientific, cultural, or historic resources, including those listed or eligible for listing on the National Register of Historic Resources (40 CFR 1508.27(b)(8)? ( ) Yes (X) No

Rationale: There are no areas of native American religious concern in the project area (page 27). Potential impacts to cultural resources have been analyzed in Chapter 3 of the attached EA and found not to be significant (pages 29-31).

9) Would any of the alternatives have significant adverse impacts on threatened or endangered species or their critical habitat (40 CFR 1508.27(b)(9)? ( ) Yes (X) No

Rationale: There are no threatened or endangered species or designated critical habitat within the project area (Table 4, page 9 and page 23).

10) Would any of the alternatives have effects that threaten to violate Federal, State, or local law or

requirements imposed for the protection of the environment (40 CFR 1508.27(b)(10)? ( ) Yes (X) No

Rationale: All of the four alternatives analyzed in the attached EA comply with all Federal, State, and local environmental laws or other environmental requirements, including the requirements of the National Environmental Policy Act.

The Federal Land Policy and Management Act requires that any action that BLM implements must also conform with the current land use plan and other applicable plans and policies. The purpose and need for the proposed action conforms with the management direction contained in the *Lakeview Resource Management Plan/Record of Decision* (BLM 2003b). The alternatives that were analyzed in the EA conform to the management direction requirements of this plan and the *Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the States of Oregon and Washington* (BLM 1997), the *Greater Sage-Grouse Conservation Strategy and Assessment for Oregon* (ODFW 2005), the *Rosebud/Edmunds Well Habitat Management Plan* (BLM 1993a), the *Greater Sage-Grouse Interim Management Policies and Procedures* (BLM 2011c), and the grazing regulations (43 CFR Part 4100) in varying degrees (EA pages 5-8). Conformance with this direction will be addressed in more detail within the proposed decision as it represents important decision factors that must be considered in making the final decision (EA page 2).

Finding

On the basis of the analysis contained in the attached EA, the consideration of intensity factors described above, and all other available information, my determination is that none of the alternatives analyzed would constitute a major federal action which would have significant adverse or beneficial impacts on the quality of the human environment. Therefore, an Environmental Impact Statement (EIS) is unnecessary and will not be prepared.

_____ _____

Thomas E. Rasmussen, Field Manager Date
Lakeview Resource Area

Peter Creek Allotment #00100 Livestock Grazing Permit Renewal

ENVIRONMENTAL ASSESSMENT

DOI-BLM-L050-2012-0014-EA

Lakeview Resource Area
Bureau of Land Management
Lakeview District Office
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June 2012

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CHAPTER 1—PURPOSE AND NEED FOR ACTION

A. Introduction

The Lakeview District, Bureau of Land Management (BLM) has prepared this Environmental Assessment (EA) to analyze the potential effects of renewing term grazing Permit #3601503 for a ten year period for the Peter Creek Allotment (#00100). This analysis also considers various options for maintaining or improving one existing range improvement project: Peters Creek Pipeline #705566. This EA serves as the analytical basis for compliance with the National Environmental Policy Act of 1969 (NEPA), and in making a determination as to whether any significant impacts to the human environment would result from the proposal.

The Peter Creek Allotment is located approximately fifteen miles northeast of the town of Christmas Valley, Oregon. This allotment is 14,440 acres in size. 13,800 acres are BLM and 640 are privately owned (Map 1).

An interdisciplinary team conducted an assessment of the Rangeland Health Standards within Peter Creek Allotment in 2002. The Rangeland Health Assessment (RHA) was reviewed as part of this environmental analysis. The finding was that the assessment is still valid and that no adjustments to livestock grazing are required within the next year. While the vast majority of the allotment met all five standards, about 10% of the South Pasture was found to not be achieving Standard 3—Ecological Processes. This area is approximately 1,380 acres and contains sandy soils that had been farmed during the past homestead era and were not attaining or moving toward the potential vegetation community for this soil type. This acreage has not fully recovered from the loss of vegetative cover during past farming practices. This problem is not attributed to current livestock grazing. The findings of the Rangeland Health Assessment (RHA) for the allotment are summarized in Table 8 and are incorporated in their entirety herein by reference (BLM 2002; 2010 available at http://www.blm.gov/or/districts/lakeview/plans/inventas.php).

B. Purpose and Need for Action

The grazing permit for the allotment expired in 2010 at which time the permit renewal application was submitted for consideration by the permittee. At that time the BLM was unable to fully process the permit renewal; therefore the permit was renewed under the authority of Section 416, Public Law 111-88, until such time as the permit could be fully processed. The primary purpose of this analysis is to respond to the permittee's permit renewal application and consider whether to reissue, modify, or not reissue the 10-year term livestock grazing permit #3601503 associated with the Peter Creek Allotment (#00100).

The existing Peter Creek Pipeline (RIPs #705566) has provided livestock water sources along the eastern side of the allotment. However freezing and surface fracturing of the buried PVC pipe has resulted in this range improvement being unusable for the last several years. A secondary

purpose of the analysis is to consider whether to repair, relocate, or abandon the pipeline as a range of possible options which would provide water for livestock within the allotment.

C. Decisions to Be Made

The authorized officer will decide whether or not to renew the Term Grazing Permit, and if so, under what terms and conditions. The authorized officer will also decide whether or not to repair, relocate, or abandon the Peters Creek Pipeline.

D. Decision Factors

Decision factors are additional criteria used by the decision maker to choose the alternative that best meet the purpose and need for the proposal. These include:

a) How well does the decision conform to laws, regulations, and policies related to grazing use and protecting other resource values?
b) How well does the decision conform to the resource management and allotment management plans?
c) How well does the decision promote maintenance of rangeland health standards?
d) How well does the decision conform with ODFW 2005 guidelines?
e) How well does the decision conform with IM 2012-043 regarding interim sage-grouse management?

CHAPTER 2—ALTERNATIVES

A. Actions Common to All Grazing Alternatives (1-3)

<u>Grazing management system</u>

The current rest rotation grazing system would be applied to all grazing alternatives (Map 2). Each pasture is grazed two years in a row for part of the year and then rested the year after deferment. The term deferment refers to grazing after grass species have completed most of their growth cycle. The typical growth cycle for the Lakeview Resource Area is 4/15 for start of growth through 7/15 seed set. The three pastures are grazed, deferred and rested as shown in Table 1.

Table 1. Rest Rotation Grazing System

Pasture	Year 1 in Rotation (2013)	Year 2 in Rotation (2014)	Year 3 in Rotation (2015)
South	Graze April (May)-July 15	Defer, Graze July-October	Rest
Middle	Defer, Graze July-October	Rest	Graze first April(or May)-July
North	Rest	Graze First April (or May)-July	Defer, Graze July-October

Monitoring

Monitoring would continue as required in the Peter Creek Allotment Management Plan, (AMP) incorporated by reference, (BLM 1990). In summary trend monitoring studies include nested frequency and 180° step-toe and photo station and observed apparent trend methodologies are used to measure cover, species composition and frequency. Utilization studies would be conducted using the key forage plant method. Utilization is a measure of the amount of the current year's forage that is consumed by livestock. Monitoring methodology would follow the latest protocol such as Technical Reference 1734-3 and 1734-4 (BLM 1996) incorporated by reference. Table 2 describes the key species and utilization targets identified in the AMP.

Table 2. Key Species and Target Utilization Levels for Pastures within the Peter Creek Allotment

Pasture	Trend Plot[1]	BLM Acres	Key Species	Utilization Target %
North	PC-1	4,651	Idaho Fescue (*Festuca idahoensis*) Squirreltail (*Elymus elymoides*) Thurbers Needlegrass (*Achnatherum thurberianum*)	50
Middle	PC-3	4,971	Idaho Fescue (*Festuca idahoensis*) Squirreltail (*Elymus elymoides*) Thurbers Needlegrass (*Achnatherum thurberianum*)	50
South	PC-2	4,391	Idaho Fescue (*Festuca idahoensis*) Squirreltail (*Elymus elymoides*) Thurbers Needlegrass (*Achnatherum thurberianum*)	50

[1] See Map 1 for locations of trend plots.

Grazing Permit Terms and Conditions Applicable to All Grazing Alternatives

Terms and conditions that comply with Federal and State policies will be included within any grazing permit issued under an alternative. This includes requirements such as: pay fees, submit actual use reports, provide administrative access across private land, continued compliance with S&Gs, and maintenance of range improvements.

Grazing Management Flexibility

Knowing that uncertainties exist in managing for sustainable ecosystems, changes to the annual grazing use may be authorized within the limits of the grazing permit for reasons such as, but not limited to:

> Adjust the rotation/timing of grazing based on previous year's monitoring and current year's climatic conditions. An example of this would be; to turn livestock out later in the season on a year with a wet cold spring; or to bring livestock off the allotment early as conditions warrant this need.

Dry years that limit water availability; An example would be resting a pasture that had low water and shifting livestock use to the pasture that had water. Conversely on wet years, livestock could be moved to areas near more dependable water sources.

Change in use periods to balance utilization levels in each pasture. An example of this would be to shorten the time period or number of livestock in a pasture that had 65% average utilization and or increase the time period and number of livestock in another pasture that had 30% average utilization if the target utilization in both pastures is 50%.

Flexibility in grazing management would be authorized within the active permitted AUMs and outside permit dates, some of the more common adjustments are:

Increasing livestock numbers while shortening the season of grazing use

Adjustments to the length of time and AUMs of grazing use to meet resource objectives including but not limited to utilization targets

Temporary (1 year) adjustments to pasture use usually dependent on water availability or climate related issues. Sometimes adjustments would be made to reduce conflicts with other resources; such as one time recreational or other activities where livestock or the other resource would benefit from adjusting the livestock use.

B. Alternative 1: No Action

The No Action Alternative would renew the existing livestock grazing permit (#3601503) in the Peter Creek Allotment for the current grazing permittee with the same terms and conditions. A 10-year term livestock grazing permit would be issued that continues current grazing management during the permitted season with the current specified grazing use and rest-rotation grazing system (Table 3). The Peter Creek Pipeline would be maintained in its current location. This definition for the No Action Alternative is consistent with BLM (2000) guidance.

Table 3. Specified Grazing Use for Alternatives 1 - 3

	LIVESTOCK		**GRAZING PERIOD**		**TYPE USE**	**AUMs**
Alternative	Number	Kind	Begin Date	End Date		
1	54	CATTLE	04/15	10/15	Active	329
2	65	CATTLE	05/15	10/15	Active	329
3	54	CATTLE	04/15	10/15	Active	329

C. Alternative 2: Reduced Season

Under this alternative, livestock grazing permit (#3601503) in the Peter Creek Allotment would be renewed at the same number of AUMs, but over a shorter grazing period. The shorter season would eliminate one month of spring use. Under this alternative a 10-year term livestock grazing permit would be issued from May 15th through October 15th (Table 3). No maintenance or modification would be done to the Peter Creek Pipeline.

D. Alternative 3: Renew Grazing Permit and Modify Pipeline

Alternative 3 would renew the existing livestock grazing permit (#3601503) in the Peter Creek Allotment with the same terms and conditions as Alternative 1 (Table 3). In addition, the following work would be done to the Peter Creek Pipeline (Map 4):

> Two miles of existing buried pipeline from Winter Well to the North Pasture would be replaced with above ground high density polyethylene (HDPE) overland pipe in the same location.
>
> Three miles of existing buried pipeline in the Middle and South pastures would be relocated along the existing pasture fence to the east (Map 2) and replaced with above-ground HDPE plastic pipe. All exposed or broken PVC pipe would be removed.
>
> Approximately 1.75 miles of road associated with the removed pipeline would be closed and rehabilitated.
>
> All watering troughs on the pipeline would be outfitted with escape ramps to protect birds, small mammals, and other wildlife from being trapped in the troughs.

E. Alternative 4: No Grazing

Under this alternative, the current grazing permit would not be renewed and livestock grazing would not be authorized on public lands within the Peter Creek Allotment. The Peter Creek pipeline would be abandoned. All materials would be removed and/or made available for other range improvement projects elsewhere in the resource area. However, the access road associated with this pipeline would remain open for motorized use. This alternative is being considered to provide a full range of alternatives and comply with current grazing management permit renewal guidance (BLM 2000, 2008b).

F. Conformance with Land Use Plan

The Lakeview RMP/ROD (BLM 2003b) is the governing land use plan for the area and provides the following goals and management direction related to livestock grazing use:

Livestock Grazing Management Goal—***Provide for a sustainable level of livestock grazing consistent with other resource objectives and public land-use allocations*** (Page 52).

> The Peter Creek Allotment is currently open or allotted to grazing use and is allocated for 329 AUMs of livestock forage and 90 AUMs of wildlife forage (Page 46, Table 5; Map G-3).
>
> "*The current licensed grazing levels (Appendix E1) will be maintained until analysis or evaluation of monitoring data or rangeland health assessments identify a need for adjustments to meet objectives. Applicable activity plans (including existing allotment management plans, agreements, decisions and/or terms and conditions of grazing use authorizations) will be developed, revised where necessary, and implemented to ensure that resource objectives are met. The full permitted use level for each allotment has been and continues to be analyzed*

through individual allotment assessments, such as rangeland health and livestock grazing guidelines…." (Page 52).

"*Rangeland improvement projects will be implemented to meet resource objectives… Range improvement projects that do not enhance resource values and meet management objectives will be abandoned and rehabilitated*" (Page 53).

Appendix E1 – Allotment Specific Management Direction

Livestock distribution/management - *Improve livestock management and distribution through improved management practices, installation of livestock management facilities (such as fences and water sources), and/or other actions as opportunities arise* (Page A-10).

Improve/maintain range condition - *Use management practices and/or better animal distribution; develop range improvements when appropriate: adjust permitted use as needed* (Page A-10).

General –*Continue livestock management practices under the 1990 allotment management plan. Revise the following objectives as needed to meet multiple use objectives* (Page A-10):

> *Maintain current allocation of 329 AUMs for livestock and 90 AUMs for wildlife. Wildlife includes 30 AUMs for bighorn sheep, 25 AUMs for deer and pronghorn, 30 AUMs for elk and 5 other.*
>
> *Provide each pasture of the allotment periodic growing season rest. The growing season is defined as April 1 to peak of flowering on or about June 20.*
>
> *Manage for an average maximum 50% utilization on key forage species.*
>
> *Maintain the range condition as measured by existing nested plot frequency monitoring studies.*
>
> *On (plot) PC-1 maintain Idaho Fescue (FEID) at 50% or greater, maintain squirreltail (ELEL) at 20% or greater and maintain Thurber's needlegrass (ACTH) at 20% or greater.*
>
> *On (plot) PC-2 maintain Idaho Fescue (FEID), squirreltail (ELEL), and Thurber's needlegrass (ACTH) at 30% each or greater.*
>
> *On (plot) PC-3 maintain Idaho Fescue (FEID) and squirreltail (ELEL) at 30% or greater, and maintain Thurber's needlegrass (ACTH) at 20% or greater.*

Wildlife/Wildlife Habitat - *Follow the greater sage-grouse Livestock Grazing guidelines (pages 75-76 of ODFW 2005), where appropriate* (Page A-10, as maintained).

Operation and Maintenance Actions

"*Maintenance of existing and newly constructed facilities or projects will occur over time… Such activities could include, but are not limited to, routine maintenance of existing…water control structures…, wells, pipelines, waterholes, fences,… and other similar facilities/projects*" (Page 100).

G. Consistency with Other Authorities

This EA has been prepared in conformance with the NEPA. Grazing permits are subject to renewal in accordance with the provisions of the Taylor Grazing Act (1934), Federal Land Policy and Management Act (FLPMA, 1976), Public Rangelands Improvement Act (1978), and applicable grazing regulations at 43 Code of Federal Regulations (CFR) Part 4100.

In order for an applicant to lawfully graze livestock on public land, the party must obtain a valid grazing permit or lease. The grazing regulations, 43 CFR 4130.2(a), state "grazing permits or leases shall be issued to qualified applicants to authorize use on the public lands and other lands under the administration of the Bureau of Land Management that are designated as available for livestock grazing through land use plans." As noted above, the Lakeview RMP/ROD has designated this allotment as available for livestock grazing (BLM 2003b). The permit renewal applicant (current permittee) controls the base property associated with the grazing preference on the allotment and has been determined to be a qualified applicant.

A performance review of the permittee's past use has been completed and BLM found the permittee to have a satisfactory record of performance pursuant to 43 CFR 4110.1(b). This conclusion was based on: grazing utilization at acceptable levels; bills paid on time; actual use turned in annually; permit terms and conditions were adhered to, base property requirements met, and no history of livestock trespass or unauthorized use. The record of performance review is hereby incorporated by reference.

H. Consistency with Other Plans and Policies

The final decision must also take into account the following plans and policies:

Conducting Wilderness Characteristics Inventory on BLM Lands (BLM 2012a) – Current manual that provides guidance on the process that BLM should use when updating its wilderness characteristics inventory.

Greater Sage-Grouse Conservation Assessment and Strategy for Oregon (ODFW 2005) - states "where livestock grazing management results in a level of forage use (use level) that is consistent with Resource Management Plans, Allotment Management Plans, Terms and Conditions of Grazing Permits or Leases, other allotment specific direction, and regulations, no changes to use or management are required if habitat quality meets Rangeland Health Standard and Guidelines" (Page 75). The plan also provides guidelines on how to construct or maintain range improvement projects to minimize impacts to sage-grouse habitat (Page 76).

Greater Sage-Grouse Interim Management Policies and Procedures (BLM 2011c) – represents the current BLM Washington Office interim policy for sage-grouse habitat management until such time as plan amendments can be completed throughout the range of the species that address a comprehensive conservation strategy. This policy addresses proposed grazing permit renewals and proposed water developments as follows:

<u>Permit Renewals</u>

Plan and authorize livestock grazing and associated range improvement projects on BLM lands in a way that maintains and/or improves Greater Sage-Grouse and its habitat. Analyze through a reasonable range of alternatives any direct, indirect, and cumulative effects of grazing on Greater Sage-Grouse and its habitats through the NEPA process:

- Incorporate available site information collected using the *Sage-Grouse Habitat Assessment Framework* when evaluating existing resource condition and developing resource solutions,
- Incorporate management practices that will provide for adequate residual plant cover (e.g., residual grass height) and diversity in the understories of sagebrush plant communities as part of viable alternatives. When addressing residual cover and species diversity, refer to the ESD (ecological site data) and "*State and Transition Model*," where they are available, to guide the analysis.
- Evaluate and implement grazing practices that promote the growth and persistence of native shrubs, grasses, and forbs. Grazing practices include kind and numbers of livestock, distribution, seasons of use, and livestock management practices needed to meet both livestock management and Greater Sage-Grouse habitat objectives.
- Evaluate the potential risk to Greater Sage-Grouse and its habitats from existing structural range improvements. Address those structural range improvements identified as posing a risk during the renewal process.
- Balance grazing between riparian habitats and upland habitats to promote the production and availability of beneficial forbs to Greater Sage-Grouse in meadows, mesic habitats, and riparian pastures for Greater Sage-Grouse use during nesting and brood-rearing while maintaining upland conditions and functions. Consider changes to season-of-use in riparian/wetland areas before or after the summer growing season.

To ensure that the NEPA analysis for permit/lease renewal has a range of reasonable alternatives:

- Include at least one alternative that would implement a deferred or rest-rotation grazing system, if one is not already in place and the size of the allotment warrants it.
- Include a reasonable range of alternatives (e.g., no grazing or a significantly reduced grazing alternative, current grazing alternative, increased grazing alternative, etc.) to compare the impacts of livestock grazing on Greater Sage-Grouse habitat and land health from the proposed action.

<u>Water Developments</u>

- NEPA analysis for all new water developments must assess impacts to Greater Sage-Grouse and its habitat.
- Install escape ramps and a mechanism such as a float or shut-off valve to control the flow of water in tanks and troughs.
- Design structures in a manner that minimizes potential for production of mosquitoes which may carry West Nile virus.

CHAPTER 3—DESCRIPTION OF THE AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section presents a description of the current environment within the allotment and a discussion of the potential changes resulting from implementation of the alternative management actions. An inter-disciplinary (ID) team has reviewed and identified the resources values and uses that could potentially be affected by the alternative actions. The resources identified as "not affected" or "not present" are listed in Tables 4 and 5 and will not be discussed or further analyzed in this EA. The remainder of this chapter describes the potential direct, indirect, and cumulative effects on resources and resource uses that may result from each alternative.

Table 4 - Critical Elements of the Human Environment that Would Not be Affected

Elements of Human Environment		Rationale
ACECs	Not Present	No ACECs occur within the allotment.
Air Quality (Clean Air Act)	Not Affected	None of the alternatives are expected to have measureable impacts to air quality or regulated air pollutants.
Environmental Justice (Executive Order 12898)	Not Affected	The Proposed Action and alternatives would not have disproportionately high or adverse effects on minority or low-income populations as such populations do not exist within the allotment area.
Prime or Unique Farmlands	Not Present	No such lands have been identified in the allotment.
Flood Plains (Executive Order 13112)	Not Present	No proposed construction within or other modification of flood plains would occur. Therefore, there would be no floodplain or hydrologic impacts.
Riparian/Wetlands (Executive Order 11990)	Not Present	No riparian areas or wetlands are present on BLM lands in the Peter Creek Allotment.
Paleontology	Not Present	There are no known paleontological resources within the allotment.
Threatened and Endangered Plants and Animals	Not Present	No known federally listed plant or animal species or their habitat are found within the allotment. No fish bearing streams are present in the allotment.
Wild and Scenic Rivers	Not Present	There are no wild or scenic rivers within the allotment.
Water Quality (Clean Water Act)	Not Present	There are no perennial streams or municipal drinking water sources in the allotment.
Wilderness	Not Present	There are no WSAs or designated wilderness areas within the allotment.

Table 5 – Other Resources and Uses that Would not be Affected

Lands	Not Affected	None of the alternatives analyzed would have any effects on current land status or land tenure.
Fisheries	Not Present	No perennial streams or associated fisheries exist within the allotment.
Minerals and Energy	Not Affected	None of the alternatives analyzed would have any effects on mineral or energy resources or uses.
Hazardous or Solid Waste	Not Present	No such sites or issues are known within the allotment.
Noxious Weeds (Executive Order 13112)	Not Present	No noxious weed infestations are present within the Peter Creek Allotment. If new infestations are found in the future, they would be treated in accordance with the most current Integrated Weed Treatment Plan (such as BLM 2004).
Wilderness Characteristics	Not Present	Since 2007, the BLM has been conducting wilderness inventory updates for public lands within the Lakeview Resource Area following current inventory guidance (USDI-BLM 2007c, 2008c, 2012a). In this process, an inter-disciplinary team reviewed the existing wilderness inventory information contained in the BLM's wilderness inventory files, previously published inventory findings (USDI-BLM 1979f, 1979g, 1979h, 1980a, and 1980b), and citizen-provided wilderness information (ONDA 2005). BLM conducted field inventory, completed route analysis forms, made unit boundary determinations, and subsequently evaluated wilderness character within each inventory unit. BLM recently completed wilderness character inventory updates for the West Benjamin, Walker Butte, and Moonlight Butte areas, which collectively cover the Peter Creek Allotment. While ONDA reported wilderness characteristics to be present within the Moonlight Butte portion of the allotment (ONDA 2005, p. 152-161), BLM did not find wilderness characteristics to be present in any of the areas evaluated (BLM 2009, 2011a, 2011b; also available at http://www.blm.gov/or/districts/lakeview/plans/inventas.php). BLM hereby incorporates these findings by reference in their entirety. Based upon the results of this inventory update, there would be no impacts to lands with wilderness character.
Wild Horses (Wild Horse and Burro Act)	Not Present	The allotment is located outside of designated wild horse herd management areas.

A. Climate

Affected Environment:

Climate patterns of this region are typical of the Intermountain West precipitation zone, with winters and early springs cold and constituting the majority of the precipitation, while summers are typically warm and dry. Average precipitation for Peter Creek Allotment, based upon the Parameter-elevation Regressions on Independent Slopes Model (PRISM system, is estimated to average 7-12 inches/year, with extreme lows (<6 in) and highs (>13in) occasionally occurring. Average yearly temperatures range from 30-59º F, with average lows in December ~18º F, and

average highs in July ~82º F; the coldest and warmest months, respectively (PRISM Climate Group, 2012). The soil regime within Peter Creek Allotment is listed as frigid, with the frost-free time period ranging from 50 to 80 days (NRCS 2012). Peak plant growth typically occurs from April through June.

