USDA Natural Resources Conservation Service

Ecological site R003XY015OR
Meadow Fen 40-60 PZ

Last updated: 5/10/2024
Accessed: 05/11/2024

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Associated sites

R003XY017OR	**Sphagnum Fen 40-60 PZ** Occur in association and in complexes with this site.

Similar sites

R003XY018OR	**Woodland Fen 40-60 PZ** Similar site in small forest openings near or on stream terraces or around springs.
R003XY017OR	**Sphagnum Fen 40-60 PZ** Sedge dominated site that also has high amounts of boggy organic material.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

These mostly herbaceous sites occur on terraces along perennial streams or at edges of Sphagnum Fen site (R003XY017OR). Shasta Red Fir or Lodgepole Pine can pioneer in the site from downed woody material (wind throw). They are often found at the intersection of newer, volcanic material and older, glaciated deposits. There is significant spring activity where these two materials are exposed.

Table 2. Representative physiographic features

Landforms	(1) Fen (2) Flood plain (3) Terrace
Aspect	Aspect is not a significant factor

Climatic features

Precipitation comes mostly as snow. Winters are snowy and very cold; summers are cool and dry. Summer thunderstorms sometimes occur, providing small amounts of growing season precipitation.

Table 3. Representative climatic features

Frost-free period (average)	45 days
Freeze-free period (average)	90 days
Precipitation total (average)	1,524 mm

Influencing water features

The site frequently occurs adjacent to springs and bogs in openings within forested areas and adjacent to streams where newer volcanic material rests on older glacial bedrock.

Soil features

This site can have relatively deep accumulations of rubbed fibers and mucky peat soils, sometimes with a layer of ashy sand in the subsoil.

This site is influenced by a fluctuating water table, varying degrees of anaerobic conditions, and generally thick surfaced organic soils (from 35 to over 70 inches to mineral soil). These are characterized by high water tables, peaty organic matter accumulation, and low nutrient availability. The nutrient supply to fens comes primarily from precipitation, surface, and groundwater whereas the nutrient supply for bogs is from precipitation only (Aerts, 1999, Johnson et. al, 1995, Radforth and Brawner, 1977).

Increases in stability of both surface and subsurface samples reflect increased soil erosion resistance and resilience. Surface stability is correlated with current erosion resistance, while subsurface stability is correlated with resistance following soil disturbance. Sites with average values of 5.5 or above generally are very resistant to erosion, particularly if there is little bare ground and there are few large gaps. Maximum possible soil stability values may be less than 6 for very coarse sandy soils. High values usually reflect good hydrologic function. This is because stable soils are less likely to disperse and clog soil pores during rainstorms. High stability values also are strongly correlated with soil biotic integrity. Soil organisms make the “glue” that holds soil particles together. In most ecosystems, soil stability values decline first in areas without cover (Veg = NC). In more highly degraded systems, Veg = Canopy values also decline.

The following soil aggregate stability results are typical of the reference plant community. Soil aggregates are tightly bound - all areas are covered with perennial vegetation.

Type location Average Stability:
All samples taken = 6.0

Protected samples = 6.0
Unprotected samples = N/A

Type location Average Stability by Vegetation Class:
No cover = N/A
Grass/Grasslikes = 6.0
Forbs = 6.0
Shtubs = N/A
Trees = N/A

