Institute for Natural Resources

To:	Jon Jinings
From:	Theresa Burcsu
cc:	Jamie Damon
Date:	December 2, 2015
Subject:	Baseline Developed Land Area for LCDC Rule OAR 660-023-0115 and LCDC Meeting December 3, 2015

The SageCon Partnership has drafted baseline values of developed land area and percentages in Oregon PACs (Priority Conservation Areas). Contributors to this iteration of the analysis were staff from the Institute for Natural Resources. Past contributors include, Harney County GIS, Baker County Planning, The Nature Conservancy, and ODFW. Past reviewers include county planning departments (Malheur, Lake, Deschutes, Union, and Crook), and others.

Review data is available for download at ftp://131.252.97.79/Transfer/SageCon/outgoing/Counties/. A GIS data orientation webinar was given on Monday November 16 at 12:30 PM. The webinar was recorded and posted at the above FTP location for those who could not join the live meeting.

Changes since the last draft baseline (November 13, 2015) include:

- Removal of the information for joining the GIS data orientation webinar
- Table 5 was removed as it was not directly related to the baseline calculations. It described the amount of private land without a protected land status as defined in the Protected Areas Database for the United States (produced by the U.S. Geological Survey Gap Analysis Program (GAP))

Changes made for the November 13, 2015 memo:

- Using the same data for all counties. In the previous version, SageCon data in Harney County was replaced with GIS data provided by Harney County.
- Roads data has been replaced with roads identified as “disturbance cap” roads identified by BLM. Disturbance cap roads are BLM inventory roads that fall into maintenance levels 3, 4, and 5; county roads that have similar maintenance levels as BLM inventory roads, and highway road types. BLM worked with county engineers and GIS personnel to identify county roads for the disturbance cap. All features were buffered based on the road type by BLM and delivered as polygon data to INR.
- GIS databases have been reorganized to enhance user experience and improve reviewer tracking of GIS processing used to prepare data for the draft baseline calculation

The baseline values address direct impacts or “footprints” of development only. The calculations were carried out using, as guidance, BLM’s relationship between 18 threats to sage-grouse and habitat disturbance measures for monitoring and disturbance calculations (please see Table 1) and BLM Direct Area of Influence definitions included in Table 6 of the BLM GSG Monitoring Framework (May 30, 2014; please see Table 2). The BLM Direct Area of Influence is a concept that refers to direct impacts or “footprints” of development. The concept does not address the indirect impacts of development. BLM

used this concept to identify standards for use in spatial data (GIS) analysis of specific habitat degradation (development) types for broad to mid-spatial scales.

Baseline development direct area of influence or "footprints" were generated in ArcGIS 10.3 using spatial data for the development types listed in Table 6 of the BLM Monitoring Framework (see Table 1) in ArcGIS 10.3. Data sources and direct areas of influence used in the baseline calculations are identified in Table 3.

For all PACs, baseline calculations were developed using spatial data from a variety of sources and producers. Energy facilities were sourced from Ventyx and verified visually over NAIP imagery. No Ventyx energy facilities were located within any of the current PACs and were not included in the calculations presented here. "Other vertical structures" were included in the analysis per BLM's recommendations for monitoring and disturbance calculations (please see Table 1). Roads data were developed by BLM and the process used by BLM was reviewed by GIS and wildlife experts as reported in the final report of the Roads Group (aka "Roadies Group").

Mining activity, or more specifically, aggregate sites inventoried by Oregon Department of Transportation, were captured using aerial imagery interpretation to draw (digitize) areas where vegetation was visibly disturbed or developed at the 1:5,000 viewing scale; adjacent undisturbed areas were excluded. The digitized layer for mining, or locatable mines, has undergone review and revisions were made based on the comments submitted. Revisions included omitting erroneous polygons and more precisely capturing (digitize) mining activities recorded in the ODOT mining layer. Oregon Department of Geology and Mineral Industries (DOGAMI) Mineral Land Regulation and Reclamation (MLRR) permitted site features were acquired from DOGAMI but not used in the calculations. Twenty-four of the DOGAMI permitted site features occurred in PACs. Of these, 17 were captured by the ODOT aggregate site polygons. Of the remaining permits, 2 were undeveloped, 1 had a recorded disturbed area of 4.6 acres, and the remaining 4 permitted sites (120.2 acres total; 30.05 acres mean size) were visible in the World Imagery provided by ArcGIS online (accessed November 30, 2015) and did not overlap other features used in the baseline calculations. BLM has begun to examine its mining permits but estimates that the total disturbance of these sites will be small. For this memo, only locatable mines larger than 5 acres in size and georeferenced with a known ODOT aggregate site point were considered.