Changes in greenhouse gas levels may affect global climate (Forster *et al*. 2007). However, the U.S. Geological Survey (USGS) has summarized the latest science on greenhouse gas emissions and concluded it is currently beyond the scope of existing science to identify a specific source of greenhouse gas emissions and designate it as the cause of specific climate impacts at a specific location (USGS 2008). For this reason, the analysis focuses on quantifying the potential changes in greenhouse gas emissions and carbon sequestration associated with the alternatives.

Environmental Consequences:

<u>Effects Common to Alternatives 1-4</u>

Livestock grazing results in methane emissions as a result of ruminant digestion. Methane emission rates from cattle vary widely and depend on many variables (Johnson and Johnson 1995; DeRamus *et al*. 2003). Estimates for grazing cattle typically range from 80 to 101 kilograms of methane per year per animal (Environmental Protection Agency (EPA), 2009) or 6.7-9.2 kilograms of methane per month. This analysis assumes a methane emission rate of 8 kilograms of methane per AUM. Assuming that methane has a global warming potential 21 times that of carbon dioxide (EPA 2009, p. ES-3), each AUM results in 0.168 metric tons of carbon dioxide equivalent.

Current U.S. emissions of methane from livestock production total approximately 139 million metric tons of carbon dioxide equivalent per year (EPA 2009, p. 6-2); current U.S. emissions of all greenhouse gases total approximately 7 billion metric tons of carbon dioxide equivalent (EPA 2009, p. 2-4); current global emissions of all greenhouse gases total about 25 billion metric tons of carbon dioxide equivalent (Denman *et al*. 2007, p. 513).

The alternatives would permit grazing use between 0 and 329 AUMs per year within the Peter Creek Allotment which would result in methane emissions estimated between 0 and 55.27 metric tons of carbon dioxide equivalent per year. This emission represents less than 0.00000039 percent of the estimated annual U.S. methane emissions from livestock production, 0.000000008 percent of the annual U.S. emissions of all greenhouse gases, and 0.0000000002 percent of the global emissions of all greenhouse gases.

The amount of greenhouse gas emissions estimated from the alternatives would represent an extremely small incremental contribution to total national and global emissions. In addition, the level of emissions would be so small that it would not even merit reporting under current EPA rules related to mandatory annual reporting of greenhouse gases from industrial and agricultural sectors (reporting threshold is 25,000 metric tons of carbon dioxide equivalent; 40 CFR 98.2).

Livestock grazing can affect rangeland carbon levels, through changes in plant community and changes in ecosystem processes, but the effects have been variable and inconsistent among the ecosystems studied (Schuman *et al*. 2009). Some studies have found that grazing can result in increased carbon storage compared to no grazing, because of increased plant turnover and changes in plant species composition (Follett *et al*. 2001). Many changes in rangeland carbon from different grazing practices do not result in substantial changes in total ecosystem carbon, but rather simply redistribute carbon, for example, from aboveground vegetation to root biomass (Derner and Schuman 2007).

Overall, the changes in rangeland carbon storage that are likely to result from the minor changes in grazing practices described in the alternatives would be small and difficult to predict, especially where a RHA has determined that the Standards for Rangeland Health Standards and Guidelines for Livestock Grazing Management are being met. Therefore, this analysis assumes that the minor changes in proposed grazing practices on this allotment would not result in any measurable change in total carbon storage under any of the alternatives analyzed.

B. Soils and Biological Soil Crusts

Affected Environment:

Soil information was collected from the Natural Resource Conservation Service (NRCS 2012) Web Soil Survey online reports found at: http://websoilsurvey.nrcs.usda.gov/app/, as well as soil data on file at the Lakeview District BLM Office. This data is herein incorporated by reference in its entirety and is summarized in the following section.

There is a complexity of soils present within Peter Creek Allotment. Eight soil map units comprise 80% or more of the area. Several smaller soil map units are also present primarily depicting isolated features such as rock outcrops and lakebeds (see Map A1). Recent volcanic activity is apparent in all profiles, exhibiting at least one “ashy” layer (see Table A2) The four most dominant soil map units within the allotment and their respective percentages are: Lastcall-Moonbeam complex (28%), Goodtack ashy very fine sandy loam (15%), Suckerflat-Weglike complex (13%), and Wegert very cobbly ashy loamy fine sand (11%) (see Table A1). All of these dominant soils are well drained with very low to low water holding capacities (see Table A2). Erosion potential (based on K factor rating system) is low to moderate (K factor .05-0.37) on all soils except on the Goodtack ashy very fine sandy loam, 2 to 10 percent slope soil, which has a moderately high to high erosion potential (K factor 0.55).

Observed apparent trend (OAT) data was used to determine trend indicators correlated to soil stability. These indicators are: surface litter, pedestals, and gullies. OAT data collected indicates stable soils within Peter Creek Allotment; i.e. the majority of litter is collecting in place, there is little evidence of pedestaling, and gullies are absent from the allotment.

Biological soil crusts (BSCs) such as mosses, lichens, micro fungi, cyanobacteria and algae play a role in a functioning ecosystem and are one of at least 12 potential indicators used in evaluating upland watershed function. In addition to providing biological diversity, BSCs contribute to soil stability through increased resistance to erosion and nutrient cycling (Belnap *et al.* 2001). Lichen species diversity is poorly known in the Pacific Northwest (Root *et al*. 2011). Further, identification of BSCs at the species level is not practical for fieldwork, as it is very difficult and may require laboratory culturing (Belnap *et al.* 2001). BSC cover data was collected for this allotment during the North Lake Ecological Site Inventory (ESI) process. The inventory crew ranked cover on a relative scale of 0 to 10 as follows:

0= bareground
1= clearly a crust is present
2= just Cyanobacteria present
4= lichens and mosses covering 1-5% of the ground
6= lichens and mosses covering 5-10% of the ground
8= lichens and mosses covering 10-20% of the ground
10= lichens and mosses covering greater than 20% of the ground

The ratings for this allotment fall mid-range. About 45% of the acreage has a rating of 4. About 46% of the acreage has a rating of 6%. The other 9% was various small acreages that were not significant to the overall ratings. In addition, sampling completed from each of the trend plots within each of the pastures has picked up baseline levels of BSCs from cover points (North and Middle pastures from nested frequency frame points, and the South pasture from Pace 180º toe hits). BSCs were identified as either present or not present. Percentage of BSCs found at trend plot locations in each pasture were: North 3%, Middle 3%, and South 13%.

Environmental Consequences:

<u>Effects Common to Alternatives 1-2</u>

The impacts of livestock grazing on soils within the Lakeview Resource Area were analyzed in the Lakeview Proposed RMP/Final EIS (BLM 2003a) and that analysis is incorporated herein by reference. In summary, livestock use would continue to negatively impact area soils due to compaction at waterholes and along trails (pages 4-35 to 4-36). However, a rest-rotation grazing system is designed to reduce or mitigate these impacts.

Soils and BSCs would continue to be negatively impacted in livestock concentration areas near water sources and cattle trails under both Alternatives 1 and 2 (See Map 3). Livestock would tend to concentrate within a quarter of a mile around existing water sources (a quarter mile buffer around a water source represents approximately 120 acres). There are 8 water troughs, 7 constructed waterholes and reservoirs, and one small undeveloped intermittent spring in the allotment (Map 4). Approximately 1,920 acres (16 x 120 acres) around water sources would be impacted by concentrated grazing use under Alternatives 1 and 2.

Cattle trails tend to be located along fence lines and near water sources. These trails are typically less than 5 feet wide. There are about 28.7 miles of fence located within the allotment representing another 24.4 acres (28.7 mi. x 5 ft. x 5,280 ft. per mi./ 43,560 $ft.^2$ per acre) of disturbance associated with past fence construction and livestock trailing. BLM does not have a quantifiable means of estimating disturbed acres associated with cross-country livestock trailing to water sources, but based on estimates associated with fencing, believes that it represents a very small percentage of the allotment.

In total, approximately 1,944.4 acres (13.5%) of the soils and BSCs within the allotment would be impacted by concentrated livestock use under both alternatives. While more livestock would be concentrated in these same areas under Alternative 2, the soil impacts would occur in a shorter period of time and within the same areal extent as Alternative 1. Further, soils would have more time to heal through rest and natural processes such as frost-heave. For these reasons, the impacts would be similar to Alternative 1.

Alternative 3: Renew Grazing Permit and Modify Pipeline

The impacts of continuing a rest-rotation grazing system in the allotment would be similar to those described for Alternatives 1 and 2. However, water locations and livestock use patterns would shift under Alternative 3. The effects of hoof action on soil and BSCs throughout the majority of the allotment (where dispersed grazing use occurs) would remain relatively minor. Through proper range management the negative effects that occur in concentration areas (hoof divots, trails, etc.) would have time to heal through rest, natural processes such as frost-heave, and annual adjustments such as salt and water placement in each pasture (See Map 2).

Under Alternative 3, there would be some additional surface disturbance to soils and BSCs from vehicle traffic during construction and future maintenance of the relocated pipeline section. Increased disturbance would also occur in the vicinity of the new water troughs due to cattle hoof action being concentrated in these areas. The total acreage impacted by concentrated livestock use at 13 existing and 3 relocated water sources would be similar to Alternatives 1 and 2, as the existing disturbance around the 3 former water trough sites (approximately 360 acres) would reclaim over time. On the allotment as a whole, the repairing and relocating of the Peter Creek Pipeline would likely reduce the severity of hoof impacts at any given watering location due to livestock being dispersed across more functioning watering sites each year.

This would also facilitate the ability to use minor annual adjustments to grazing strategies. For example; areas that experienced high impacts in a previous year could be rested by shutting off water to certain troughs. Cattle distribution across the allotment as a whole would improve. Cattle congregating areas could be controlled through water availability. With better distribution, the western edge of the allotment would experience less disturbance, likely allowing soils in these specific areas to reestablish good aggregation from increased plant growth, as well as increased BSC cover.

There would be an additional small, disturbed area (estimated at 3.6 acres; 10 feet wide swath 3 miles long; 0.0002% of the allotment) associated with pipeline construction and maintenance. However, the closure and rehabilitation of approximately 1.75 miles of existing road in the southern part of the allotment would allow soils in this area (2.1 acres) to rebuild aggregate structure, through plant growth, frost heaving, and removal of compaction by vehicle use. BSCs would also have opportunities to re-establish in this area. This would partially offset the impacts of pipeline relocation disturbance over time.

New cattle trails to the new water troughs would develop while existing trails to the old trough locations would reclaim over time (5-10 years). For this reason, the total number of trails and associated area of surface disturbance for this alternative is expected to be similar to Alternatives 1 and 2.

Alternative 4: No Grazing

Under the No Grazing Alternative, little change to soils would occur on the allotment as a whole in the short-term (up to 5 years). Most of the concentrated livestock use areas (1,920 acres) associated with water sources and cattle trails) would reclaim naturally with vegetation and BSCs from surrounding areas over the long term (5-10 years). Some of these trails may persist due to continued use by wildlife such as elk and deer. It is likely that interspace areas (bare spots between grass/shrub species) may be reduced across the allotment due the lack of cattle grazing. However, this change would likely be undetectable over the short-term.

C. Upland Vegetation

Affected Environment:

Vegetation within Peter Creek Allotment comprises a fairly complex sagebrush steppe system. Plant community trends change from south to north, as both elevation and precipitation increase toward the north. Multiple plant community shifts occur which are influenced by soil type and depth. The majority of the area has flat to rolling topography and vegetation is not influenced by aspect. Three main varieties of sagebrush are dispersed throughout the allotment including: Basin big sagebrush, *Artemisia tridentata tridentata* (ARTRT), Wyoming big sagebrush *Artemisia tridentata wyomingensis* (ARTRW8), and low sagebrush, *Artemisia arbuscula* (ARAR8) (Plant codes represent genus-species abbreviations adopted by USDA-NRCS; see also Plants Database available at http://www.plants.usda.gov). The area supports a healthy abundance of native grasses and forbs. Table 6 depicts the percent species occurrence for key indicator plant species related to AMP goals in each pasture. Data was collected between 1984 and 2011 at three long term trend plots and is hereby incorporated by reference (see trend plot photos).

Table 7 describes the dominant plant communities as they relate to range sites within the allotment. Data presented in the table is summarized from the North Lake Ecological Site

Inventory (ESI) which is hereby incorporated by reference. Several indicators of plant community health are described. These include current dominant vegetation, observed

Table 6—Comparison between Key Species Representative of Each Pasture within the Peter Creek Allotment (#00100) as reflected in the goals for each species in each pasture in the AMP

Species	**South Pasture (PC-2)**	**Middle Pasture (PC-3)**	**North Pasture (PC-1)**
Grasses	% Occurrence		
Festuca idahoensis	Meeting 30 or >	Meeting 30 or >	Meeting 50 or >
Acnatherum thurberianum	Meeting 20 or >	Meeting 30 or >	Meeting 20 or >
Elymus elymoides	Meeting 30 or >	Not Meeting 20 or > (18)*	Meeting 20 or >
Shrubs (No goal statements in AMP)			
Artemisia tridentata wyomingensis	26	24	52
Chrysothamnus visidiflorus	19	26	34
*Although the Middle Pasture is not meeting the objective for 20% or greater *Elymus elymoides*. This species is stable and comparable to percentages that existed at the time the objective was written for the AMP.			

apparent trend (OAT), Standsite (a measure of spacing between indicator plant species), condition rating, and seral stage.

Post-settlement juniper expansion within the Peter Creek Allotment is strongly correlated on the ground with the MUN 665 soil unit (See Photo 1). Historic stands or pre-settlement woodlands (prior to 1860) were sparse and savanna-like on rocky shallow soils, occurring across approximately 10 percent of the area currently occupied by juniper within the Great Basin (Miller *et al*. 2008).

Environmental Consequences:

Effects Common to Alternatives 1-3

The impacts of continuing grazing under a rest-rotation grazing system on the upland plant communities within the Lakeview Resource Area have previously been analyzed in the Draft Lakeview RMP/EIS and Lakeview Proposed RMP/Final EIS (BLM 2001, 2003a) and these analyses are incorporated herein by reference. In summary, the vegetation composition of key species is expected to improve over time under this type of grazing system (BLM 2003a; pages 4-5 and 4-9). In addition, a rest rotation system would significantly improve the composition of the key perennial herbaceous species within both the big sagebrush/grassland and low sagebrush-grassland communities (BLM 2001; page A-162). Absent a wildfire, juniper expansion is

expected to continue regardless of grazing strategies, as it out-competes understory grasses and shrubs for available moisture and soil nutrients.

Table 7: Summary of Dominant Plant Communities and Ecological Site Inventory Plant Community Health Indicator Elements

Range Site Number	Range Site Name	Current Dominant Vegetation Common Name	Current Dominant Vegetation Plant Code*	Potential Vegetation Plant Code*	Observed Apparent Trend	Stand Site	Condition Rating/ Seral Stage	% of area
023XY316OR	Droughty Loam 11-13PZ	Basin big sagebrush/Thurber needlegrass	ARTRT/ACTH7	ARTRT/FEID/ ACTH7	Static	1/2 full	Good/Late	3%
023XY316OR	Droughty Loam 11-13PZ	Basin big sagebrush/Thurber needlegrass	ARTRT/ACTH7	ARTRT/FEID/ ACTH7	Static	1/4 full	Fair/Mid	9%
023XY316OR	Droughty Loam 11-13PZ	Wyoming big sagebrush/ Thurber needlegrass	ARTRW8/ACTH7	ARTRT/FEID/ ACTH7	Static	1/2 full	Good/Late	4%
023XY211OR	Pumice Claypan 10-12PZ	Low sagebrush/ Idaho fescue	ARAR8/FEID	FEID-ACHNA /ARAR8	Upward	1/2 full	Good/Late	5%
023XY211OR	Pumice Claypan 10-12PZ	Low sagebrush/ Idaho fescue	ARAR8/FEID	FEID-ACHNA/ ARAR8	Upward	1/2 full	Good/Late	2%
023XY511OR	Juniper Lava Benches 9-12 PZ	Low sagebrush/ Idaho fescue	ARAR8/FEID	FEID-POSE/ARAR8/ JUOC	Upward	3/4 to full	Excellent /PNC	29%
023XY511OR	Juniper Lava Benches 9-12 PZ	Western juniper/Low sagebrush/ Idaho fescue	JUOC/ARAR8/FEID	FEID-POSE/ARAR8/ JUOC	Static	1/2 full	Good/Late	9%
023XY511OR	Juniper Lava Benches 9-12 PZ	Western juniper/Low sagebrush/ Idaho fescue	JUOC/ARAR8/FEID	FEID-POSE/ARAR8/JUOC	Upward	3/4 to full	Excellent /PNC	9%
023XY608OR	Droughty Pumice Plains 8-11PZ	Yellow rabbitbrush /Squirreltail	CHVI8/ELEL5	HECO26-ACOC3/ARTRV-ERNA10	Downward	1/4 full	Fair/Late	9%
010XA027OR	Pumice North 10-12 PZ	Juniper/Basin big sagebrush/needle and thread grass	JUOC/ARTRT/HECOC8	HECO26-FEID-ACOC3/ARTRV/ JUOC	Upward	1/2 full	Good/Late	12%
023XY604OR	Arid Plains 8-11	Wyoming big sagebrush/Squirrel tail	ARTRW8/ELEL5		Downward	1/2 full	Fair	6%
		Unvegetated (small lakebeds, rock outcrops, transition areas)						5%

* *Source: USDA-NRCS Plants Database available at http://www.plants.usda.gov.*

Photo 1—Juniper encroachment within Peter Creek Allotment; Photo taken on western edge of MUN 665 (see Map A1) looking east.

Alternative 1: No Action

Approximately 1,944.4 acres (13.5%) of the vegetation communities within the allotment would continue to be impacted by concentrated livestock use (near cattle trails and water sources). Impacts to vegetation across the majority of the allotment (86.5%) would be dispersed and much less concentrated. Rest rotation grazing management as adjusted through the flexibility provided in the annual application process, would control livestock distribution, grazing utilization levels and provide rest from grazing. This would provide for a diversity of residual grass cover heights across the allotment. Grazing at light to moderate intensities would likely

Current livestock management would allow 2 years of recovery time after each grazing period. Table 8 describes timing of grazing in relation to critical growing seasons of grasses forbs and shrubs. This would allow plants to complete their growth cycle, and remain viable and healthy after each grazing period (Appendix E5, BLM 2003a, p. A-169). The current vegetation communities, described in Table 7, contain a diversity of native grasses, forbs, and shrubs that would be maintained with the current rest rotation grazing system. Grasses and forbs that are grazed one in during their main spring summer growing season would be deferred the following year and then rested the third year. Shrubs that become palatable to livestock during their late summer/fall growth cycle and that are grazed during the defer treatment; would be rested completely the following year. On the third year of the cycle grazing would occur in the spring to Mid-summer time period in which cattle favor grasses and shrubs. Therefore, little or no grazing use of shrubs is expected to occur, and a second year is allowed for recovery from

grazing use on shrubs. The use of livestock preferences, timing of grazing season, rest and defer grazing systems, and stocking rates to stabilize vegetation communities and produce sustainable forage for livestock is well documented in the literature (Stoddart *et al.* 1975).

Table 8. Grazing Seasons Associated with Alternatives 1-3

Time Period	**Spring**	**Mid-Summer**	**Fall**
Importance to Plant health	Important plant growth period for grasses and forbs		Important growth period for shrubs
Year 1	Graze		No grazing
Year 2	No grazing	No grazing	Graze
Year 3	No Grazing		

Alternative 2: Reduced Season

Similar to Alternative 1, approximately 1,944.4 acres (13.5%) of the vegetation communities within the allotment would continue to be impacted by concentrated livestock use (near cattle trails and water sources). Impacts to vegetation across the majority of the allotment (86.5%) would be dispersed and much less concentrated. While Alternative 2 would have more livestock than Alternative 1, these livestock would tend to concentrate in the same areas and areal extent as Alternative 1. Further, the impacts to vegetation would occur in a shorter period of time compared to Alternative 1.

Rest rotation grazing management as adjusted through the flexibility provided in the annual application process; would control livestock distribution, grazing utilization levels, and provide for rest from grazing. This would provide for a diversity of residual grass cover heights across the allotment, similar to Alternative 1.

The proposed livestock management would allow 2 years of recovery time after each grazing period. This would allow plants to complete their growth cycle, and remain viable and healthy after each grazing period ((Appendix E5, BLM 2003a, p. A-169)). The one month later turnout in the spring would give grass and forb plants additional time to recover from livestock grazing from the previous year. Livestock would not be grazing during the initial growth period for grasses and forbs (Table 8). While the current vegetation communities (Table 7) contain a diversity of native grasses, forbs, and shrubs that would be maintained with a rest rotation grazing system, over the long-term (5-10 years), this alternative would likely result in a slight increase of grass species over shrub species based on the removal of grazing during April. This is because plants are most sensitive to grazing during their period of maximum growth and corresponding minimum carbohydrate reserves (Cook and Stoddart 1963, Donart and Cook 1970, Cook and Child 1971, Krail *et al*. 1971; from Hanley, 1979).

Alternative 3: Renew Grazing Permit and Modify Pipeline

The impacts of continuing a rest-rotation grazing system in the allotment would be similar to those described for Alternative 1. However, some water locations and livestock use patterns would shift under Alternative 3.

There would be some additional surface disturbance to vegetation from vehicle traffic during construction and future maintenance of the relocated pipeline section. Increased disturbance would also occur in the vicinity of the new water troughs due to cattle being concentrated in these areas (see Soils section). The total acreage impacted by concentrated livestock use at 13 existing and 3 relocated water sources would be similar to Alternatives 1 and 2, as the existing disturbance around the 3 former water trough sites (approximately 360 acres) would reclaim over time. The repairing and relocating of the Peter Creek Pipeline would improve livestock distribution and spread the vegetation impacts across a larger area, due to livestock being dispersed across more functioning watering sites each year. The vegetation communities along the western edge of the allotment would experience less grazing disturbance, while communities on the eastern edge would experience more disturbance.

There would be an additional small, disturbed area (estimated at 3.6 acres) associated with pipeline construction and maintenance. However, the closure and rehabilitation of the existing road in the southern part of the allotment would allow vegetation in this area (2.1 acres) to recover. This would partially offset the impacts to vegetation associated with pipeline relocation disturbance over time (5-10 years).

New cattle trails to the new water troughs would develop while existing trails to the old trough locations would reclaim over time (5-10 years). For this reason, the total number of trails and associated area of vegetation disturbance for this alternative is expected to be similar to Alternatives 1 and 2.

Alternative 4: No Grazing

Plant communities shifts occur very slowly in the high desert climate without the influence of a major disturbance such as fire, weed invasion or catastrophic event. Under the No Grazing Alternative, there would be little or no noticeable difference in plant communities in the short term 5-10 years and only slight shifts in vegetation over the long-term (10-20 years). One review of literature confirming this statement is *Grazing Impacts on Rangeland Vegetation: What We Learned* (Holecheck *et al.* 2006). Data from the North Lake ESI (NRCS 2004) reflects a potential natural community that varies only slightly from the current dominant vegetation. Long-term shifts would likely show a 5-10% shift of grass species toward an increase in those that had been favored by cattle and a decrease in those less utilized by cattle. The shrub component is likely to remain relatively stable.

The vegetative community is likely to become less resilient to wildfire as previous years ungrazed material accumulates. Absent a wildfire, juniper expansion is expected to continue

regardless of grazing strategies, as it out-competes understory grasses and shrubs for available moisture and soil nutrients.

D. Wildlife

Affected Environment:

The RHA found this allotment was meeting the Rangeland Health Standard 5 related to wildlife habitat (BLM 2002).

The allotment falls within the larger Oregon Department of Fish and Wildlife (ODFW) Wagontire big game habitat management unit. The deer, elk, and pronghorn antelope populations are relatively stable within this unit. Habitat quantity and quality do not appear to be limiting big game population size or health within the unit. Deer and pronghorn populations continue to fluctuate at or slightly above ODFW's population management objectives for the unit (ODFW 2003). The allotment comprises a small percentage of the unit and provides habitat capable of supporting mule deer, pronghorn antelope, and elk. There are currently 90 AUMs allocated for mule deer, pronghorn, elk, and other wildlife species within the allotment (BLM 2003b, page A-10). Based on previous consultation with ODFW biologists, this forage allocation is adequate to support big game populations within the allotment.