Ecological dynamics

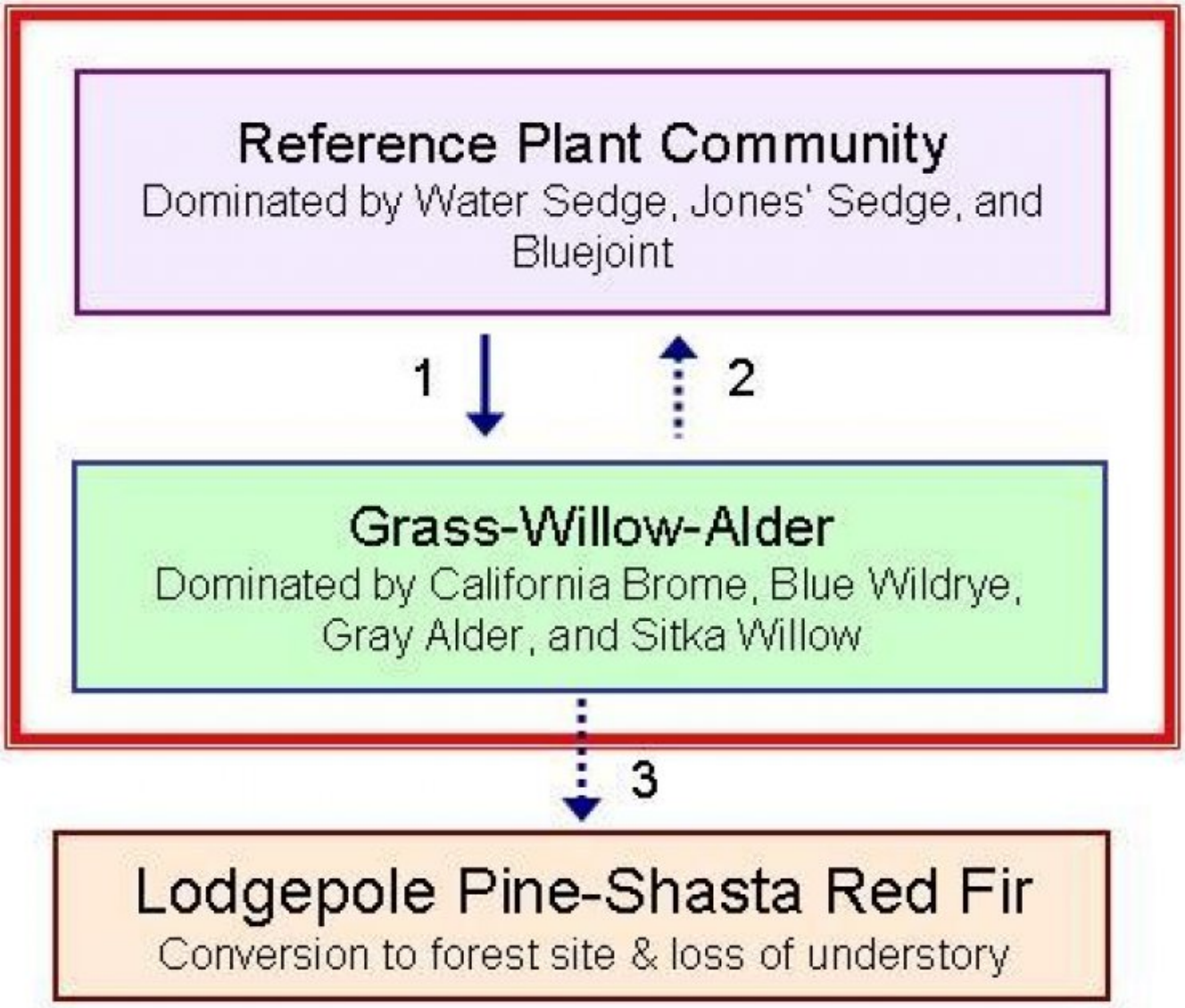
The site regularly has a sparse canopy of Lodgepole Pine (at least at the edges of the site). It appears on the landscape: 1) in association with the Sphagnum Fen ecological site toward the wetter end and Lodgepole Pine (*Pinus contorta*) / Shasta Red Fir (Abies shastensis) forests on the surrounding drier soils and 2) along perennial streams and springs at the intersection of older glaciated igneous material overlain with newer volcanic ashflow materials.

Historic fires and seasonal ponding may keep the Lodgepole Pine and Shasta Red Fir in check. Many small trees can appear on the site but investigations showed that many of the older trees were in the 80-100 year old range in the "Bog" areas and much less than that in the riparian areas suggesting an occasional purge of conifers from the wet areas from a relatively hot fire. Fire frequency is probably the same as for the surrounding forest sites. Fire suppression efforts since 1900 have possibly decreased the extent of this site as woody species have increased canopy cover and decreased cover of grasses and sedges.

The site appears to be important wildlife habitat providing both cover and food; Elk feed on this site extensively in the summer months. It is the most productive of rangeland sites in the park with a range of production estimated from 7500 to 9500 pounds per acre per year of air-dry vegetation.

This fen site displays 2 distinct plant communities within the reference plant community state. Studies have shown that organic matter accumulation (by increased litter on the surface as well as windthrown trees) affects the characteristic plant community. Brock (1988, in Door et. Al., 2000) suggested that peat hummocks accumulate on top of the organic soil surface in the absence of fire; fires in dry, hot years would consume the hummocks and leave the saturated organic soil surface. A peat accumulation of 4 to 6 inches will allow grasses and sedges to root above permanently saturated layers. Accumulations of peat greater than 6 inches will allow colonization of Blueberry, Alder, and Willows. Lodgepole Pine can grow on peat hummock accumulations of 16 inches or more. There is also some evidence that conifer litter has an allelopathic effect on mosses (mosses are killed by the accumulation or decomposition of the litter).