Where development type footprints overlapped, the data layers were processed so that any land area was only counted once in the calculations.

The results of the calculations and the potential for existing development in each PAC are listed in Table 4. Results in this table differ moderately from the draft developed land area values distributed to the SageCon Policy Focus Group in December 2014. The main reasons for the differences were: (i) refinements to the mining layer, (ii) differences in the road set used for the iteration presented here, and (iii) omission of digitized polygons incorrectly identified as development in the previous draft database. The values in Table 4 do not differ from the values distributed to county commissioners and planning directors on November 18, 2015.

Table 1. Relationship between the 18 threats and the three habitat disturbance measures for monitoring and disturbance calculations (Table 1-1 in ORGRSG Appendix I. Disturbance Cap Calculation Model (2015))

USFWS Listing Decision Threat	Sagebrush Availability	Habitat Degradation	Energy and Mining Density
Agriculture	X		
Urbanization	X		
Wildfire	X		
Conifer encroachment	X		
Treatments	X		
Invasive Species	X		
Energy (oil and gas wells and development facilities)		X	X
Energy (coal mines)		X	X
Energy (wind towers)		X	X
Energy (solar fields)		X	X
Energy (geothermal)		X	X
Mining (active locatable, leasable, and saleable developments)		X	X
Infrastructure (roads)		X	
Infrastructure (railroads)		X	
Infrastructure (power lines)		X	
Infrastructure (communication towers)		X	
Infrastructure (other vertical structures)		X	
Other developed rights-of-way		X	

Table 2. BLM included this table as Table 6 in the Final Greater Sage-Grouse Monitoring Framework (2014) to describe geospatial data sources and standards for examining habitat degradation at the broad spatial scale. The "Area Source" column found in the original BLM documentation has been removed to simplify the table.

Degradation Type	Subcategory	Data Source	Direct Area of Influence
Energy (oil & gas)	Wells	IHS; BLM (AFMSS)	5.0 ac (2.0 ha)
	Power Plants (power plants)	Platts	5.0 ac (2.0 ha)
Energy (coal)	Mines	BLM; USFS; Office of Surface Mining Reclamation and Enforcement; USGS Mineral Resources Data System	Polygon area (digitized)
	Power Plants (power plants)	Platts	Polygon area (digitized)
Energy (wind)	Wind Turbines	Federal Aviation Administration	3.0 ac (1.2 ha)
	Power Plants (power plants)	Platts	3.0 ac (1.2 ha)
Energy (solar)	Fields/Power Plants	Platts (power plants)	7.3 ac (3.0 ha) per MW
Energy (geothermal)	Wells	IHS	3.0 ac (1.2 ha)
	Power Plants (power plants)	Platts	Polygon area (digitized)
Mining	Locatable Developments	InfoMine	Polygon area (digitized)
Infrastructure (roads)	Surface Streets (Minor Roads)	Esri StreetMap Premium	40.7 ft (12.4 m)
	Major Roads	Esri StreetMap Premium	84.0 ft (25.6 m)
	Interstate Highways	Esri StreetMap Premium	240.2 ft (73.2 m)
Infrastructure (railroads)	Active Lines	Federal Railroad Administration	30.8 ft (9.4 m)
Infrastructure (power lines)	1-199kV Lines	Platts (transmission lines)	100 ft (30.5 m)
	200-399 kV Lines	Platts (transmission lines)	150 ft (45.7 m)
	400-699kV Lines	Platts (transmission lines)	200 ft (61.0 m)
	700+kV Lines	Platts (transmission lines)	250 ft (76.2 m)
Infrastructure (communication)	Towers	Federal Communications Commission	2.5 ac (1.0 ha)

Table 3. Development types and data sources used to calculate the existing development footprint for the PACs.