The allotment also provides habitat for numerous small, nongame mammals and birds, including raptors, common to the Great Basin.

Some migratory birds use all habitat types in the allotment for nesting, foraging, and resting as they pass through on their yearly migrations. There has been no formal monitoring of migratory birds on this allotment. Common species observed or expected to occur based on species range and vegetation in the allotment include American robin (*Turdus migratorius*), dark-eyed junco (*Junco hyemalis*), mourning dove (*Zenaida macroura*), Townsend's solitaire (*Myadestes townsendi*), and mountain bluebird (*Sialia currucoides*).

Birds of Conservation Concern for the Great Basin Region that may inhabit the allotment include: Brewer's sparrow (*Spizella breweri*), sage sparrow (*Amphispiza belli*), and loggerhead shrike (*Lanius ludovicianus*) (USFWS 2008) which tend to associate more with sagebrush or shrubland type habitat. A mix of big and low sagebrush communities inter-mingled with invasive juniper comprise the dominant vegetation across the allotment. Waterfowl may frequent the allotment during migration and a few pairs may breed on the private reservoirs in the area.

Environmental Consequences:

<u>Alternative 1: No Action</u>

Current grazing management has achieved Rangeland Health Standard 5 for wildlife habitat. Approximately 1,944.4 acres (13.5%) of the wildlife habitat within the allotment would continue

to be impacted by concentrated livestock use (near cattle trails and water sources), while impacts to habitat across the majority of the allotment (86.5%) would be dispersed and much less concentrated. The existing vegetation communities (Table 7) contain a diversity of native grasses, forbs, and shrubs that would be maintained across the allotment through continuation of the current rest rotation grazing system. (Refer to the Upland Vegetation section). In particular, the allotment has adequate habitat to support an appropriate assemblage of migratory birds and current livestock grazing does not appear to be affecting this habitat.

Current livestock grazing use (both stocking rates and grazing schedule) does not appear to be limiting wildlife habitat within the majority of the allotment. Rangeland Health Standard 5 would continue to be met and the allotment would continue to provide adequate quality wildlife habitat that is capable of supporting an appropriate assemblage of sagebrush-dependent wildlife species. However, juniper expansion would be expected to continue (in the absence of wildfire) and negatively impact sagebrush dependent species over time.

Alternative 2: Reduced Season

The impacts of this alternative on wildlife habitat would be similar to Alternative 1. While Alternative 2 would have more livestock than Alternative 1, these livestock would tend to concentrate in the same areas and areal extent as Alternative 1. Further, the impacts to vegetation would occur in a shorter period of time compared to Alternative 1. The existing vegetation communities (Table 7) contain a diversity of native grasses, forbs, and shrubs that would be maintained across the allotment through continuation of a rest rotation grazing system. (Refer to the Upland Vegetation section).

Rangeland Health Standard 5 would continue to be met and the allotment would continue to provide adequate quality wildlife habitat that is capable of supporting an appropriate assemblage of sagebrush-dependent wildlife species. However, juniper expansion would be expected to continue (in the absence of wildfire) and negatively impact sagebrush dependent species over time.

Alternative 3: Renew Grazing Permit and Modify Pipeline

Many of the impacts of this alternative on wildlife habitat would be similar to Alternative 1. The existing vegetation communities (Table 7) contain a diversity of native grasses, forbs, shrubs, and trees that would be maintained across the allotment through continuation of a rest rotation grazing system. (Refer to the Upland Vegetation section). There would be very little change in net migratory bird habitat quality under this alternative compared to the no action alternative.

The area impacted through pipeline relocation and new trough placement represents approximately 3.6 acres of permanent disturbance to sagebrush habitat, much of which would occur near the existing disturbances associated with the allotment fences (see Maps 1 and 5). While the proposed water troughs would improve livestock distribution across the allotment, there

would be some additional disturbance to sagebrush habitat in the vicinity of the 3 new water troughs (approximately 360 acres) due to cattle concentrating in these areas. Over the long-term, the total sagebrush acreage impacted by concentrated livestock use at the 13 existing and 3 relocated water sources would be similar to Alternatives 1 and 2, as the existing disturbance around the 3 former water trough sites (approximately 360 acres) would reclaim and offset the new disturbance over time (5-10 years).

The pipeline work would be completed in less than a week, and therefore, the potential for direct wildlife disturbance/displacement would be temporary and minor. The risk of migratory bird displacement would decrease as the distance from construction activities increases, and effects would be indiscernible for birds located further than a half mile from the project. All troughs on the pipeline would be outfitted with escape ramps to minimize the risk of mortality to wildlife using the water sources.

Under this alternative, the allotment would continue meet Rangeland Health Standard 5 and provide suitable wildlife habitat, along with increased water availability for wildlife, into the foreseeable future.

Alternative 4: No Grazing

Under the no grazing alternative there would be very little change in the existing quality of wildlife or migratory bird habitat compared to the no action alternative. However, the removal of grazing would provide increased forage availability for wildlife. Some wildlife would likely not be able to take advantage of this increased forage because they would need to disperse to areas outside the allotment to find water, as water would no longer being available from Peters Creek Pipeline and troughs.

The allotment currently meets Rangeland Health Standard 5, provides quality wildlife habitat and forage, and would continue to do so under this alternative into the foreseeable future.

E. Special Status Species

Affected Environment:

There are no Federally listed threatened or endangered fish or wildlife species found within the Peter Creek Allotment.

Special status bats may occur within the allotment, but likely only involve occasional migrating individuals or animals foraging or passing through from adjacent habitat. There are no known caves, adits, shafts, or outbuildings on the BLM portion of the allotment capable of providing hibernacula for bats. Habitat is unknown on adjacent private lands. Due to the low potential for occurrence and lack of roosting/resting habitat, none of the alternatives would likely have any measurable impacts to these bat species, and therefore, they are not carried forward for further analysis.

The Rangeland Health Assessment noted that the following special status species or their habitat may occur within the allotment: bald eagle (*Haliaeetus leucocephalus*), ferruginous hawk *(Buteo regalis),* peregrine falcon (*Falco peregrinus*), burrowing owl *(Speotyto cunicularia),* pygmy rabbit *(Brachylagus idahoensis),* and greater sage-grouse (*Centrocercus urophasianus*) (BLM 2002). More recently, golden eagles (*Aqila chrysaetos*) have been seen within the allotment foraging on small mammals.

While potential habitat for peregrine falcon, ferruginous hawk, burrowing owl, and pygmy rabbits was identified in the Rangeland Health Assessment (BLM 2002), none of these species have actually been confirmed within the allotment to date. No nesting habitat exists within this allotment for peregrine falcon and there have been no incidental sightings of peregrine falcons in the vicinity of this allotment. Inventories were conducted for burrowing owls throughout this allotment, but none were located. There have been no inventories or incidental sightings indicating ferruginous hawks or pygmy rabbits are present within this allotment. For this reason, peregrine falcon, ferruginous hawk, burrowing owl, and pygmy rabbits are not carried forward in this analysis.

Currently there are no known nests or nesting habitat for bald eagles or golden eagles within the allotment. They are suspected to be occasional visitors to the area. Bald eagles may forage on carrion scattered within the allotment (BLM 2002).

Vegetation conditions within the allotment provide some suitable, but currently unoccupied habitat for greater sage-grouse, which is also a Bird of Conservation Concern for the Great Basin Region and a USFWS candidate species. In March 2010, the U.S. Fish and Wildlife Service (USFWS 2010) issued its 12-Month Finding which noted that that listing the greater sage-grouse range-wide is warranted, but precluded by higher priority listing actions. The major risk factors in the western portion of the range that are relevant to the allotment area include habitat conversion due to fire, juniper expansion, and west nile virus occurrence.

Based on Oregon Department of Fish and Wildlife's (ODFW) most recent sage-grouse lek data, there are no known sage grouse lek sites within or directly adjacent to the allotment. There is one active lek complex (South Saddle Butte) comprised of 3 leks in close proximity to one another located about 1.1 to 1.2 miles north of the allotment boundary.

Sage-grouse have been seen occasionally within the allotment. Based on the habitat characterization conducted during the rangeland health assessment, the allotment contained about 1,100 acres (8%) of potentially suitable nesting habitat, 4,300 acres (30%) of potentially suitable brood rearing habitat, and 1,500 acres (10%) of potentially suitable winter habitat at that time. The other 52% of the allotment was not considered suitable habitat, mainly due to western juniper expansion into the area (BLM 2002; see Photo 1).

ODFW (2011) developed habitat maps that identify the most productive landscapes for sage-grouse as either "core habitat" or "low density habitat". Based on this habitat characterization,

the northern two-thirds of the allotment (approximately 10,988 acres) was classified as low density habitat.

Sage-grouse habitats were reassessed for this EA using the *Sage-grouse Habitat Assessment Framework* (Stiver *et. al.* 2010). At the Third Order scale (sage-grouse home range scale) habitats are limited within the allotment. Connelly *et al*. (2004) found most sage-grouse nest within 4 miles of a lek. Based on the distance from the nearest active lek and the sagebrush cover heights associated with the current dominant vegetation types, about 4% of the allotment is suitable nesting habitat. Based on the cover heights associated with the current dominant sagebrush vegetation types, about 22% of the allotment is suitable and 12% of the allotment is marginal brood-rearing/summer habitat. Based on the cover heights associated with the current dominant sagebrush vegetation types and the expansion of western juniper in the area, about 22% of the allotment is suitable and 66% is marginal winter habitat (Table 7 and Map 5).

Environmental Consequences:

<u>Effects Common to Alternatives 1-4</u>

Knick and Connelly (2011) contains a compilation of recent sage-grouse research which addresses a variety of issues related to management of the species at the range-wide scale (often referred to as the "Monograph"). Information from the Monograph was synthesized for application at the regional scale (Oregon) within the *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon: A Plan to Maintain and Enhance Populations and Habitats* (ODFW 2011).

ODFW (2011; page 13) cites two unpublished studies that documented sage-grouse mortality associated with fencing as a risk factor in winter habitat in Wyoming and near lek sites in Idaho. The ODFW (2011; p. 104) strategy recommends that fences within 1 mile of leks be marked with anti-strike markers (reflectors). Based on the closest active lek being over a mile away from fences associated with the allotment boundary and predominantly marginal quality winter habitat, the risk of fence collision mortality would be low and anti-strike markers would not be required to comply with ODFW's latest management guidelines.

<u>Alternatives 1 and 2</u>

An estimated 1,920 acres (13.5%) of predominantly sagebrush habitat types within the allotment would continue to be impacted by livestock trailing and concentration near existing water sources. The remainder of the vegetation and associated habitats within the allotment would continue to be impacted to a very minor degree by dispersed grazing use. Most of the allotment is currently achieving Rangeland Health Standard 5 for wildlife habitat, including special status species habitat, and this trend is expected to continue into the foreseeable future under these alternatives. There could potentially be a decline in suitable raptor and sage-grouse habitat as western juniper continues to encroach into the area over the long-term in the absence of wildfire

or other treatment. However, the allotment currently provides ample foraging habitat under current grazing management for existing levels of occasional raptor use.

Due to the limited amount of habitat, continuing grazing under these two alternatives would have minor effects on sage-grouse nesting and brood-rearing/summer habitat within the allotment. In the long-term, the diversity of native plants and residual cover currently suitable for sage-grouse would be maintained under the livestock management associated with Alternatives 1 and 2. The presence of herbaceous vegetation within each pasture would not increase the available vertical or horizontal screening cover, but would retain forbs and habitat for insects, which are important to sage-grouse during the spring and summer months (Drut *et al*. 1994, Gregg and Crawford 2009). Continued grazing would have little effect on suitable or marginal quality winter habitat. Juniper expansion would continue to impact the quality of marginal winter habitat in the absence of wildfire or other treatment.

Another risk factor identified in the Monograph, the Oregon Strategy, and the 12-Month Finding is West Nile virus spread by mosquitoes around standing water (Knick and Connelly 2011, ODFW 2011, USFWS 2010). Sage-grouse are susceptible to West Nile Virus (Clark *et al*. 2006) and mortality may be as high as 100 percent (Naugle *et al*. 2004) in certain areas. The virus is primarily transmitted by infected mosquitoes, and was first detected in southeastern Oregon near Burns Junction in 2006, and then later near Crane and Jordan Valley that same year. Total mortalities have markedly declined since 2003. The virus has not been detected near the allotment or in southeast Oregon since the first observations in 2006 (DeBess 2009). Existing water troughs are designed to minimize overflow and minimize potential for the production of mosquitoes. Alternative 2 would not have any substantially different effects on suitable mosquito larval habitat at water troughs compared to Alternative 1. Therefore, the risk of virus spread or mortality would be low and virtually identical under both alternatives.

<u>Alternative 3: Renew Grazing Permit and Modify Pipeline</u>

Most of the impacts of this alternative on special status species would be similar to Alternative 1 and 2 with the following additional impacts.

The area impacted through pipeline relocation and new trough placement represents approximately 3.6 acres of permanent disturbance to sagebrush habitat, much of which would occur near the existing disturbance associated with the allotment boundary fence. In addition, the southern end of the old pipeline and access road would be closed and rehabilitated (Map 4). Over time, about 2.1 acres in this area would revert to sagebrush habitat and would offset some of the minor habitat impacts associated with pipeline relocation.

While the proposed water troughs would improve livestock distribution across the allotment, there would be some additional minor disturbance to sagebrush habitat in the vicinity of the 3 new water troughs due to cattle concentrating in these areas (approximately 360 acres; see Map 4). However, the total sagebrush acreage impacted by concentrated livestock use at the 13 existing and 3 relocated water sources would be similar to Alternatives 1 and 2, as the existing

disturbance around the 3 former water trough sites (approximately 360 acres) would recover over time.

Existing and new water troughs proposed under this alternative would be designed to minimize overflow and minimize potential for the production of mosquitoes. Therefore, Alternative 3 would have similar effects on suitable mosquito larval habitat at water troughs as Alternatives 1 and 2.

Alternative 4: No Grazing

Under the no grazing alternative there would be no substantial change in special status species habitat quantity or quality in the short-term compared to Alternative 1. An estimated 1,920 acres (13.5%) of sagebrush habitat within the allotment formerly impacted by livestock trailing and concentration near existing water sources would improve over the long-term. The potential effects of juniper encroachment would be similar to Alternative 1.

Alternative 4 would result in less total suitable mosquito larval habitat at available at water troughs across the allotment compared to Alternatives 1-3. However, this would not substantially lower the risk of virus spread or mortality compared to these alternatives.

F. Livestock Grazing Management

Affected Environment:

There is one term Grazing Permit authorizing 329 AUMs of cattle use in Peter Creek Allotment #00100. The season of use is from April 15th thru October 15th. Grazing is managed under a Rest Rotation grazing system utilizing three pastures (Table 2). The grazing system and pasture use schedule are outlined in Map 2.

Livestock use has typically been concentrated in the western portions of the pastures where the most dependable permanent water sources are located. In the recent past, Peter Creek Pipeline served to provide more water sources along the eastern sides of the pastures. However freezing and surface fracturing of the PVC pipe has resulted in this range improvement being unusable for the last several years.

Range Condition

A Rangeland Health Assessment (RHA) was performed in 2002 to determine if current management was in conformance with the applicable standards and guidelines (S&Gs). Existing grazing management practices or levels of grazing use in the Peter's Creek Allotment #00100 promote achievement or significant progress towards the *Oregon/Washington Standards and Guidelines for Rangeland Health and conform to the Guidelines for Livestock Grazing Management* (BLM 1997, 2002; Table 9). All standards that are attributed to livestock grazing were met for the Peter's Creek Allotment. Standard 3 (Ecological Processes) was not met

because a portion of the South Pasture has not recovered from vegetation removal from previous home-steading era farming practices.

Table 9. Summary of Rangeland Health Assessment (BLM 2002)

Standard	Determination	Causal Factors	Comments
1. **Watershed Function – Uplands**	Met	NA	Upland soils in the Peter's Creek Allotment exhibit infiltration and permeability rates, moisture storage, and stability appropriate for soil, climate, and land form. Root occupancy for the soil is appropriate
2. **Watershed Function - Riparian/ Wetland Areas**	Met	NA	The allotment contains no riparian/wetland areas on BLM managed lands.
3. **Ecological Processes**	Not Met	Previous Farming	Ninety percent of the allotment is healthy, as indicated by plant composition and community structure of native grasses, forbs, and shrubs which are expected for the site. There is good plant vigor and plants are able to complete their reproductive cycle following grazing use 2 out of 3 years or when moisture is adequate. Organic matter in the form of plant litter is accumulating and being incorporated into the soil. Available trend data shows that plant cover and the amount and distribution of bare ground is within the range of variability expected for the ecological sites found in the allotment. Wildlife species are at appropriate levels. The reason this standard is not met is that past farming practices (disking and haying) removed much of the native vegetative cover and increased the soil erosion potential on about 10% of the allotment. This area does not appear to be recovering from that farming use.
4. **Water Quality**	Met	NA	No surface water or groundwater within the allotment has been listed for exceeding State Water Quality standards.
5. **Native, Threatened & Endangered, and Locally Important Species**	Met	NA	No conflicts exist between cattle grazing and wildlife species within the allotment. There are no known sage-grouse lek sites. No known noxious weed sites in the Allotment. No known sensitive plant species in the Allotment.

Environmental Consequences:

<u>Effects Common to Alternatives 1-3</u>

Actual use, utilization, and climate data have been summarized in the allotment monitoring file and indicate that livestock grazing levels are sustainable at the current forage allocation for the allotment. Trend data indicates a stable to upward trend across 82% of the allotment, and the current rest rotation grazing system is meeting all Standards and Guidelines. Livestock grazing

management is maintaining a vegetative community that supports other resources objectives and uses.

Grazing levels would remain at 329 AUMs under Alternatives 1-3. This level of use, along with managed grazing, would provide a sustainable forage base under all three alternatives. There could potentially be a decline in forage production over the long-term as western juniper continues to expand into the area in the absence of wildfire.

Effects Common to Alternatives 2 and 3

Distribution of livestock would improve under Alternatives 2 and 3 due to improved water distribution. Higher livestock numbers and shorter season under Alternative 2 would encourage cattle to move more frequently rather than concentrate near water (Bailey 2004). The water provided by the pipeline and trough system in Alternative 3 would provide for better distribution of cattle across the entire allotment compared to Alternatives 1 or 2.

Alternative 4: No Grazing

Under this alternative, livestock grazing within the allotment would not be authorized. The permittee would need to replace 329 AUMs of lost forage with private land forage or hay in the general vicinity. The additional cost to replace this forage would be at the permittee's expense. These costs are discussed further in the social and economic section.

Existing range improvement projects within the allotment would not be maintained. However, the allotment boundary fences would still need to be maintained by the BLM or adjacent permittees.

G. Native American Traditional Practices

Affected Environment:

The allotment is located within a pre-Contact and modern Native American Traditional Use area. Some members of The Confederated Tribes of Warm Springs and The Burns Paiute Tribes may have ancestors one to two generations back that used the Peter Creek Allotment Area in their seasonal economic activities, including hunting and gathering. The allotment has high potential for hunting and contains a few areas where culturally important plants of various kinds can be collected. However, the BLM is not aware of any specific location(s) in the allotment that is important to these tribes or the families that make up their membership.

Environmental Consequences:

Effects Common to Alternatives 1-4

There is currently no known use of the area for plant collecting or religious uses. The proposed pipeline relocation (Alternative 3 only) may be within an area of importance to these tribes, but no

specific areas have been identified. Therefore, BLM anticipates that there would be no negative impacts to Native American traditional practices from any of the alternatives.

H. Cultural Resources

Affected Environment:

Only about 500 acres of the Peter Creek Allotment have had a Class III cultural survey performed on them. Surveys have been done on around water developments, power line right-of-ways, and roads. The fact that cultural surveys have not been completed on 100% of the allotment represents a resource for which there is "incomplete or unavailable information". According to the CEQ's NEPA regulations (40 CFR Part 1502.22), when an agency is evaluating impacts and there is incomplete or unavailable information, the agency must make clear that such information is lacking. Further, if the information "cannot be obtained because the cost of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include…. (1) a statement that such information is incomplete or unavailable; (2) a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts….; (3) a summary of the existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant impacts… and (4) the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community…". The DOI NEPA regulations state that these costs are not just monetary, but can also include "social costs, delays, opportunity costs, and non-fulfillment or non-timely fulfillment of statutory mandates" (43 CFR Part 46.125). The costs of obtaining a comprehensive survey of cultural resources across the entire allotment are estimated at $800 to $1080 per acre (or approximately $110,000 to $150,000 total) and would be exorbitant.

The allotment has a moderate probability for containing high value archaeological resources because it is fairly well watered and has widespread areas suitable for hunting or the collection of edible grass seed crops, various roots, and berries. Based upon analysis of the sites which are located in the area, the allotment appears to have been used for plant gathering and hunting, especially in the last 2,000 to 4,000 years. Some evidence of occupation during 8,000 to 10,000 years before present (BP) is also indicated by the sites presently known.

Based on past cultural surveys, five sites have been documented in the allotment. Four sites are prehistoric sites related to stone tool manufacture and maintaining hunting tools. One site is more complex and also involves plant food processing and a longer term encampment.

Environmental Consequences:

<u>Alternative 1- No Action</u>

Based on field observations by BLM cultural resources staff over the last 38 years on known cultural resource sites in the Lakeview Resource Area, livestock can impact cultural materials located in the top 12 inches of the soil profile. These effects include ground cover removal, surface scuffing, and hoof shear. The reoccurring cycle of ground disturbance, removal of vegetative cover, along with water and wind erosion can lead to continued loss of soil and

further exposure of a given site, and loss of vertical context within the site. Cultural materials within the top 12 inches of soil can be exposed to trampling damage, resulting in reduced site integrity. The deepest disturbance is typically seen at sites located in congregation areas (near water sources and trailing areas) where concentrated hoof shear is common. Generalized dispersed grazing, with light hoof shear and surface scuffing, can result in light (2 inches) to moderate (6 inches) depth of impacts to some sites.

All five documented sites in the Peter Creek Allotment have been impacted in varying degrees from surface scuffing (2 inches deep) to hoof shear (12 inches deep) by livestock use. However, the severity and extent of impacts have not been quantified. One site has also been affected by road construction and use. The most common impacts to these documented sites have been livestock trampling, wind erosion, and sheet wash erosion from rain.

Based on the analysis described in the Soils section, approximately 1,944.4 acres (13.5%) of the allotment would continue to be impacted by concentrated livestock use (near water sources and cattle trails) under Alternative 1. Any undocumented cultural sites located in these areas would have the highest potential to continue to be impacted by hoof shear and trampling. Any undocumented sites located across the remainder of the allotment would continue to be impacted by light hoof shear, surface scuffing, and erosion from wind and water.

Alternative 2: Reduced Season

Spreading livestock distribution more evenly over the allotment under Alternative 2 would not likely increase the effects on cultural resources compared to the No Action Alternative. Further, since the amount of time of livestock use would be reduced slightly under Alternative 2, this may result in slightly less trampling compared to the No Action Alternative, particularly in existing livestock concentration areas. Away from livestock concentration areas, erosion from wind and water would be expected to continue.

Alternative 3: Renew Grazing Permit and Modify Pipeline

Spreading livestock distribution more evenly over the allotment under Alternative 3 would not likely increase the effects on cultural resources substantially across most of the allotment. There would be approximately 3.6 acres of additional surface disturbance associated with pipeline construction and maintenance. New livestock congregation areas (approximately 360 acres) would arise due to 3 new water trough placements resulting in increased disturbance from cattle hoof action concentrated in these areas.

A cultural survey was recently completed along the proposed pipeline and trough relocation area and no sites were located. Therefore, there would be no additional impacts to cultural resources associated specifically with this range improvement project.

The total acreage impacted by concentrated livestock use at the 13 existing and 3 relocated water sources would be similar to Alternatives 1 and 2, as the existing disturbance around the 3

former water trough sites (approximately 360 acres) would reclaim over time and offset the new disturbance. Away from livestock concentration areas, erosion from wind and water would be expected to continue.