State and transition model



R003XY015OR: MEADOW FEN 40-60 PZ

1. Decreased water table or flow from springs and long-term lack of fire
2. Fire, increase in water table (rise in streambed elevation?)
3. Long-term lack of fire (lowering of streambed elevation?, climate change?)

State 1
Reference State

Community 1.1
Sedge-Grass

The Meadow Fen site is found along perennial streams and the edges of the wetter fen sites (such as Sphagnum Fen 40-60 PZ - R003XY017OR). It is dominated with a lush stand of Water Sedge (*Carex aquatilis*) and lesser amounts of Jones' Sedge (*Carex jonesii*), Bluejoint Reedgrass (Calomagrostis canadensis) and Arrowleaf Ragwort (*Senecio triangularis*). Increases in the proportion of canopy gaps are related to increased risk of wind erosion and invasive “weed” species establishment. For example, wind velocities in most areas of the western United States are capable of moving disturbed soil in 20-in gaps in grasslands. Disturbed soil in gaps 3-6 ft in diameter is nearly as susceptible to erosion as that with no vegetation. Minimum gap size required to cause wind erosion increases with vegetation height. Increases in the proportion of the line covered by large basal gaps reflect increased susceptibility to water erosion and runoff. Plant bases slow water movement down slopes. As basal gaps increase, there are fewer obstacles to water flow, so runoff and erosion increase. Increases in large basal gaps have a greater effect where rock and litter cover are low, because they are the only obstacles to water flow and erosion. The following canopy and basal gaps are typical of the reference plant community. High plant density and diversity of the plant community limits the kinds and amounts of canopy and basal gaps. Only a small percent of the area will have small basal gaps; there should be no other canopy or basal gaps present. Type Location Canopy Gaps (%): 1.0-2.0 ft. = 0 2.1-3.0 ft. = 0 3.1-6.0 ft. = 0 > 6.0 ft. = 0 Type Location Basal Gaps (%): 1.0-2.0 ft. = 5.7 2.1-3.0 ft. = 0 3.1-6.0 ft. = 0 > 6.0 ft. = 0

Table 4. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	3363	6165	8967
Forb	1457	1569	1681
Total	**4820**	**7734**	**10648**

Table 5. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	1-5%
Grass/grasslike foliar cover	80-95%
Forb foliar cover	15-25%
Non-vascular plants	5-10%
Biological crusts	0%
Litter	65-85%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0-1%
Bare ground	0-1%

Table 6. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	10-20%	5-10%
>0.15 <= 0.3	–	–	20-30%	5-10%
>0.3 <= 0.6	–	1-2%	20-40%	1-3%
>0.6 <= 1.4	0-1%	1-2%	10-20%	1-3%
>1.4 <= 4	0-1%	0-1%	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 5. Plant community growth curve (percent production by month). OR1255, A3 Meadow Fen. 015 - Use for both reference plant communities.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	15	25	30	15	5	5	0	0

Community 1.2
Grass-Willow-Alder

This plant comunity phase of the Meadow Fen site is found along perennial streams and terraces adjacent to Western Hemlock and/or Shasta Red Fir forest sites. It is dominated with California Bromegrass (*Bromus carinatus*),Bluejoint Reedgrass (Calomagrostis canadensis), Gray Alder (*Alnus incana*), and Sitka Willow (*Salix sitchensis*). Canopy and basal gaps are similar to reference plant community #1.

Table 7. Ground cover

Tree foliar cover	5-15%
Shrub/vine/liana foliar cover	5-10%
Grass/grasslike foliar cover	80-90%
Forb foliar cover	15-25%
Non-vascular plants	5-10%
Biological crusts	0%
Litter	60-80%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0-1%
Bare ground	0-1%

Table 8. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	0-1%	0-1%	20-30%	10-15%
>0.15 <= 0.3	0-1%	1-2%	30-40%	5-10%
>0.3 <= 0.6	1-3%	2-3%	20-50%	1-5%
>0.6 <= 1.4	2-5%	–	–	–
>1.4 <= 4	1-3%	–	–	–
>4 <= 12	1-3%	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 6. Plant community growth curve (percent production by month). OR1255, A3 Meadow Fen. 015 - Use for both reference plant communities.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	15	25	30	15	5	5	0	0