Development Type		Data Source	Direct Area of Influence
Main Type	**Subcategory**		
Energy (oil & gas)	Wells	Not used	5.0 ac (2.0 ha)
	Power plants	Not used	5.0 ac (2.0 ha)
Energy (coal)	Mines	Not used	5.0 ac (2.0 ha)
	Power plants	Ventyx[1, 2]	5.0 ac (2.0 ha)
Energy (wind)	Wind turbines	Federal Aviation Administration Wind Turbines[3]	3 ac (1.2 ha)
	Power plants	Ventyx[1, 2]	3 ac (1.2 ha)
Energy (solar)	Fields/power plants	Ventyx[1, 2]	7.3 ac (3.0 ha) per MW
Energy (geothermal)	Wells	DoGAMI[4]	3 ac (1.2 ha)
	Power plants	Ventyx[1, 2]	polygons or 3 ac (1.2 ha) buffered points
Mining	Locatable sites	ODOT Aggregate Sites[5]	polygon
Infrastructure (roads)	Surface streets	BLM GTRN; highway lines[6]	40.7 ft (12.4 m)
	Major roads	BLM GTRN; highway lines[6]	84 ft (25.6 m)
	Interstate highways	BLM GTRN; highway lines[6]	240.2 ft (73.2 m)
Infrastructure (railroads)	Active Lines	Federal Railroad Administration[3]	30.8 ft (9.4 m)
Infrastructure (power lines)	1-199kV Lines	Platts 2013 (transmission lines)	100 ft (30.5 m)
	200-399kV Lines	Platts 2013 (transmission lines)	150 ft (45.7 m)
	400-699kV Lines	Platts 2013 (transmission lines)	200 ft (61.0 m)
	700+kV Lines	Platts 2013 (transmission lines)	250 ft (76.2 m)
	Misc. electric lines of unknown voltage	Oregon Department of Forestry	175 ft[ǂ] (53.3 m)
Infrastructure (communication)	Towers	Federal Communications Commission Communication Towers[3]	2.5 ac (1.0 ha)
Infrastructure (other vertical structures)	Other vertical structures	Federal Aviation Administration Other Vertical Structures[3]	2.5 ac (1.0 ha)

[1] no features in project area
[2] Ventyx Electric Power Plants EV Energy Layer and Electric Generating Units EV Energy Layer
[3] buffered by BLM National Operations Center and provided to SageCon
[4] Mineral Land Regulation and Reclamation Geothermal Information Layer
[5] ODOT Aggregate Material Sources
[6] Compiled from BLM OR GTRN PUB Roads Line, BLM OR Oregon and Washington Highways Line (highways_arc). GTRN roads contain an attribute for maintenance level that is carried over from the BLM FAMS database. Maintenance levels 3, 4, and 5 were used to classify road lines into a new GTRN binary attribute called "Disturbance_cap" that indicates if a road counts against the BLM disturbance cap. BLM worked with counties to classify county roads using criteria to match the BLM maintenance levels as closely as possible. The "highways_arc" dataset is published by BLM. The source for the data features in the highways_arc dataset is the ODOT centerline dataset.
[ǂ] average of all transmission line widths

Table 4. Total existing developed land area and percentage for each PAC.

Core Area/PAC	County(ies)	PAC Size (acres)	Existing Develop. (acres)	Existing Develop. (percentage)
Baker	Baker, Union	336,415	3,188	0.95%
Beatys	Lake, Harney	841,398	1,262	0.15%
Brothers/N Wagontire	Crook, Deschutes, Lake	293,344	1,682	0.57%
Bully Creek	Malheur	279,723	572	0.20%
Burns	Harney	35,756	36	0.10%
Cow Lakes	Malheur	249,705	804	0.32%
Cow Valley	Baker, Malheur	368,442	1,697	0.46%
Crowley	Harney, Malheur	490,890	1,963	0.40%
Drewsey	Harney, Malheur	368,560	1,258	0.34%
Dry Valley/Jack Mountain	Harney	449,423	1,216	0.27%
Folly Farm/Saddle Butte	Harney, Malheur	251,574	401	0.16%
Louse Canyon	Malheur	672,453	833	0.12%
Paulina/12 Mile/Misery Flat	Crook, Deschutes, Harney, Lake	441,745	1,101	0.25%
Picture Rock	Lake	42,588	440	1.03%
Pueblos/S Steens	Harney	208,940	545	0.26%
Soldier Creek	Malheur	295,486	390	0.13%
Steens	Harney	185,773	729	0.39%
Trout Creeks	Harney, Malheur	393,822	1,191	0.30%
Tucker Hill	Lake	31,545	78	0.25%
Warners	Harney, Lake	330,249	2,126	0.64%