Alternative 4: No Grazing

No new disturbance from livestock grazing would occur within the allotment. However, effects to cultural resources would continue from wind and water erosion.

I. Recreation

Affected Environment:

The recreational opportunities and uses within the allotment are typical of those available throughout northern Lake County. There are currently no developed recreation sites within the allotment, nor are any planned in the future. Most of the area is managed for Semi-Primitive Motorized activities, opportunities, and experiences. The area immediately adjacent to County Road 5-12B is managed for a roaded natural recreation experience (Map R-3, BLM 2003b). The area possesses a moderate probability of experiencing isolation, closeness to nature, and self-reliance in outdoor skills. User interaction is low, but there is evidence of other users. Use of motorized vehicles is allowed on existing roads and trails (Map R-7, BLM 2003b).

The primary recreation activities in the Peter Creek Allotment are big game (e.g., mule deer, and pronghorn antelope and elk) hunting. Other recreation activities periodically occur in the allotment including: wildlife viewing, dispersed camping, hiking, recreational driving, and horseback riding. There are no known conflicts between current grazing use and existing recreational activities within the allotment.

Environmental Consequences:

Effects Common to Alternatives 1 and 2

These alternatives would have negligible effects on recreational opportunities or uses. Current levels of recreation activities, opportunities, and experiences in the allotment would likely remain relatively constant.

Alternative 3: Renew Grazing Permit and Modify Pipeline

The improved distribution of livestock would have minimal, but positive impacts to recreation opportunities in the area. Redistributing more livestock to the east side of the allotment would minimally increase recreational site-seeing and wildlife viewing experiences by moving livestock away from the county road, potentially increasing wildlife viewing opportunities along this road. Hunting opportunities for big game would be largely unaffected since livestock are usually

off the allotment during hunting season. This alternative would have no measurable effect on dispersed camping, hiking, or horseback riding opportunities.

Alternative 4: No Grazing

This alternative would marginally enhance recreation activities, opportunities, and experiences in the allotment by slightly reducing user interaction and the evidence of others. In addition, wildlife-dependent recreational experiences in the area such as hunting and wildlife viewing opportunities would likely be slightly improved by the removal of livestock grazing. Wildlife viewing opportunities along the county road would be similar to Alternative 3.

J. Visual Resources

Affected Environment:

The visual setting in the project area is typical of northern Lake County with open views of low rolling terrain dominated by sagebrush and western juniper communities. Observable developments within the area consist of roads, fences, water developments, as well as private ranch structures.

The Lakeview RMP/ROD classifies the entire Peter Creek Allotment as Class IV (Map VRM-3, BLM 2003b). VRM Class IV allows for management activities that result in "major modification of the landscape." These management activities may dominate the view and become the focus of viewer attention. However, every effort should be made to minimize the impact of these projects by carefully locating activities, minimizing disturbance, and designing the projects to conform to the characteristics of the landscape.

Environmental Consequences:

Effects Common to Alternatives 1-4

Alternative 3 would have slightly more visual impacts than alternatives 1, 2, or 4. However, all four alternatives would meet the management objectives for VRM Class IV and would, therefore, have minimal effects on existing visual quality.

K. Social and Economic Values

Affected Environment:

The economy of Lake County is based primarily on agriculture, timber, livestock, and government sectors. Livestock grazing and associated feed production industries are major contributors to the economy of Lake County. The most common is the raising of cattle and calves for beef. In 2009, an estimated 96,500 head of cattle and calves were in Lake County, Oregon (Oregon Agricultural Information System 2010). In 2009, Lake County ranchers sold an

estimated $28,000,000 worth of cattle and calves or related beef products from public lands. The allotment supports about 54 cattle on an annual basis for 7 months of the year. About 29 calves can be produced annually. Ranching is also important as a social lifestyle within Lake County.

Environmental Consequences:

Effects Common to Alternatives 1-4

Public lands in and around the allotment would continue to contribute social amenities such as open space and recreational opportunities. These amenities encourage tourism in the surrounding region and provide economic benefits to nearby communities such as Christmas Valley, Riley, and Burns, though the specific contribution of the allotment cannot be accurately estimated.

Alternatives 1 – 3

Under these alternatives, the Federal Government would continue to collect grazing fees (329 AUMs * $1.35/AUM = $444.15) from the permittee. This commodity use of public lands would continue to generate revenues for the Federal government on an annual basis. The rancher/permittee would continue to produce approximately 54 cattle each year, contributing less than 1% to the total county-wide cattle production.

The pipeline relocation project proposed under Alternative 3 could potentially provide a one-time influx of approximately $15,000 in income to surrounding businesses and communities from project construction activities.

Alternative 4: No Grazing

A minimum annual loss of $444.15 would occur to the Federal government due to the loss of grazing fee collections associated with this allotment. This would also result in the loss of suitable grazing land for the local rancher/permittee. The rancher would then have to find suitable pasture to graze his livestock elsewhere in the surrounding region or feed additional hay. This would result in additional costs to the rancher. The average pasture rate for private land forage in Oregon is $14.80 Per AUM. The additional annual cost to the rancher would be approximately $4,425 ((329 AUMs * $14.80) - $444.15)). If the rancher could not secure other suitable pasture land or could not afford these increased costs, then approximately 54 cattle would no longer be produced in Lake County, resulting in less than a 1% annual reduction in county-wide cattle production. Although this is a small percentage of the total livestock production, the real loss would be in the loss of one small operating ranch.

L. Cumulative Effects

Analysis Scale and Timeframe

For the purposes of this analysis, cumulative impacts are generally addressed at the allotment scale. The reasons for choosing this analysis scale include the fact that issuing a permit is a decision that affects the entire allotment and BLM has a good idea of other potential reasonably foreseeable actions that may occur within the allotment due to management direction identified in the Lakeview RMP/ROD (Appendix E, BLM 2003b) and AMP (BLM 1990). However, the analysis spatial scales could vary somewhat depending upon the resource value/use being addressed. The timeframe of analysis is defined as the same 15-20 year expected life of the Lakeview RMP/ROD. The reason for choosing this timeframe is because this represents the same analysis timeframe considered in the Lakeview Proposed RMP/Final EIS (BLM 2003a) and portions of that analysis may be appropriate for tiering purposes.

Known Past Activities

The Council on Environmental Quality (CEQ) issued cumulative impact guidance on June 24, 2005, that states the "environmental analysis required under NEPA is forward-looking," and review of past actions is required only "to the extent that this review informs agency decision-making regarding the proposed action." Use of information on the effects of past action may be useful in two ways: one is for consideration of the proposed action's cumulative effects, and secondly as a basis for identifying the proposed action's direct and indirect effects.

The CEQ stated that "[g]enerally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions." This is because a description of the current state of the environment (ie. affected environment section) inherently includes the effects of past actions. Further, the "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions." Information on the current environmental condition is more comprehensive and more accurate for establishing a useful starting point for a cumulative effects analysis than attempting to establish such a starting point by adding up the described effects of individual past actions to some environmental baseline condition in the past that, unlike current conditions, can no longer be verified by direct examination.

The second area in which the CEQ guidance states that information on past actions may be useful is in "illuminating or predicting the direct and indirect effects of a proposed action. The usefulness of such information is limited by the fact that it is anecdotal only, and extrapolation of data from such singular experiences is not generally accepted as a reliable predictor of effects".

The Department of Interior issued some additional guidance related to past actions which state, "when considering the effects of past actions as part of a cumulative effects analysis, the Responsible Official must analyze the effects in accordance with 40 CFR 1508.7 and in accordance with relevant guidance issued by the Council on Environmental Quality, such as ''The Council on Environmental Quality Guidance Memorandum on Consideration of Past

Actions in Cumulative Effects Analysis'' dated June 24, 2005, or any superseding Council on Environmental Quality guidance (see 43 CFR 46.115)".

Based on this guidance, BLM has summarized known disturbances that have occurred within the allotment as part of past or on-going management activities. These include: livestock grazing and management, road construction and maintenance, and range improvement project construction and maintenance.

The Peter Creek Allotment has historically been grazed by cattle. Prior to the Taylor Grazing Act of 1935, grazing on public lands was essentially uncontrolled. After the Taylor Grazing Act, allotments were established tied to private base property owned by a permittee, and were initially under the management responsibility of the Grazing Service. Under the Grazing Service and then under the new BLM in 1946, the number of grazing livestock was higher and the pattern of grazing use was more intense than what occurs today.

Based on a GIS analysis of current data for the allotment, approximately 16.6 miles of roads and 21.1 miles of primitive roads (37.7 miles and 45.7 acres of disturbance total) have been constructed or created within the allotment. About 28.7 miles of fence (24.4 acres disturbance) and 5.0 miles of pipelines (already accounted for within the acres associated with road disturbance) currently exist. Other past and present actions within the allotment have included a small 42-acre wildfire, dispersed recreational activity, and about 1,380 acres of past homesteading/agricultural use (in the South Pasture). There are 8 water troughs, 7 constructed waterholes and reservoirs, and one small undeveloped intermittent spring in the allotment (Map 4) resulting in approximately 1,920 acres of concentrated livestock use. This represents an estimated total of about 3,412 acres of past or on-going ground disturbance.

All of these past activities have affected or shaped the landscape within the allotment into what it is today. Current resource conditions are described further in the "Affected Environment" portion of Chapter 3 earlier in this document, as well as in the Rangeland Health Assessment for the allotment (BLM 2002).

Reasonably Foreseeable Future Actions

The Lakeview RMP/ROD (Appendix E3, page A-143, BLM 2003b) does not specifically list any future project proposals for this allotment. However, the Reasonably Foreseeable Future Actions that would likely occur in this allotment under Alternatives 1-3 are: continued road maintenance, range improvement maintenance, and hunting and other dispersed recreation activities.

Road and range improvement maintenance activities would occur on an as needed basis and generally would not cause additional surface disturbance beyond what already exists on the ground. Further, such activities are considered to be so minor as to be categorically excluded from NEPA analysis (BLM 2008a). The amount and location of dispersed recreational activities

are difficult to estimate, but are not expected to result in any additional, long-term surface disturbance in the allotment.

While juniper encroachment has been recognized as an on-going problem within the allotment, future fuels and juniper treatment projects in this area are currently a low priority compared to other areas within the Lakeview Resource Area (Appendix E3; BLM 2003b). For this reason, these types of projects will not be analyzed further. The frequency and number of acres that could potentially be burned by wildfire or otherwise affected by fire suppression or rehabilitation activities within the allotment would be difficult to accurately predict and is somewhat speculative. For this reason, these activities will not be analyzed further.

The Reasonably Foreseeable Future Actions that would likely occur in this allotment under Alternative 4 would largely be similar to Alternatives 1-3. However, range improvement maintenance would not be needed, except for the allotment boundary fences associated with grazing on adjacent allotments.

Cumulative Effects Common to Alternatives 1 – 4

None of the alternatives would have any incremental cumulative effects on climate, greenhouse gas emissions, carbon storage, native American traditional practices, recreation, or visual quality, as the analysis revealed that there would be little or no direct or indirect effects on these values/issues.

Cumulative Effects Common to Alternatives 1 – 3

For purposes of this analysis, total acres of high ground disturbance or recovery served as the indicator of cumulative impacts on soils, BSCs, upland vegetation, cultural resources, and wildlife and special status species habitat.

The incremental cumulative effects of continued grazing of up to 329 AUMs each year and pipeline project maintenance/relocation, when added to past, present, and reasonably foreseeable future actions would result in either: no change in total acres of high ground disturbance (Alternatives 1 and 2), or a minor incremental increase in total acres of high ground disturbance of 1.5 acres (Alternative 3) (see Table 10).

Table 10 - Cumulative Acres of High Ground Disturbance

	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**
Past/Present Actions	3,412	3,412	3,412	3,412
Estimated Area of Disturbance or Recovery	0	0	363.6 new - 362.1 recovered = 1.5 total	-1920 recovered
Cumulative Total	3,412	3,412	3,413.5	1,492

Implementation of Alternatives 1-3 is not expected to contribute to any measurable positive or negative incremental cumulative social or economic effects to either the livestock permittee or the agricultural sector of the annual Lake County economy, as grazing and livestock production within the allotment would continue at current levels.

Cumulative Effects of Alternative 4

The incremental cumulative effects of removal of grazing and the existing pipeline project, when added to past, present, and reasonably foreseeable future actions would result in an incremental decrease in total ground disturbance of about 1,612 acres (Table 10).

Implementation of Alternative 4 would have a minor, incremental cumulative effect (less than 1% reduction) on the agricultural sector of the annual Lake County economy.

CHAPTER 4—CONSULTATION AND COORDINATION

A. List of Preparers

Range Management Specialist – Casey O'Connor
Supervisory Range – Theresa Romasko
Fisheries Biologist – James Leal
Natural Resource Specialist – Brennan Hauk
Wildlife Biologist – Vernon Stofleth
Outdoor Recreation Planner – Chris Bishop
Cultural Resource Specialist – Bill Cannon
Planning and Environmental Coordinator – Paul Whitman

B. Agencies and Individuals Consulted

Permittee – Dan Damewood
Oregon Department of Fish and Wildlife – Craig Foster

C. Mailing List

The EA was made available for review to Federal, state, and local agencies, native American Tribes, and interested members of the public. The mailing list is contained in the project file.

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MAPS

Map 1-- Peter Creek Alltoment #00100

NORTHWEST
NORTHWEST
NORTH
MIDDLE
SOUTH
24S 18E
24S 19E
25S 18E
25S 19E
Lakeview Resource Area
6171-C0
6141-00
6141-C0
6141-B0
6141-D0
Cnty 5-12B
Old 5-12B
BPA Corridor

Miles
0 1 2 4

Legend

- Resource Area Boundaries
- Trend Plots
- BPA Transmission Lines
- Pastures
- Allotment #00100

LABEL

- DEVELOPED SPRING
- RESERVOIR
- SPRING
- WATER TROUGH
- WATERHOLE
- WELL
- Pipelines
- Township-Range
- Sections

GTRN Roads

OwnerDesg

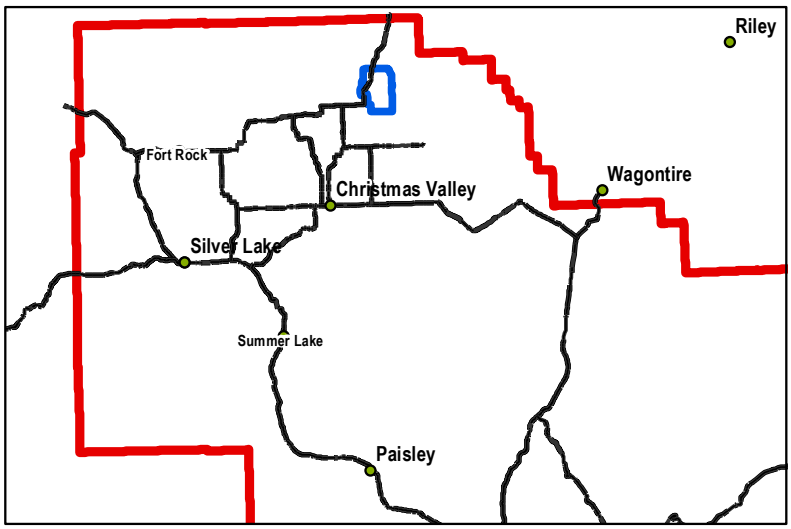
- County route
- Bureau of Land Management
- Other

- Bureau of Land Management
- U.S. Forest Service
- State
- Private/Unknown

Sage-Grouse Habitat (ODFW 2011)

- Low Density Habitat
- Core Habitat

N



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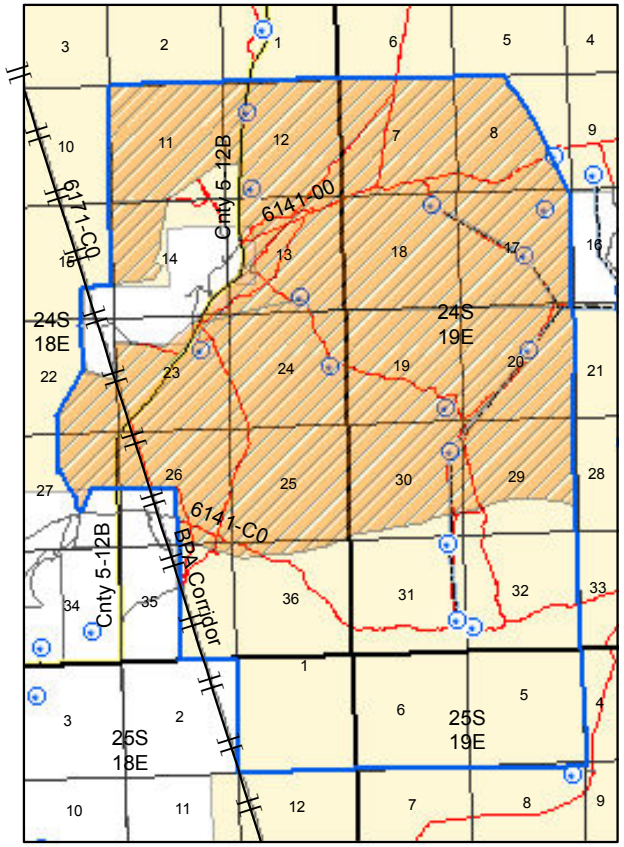
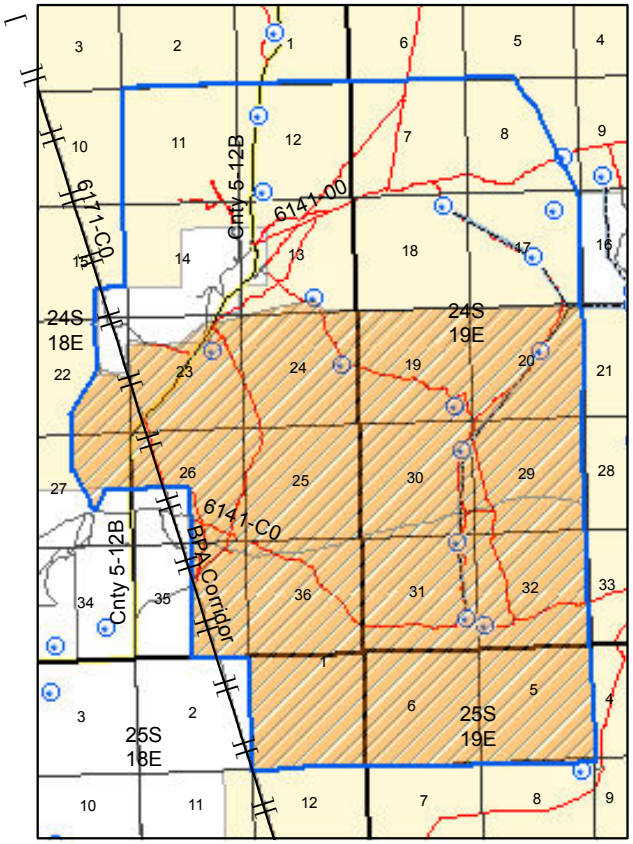
Map 2-- Peter Creek Alltoment #00100 Grazing Schematic

Year 1 (2012 for first cycle)



Year 2 (2013 for first cycle)



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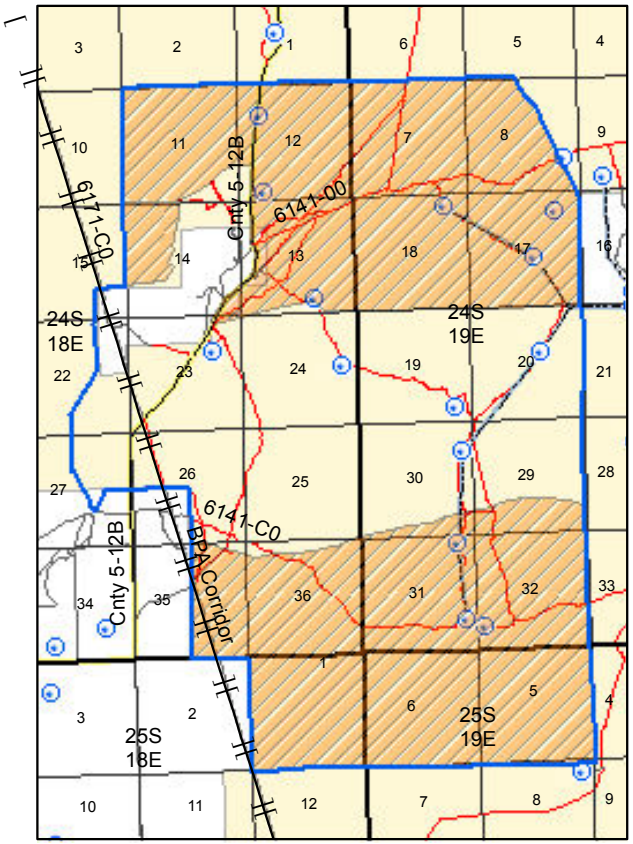

Miles

0 1 2 4

Legend

- BPA Transmission Lines
- Allotment #00100
- Pastures Used
- Water Sources
- Pipelines
- Township-Range
- Sections

GTRN Roads

OwnerDesg

- County route
- Bureau of Land Management
- Other
- Bureau of Land Management
- U.S. Forest Service
- U.S. Fish and Wildlife Service
- State
- Local Government
- Private/Unknown

N

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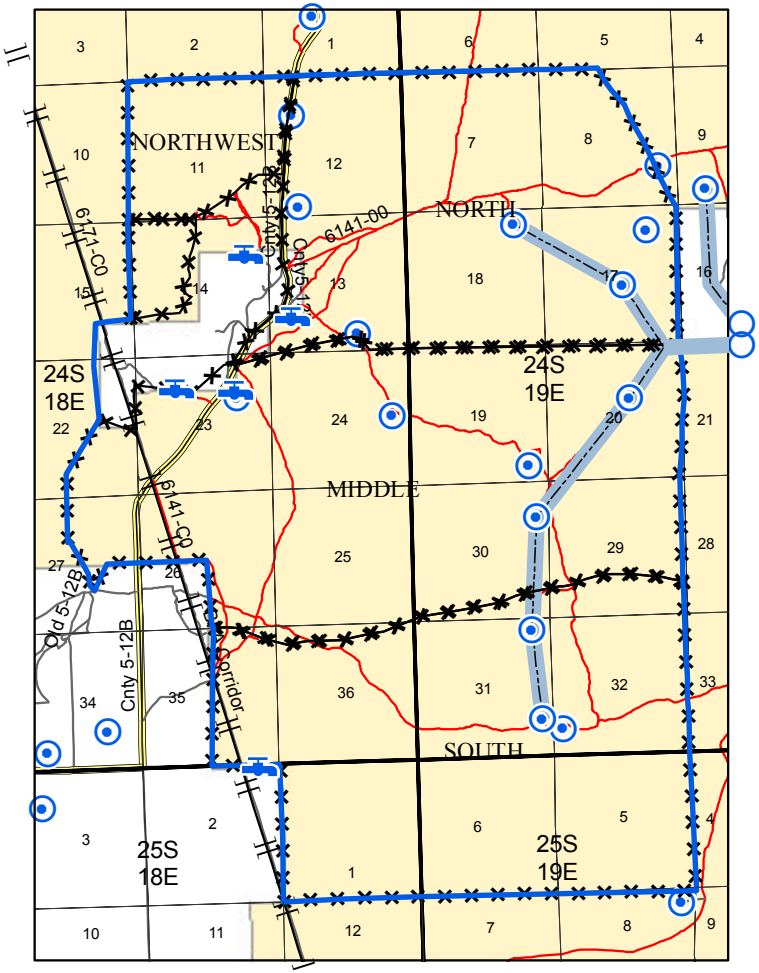
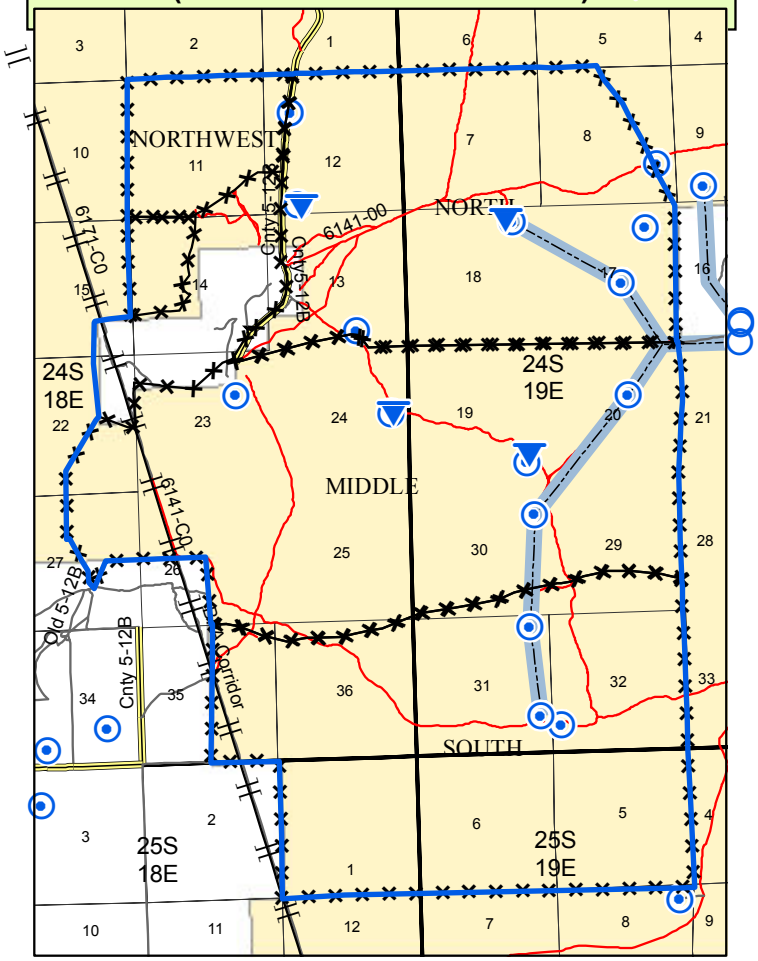
Map 3 - Peter Creek Allotment #00100 Primary Water Sources