Pathway 1.1a
Community 1.1 to 1.2

Decreased water table or flow from springs and long term lack of fire

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant deep-rooted Perennial Grasses and Sedges**			3363–8967	
	water sedge	CAAQ	*Carex aquatilis*	1681–7286	–
	bluejoint	CACA4	*Calamagrostis canadensis*	897–2242	–
	Jones' sedge	CAJO	*Carex jonesii*	336–1681	–
	swordleaf rush	JUEN	*Juncus ensifolius*	112–448	–
	fowl mannagrass	GLST	*Glyceria striata*	168–336	–
	woodrush sedge	CALU7	*Carex luzulina*	224–336	–
	blue wildrye	ELGL	*Elymus glaucus*	56–168	–
	pullup muhly	MUFI2	*Muhlenbergia filiformis*	56–168	–
	Idaho bentgrass	AGID	*Agrostis idahoensis*	56–168	–
Forb					
2	**Dominant Perennial forbs**			1457–1681	
	arrowleaf ragwort	SETR	*Senecio triangularis*	224–1121	–
	purple marshlocks	COPA28	*Comarum palustre*	84–196	–
	fringed willowherb	EPCIG	*Epilobium ciliatum ssp. glandulosum*	56–112	–
	field horsetail	EQAR	*Equisetum arvense*	56–112	–
	Columbian monkshood	ACCO4	*Aconitum columbianum*	56–112	–
	American bistort	POBI6	*Polygonum bistortoides*	34–101	–
	Gray's licorice-root	LIGR	*Ligusticum grayi*	34–101	–
	broadleaf lupine	LULAL3	*Lupinus latifolius ssp. latifolius*	11–84	–
	muskflower	MIMO3	*Mimulus moschatus*	11–84	–
	fivestamen miterwort	MIPE	*Mitella pentandra*	11–84	–
	fragrant bedstraw	GATR3	*Galium triflorum*	11–84	–
	largeleaf avens	GEMA4	*Geum macrophyllum*	11–84	–
	common cowparsnip	HEMA80	*Heracleum maximum*	11–84	–
	bugle hedgenettle	STAJ	*Stachys ajugoides*	11–84	–
	popular buttercup	RAPO	*Ranunculus populago*	11–56	–
	longstalk clover	TRLO	*Trifolium longipes*	6–17	–
	pioneer violet	VIGL	*Viola glabella*	6–17	–

Animal community

The subalpine fens and meadows also provide excellent forage availability and quality. The fens in the woodlands and along streams have significant amounts of Water Sedge (*Carex aquatilis*), Bluejoint Reedgrass (Calomagrostis canadensis), Tufted Hairgrass (Deschampsia caespitosa), and Pull-up Muhly (Muhlenbergia filiformis) that provide from 3000 to 7000 pounds of forage per acre per year. These sites are lightly to moderately used by Rocky Mountain Elk. Evidence of grazing can be seen in the summer at the fens at the head of National Creek and in the Sphagnum Bog areas. Current numbers of grazing animals do not seem to have a deleterious effect on plant community composition or structure but they do have a role in removing growing vegetation and a subsequent effect on fire frequency and nutrient availability.

Fens and riparian areas furnish important and diverse wildlife habitat. Perennial riparian areas are or have the potential of being dominated by shrubs. Healthy riparian areas have vigorous complex communities of shrubs,

forbs, grass and grass-like plants. They provide a buffer during periods of high flows, connectivity to the floodplain and contribute to good in-stream aquatic habitat. The potential for improvement of riparian habitat is excellent through proper management of existing riparian vegetation. Riparian vegetative recovery time is relatively short due to the presence of perennial and/or shallow water tables. In areas of severe channel alteration and degradation longer periods of time with additional inputs are required. Recovery time will be dependent on the progression of channel evolution.

Hydrological functions

These sites are frequently associated with seeps and springs that are exposed contact points between older glaciated materials and newer volcanic materials (pyroclastic flows over bedrock.

Wood products

None

Type locality

Location 1: Klamath County, OR	
Township/Range/Section	T31S R6E S29
UTM zone	N
UTM northing	568923
UTM easting	4745903
General legal description	On Annie Creek at bottom of trail, then downstream about 1/4 mile to large clearing.

Other references

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Johnson, D. ET. Al, 1995. Plants of the Western Boreal Forest and Aspen Parkland. Lone Pine Publishing and the Canadian Forest Service. 392p.

Klepadlo, S. and W. Campbell, eds., 1998. A Checklist of Vascular Plants of Crater Lake National Park. Crater Lake Natural History Association

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Contributors

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Approval

Kirt Walstad, 5/10/2024

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	05/11/2024
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

17. **Perennial plant reproductive capability:**