Water Available All Years (From Private Wells)



Water Available Only Following Wet Years (Most Reliable Water Holes)



0 1 2 4 Miles

Legend

- BPA Transmission Lines
- Pastures
- Allotment #00100
- Water Sources
- Peter Creek Pipeline (in need of repair)
- Township-Range
- Sections

GTRN Roads

OwnerDesg

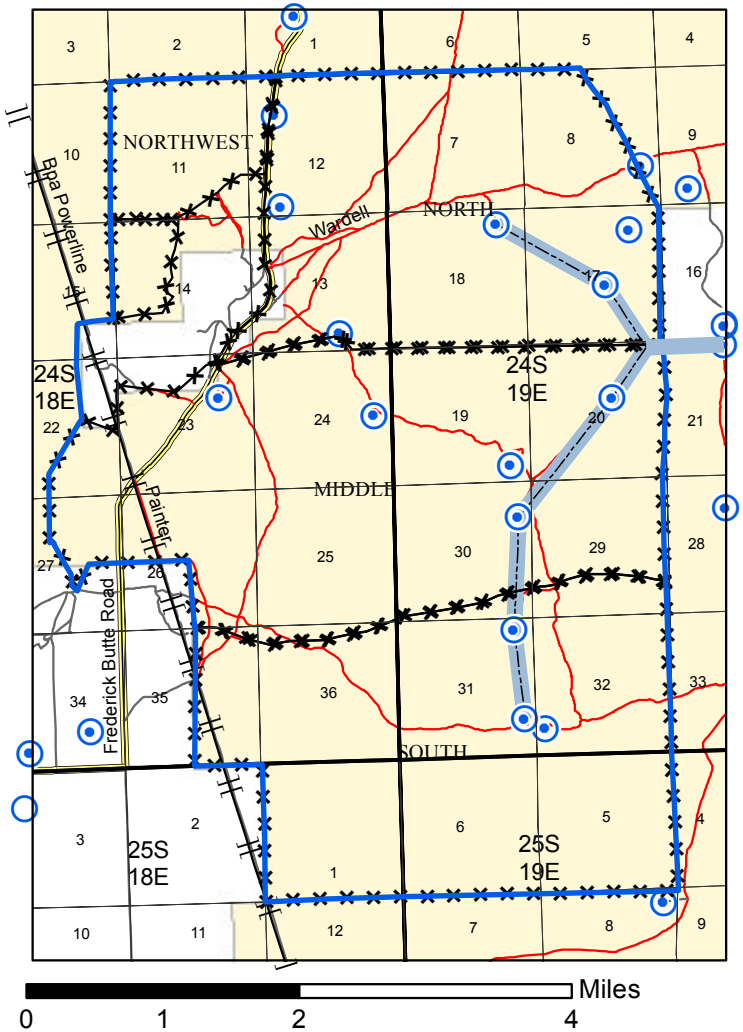
- County route
- Bureau of Land Management
- Other
- Bureau of Land Management
- U.S. Forest Service
- State
- Local Government
- Private/Unknown

N

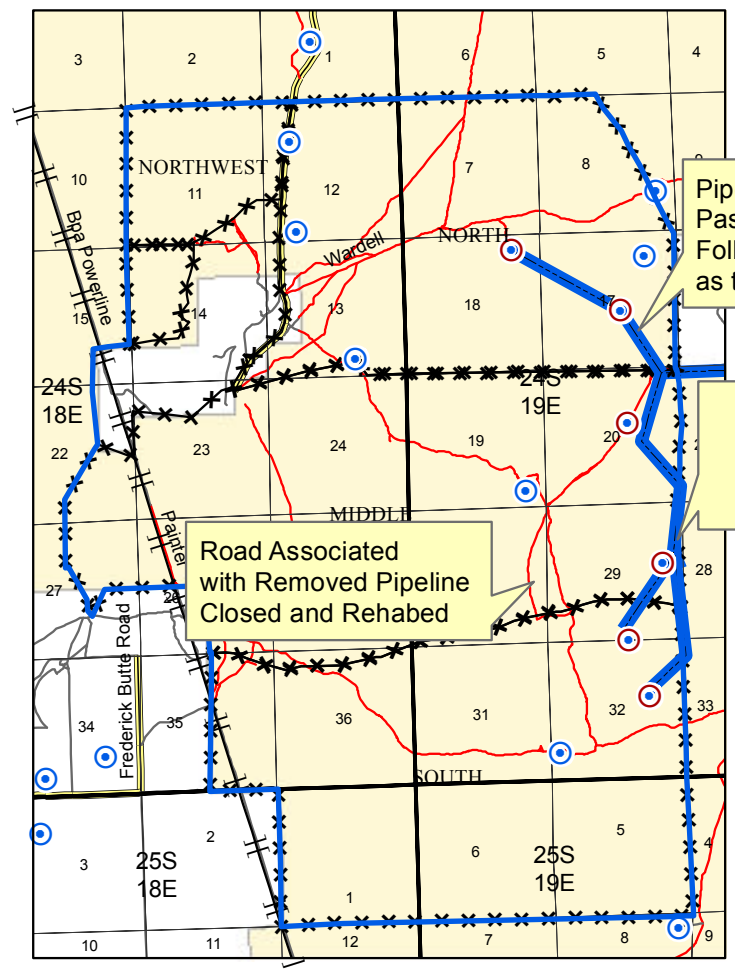
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed throught digital means and may be updated without notification.

Map4-- Peter Creek Proposed Pipeline Work (Alternative 3)

Peter Creek Pipeline - Current Location



Peter Creek Pipeline - Alternative 3



Legend

- BPA Transmission Lines
- Pastures
- Allotment #00100
- Water Sources
- Peter Creek Pipeline
- Township-Range
- Sections

GTRN Roads

OwnerDesg

- County route
- Bureau of Land Management
- Other
- Bureau of Land Management
- U.S. Forest Service
- State
- Local Government
- Private/Unknown

N

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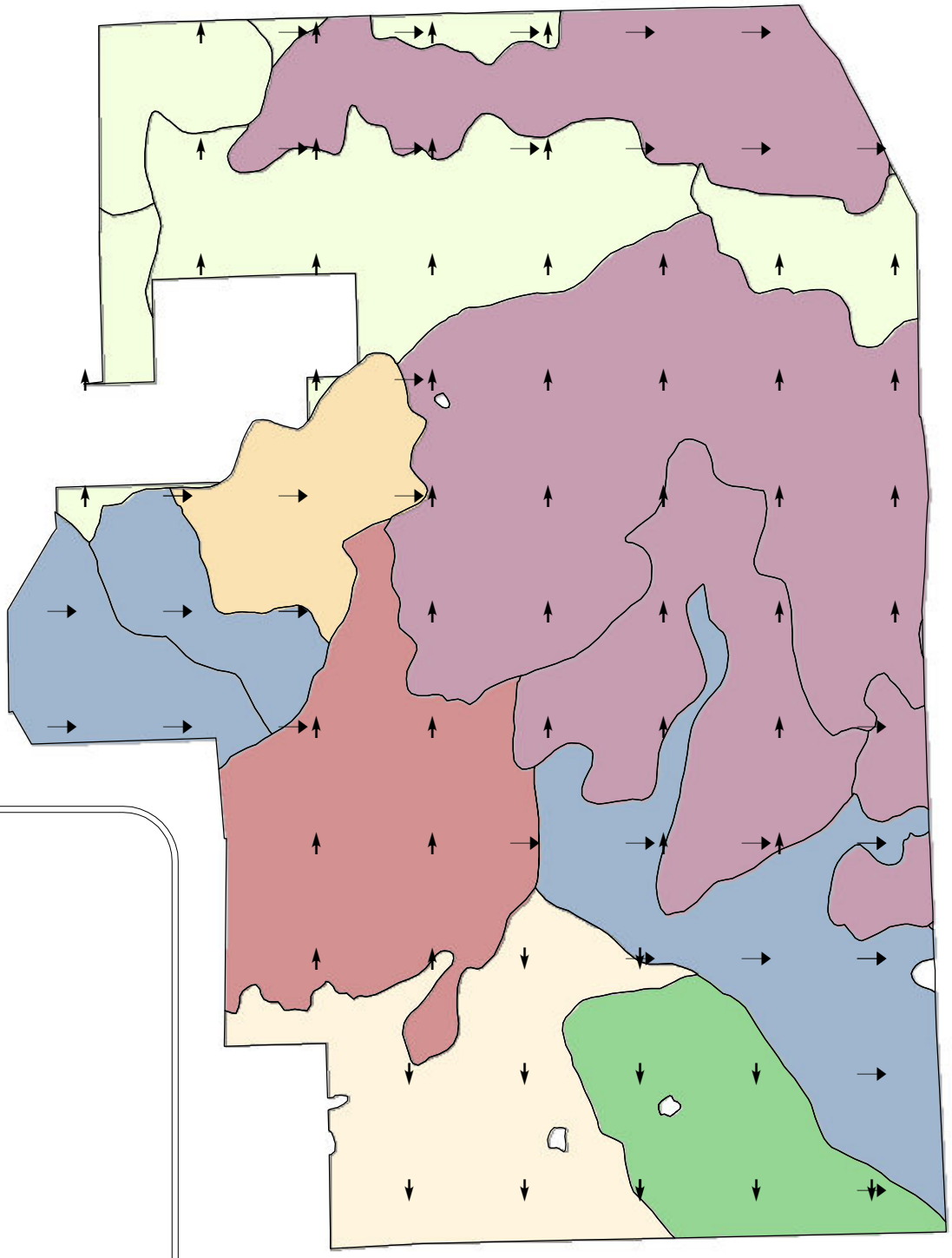
Peter Creek Allotment #00100
Exisiting Vegetation Map 5



Legend

Stand Site

STAND1

- 3/4 to Full
- 1/2 Full
- 1/4 Full

Trend

Observed Apparent Trend

- Upward
- Static
- Downward

Existing Vegetation

Dominant Vegetation

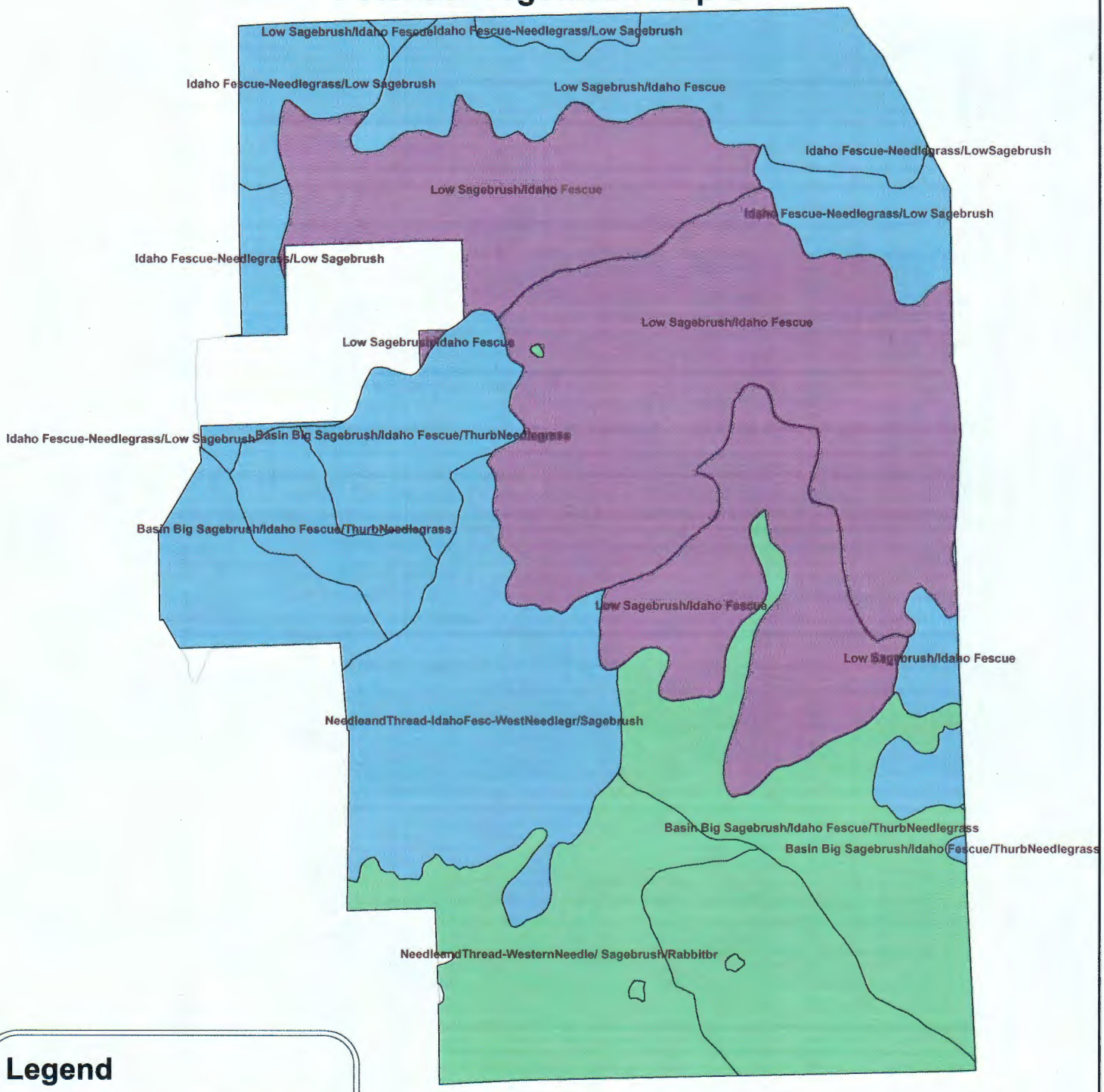
- Low sagebrush/Idaho Fescue
- Basin big sagebrush/Thurbers needlegrass
- Wyoming big sagebrush/Squirreltail
- Wyoming big sagebrush/ Thurbers needlegrasss
- Yellow rabbitbrush/Squirreltail
- Juniper/ low sagebrush/ Idaho Fescue
- Juniper/ Basin big sagebrush/needle and thread

0 0.25 0.5 1 1.5 2 Miles

N W E S

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed throught digital means and may be updated without notification.

Peter Creek Allotment #00100
Exisiting Ecological Status &
Potential Vegetation Map 6



Legend

Ecological Status Rating

Current Ecological Status

- Private No Rating
- Late
- Mid
- PNC

0 0.25 0.5 1 1.5 2 Miles

N W E S

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed throught digital means and may be updated without notification.

PC 1 1984

PC 1 2011

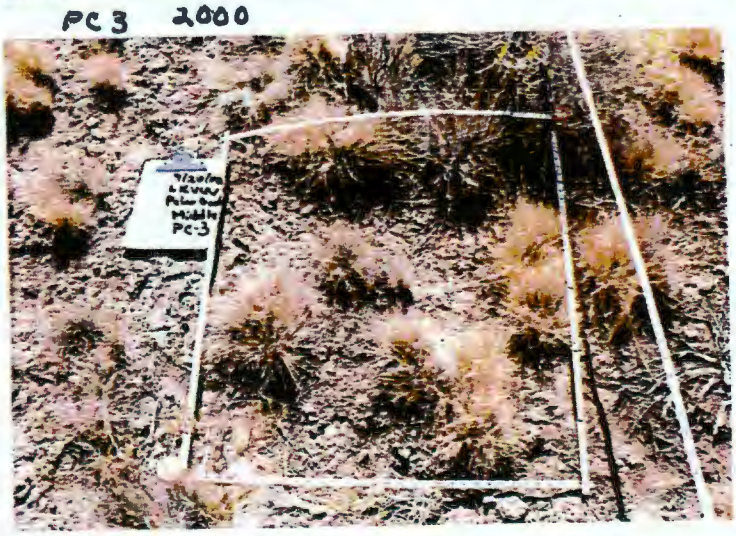
PC 2 1985

PC 2 2011

PC-2a 2011

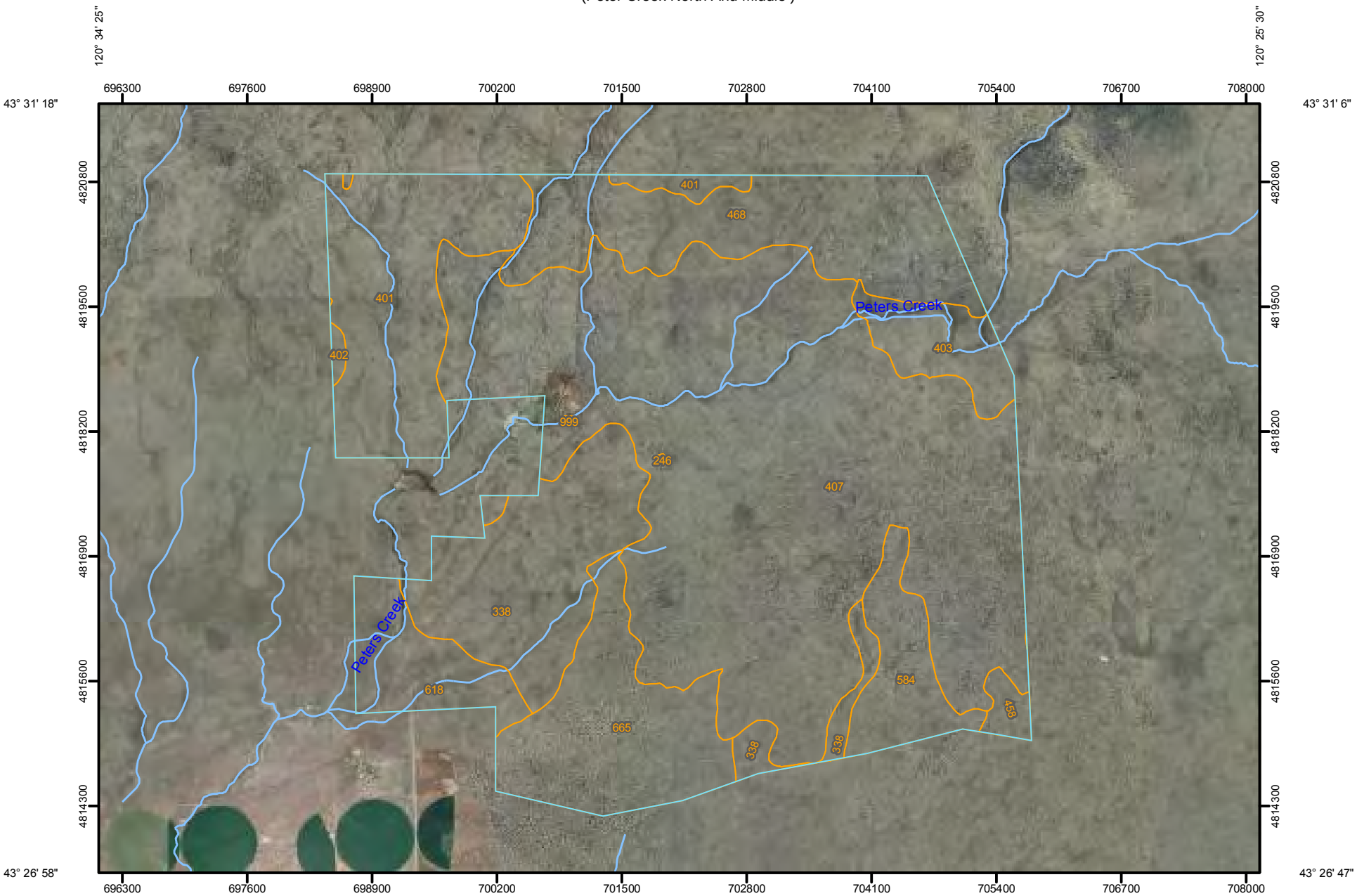
PC 3 1987

PC 3 2000



APPENDIX A – SOIL AND ECOLOGICAL SITE DATA

Soil Map—Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties
(Peter Creek North And Middle)



Map Scale: 1:57,300 if printed on A size (8.5" x 11") sheet.

N

Meters
0 500 1,000 2,000 3,000

Feet
0 3,000 6,000 12,000 18,000

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Gully

Short Steep Slope

Other

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

MAP INFORMATION

Map Scale: 1:57,300 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 10N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties
Survey Area Data: Version 7, Jan 20, 2012

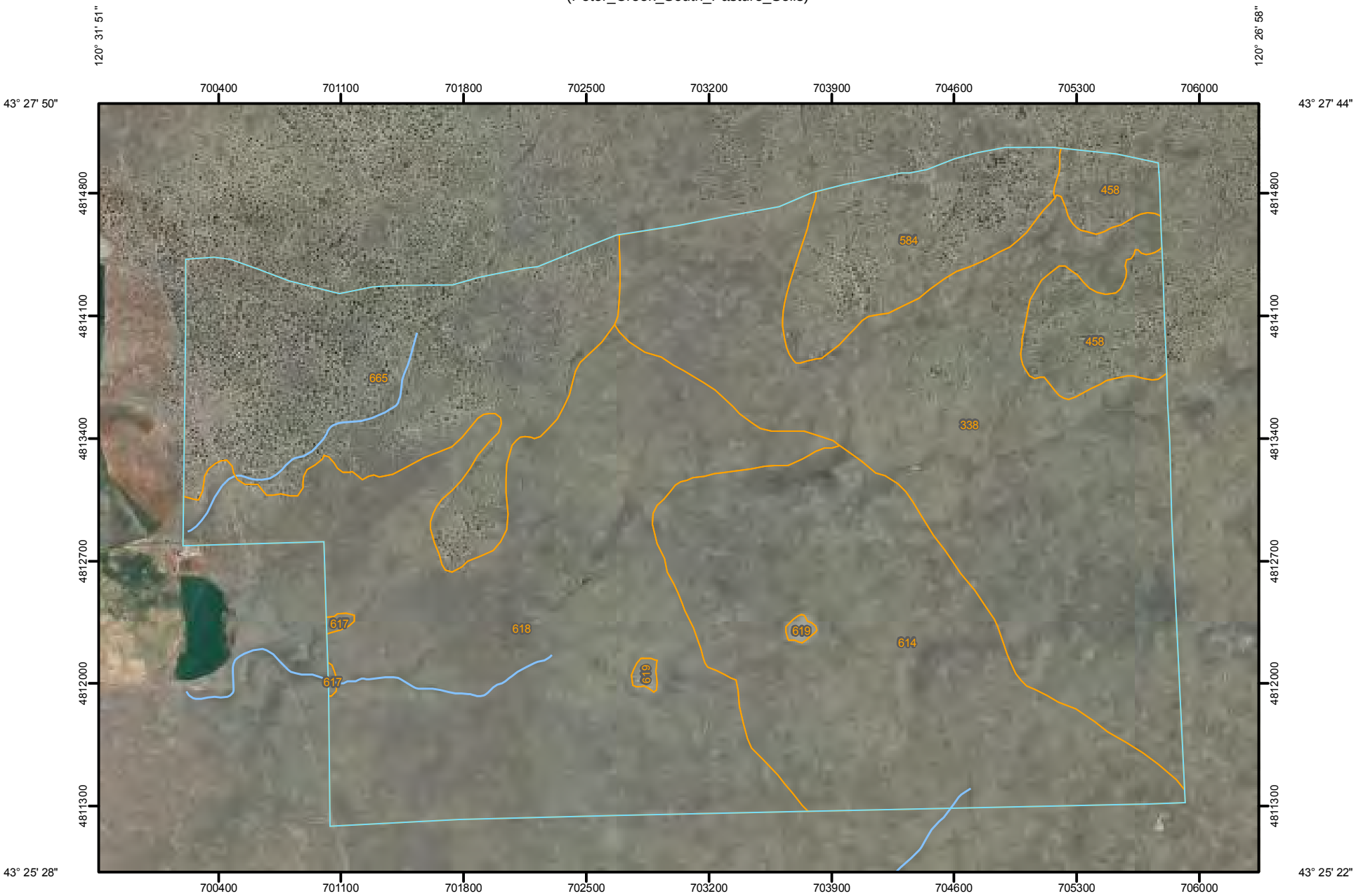
Date(s) aerial images were photographed: 7/24/2005; 7/13/2005; 7/16/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties (OR635)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
246	Chancelakes-Silverash complex, 0 to 1 percent slopes	2.3	0.0%
338	Goodtack ashy very fine sandy loam, 2 to 10 percent slopes	1,036.9	10.6%
401	Lastcall ashy sandy loam, 1 to 8 percent slopes	1,085.5	11.0%
402	Lastcall complex, 1 to 10 percent slopes	18.8	0.2%
403	Lastcall-Hayespring complex, 0 to 8 percent slopes	287.5	2.9%
407	Lastcall-Moonbeam complex, 1 to 10 percent slopes	4,689.2	47.7%
458	Moonbeam very gravelly ashy loam, 1 to 12 percent slopes	67.0	0.7%
468	Moonbeam-Senra complex, gravelly, 1 to 5 percent slopes	1,052.0	10.7%
584	Senra-Hayespring complex, droughty, 2 to 10 percent slopes	363.2	3.7%
618	Suckerflat-Weglike complex, 2 to 6 percent slopes	378.8	3.9%
665	Wegert very cobbly ashy loamy fine sand, 0 to 15 percent slopes	843.0	8.6%
999	Water	2.0	0.0%
Totals for Area of Interest		**9,827.0**	**100.0%**

Soil Map—Lake County, Oregon, Northern Part
(Peter_Creek_South_Pasture_Soils)



Map Scale: 1:31,400 if printed on A size (8.5" x 11") sheet.

N

Meters
0 400 800 1,600 2,400

Feet
0 1,500 3,000 6,000 9,000

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Gully

Short Steep Slope

Other

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

MAP INFORMATION

Map Scale: 1:31,400 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 10N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lake County, Oregon, Northern Part
Survey Area Data: Version 6, Feb 16, 2010

Date(s) aerial images were photographed: 7/13/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Lake County, Oregon, Northern Part (OR635)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
338	Goodtack ashy very fine sandy loam, 2 to 10 percent slopes	1,123.6	25.6%
458	Moonbeam very gravelly ashy loam, 1 to 12 percent slopes	177.9	4.1%
584	Senra-Hayespring complex, droughty, 2 to 10 percent slopes	259.6	5.9%
614	Suckerflat cobbly ashy loam, 2 to 10 percent slopes	851.7	19.4%
617	Suckerflat-Rock outcrop complex, 8 to 15 percent slopes	5.0	0.1%
618	Suckerflat-Weglike complex, 2 to 6 percent slopes	1,296.3	29.5%
619	Silverash ashy fine sandy loam, 0 to 1 percent slopes	9.9	0.2%
665	Wegert very cobbly ashy loamy fine sand, 0 to 15 percent slopes	666.6	15.2%
Totals for Area of Interest		**4,390.6**	**100.0%**

Lake County, Oregon, Northern Part

619—Silverash ashy fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

Elevation: 4,310 to 5,000 feet
Mean annual precipitation: 8 to 12 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 50 to 80 days

Map Unit Composition

Silverash and similar soils: 85 percent
Minor components: 10 percent

Description of Silverash

Setting

Landform: Lakebeds, depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Volcanic ash derived from volcanic rock over lacustrine deposits derived from volcanic rock

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 4 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water capacity: High (about 9.9 inches)

Interpretive groups

Land capability (nonirrigated): 6s
Ecological site: PONDED CLAY (R023XY200OR)

Typical profile

0 to 2 inches: Ashy fine sandy loam
2 to 8 inches: Ashy loam
8 to 21 inches: Clay
21 to 62 inches: Sandy clay loam

Minor Components

Playas

Percent of map unit: 10 percent

Landform: Playas

Data Source Information

Soil Survey Area: Lake County, Oregon, Northern Part
Survey Area Data: Version 6, Feb 16, 2010

Lake County, Oregon, Northern Part

618—Suckerflat-Weglike complex, 2 to 6 percent slopes

Map Unit Setting

Elevation: 4,350 to 4,550 feet
Mean annual precipitation: 8 to 11 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 50 to 80 days

Map Unit Composition

Suckerflat and similar soils: 50 percent
Weglike and similar soils: 35 percent

Description of Suckerflat

Setting

Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash derived from volcanic rock and alluvium derived from basalt and residuum weathered from basalt

Properties and qualities

Slope: 2 to 10 percent
Surface area covered with cobbles, stones or boulders: 3.0 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 3.7 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: ARID PLAINS 8-11 PZ (R023XY604OR)

Typical profile

0 to 8 inches: Cobbly ashy loam
8 to 18 inches: Cobbly ashy loam
18 to 22 inches: Bedrock

Description of Weglike

Setting

Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Eolian sands derived from volcanic rock over residuum weathered from tuff breccia

Properties and qualities

Slope: 0 to 6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability (nonirrigated): 6c
Ecological site: DROUGHTY PUMICE PLAINS 8-11 PZ (R023XY608OR)

Typical profile

0 to 3 inches: Ashy loamy sand
3 to 12 inches: Ashy sandy loam
12 to 22 inches: Gravelly loam
22 to 23 inches: Extremely gravelly loam
23 to 27 inches: Bedrock

Data Source Information

Soil Survey Area: Lake County, Oregon, Northern Part
Survey Area Data: Version 6, Feb 16, 2010

Lake County, Oregon, Northern Part

617—Suckerflat-Rock outcrop complex, 8 to 15 percent slopes

Map Unit Setting

Elevation: 4,300 to 4,500 feet
Mean annual precipitation: 8 to 11 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 50 to 80 days

Map Unit Composition

Suckerflat and similar soils: 50 percent
Rock outcrop: 40 percent

Description of Suckerflat

Setting

Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash derived from volcanic rock and alluvium derived from basalt and residuum weathered from basalt

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Very low (about 2.8 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: DROUGHTY PUMICE PLAINS 8-11 PZ (R023XY608OR)

Typical profile

0 to 8 inches: Ashy loamy sand
8 to 18 inches: Cobbly ashy loam
18 to 22 inches: Bedrock

Description of Rock Outcrop

Properties and qualities

Slope: 8 to 40 percent
Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Land capability (nonirrigated): 8

Typical profile

0 to 60 inches: Bedrock

Data Source Information

Soil Survey Area: Lake County, Oregon, Northern Part
Survey Area Data: Version 6, Feb 16, 2010

Lake County, Oregon, Northern Part

614—Suckerflat cobbly ashy loam, 2 to 10 percent slopes

Map Unit Setting

Elevation: 4,500 to 4,650 feet
Mean annual precipitation: 8 to 11 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 50 to 80 days

Map Unit Composition

Suckerflat and similar soils: 85 percent

Description of Suckerflat

Setting

Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash derived from volcanic rock and alluvium derived from basalt and residuum weathered from basalt

Properties and qualities

Slope: 2 to 10 percent
Surface area covered with cobbles, stones or boulders: 3.0 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 3.7 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: ARID PLAINS 8-11 PZ (R023XY604OR)

Typical profile

0 to 8 inches: Cobbly ashy loam
8 to 18 inches: Cobbly ashy loam
18 to 22 inches: Bedrock

Data Source Information

Soil Survey Area: Lake County, Oregon, Northern Part
Survey Area Data: Version 6, Feb 16, 2010

Lake County, Oregon, Northern Part

584—Senra-Hayespring complex, droughty, 2 to 10 percent slopes

Map Unit Setting

Elevation: 4,580 to 4,870 feet
Mean annual precipitation: 8 to 12 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 50 to 80 days

Map Unit Composition

Senra, droughty, and similar soils: 45 percent
Hayespring, droughty, and similar soils: 40 percent

Description of Senra, Droughty

Setting

Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived from volcanic rock over residuum weathered from basalt or tuff breccia

Properties and qualities

Slope: 2 to 10 percent
Depth to restrictive feature: 15 to 20 inches to duripan; 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.1 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: JUNIPER LAVA BENCHES 9-12 PZ (R023XY511OR)

Typical profile

0 to 3 inches: Ashy fine sandy loam
3 to 10 inches: Ashy loam
10 to 15 inches: Ashy sandy clay loam
15 to 19 inches: Channery ashy clay loam
19 to 32 inches: Cemented material
32 to 36 inches: Bedrock

Description of Hayespring, Droughty

Setting

Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Mixed volcanic ash and residuum derived from basalt

Properties and qualities

Slope: 2 to 10 percent
Depth to restrictive feature: 20 to 40 inches to duripan; 22 to 52 inches to duripan; 30 to 60 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: DROUGHTY JUNIPER HILLS 8-11 PZ (R023XY673OR)

Typical profile

0 to 3 inches: Gravelly ashy very fine sandy loam
3 to 10 inches: Stony ashy fine sandy loam
10 to 17 inches: Cobbly ashy clay loam
17 to 24 inches: Ashy clay loam
24 to 44 inches: Cemented material
44 to 54 inches: Bedrock

Data Source Information

Soil Survey Area: Lake County, Oregon, Northern Part
Survey Area Data: Version 6, Feb 16, 2010

Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties

468—Moonbeam-Senra complex, gravelly, 1 to 5 percent slopes

Map Unit Setting

Elevation: 4,580 to 5,200 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 50 to 80 days

Map Unit Composition

Moonbeam, gravelly ashy fine sandy loam surface, and similar soils: 60 percent
Senra and similar soils: 25 percent
Minor components: 15 percent

Description of Moonbeam, Gravelly Ashy Fine Sandy Loam Surface

Setting

Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash over residuum derived from volcanic rock such as basalt

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: 13 to 20 inches to duripan; 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 3.0 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: JUNIPER LAVA BENCHES 9-12 PZ (R023XY511OR)

Typical profile

0 to 3 inches: Gravelly ashy fine sandy loam
3 to 8 inches: Gravelly ashy sandy clay loam
8 to 14 inches: Clay
14 to 18 inches: Clay
18 to 27 inches: Cemented material
27 to 37 inches: Bedrock

Description of Senra

Setting

Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash and residuum derived from volcanic rock such as basalt or tuff-breccia

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: 15 to 20 inches to duripan; 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.1 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: PUMICE CLAYPAN 10-12 PZ (R023XY211OR)

Typical profile

0 to 3 inches: Ashy fine sandy loam
3 to 10 inches: Ashy loam
10 to 15 inches: Ashy sandy clay loam
15 to 19 inches: Channery ashy clay loam
19 to 32 inches: Cemented material
32 to 42 inches: Bedrock

Minor Components

Rock outcrop

Percent of map unit: 5 percent

Lastcall

Percent of map unit: 5 percent
Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: JUNIPER LAVA BENCHES 9-12 PZ (R023XY511OR)

Raztack

Percent of map unit: 3 percent
Landform: Lakebeds
Landform position (three-dimensional): Dip
Down-slope shape: Concave

Across-slope shape: Concave
Ecological site: SHALLOW SWALE 10-14 PZ (R023XY324OR)

Norcross
Percent of map unit: 2 percent
Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: SHALLOW STONY 10-20 PZ (R021XY204OR)

Data Source Information

Soil Survey Area: Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties
Survey Area Data: Version 7, Jan 20, 2012

Lake County, Oregon, Northern Part

458—Moonbeam very gravelly ashy loam, 1 to 12 percent slopes

Map Unit Setting

Elevation: 4,700 to 5,200 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 50 to 80 days

Map Unit Composition

Moonbeam and similar soils: 85 percent

Description of Moonbeam

Setting

Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits and residuum weathered from basalt and tuff

Properties and qualities

Slope: 1 to 12 percent
Surface area covered with cobbles, stones or boulders: 4.0 percent
Depth to restrictive feature: 13 to 20 inches to duripan; 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 3.0 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: JUNIPER LAVA BENCHES 9-12 PZ (R023XY511OR)

Typical profile

0 to 3 inches: Very gravelly ashy loam
3 to 8 inches: Gravelly ashy sandy clay loam
8 to 14 inches: Clay
14 to 18 inches: Clay
18 to 27 inches: Cemented material

27 to 31 inches: Bedrock

Data Source Information

Soil Survey Area: Lake County, Oregon, Northern Part
Survey Area Data: Version 6, Feb 16, 2010

Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties

407—Lastcall-Moonbeam complex, 1 to 10 percent slopes

Map Unit Setting

Elevation: 4,470 to 5,100 feet
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 50 to 80 days

Map Unit Composition

Lastcall and similar soils: 45 percent
Moonbeam and similar soils: 40 percent
Minor components: 15 percent

Description of Lastcall

Setting

Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash and residuum derived from volcanic rock such as basalt

Properties and qualities

Slope: 1 to 10 percent
Surface area covered with cobbles, stones or boulders: 15.0 percent
Depth to restrictive feature: 26 to 34 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.6 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: JUNIPER LAVA BENCHES 9-12 PZ (R023XY511OR)

Typical profile

0 to 2 inches: Stony ashy sandy loam
2 to 7 inches: Ashy sandy loam
7 to 13 inches: Ashy sandy loam
13 to 21 inches: Cobbly ashy sandy clay loam
21 to 31 inches: Cobbly ashy sandy clay loam
31 to 41 inches: Bedrock

Description of Moonbeam

Setting

Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash over residuum derived from volcanic rock such as basalt

Properties and qualities

Slope: 1 to 10 percent
Surface area covered with cobbles, stones or boulders: 10.0 percent
Depth to restrictive feature: 13 to 20 inches to duripan; 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 3.0 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: JUNIPER LAVA BENCHES 9-12 PZ (R023XY511OR)

Typical profile

0 to 3 inches: Stony ashy fine sandy loam
3 to 8 inches: Gravelly ashy sandy clay loam
8 to 14 inches: Clay
14 to 18 inches: Clay
18 to 27 inches: Cemented material
27 to 37 inches: Bedrock

Minor Components

Rock outcrop

Percent of map unit: 5 percent

Embal

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: SWALE 10-14 PZ (R023XY202OR)

Goodtack

Percent of map unit: 5 percent
Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve

Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: DROUGHTY LOAM 11-13 PZ (R023XY316OR)

Data Source Information

Soil Survey Area: Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties
Survey Area Data: Version 7, Jan 20, 2012

Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties

403—Lastcall-Hayespring complex, 0 to 8 percent slopes

Map Unit Setting

Elevation: 4,700 to 4,890 feet
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 50 to 80 days

Map Unit Composition

Lastcall and similar soils: 65 percent
Hayespring and similar soils: 30 percent
Minor components: 5 percent

Description of Lastcall

Setting

Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash and residuum derived from volcanic rock such as basalt

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 26 to 34 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.8 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: PUMICE CLAYPAN 10-12 PZ (R023XY211OR)

Typical profile

0 to 2 inches: Ashy sandy loam
2 to 7 inches: Ashy sandy loam
7 to 13 inches: Ashy sandy loam
13 to 21 inches: Cobbly ashy sandy clay loam
21 to 31 inches: Cobbly ashy sandy clay loam
31 to 41 inches: Bedrock

Description of Hayespring

Setting

Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Mixed volcanic ash and residuum derived from volcanic rock such as basalt

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 15.0 percent
Depth to restrictive feature: 20 to 40 inches to duripan; 22 to 52 inches to duripan; 30 to 60 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: PUMICE 8-10 PZ (R023XY514OR)

Typical profile

0 to 3 inches: Stony ashy fine sandy loam
3 to 10 inches: Stony ashy fine sandy loam
10 to 17 inches: Cobbly ashy clay loam
17 to 24 inches: Ashy clay loam
24 to 44 inches: Cemented material
44 to 54 inches: Bedrock

Minor Components

Goodtack

Percent of map unit: 5 percent
Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: DROUGHTY LOAM 11-13 PZ (R023XY316OR)

Data Source Information

Soil Survey Area: Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties
Survey Area Data: Version 7, Jan 20, 2012

Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties

402—Lastcall complex, 1 to 10 percent slopes

Map Unit Setting

Elevation: 4,540 to 4,800 feet
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 50 to 80 days

Map Unit Composition

Lastcall, gently sloping, and similar soils: 65 percent
Lastcall, nearly level, and similar soils: 20 percent
Minor components: 15 percent

Description of Lastcall, Gently Sloping

Setting

Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash and residuum derived from volcanic rock such as basalt

Properties and qualities

Slope: 1 to 10 percent
Depth to restrictive feature: 26 to 34 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.8 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: JUNIPER LAVA BENCHES 9-12 PZ (R023XY511OR)

Typical profile

0 to 2 inches: Ashy sandy loam
2 to 7 inches: Ashy sandy loam
7 to 13 inches: Ashy sandy loam
13 to 21 inches: Cobbly ashy sandy clay loam
21 to 31 inches: Cobbly ashy sandy clay loam
31 to 41 inches: Bedrock

Description of Lastcall, Nearly Level

Setting

Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash and residuum derived from volcanic rock such as basalt

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: 26 to 34 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.8 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: PUMICE CLAYPAN 10-12 PZ (R023XY211OR)

Typical profile

0 to 2 inches: Ashy sandy loam
2 to 7 inches: Ashy sandy loam
7 to 13 inches: Ashy sandy loam
13 to 21 inches: Cobbly ashy sandy clay loam
21 to 31 inches: Cobbly ashy sandy clay loam
31 to 41 inches: Bedrock

Minor Components

Moonbeam

Percent of map unit: 10 percent
Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: PUMICE CLAYPAN 10-12 PZ (R023XY211OR)

Rock outcrop

Percent of map unit: 5 percent

Data Source Information

Soil Survey Area: Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties
Survey Area Data: Version 7, Jan 20, 2012

Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties

401—Lastcall ashy sandy loam, 1 to 8 percent slopes

Map Unit Setting

Elevation: 4,520 to 5,000 feet
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 50 to 80 days

Map Unit Composition

Lastcall and similar soils: 85 percent
Minor components: 15 percent

Description of Lastcall

Setting

Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash and residuum derived from volcanic rock such as basalt

Properties and qualities

Slope: 1 to 8 percent
Depth to restrictive feature: 26 to 34 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.8 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: PUMICE CLAYPAN 10-12 PZ (R023XY211OR)

Typical profile

0 to 2 inches: Ashy sandy loam
2 to 7 inches: Ashy sandy loam
7 to 13 inches: Ashy sandy loam
13 to 21 inches: Cobbly ashy sandy clay loam
21 to 31 inches: Cobbly ashy sandy clay loam
31 to 41 inches: Bedrock

Minor Components

Kunceider

Percent of map unit: 5 percent

Landform: Lava plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: JUNIPER SHALLOW PUMICE HILLS 10-12 PZ (R010XA021OR)

Moonbeam
Percent of map unit: 5 percent
Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: PUMICE CLAYPAN 10-12 PZ (R023XY211OR)

Senra
Percent of map unit: 5 percent
Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: PUMICE CLAYPAN 10-12 PZ (R023XY211OR)

Data Source Information

Soil Survey Area: Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties
Survey Area Data: Version 7, Jan 20, 2012

Lake County, Oregon, Northern Part

338—Goodtack ashy very fine sandy loam, 2 to 10 percent slopes

Map Unit Setting

Elevation: 4,380 to 4,980 feet
Mean annual precipitation: 11 to 13 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 50 to 80 days

Map Unit Composition

Goodtack and similar soils: 85 percent

Description of Goodtack

Setting

Landform: Lava plateaus, hillslopes
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash over residuum derived from basalt or tuff breccia

Properties and qualities

Slope: 2 to 10 percent
Depth to restrictive feature: 16 to 20 inches to duripan; 20 to 48 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water capacity: Low (about 4.1 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: DROUGHTY LOAM 11-13 PZ (R023XY316OR)

Typical profile

0 to 3 inches: Ashy very fine sandy loam
3 to 7 inches: Ashy fine sandy loam
7 to 19 inches: Ashy fine sandy loam
19 to 46 inches: Cemented material

46 to 56 inches: Bedrock

Data Source Information

Soil Survey Area: Lake County, Oregon, Northern Part
Survey Area Data: Version 6, Feb 16, 2010

Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties

246—Chancelakes-Silverash complex, 0 to 1 percent slopes

Map Unit Setting

Elevation: 4,350 to 5,170 feet
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 50 to 80 days

Map Unit Composition

Chancelakes and similar soils: 70 percent
Silverash and similar soils: 25 percent
Minor components: 5 percent

Description of Chancelakes

Setting

Landform: Drainageways
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Lacustrine deposits derived from volcanic rock such as basalt and tuff with an influence of volcanic ash

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 0 to 1 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water capacity: High (about 9.1 inches)

Interpretive groups

Land capability (nonirrigated): 6w
Ecological site: LAKEBED (R023XY100OR)

Typical profile

0 to 1 inches: Ashy silt loam
1 to 10 inches: Clay
10 to 29 inches: Clay
29 to 58 inches: Clay
58 to 63 inches: Ashy sandy clay loam

Description of Silverash

Setting

Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Volcanic ash mixed with lacustrine and alluvial deposits derived from mixed volcanic rock

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 8 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water capacity: High (about 9.9 inches)

Interpretive groups

Land capability (nonirrigated): 6w
Ecological site: PONDED CLAY (R023XY200OR)

Typical profile

0 to 2 inches: Ashy fine sandy loam
2 to 8 inches: Ashy loam
8 to 21 inches: Clay
21 to 62 inches: Sandy clay loam

Minor Components

Playas

Percent of map unit: 5 percent
Landform: Playas

Data Source Information

Soil Survey Area: Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties
Survey Area Data: Version 7, Jan 20, 2012

Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties

665—Wegert very cobbly ashy loamy fine sand, 0 to 15 percent slopes

Map Unit Setting

Elevation: 4,330 to 4,680 feet
Mean annual precipitation: 8 to 11 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 50 to 80 days

Map Unit Composition

Wegert and similar soils: 85 percent
Minor components: 15 percent

Description of Wegert

Setting

Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash and pumice over residuum derived from volcanic rock such as basalt

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Very low (about 2.9 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: JUNIPER PUMICE FLAT 8-10 PZ (R010XA027OR)

Typical profile

0 to 2 inches: Very cobbly ashy loamy fine sand
2 to 6 inches: Ashy loamy sand
6 to 27 inches: Ashy loamy sand
27 to 31 inches: Extremely cobbly ashy loamy sand
31 to 41 inches: Bedrock

Minor Components

Weglike

Percent of map unit: 10 percent
Landform: Lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: DROUGHTY PUMICE PLAINS 8-11 PZ (R023XY608OR)

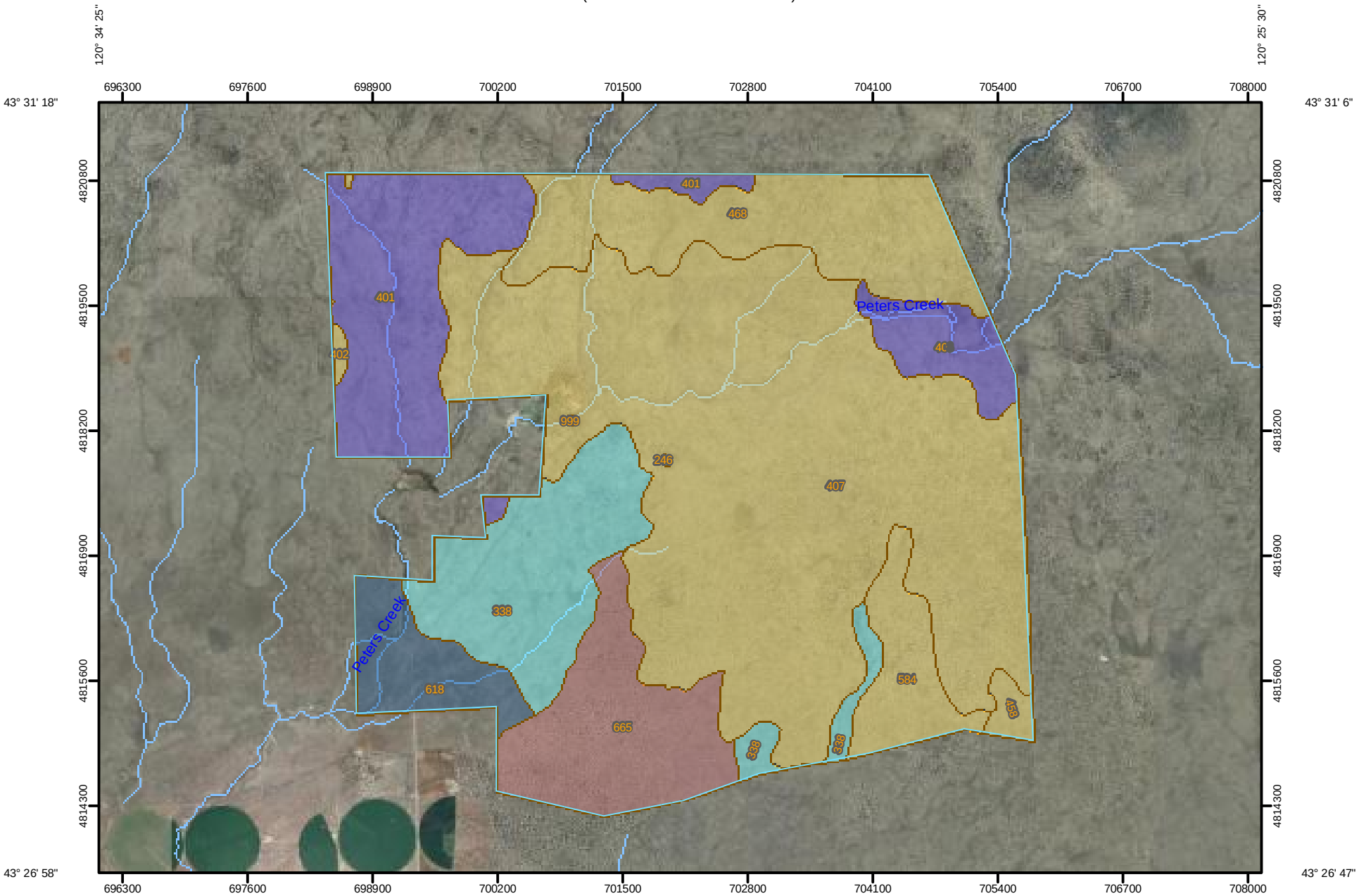
Borobey

Percent of map unit: 5 percent
Landform: Lake terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: STIPA FESCUE BASIN 8-11 PZ (R023XY670OR)

Data Source Information

Soil Survey Area: Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties
Survey Area Data: Version 7, Jan 20, 2012

All Ecological Sites — Rangeland—Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties
(Peter Creek North And Middle)



Map Scale: 1:57,300 if printed on A size (8.5" x 11") sheet.

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Meters
0 500 1,000 2,000 3,000

Feet
0 3,000 6,000 12,000 18,000

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

R010XA027OR — JUNIPER PUMICE FLAT 8-10 PZ

R023XY100OR — LAKEBED

R023XY211OR — PUMICE CLAYPAN 10-12 PZ

R023XY316OR — DROUGHTY LOAM 11-13 PZ

R023XY511OR — JUNIPER LAVA BENCHES 9-12 PZ

R023XY604OR — ARID PLAINS 8-11 PZ

Not rated or not available

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

MAP INFORMATION

Map Scale: 1:57,300 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 10N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties
Survey Area Data: Version 7, Jan 20, 2012

Date(s) aerial images were photographed: 7/24/2005; 7/13/2005; 7/16/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

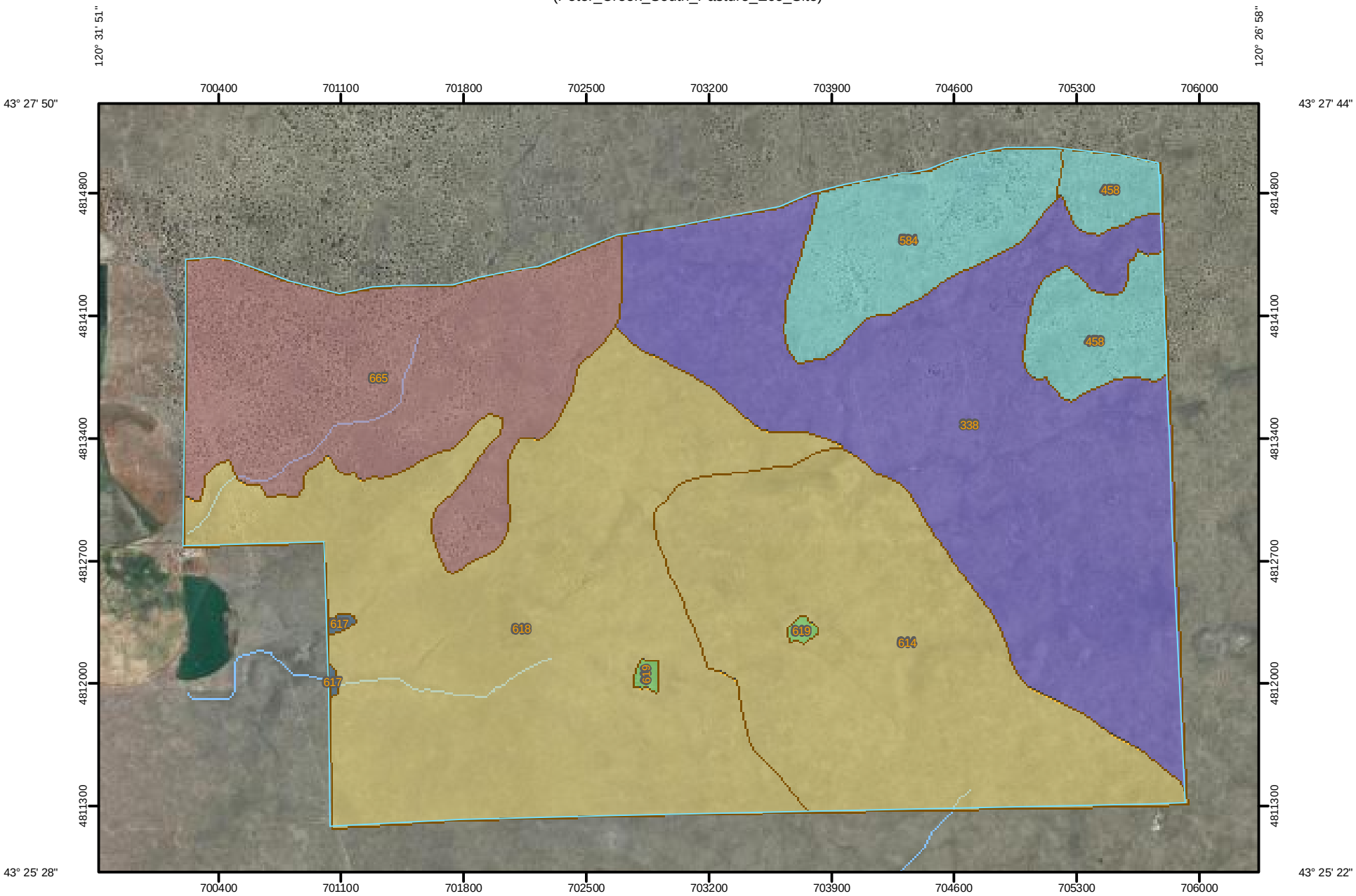
All Ecological Sites — Rangeland

Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties					
Map unit symbol	**Map unit name**	**Component name (percent)**	**Ecological site**	**Acres in AOI**	**Percent of AOI**
246	Chancelakes-Silverash complex, 0 to 1 percent slopes	Chancelakes (70%)	R023XY100OR — LAKEBED	2.3	0.0%
		Silverash (25%)	R023XY200OR — PONDED CLAY		
		Playas (5%)			
338	Goodtack ashy very fine sandy loam, 2 to 10 percent slopes	Goodtack (85%)	R023XY316OR — DROUGHTY LOAM 11-13 PZ	1,036.9	10.6%
		Moonbeam (10%)	R023XY211OR — PUMICE CLAYPAN 10-12 PZ		
		Rubble land (5%)			
401	Lastcall ashy sandy loam, 1 to 8 percent slopes	Lastcall (85%)	R023XY211OR — PUMICE CLAYPAN 10-12 PZ	1,085.5	11.0%
		Kunceider (5%)	R010XA021OR — JUNIPER SHALLOW PUMICE HILLS 10-12 PZ		
		Moonbeam (5%)	R023XY211OR — PUMICE CLAYPAN 10-12 PZ		
		Senra (5%)	R023XY211OR — PUMICE CLAYPAN 10-12 PZ		
402	Lastcall complex, 1 to 10 percent slopes	Lastcall, gently sloping (65%)	R023XY511OR — JUNIPER LAVA BENCHES 9-12 PZ	18.8	0.2%
		Lastcall, nearly level (20%)	R023XY211OR — PUMICE CLAYPAN 10-12 PZ		
		Moonbeam (10%)	R023XY211OR — PUMICE CLAYPAN 10-12 PZ		
		Rock outcrop (5%)			
403	Lastcall-Hayespring complex, 0 to 8 percent slopes	Lastcall (65%)	R023XY211OR — PUMICE CLAYPAN 10-12 PZ	287.5	2.9%
		Hayespring (30%)	R023XY514OR — PUMICE 8-10 PZ		
		Goodtack (5%)	R023XY316OR — DROUGHTY LOAM 11-13 PZ		

Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties					
Map unit symbol		**Component name (percent)**	**Ecological site**	**Acres in AOI**	**Percent of AOI**
407	Lastcall-Moonbeam complex, 1 to 10 percent slopes	Lastcall (45%)	R023XY511OR — JUNIPER LAVA BENCHES 9-12 PZ	4,689.2	47.7%
		Moonbeam (40%)	R023XY511OR — JUNIPER LAVA BENCHES 9-12 PZ		
		Embal (5%)	R023XY202OR — SWALE 10-14 PZ		
		Goodtack (5%)	R023XY316OR — DROUGHTY LOAM 11-13 PZ		
		Rock outcrop (5%)			
458	Moonbeam very gravelly ashy loam, 1 to 12 percent slopes	Moonbeam (85%)	R023XY511OR — JUNIPER LAVA BENCHES 9-12 PZ	67.0	0.7%
		Rock outcrop (10%)			
		Senra (5%)	R023XY211OR — PUMICE CLAYPAN 10-12 PZ		
468	Moonbeam-Senra complex, gravelly, 1 to 5 percent slopes	Moonbeam, gravelly ashy fine sandy loam surface (60%)	R023XY511OR — JUNIPER LAVA BENCHES 9-12 PZ	1,052.0	10.7%
		Senra (25%)	R023XY211OR — PUMICE CLAYPAN 10-12 PZ		
		Lastcall (5%)	R023XY511OR — JUNIPER LAVA BENCHES 9-12 PZ		
		Rock outcrop (5%)			
		Raztack (3%)	R023XY324OR — SHALLOW SWALE 10-14 PZ		
		Norcross (2%)	R021XY204OR — SHALLOW STONY 10-20 PZ		
584	Senra-Hayespring complex, droughty, 2 to 10 percent slopes	Senra, droughty (45%)	R023XY511OR — JUNIPER LAVA BENCHES 9-12 PZ	363.2	3.7%
		Hayespring, droughty (40%)	R023XY673OR — DROUGHTY JUNIPER HILLS 8-11 PZ		
		Goodtack (10%)	R023XY316OR — DROUGHTY LOAM 11-13 PZ		
		Rock outcrop (5%)			

Lake County, Oregon, Northern Part, Parts of Lake and Klamath Counties					
Map unit symbol					
618	Suckerflat-Weglike complex, 2 to 6 percent slopes	Suckerflat (50%)	R023XY604OR — ARID PLAINS 8-11 PZ	378.8	3.9%
		Weglike (35%)	R023XY608OR — DROUGHTY PUMICE PLAINS 8-11 PZ		
		Fort Rock (10%)	R023XY508OR — PUMICE FLAT 10-12 PZ		
		Morehouse (5%)	R023XY610OR — PUMICE DUNES 8-10 PZ		
665	Wegert very cobbly ashy loamy fine sand, 0 to 15 percent slopes	Wegert (85%)	R010XA027OR — JUNIPER PUMICE FLAT 8-10 PZ	843.0	8.6%
		Weglike (10%)	R023XY608OR — DROUGHTY PUMICE PLAINS 8-11 PZ		
		Borobey (5%)	R023XY670OR — STIPA FESCUE BASIN 8-11 PZ		
999	Water	Water (100%)		2.0	0.0%
Totals for Area of Interest				**9,827.0**	**100.0%**

All Ecological Sites — Rangeland—Lake County, Oregon, Northern Part
(Peter_Creek_South_Pasture_Eco_Site)



Map Scale: 1:31,400 if printed on A size (8.5" x 11") sheet.

N

Meters
0 400 800 1,600 2,400

Feet
0 1,500 3,000 6,000 9,000

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

R010XA027OR — PUMICE FLAT 8-10 PZ

R023XY200OR — PONDED CLAY

R023XY316OR — DROUGHTY LOAM 11-13 PZ

R023XY511OR — JUNIPER LAVA BENCHES 9-12 PZ

R023XY604OR — ARID PLAINS 8-11 PZ

R023XY608OR — DROUGHTY PUMICE PLAINS 8-11 PZ

Not rated or not available

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

MAP INFORMATION

Map Scale: 1:31,400 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 10N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lake County, Oregon, Northern Part
Survey Area Data: Version 6, Feb 16, 2010

Date(s) aerial images were photographed: 7/13/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

All Ecological Sites — Rangeland

Lake County, Oregon, Northern Part					
Map unit symbol	**Map unit name**	**Component name (percent)**	**Ecological site**	**Acres in AOI**	**Percent of AOI**
338	Goodtack ashy very fine sandy loam, 2 to 10 percent slopes	Goodtack (85%)	R023XY316OR — DROUGHTY LOAM 11-13 PZ	1,123.6	25.6%
458	Moonbeam very gravelly ashy loam, 1 to 12 percent slopes	Moonbeam (85%)	R023XY511OR — JUNIPER LAVA BENCHES 9-12 PZ	177.9	4.1%
584	Senra-Hayespring complex, droughty, 2 to 10 percent slopes	Senra, droughty (45%)	R023XY511OR — JUNIPER LAVA BENCHES 9-12 PZ	259.6	5.9%
		Hayespring, droughty (40%)	R023XY673OR — DROUGHTY JUNIPER HILLS 8-11 PZ		
614	Suckerflat cobbly ashy loam, 2 to 10 percent slopes	Suckerflat (85%)	R023XY604OR — ARID PLAINS 8-11 PZ	851.7	19.4%
617	Suckerflat-Rock outcrop complex, 8 to 15 percent slopes	Suckerflat (50%)	R023XY608OR — DROUGHTY PUMICE PLAINS 8-11 PZ	5.0	0.1%
		Rock outcrop (40%)			
618	Suckerflat-Weglike complex, 2 to 6 percent slopes	Suckerflat (50%)	R023XY604OR — ARID PLAINS 8-11 PZ	1,296.3	29.5%
		Weglike (35%)	R023XY608OR — DROUGHTY PUMICE PLAINS 8-11 PZ		
619	Silverash ashy fine sandy loam, 0 to 1 percent slopes	Silverash (85%)	R023XY200OR — PONDED CLAY	9.9	0.2%
		Playas (10%)			
665	Wegert very cobbly ashy loamy fine sand, 0 to 15 percent slopes	Wegert (85%)	R010XA027OR — PUMICE FLAT 8-10 PZ	666.6	15.2%
Totals for Area of Interest				**4,390.6**	**100.0%**

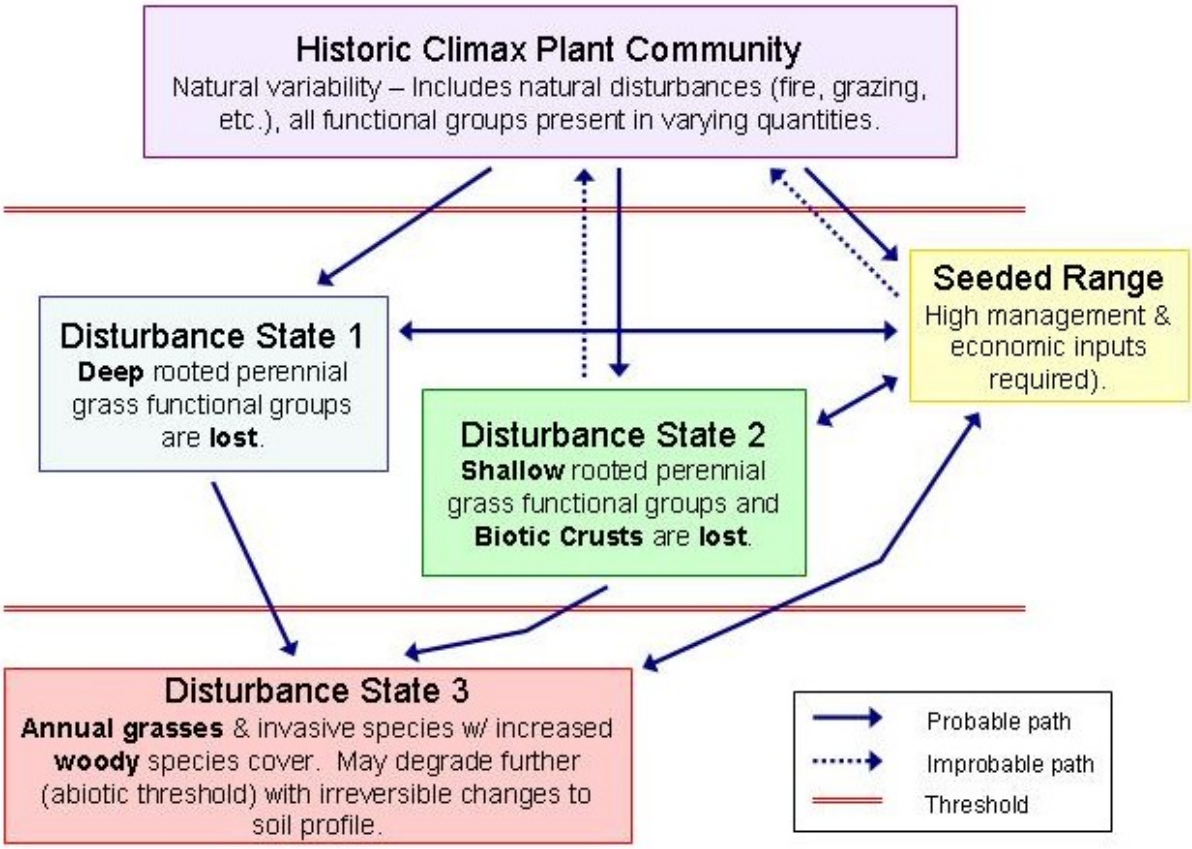
R023XY324OR — SHALLOW SWALE 10-14 PZ: Historic Climax Plant Community

Plant Community Description

The potential native palnt community is dominated by low sagebrush, Nevada and Sandbergs bluegrasses. Vegetative compositionsi about 70 percent grasses, 10 percent forbs and 20 percent shrubs.

R023XY316OR — DROUGHTY LOAM 11-13 PZ: Historic Climax Plant Community

Plant Community Photos



GENERAL MODEL FOR COOL-SEASON BUNCHGRASS RANGELANDS

Historic Climax Plant Community

Plant Community Description

The potential native plant community is dominated by Idaho fescue and Thurbers needle grass. Basin big sagebrush is prominent. Bluebunch wheatgrass and Sandberg bluegrass are common. The vegtative composition of the community is approximatley 85% grass, 5% forbs and 10% shrubs.

Plant Community Tables

Annual Production (Lbs/Acre)			
Grass/Grasslike	595	765	935
Forb	35	45	55
Shrub/Vine	70	90	110
Totals	**700**	**900**	**1,100**

Plant Species Composition (Lbs/Acre)				
			Annual Production Pounds Per Acre	
				High
1: Perennial, bunch grass, deep-rooted			270	360
	Idaho fescue	Festuca idahoensis	270	360
2: Perennial, bunch grass, moderately deep-rooted			180	270
	Thurber's needlegrass	Achnatherum thurberianum	180	270
3: Perennial, bunch grass, deep-rooted			90	180
	bluebunch wheatgrass	Pseudoroegneria spicata ssp. spicata	90	180
4: Perennial, tall bunch grass, deep-rooted			18	45
	basin wildrye	Leymus cinereus	18	45
5: Perennial, bunch grass, shallow-rooted			18	45
	Sandberg bluegrass	Poa secunda	18	45
6: Perennial			18	90
	Indian ricegrass	Achnatherum hymenoides	0	18
	Ross' sedge	Carex rossii	0	18
	squirreltail	Elymus elymoides	0	18
	prairie Junegrass	Koeleria macrantha	0	18
	Cusick's bluegrass	Poa cusickii	0	18

Plant Species Composition (Lbs/Acre)				
			Annual Production Pounds Per Acre	
				High
10: Perennial			9	18
	buckwheat	Eriogonum	9	18
11: Perennial			9	18
	milkvetch	Astragalus	9	18
12: Perennial			9	18
	lupine	Lupinus	9	18
13: Perennial, all			9	45
	common yarrow	Achillea millefolium	0	9
	agoseris	Agoseris	0	9
	onion	Allium	0	9
	pussytoes	Antennaria	0	9
	arrowleaf balsamroot	Balsamorhiza sagittata	0	9
	tapertip hawksbeard	Crepis acuminata	0	9
	larkspur	Delphinium	0	9
	fleabane	Erigeron	0	9
	Lava aster	Ionactis alpina	0	9
	granite prickly phlox	Linanthus pungens	0	9
	stoneseed	Lithospermum	0	9
	desertparsley	Lomatium	0	9
	phacelia	Phacelia	0	9
	phlox	Phlox	0	9
	ragwort	Senecio	0	9
	deathcamas	Zigadenus	0	9

Plant Species Composition (Lbs/Acre)				
15: Evergreen			45	135
	basin big sagebrush	Artemisia tridentata ssp. tridentata	45	90
	mountain big sagebrush	Artemisia tridentata ssp. vaseyana	18	45
16: Deciduous			0	18
	antelope bitterbrush	Purshia tridentata	0	18

Plant Species Composition (Lbs/Acre)				
17: Evergreen			0	18
	Wyoming big sagebrush	Artemisia tridentata ssp. wyomingensis	0	9
	yellow rabbitbrush	Chrysothamnus viscidiflorus	0	9

Plant Species Composition (Lbs/Acre)				
			Annual Production Pounds Per Acre	
20: Evergreen			0	9
	western juniper	Juniperus occidentalis	0	9

R023XY211OR — PUMICE CLAYPAN 10-12 PZ: Historic Climax Plant Community

Plant Community Description

The potential native plant community is dominated by Idaho fescue (60 percent) and low sagebrush and/or early sagebrush (10 percent). Thurber needlegrass is prominent in the stand, making up about 10 percent. Forbs are minor and make up about 5 percent of the composition. Total foliar cover is about 50 percent, of which 10 percent is shrub cover, and 40 percent is grass/forb cover.

Plant Community Tables

Annual Production (Lbs/Acre)			
Grass/Grasslike	425	595	765
Forb	15	21	27
Shrub/Vine	60	84	108
Totals	**500**	**700**	**900**

Plant Species Composition (Lbs/Acre)				
			Annual Production Pounds Per Acre	
				High
1: Perennial, deep-rooted, dominant			280	420
	Idaho fescue	Festuca idahoensis	280	420
2: Perennial, deep-rooted, sub-dominant			50	105
	western needlegrass	Achnatherum occidentale	14	35
	Thurber's needlegrass	Achnatherum thurberianum	35	70
	thickspike wheatgrass	Elymus lanceolatus ssp. lanceolatus	7	14
	prairie Junegrass	Koeleria macrantha	4	8
	bluebunch wheatgrass	Pseudoroegneria spicata	7	21
4: Perennial, shallow-rooted, sub-dominant			7	35
	thickspike wheatgrass	Elymus lanceolatus ssp. lanceolatus	7	35
	Sandberg bluegrass	Poa secunda	0	7

Plant Species Composition (Lbs/Acre)				
5: Perennial, other			4	8
	Ross' sedge	Carex rossii	0	2
	squirreltail	Elymus elymoides	0	2
	Sandberg bluegrass	Poa secunda	0	2

Plant Species Composition (Lbs/Acre)				
			Annual Production Pounds Per Acre	
				High
5: Other perennial forbs, all			4	20
	pussytoes	Antennaria	0	2
	woodypod milkvetch	Astragalus sclerocarpus	0	2
	milkvetch	Astragalus	0	2
	Douglas' dustymaiden	Chaenactis douglasii	0	2
	giant blue eyed Mary	Collinsia grandiflora	0	2
	buckwheat	Eriogonum	0	2
	snow buckwheat	Eriogonum niveum	0	2
	lupine	Lupinus	0	2
	phlox	Phlox	0	2

Plant Species Composition (Lbs/Acre)				
11: deep rooted, evergreen			35	105
	little sagebrush	Artemisia arbuscula	0	105
	little sagebrush	Artemisia arbuscula ssp. longiloba	0	105
12: Perennial, evergreen, sub-dominant			12	24
	yellow rabbitbrush	Chrysothamnus viscidiflorus	4	8
	slender buckwheat	Eriogonum microthecum	4	8
	rubber rabbitbrush	Ericameria nauseosa	4	8
13: Perennial, deciduous			0	14
	antelope bitterbrush	Purshia tridentata	0	14

Plant Species Composition (Lbs/Acre)				
15: Evergreen Trees			0	14
	western juniper	Juniperus occidentalis	0	14

R023XY202OR — SWALE 10-14 PZ: Historic Climax Plant Community

Plant Community Description

The potential native plant community is dominated by basin wildrye and bluebunch wheatgrass. Basin big sagebrush, Idaho fescue, and Thurber needlegrass are common. Prairie junegrass, Sandberg bluegrass, and a variety of forbs are present. The vegetative composition of the community is approximately 85 percent grass, 5 percent forbs, and 10 percent shrubs. Approximate ground cover is 70-80 percent (basal and crown).

Plant Community Tables

Annual Production (Lbs/Acre)			
Grass/Grasslike	1,224	1,539	1,854
Forb	72	126	180
Shrub/Vine	216	333	450
Totals	**1,512**	**1,998**	**2,484**

Plant Species Composition (Lbs/Acre)				
			Annual Production Pounds Per Acre	
				High
1: Perennial, deep-rooted, dominant			990	1260
	Idaho fescue	Festuca idahoensis	180	270
	basin wildrye	Leymus cinereus	540	630
	bluebunch wheatgrass	Pseudoroegneria spicata	270	360
2: Perennial, deep-rooted, sub-dominant			126	270
	western needlegrass	Achnatherum occidentale	36	90
	Thurber's needlegrass	Achnatherum thurberianum	90	180
4: Perennial, shallow-rooted, sub-dominant			72	180
	prairie Junegrass	Koeleria macrantha	36	90
	Sandberg bluegrass	Poa secunda	36	90

Plant Species Composition (Lbs/Acre)				
5: Other perennial grasses, all			36	144
	sedge	Carex	0	48
	squirreltail	Elymus elymoides	0	48
	tufted wheatgrass	Elymus macrourus	0	48

Plant Species Composition (Lbs/Acre)				
			Annual Production Pounds Per Acre	
				High
7: Perennial, all, dominant			54	108
	fleabane	Erigeron	18	36
	buckwheat	Eriogonum	18	36
	lupine	Lupinus	18	36
9: Other perennial forbs, all			18	72
	common yarrow	Achillea millefolium	0	8
	white sagebrush	Artemisia ludoviciana	0	8
	milkvetch	Astragalus	0	8
	tapertip hawksbeard	Crepis acuminata	0	8
	stoneseed	Lithospermum	0	8
	desertparsley	Lomatium	0	8
	locoweed	Oxytropis	0	8
	phlox	Phlox	0	8
	deathcamas	Zigadenus	0	8

Plant Species Composition (Lbs/Acre)				
11: Perennial, evergreen, dominant			180	360
	basin big sagebrush	Artemisia tridentata ssp. tridentata	180	360
12: Perennial, evergreen, sub-dominant			18	36
	yellow rabbitbrush	Chrysothamnus viscidiflorus	18	36

Plant Species Composition (Lbs/Acre)				
15: Other perennial shrubs, all			18	54
	rubber rabbitbrush	Ericameria nauseosa	0	18
	granite prickly phlox	Linanthus pungens	0	18
	horsebrush	Tetradymia	0	18

R023XY200OR — PONDED CLAY: Reference Plant Community

Plant Community Description

The reference native plant community is dominated by (Nevada) Sandberg bluegrass and silver sagebrush. Beardless (creeping) wildrye is prominent. Sedges, rushes, bottlebrush squirrreltail, Sandberg and a variety of forbs are present. Vegetative composition of the community is approximately 85 percent grasses, 10 percent shrubs and 5 percent forbs. The approximate ground cover is 60 to 80 percent (basal and crown).

Plant Community Tables

Annual Production (Lbs/Acre)			
Grass/Grasslike	850	1,275	1,530
Forb	50	75	90
Shrub/Vine	100	150	180
Totals	**1,000**	**1,500**	**1,800**

Plant Species Composition (Lbs/Acre)				
			Annual Production Pounds Per Acre	
				High
1: Dominant, perennial, moderate-rooted bunchgrass			600	900
	Sandberg bluegrass	Poa secunda	600	900
2: Sub-dominant, moderate rooted, rhizomatous grass			150	300
	beardless wildrye	Leymus triticoides	150	300
3: Perennial, moderate rooted, grass/grass-like			150	300
	sedge	Carex	75	150
	mat muhly	Muhlenbergia richardsonis	75	150

Plant Species Composition (Lbs/Acre)				
4: Other perennial grasses/grass-like			75	200
	Douglas' sedge	Carex douglasii	10	50
	squirreltail	Elymus elymoides	30	100
	meadow barley	Hordeum brachyantherum	0	50
	rush	Juncus	10	70
	basin wildrye	Leymus cinereus	0	75
	mat muhly	Muhlenbergia richardsonis	50	100
	Sandberg bluegrass	Poa secunda	10	30

Plant Species Composition (Lbs/Acre)				
5: Perennial forbs			30	120
	povertyweed	Iva axillaris	10	30
	desertparsley	Lomatium	10	30
	lupine	Lupinus	10	30
	evening primrose	Oenothera	10	20
	figwort	Scrophularia	0	20

Plant Species Composition (Lbs/Acre)				
6: Dominant, deciduous, sprouting shrub			75	225
	silver sagebrush	Artemisia cana	75	225
7: Other shrub			0	50
	Jack in the pulpit	Arisaema triphyllum	0	50

R023XY100OR — LAKEBED: Historic Climax Plant Community

Plant Community Description

The potential native plant community is dominated by spikerush, Baltic rush and dock. Mat muhly and bottlebrush squirreltail are common. Vegetative composition is about 65 percent grass and 35 percent forbs.

Plant Community Tables

Annual Production (Lbs/Acre)			
Grass/Grasslike	650	910	1,300
Forb	350	490	700
Totals	**1,000**	**1,400**	**2,000**

Plant Species Composition (Lbs/Acre)				
			Annual Production Pounds Per Acre	
			Low	High
1: Dominant, perennial, moderate rooted grasslike			420	700
	spikerush	Eleocharis	420	700
2: Sub-dominant, moderate rooted grass-like			140	280
	mountain rush	Juncus arcticus ssp. littoralis	140	280
3: Moderate rooted, perennial grasses			140	280
	squirreltail	Elymus elymoides	70	140
	mat muhly	Muhlenbergia richardsonis	70	140
4: Other perennial grass/ grasslike			30	70
	sedge	Carex	10	30
	saltgrass	Distichlis spicata	0	30
	beardless wildrye	Leymus triticoides	10	30

Plant Species Composition (Lbs/Acre)				
5: Dominant, perennial forb			350	490
	dock	Rumex	350	490
6: Sub-dominant, perennial forb			70	140
	povertyweed	Iva axillaris	70	140
7: Other perennial forbs			5	70
	arnica	Arnica	5	15
	evening primrose	Oenothera	5	15
	knotweed	Polygonum	5	15
	candytuft	Smelowskia	5	15
	fiveleaf clover	Trifolium andersonii	5	15

R021XY204OR — SHALLOW STONY 10-20 PZ: HCPC, POSE/ARAR8 Plant Community

Plant Community Description

The potential native plant community is dominated by low sagebrush and Sandberg bluegrass. A variety of perennial forbs occur throughout the stand. Vegetative composition of the community is approximately 70% grasses, 10% forbs and 20% shrubs.

Plant Community Tables

Annual Production (Lbs/Acre)			
Grass/Grasslike	216	258	300
Forb	32	48	64
Shrub/Vine	52	80	108
Tree	20	30	40
Totals	**320**	**416**	**512**

Plant Species Composition (Lbs/Acre)				
2: Sub-dominant deep rooted perennial grasses			8	20
	bluebunch wheatgrass	Pseudoroegneria spicata	8	20
3: Dominant shallow rooted perennial grasses			200	260
	Sandberg bluegrass	Poa secunda	200	260
5: Other perennial grasses			8	20
	Thurber's needlegrass	Achnatherum thurberianum	0	5
	squirreltail	Elymus elymoides	0	5
	Idaho fescue	Festuca idahoensis	0	5
	prairie Junegrass	Koeleria macrantha	0	5

Plant Species Composition (Lbs/Acre)				
			Annual Production Pounds Per Acre	
				High
7: Dominant perennial forbs			28	44
	Hooker's balsamroot	Balsamorhiza hookeri	8	12
	buckwheat	Eriogonum	8	12
	desertparsley	Lomatium	8	12
	largehead clover	Trifolium macrocephalum	4	8
9: Other perennial forbs			4	20
	rockcress	Arabis	0	5
	milkvetch	Astragalus	0	5
	Indian paintbrush	Castilleja	0	5
	willowherb	Epilobium	0	5
	fleabane	Erigeron	0	5
	lupine	Lupinus	0	5
	woolly plantain	Plantago patagonica	0	5

Plant Species Composition (Lbs/Acre)				
11: Dominant evergreen shrubs			40	80
	little sagebrush	Artemisia arbuscula	40	80
12: Sub-dominant evergreen shrubs			8	20
	slender buckwheat	Eriogonum microthecum	8	20
14: Sub-dominant deciduous (or 1/2 shrubs) shrubs			4	8
	antelope bitterbrush	Purshia tridentata	4	8

Plant Species Composition (Lbs/Acre)				
16: Dominant evergreen trees			20	40
	western juniper	Juniperus occidentalis	20	40

Plant Growth Curve											
Growth Curve Name D21 Low Elev., NA, Good Condition											
Growth Curve Description RPC Growth Curve											
Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
0%	0%	15%	30%	50%	5%	0%	0%	0%	0%	0%	0%

R010XA027OR — PUMICE FLAT 8-10 PZ: Reference Plant Community

Plant Community Description

The potential native plant community is dominated by an open stand of juniper. The understory is composed of two distinct communities in complex with each other. Under the trees and within influence of the crown is an Idaho fescue dominated ground layer. The interspaces between the trees (openings) are dominated by mountain and basin big sagebrush, needle and thread, and several other minor species such as Indian ricegrass, western needlegrass, and Thurber's needlegrass. Vegetative composition is approximately 75% grasses, 5% forbs, and 20% shrubs/trees.

Plant Community Tables

Annual Production (Lbs/Acre)			
Grass/Grasslike	450	600	750
Forb	30	40	50
Shrub/Vine	90	120	150
Tree	30	40	50
Totals	**600**	**800**	**1,000**

Plant Species Composition (Lbs/Acre)				
1: Perennial, bunch-grass, deep-rooted			240	400
	needle and thread	Hesperostipa comata	240	400
2: Perennial, bunch-grass, deep-rooted			60	100
	Idaho fescue	Festuca idahoensis	60	100
3: Perennial, bunch-grass, deep-rooted			90	150
	Indian ricegrass	Achnatherum hymenoides	30	50
	western needlegrass	Achnatherum occidentale ssp. occidentale	30	50
	Thurber's needlegrass	Achnatherum thurberianum	30	50

Plant Species Composition (Lbs/Acre)				
4: Perennial, bunch-grass, deep-rooted			54	90
	Ross' sedge	Carex rossii	12	20
	squirreltail	Elymus elymoides	6	10
	thickspike wheatgrass	Elymus lanceolatus	18	30
	prairie Junegrass	Koeleria macrantha	12	20
	bluebunch wheatgrass	Pseudoroegneria spicata	6	10

Plant Species Composition (Lbs/Acre)				
9: Other perennial forbs			30	50
	common yarrow	Achillea millefolium	0	5
	pussytoes	Antennaria	0	5
	larkspur	Delphinium	0	5
	fleabane	Erigeron	0	5
	buckwheat	Eriogonum	0	5
	starlily	Leucocrinum	0	5
	lupine	Lupinus	0	5
	phacelia	Phacelia	0	5
	spreading phlox	Phlox diffusa	0	5

Plant Species Composition (Lbs/Acre)				
11: Dominant evergreen shrubs			42	70
	basin big sagebrush	Artemisia tridentata ssp. tridentata	21	70
	mountain big sagebrush	Artemisia tridentata ssp. vaseyana	21	70
12: Sub-dominant evergreen shrubs			30	50
	spiny hopsage	Grayia spinosa	30	50

Plant Species Composition (Lbs/Acre)				
15: Other shrubs			18	30
	rubber rabbitbrush	Ericameria nauseosa	0	10
	granite prickly phlox	Linanthus pungens	0	10
	antelope bitterbrush	Purshia tridentata	0	10
	desert gooseberry	Ribes velutinum	0	10
	spineless horsebrush	Tetradymia canescens	0	10

Plant Species Composition (Lbs/Acre)				
16: Dominant evergreen trees			30	50
	western juniper	Juniperus occidentalis	30	50

Plant Growth Curve											
Growth Curve Name B10A Mesic, Mid Elev., N/A, Good Condition											
Growth Curve Description RPC Growth Curve (Pumice Flats)											
Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
0%	0%	2%	10%	58%	28%	2%	0%	0%	0%	0%	0%

R010XA027OR — JUNIPER PUMICE FLAT 8-10 PZ: Reference Plant Community

Plant Community Description

The potential native plant community is dominated by an open stand of juniper. The understory is composed of two distinct communities in complex with each other. Under the trees and within influence of the crown is an Idaho fescue dominated ground layer. The interspaces between the trees (openings) are dominated by mountain and basin big sagebrush, needle and thread, and several other minor species such as Indian ricegrass, western needlegrass, and Thurber's needlegrass. Vegetative composition is approximately 75% grasses, 5% forbs, and 20% shrubs/trees.

Plant Community Tables

Annual Production (Lbs/Acre)			
Grass/Grasslike	450	600	750
Forb	30	40	50
Shrub/Vine	90	120	150
Tree	30	40	50
Totals	**600**	**800**	**1,000**

Plant Species Composition (Lbs/Acre)				
1: Perennial, bunch-grass, deep-rooted			240	400
	needle and thread	Hesperostipa comata	240	400
2: Perennial, bunch-grass, deep-rooted			60	100
	Idaho fescue	Festuca idahoensis	60	100
3: Perennial, bunch-grass, deep-rooted			90	150
	Indian ricegrass	Achnatherum hymenoides	30	50
	western needlegrass	Achnatherum occidentale ssp. occidentale	30	50
	Thurber's needlegrass	Achnatherum thurberianum	30	50

Plant Species Composition (Lbs/Acre)				
4: Perennial, bunch-grass, deep-rooted			54	90
	Ross' sedge	Carex rossii	12	20
	squirreltail	Elymus elymoides	6	10
	thickspike wheatgrass	Elymus lanceolatus	18	30
	prairie Junegrass	Koeleria macrantha	12	20
	bluebunch wheatgrass	Pseudoroegneria spicata	6	10

Plant Species Composition (Lbs/Acre)				
9: Other perennial forbs			30	50
	common yarrow	Achillea millefolium	0	5
	pussytoes	Antennaria	0	5
	larkspur	Delphinium	0	5
	fleabane	Erigeron	0	5
	buckwheat	Eriogonum	0	5
	starlily	Leucocrinum	0	5
	lupine	Lupinus	0	5
	phacelia	Phacelia	0	5
	spreading phlox	Phlox diffusa	0	5

Plant Species Composition (Lbs/Acre)				
11: Dominant evergreen shrubs			42	70
	basin big sagebrush	Artemisia tridentata ssp. tridentata	21	70
	mountain big sagebrush	Artemisia tridentata ssp. vaseyana	21	70
12: Sub-dominant evergreen shrubs			30	50
	spiny hopsage	Grayia spinosa	30	50

Plant Species Composition (Lbs/Acre)				
15: Other shrubs			18	30
	rubber rabbitbrush	Ericameria nauseosa	0	10
	granite prickly phlox	Linanthus pungens	0	10
	antelope bitterbrush	Purshia tridentata	0	10
	desert gooseberry	Ribes velutinum	0	10
	spineless horsebrush	Tetradymia canescens	0	10

Plant Species Composition (Lbs/Acre)				
16: Dominant evergreen trees			30	50
	western juniper	Juniperus occidentalis	30	50

Plant Growth Curve											
Growth Curve Name B10A Mesic, Mid Elev., N/A, Good Condition											
Growth Curve Description RPC Growth Curve (Pumice Flats)											
Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
0%	0%	2%	10%	58%	28%	2%	0%	0%	0%	0%	0%

R010XA021OR — JUNIPER SHALLOW PUMICE HILLS 10-12 PZ: Historic Climax Plant Community

Plant Community Description

The potential native plant community is dominated by western juniper, mountain big sagebrush, and Idaho fescue. Thurber needlegrass, thickspike wheatgrass, western needlegrass, and Ross sedge are common in the stand. Vegetative composition is approximately 75% grasses, 5% forbs, and 20% shrubs/trees.

Plant Community Tables

Annual Production (Lbs/Acre)			
Grass/Grasslike	464	552	640
Forb	8	28	48
Shrub/Vine	64	116	168
Tree	80	100	120
Totals	**616**	**796**	**976**

Plant Species Composition (Lbs/Acre)				
			Annual Production Pounds Per Acre	
				High
1: Dominant deep rooted perennial grasses			400	480
	Idaho fescue	Festuca idahoensis	400	480
2: Sub-dominant deep rooted perennial grasses			56	120
	Indian ricegrass	Achnatherum hymenoides	8	16
	western needlegrass	Achnatherum occidentale	8	16
	Thurber's needlegrass	Achnatherum thurberianum	16	40
	Ross' sedge	Carex rossii	8	16
	squirreltail	Elymus elymoides	8	16
	tufted wheatgrass	Elymus macrourus	8	16
4: Sub-dominant shallow rooted perennial grasses			8	40
	prairie Junegrass	Koeleria macrantha	8	40

Plant Species Composition (Lbs/Acre)				
9: Other perennial forbs			8	48
	common yarrow	Achillea millefolium	0	5
	pussytoes	Antennaria	0	5
	fleabane	Erigeron	0	5
	buckwheat	Eriogonum	0	5
	common starlily	Leucocrinum montanum	0	5
	desertparsley	Lomatium	0	5
	lupine	Lupinus	0	5
	phacelia	Phacelia	0	5
	spreading phlox	Phlox diffusa	0	5

Plant Species Composition (Lbs/Acre)				
11: Dominant evergreen shrubs			40	120
	mountain big sagebrush	Artemisia tridentata ssp. vaseyana	40	120
12: Sub-dominant evergreen shrubs			24	48
	rubber rabbitbrush	Ericameria nauseosa	8	16
	green rabbitbrush	Ericameria teretifolia	8	16
	granite prickly phlox	Linanthus pungens	8	16

Plant Species Composition (Lbs/Acre)				
16: Dominant evergreen trees			80	120
	western juniper	Juniperus occidentalis	80	120

Plant Growth Curve											
Growth Curve Name B10A Shallow Pumice RPC											
Growth Curve Description Shallow Pumice RPC Growth Curve											
Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
0%	0%	5%	20%	50%	20%	5%	0%	0%	0%	0%	0%

R023XY508OR — PUMICE FLAT 10-12 PZ: Reference Plant Community

Plant Community Description

The reference native plant community is dominated by big sagebrush and western needlegrass. Ross sedge, squirreltail, buckwheat, and green rabbitbrush are also common in the stand.

Vegetative composition is approximately 65% grasses, 5% forbs, and 30% shrubs.

Plant Community Tables

Annual Production (Lbs/Acre)			
Grass/Grasslike	260	325	390
Forb	20	25	30
Shrub/Vine	120	150	180
Totals	**400**	**500**	**600**

Plant Species Composition (Lbs/Acre)				
			Annual Production Pounds Per Acre	
				High
1: Perennial, bunch grass, deep-rooted			150	250
	western needlegrass	Achnatherum occidentale ssp. occidentale	150	250
2: Upland sedge			50	75
	Ross' sedge	Carex rossii	50	75
3: Perennial, bunch-grass, moderately deep-rooted			25	50
	Thurber's needlegrass	Achnatherum thurberianum	10	25
	squirreltail	Elymus elymoides	25	35
4: Perennial, rhizomatous			5	10
	thickspike wheatgrass	Elymus lanceolatus	5	10

Plant Species Composition (Lbs/Acre)				
8: Other perennial grasses			5	10
	sedge	Carex	0	5
	Idaho fescue	Festuca idahoensis	0	5
	prairie Junegrass	Koeleria macrantha	0	5
	mat muhly	Muhlenbergia richardsonis	0	5

Plant Species Composition (Lbs/Acre)				
			Annual Production Pounds Per Acre	
				High
10: Perennial forb			5	10
	buckwheat	Eriogonum	5	10
15: Other perennial forbs			5	10
	common yarrow	Achillea millefolium	0	5
	western pearly everlasting	Anaphalis margaritacea	0	5
	pussytoes	Antennaria	0	5
	rockcress	Arabis	0	5
	woollypod milkvetch	Astragalus purshii	0	5
	Indian paintbrush	Castilleja	0	5
	fleabane	Erigeron	0	5
	starlily	Leucocrinum	0	5
	Lewis flax	Linum lewisii	0	5
	lupine	Lupinus	0	5

Plant Species Composition (Lbs/Acre)				
20: Evergreen			100	125
	mountain big sagebrush	Artemisia tridentata ssp. vaseyana	100	125
21: Evergreen			20	30
	yellow rabbitbrush	Chrysothamnus viscidiflorus	20	30
22: Sub-shrub			0	5
	granite prickly phlox	Linanthus pungens	0	5

Structure of Canopy Cover								
Height Above Ground	Grass / Grasslike		Forbs		Shrubs / Vines		Trees	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
<= 0.5 feet	—	—	—	—	—	2%	—	—
> 0.5 - < 1 feet	5%	10%	—	2%	—	—	—	—
> 1 - <= 2 feet	30%	35%	—	3%	—	—	—	—
> 2 - <= 4.5 feet	—	—	—	—	10%	15%	—	—
> 4.5 - <= 13 feet	—	—	—	—	—	—	—	—
> 13 - <= 40 feet	—	—	—	—	—	—	—	—
> 40 - <= 80 feet	—	—	—	—	—	—	—	—
> 80 - <= 120 feet	—	—	—	—	—	—	—	—
> 120 feet	—	—	—	—	—	—	—	—