
Appendix I

Disturbance Cap Calculation Method

APPENDIX I

DISTURBANCE CAP CALCULATION METHOD

In the USFWS's 2010 listing decision for sage-grouse (75 FR 13910 2010), the USFWS identified 18 threats contributing to the destruction, modification, or curtailment of the sage-grouse's habitat or range. The 18 threats have been aggregated into three measures (**Table I-1**):

- Sagebrush Availability (percent of sagebrush per unit area)
- Habitat Degradation (percent of human activity per unit area)
- Density of Energy and Mining (facilities and locations per unit area)

Habitat Degradation and Density of Energy and Mining will be evaluated under the Disturbance Cap and Density Cap, respectively, and are further described in this appendix. The three measures, in conjunction with other information, will be considered during the NEPA process for projects authorized or undertaken by the BLM.

DISTURBANCE CAP

This land use plan has incorporated a 3% disturbance cap within Greater Sage-Grouse (GRSG) Priority Habitat Management Areas (PHMAs) and the subsequent land use planning actions if the cap is met:

*If the 3% anthropogenic disturbance cap is exceeded, not to exceed 1% per decade, on lands (regardless of land ownership) within GRSG Priority Habitat Management Areas (PHMA) in any given **Oregon PAC**, then no further discrete anthropogenic disturbances (subject to applicable laws and regulations, such as the General Mining Law of 1872, as amended, valid existing rights, etc.) will be permitted by BLM within GRSG PHMAs in any given Oregon PAC until the disturbance has been reduced to less than the cap.*

If the 3% disturbance cap, not to exceed 1% per decade, is exceeded on all lands (regardless of land ownership) within a **proposed project analysis area** in a PHMA, then no further anthropogenic disturbance will be permitted by BLM until disturbance in the proposed project analysis area has been reduced to maintain the area under the cap (subject to applicable laws and regulations, such as the General Mining Law of 1872, as amended, valid existing rights, etc.).

Table I-1
Relationship Between the 18 Threats and the Three Habitat Disturbance Measures for Monitoring and Disturbance Calculations

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	

The disturbance cap applies to the PHMA within both Oregon Priority Areas for Conservation (Oregon PACs) and at the project authorization scale. For the Oregon PACs, west-wide habitat degradation (disturbance) data layers (**Table I-2**) will be used at a minimum to calculate the amount of disturbance and to determine if the disturbance cap has been exceeded as the land use plans (LUP) are being implemented. Locally collected disturbance data will be used to determine if the disturbance cap has been exceeded for project authorizations, and may also be used to calculate the amount of disturbance in the Oregon PACs. Although locatable mine sites are included in the degradation calculation,

Table I-2
Anthropogenic Disturbance Types for Disturbance Calculations
Data Sources are Described for the West-Wide Habitat Degradation Estimates
(Table copied from the GRSG Monitoring Framework)

Degradation Type	Subcategory	Data Source	Direct Area of Influence	Area Source
Energy (oil & gas)	Wells	IHS; BLM (AFMSS)	5.0ac (2.0ha)	BLM WO-300
	Power Plants	Platts (power plants)	5.0ac (2.0ha)	BLM WO-300
Energy (coal)	Mines	BLM; USFS; Office of Surface Mining Reclamation and Enforcement; USGS Mineral Resources Data System	Polygon area (digitized)	Esri/Google Imagery
	Power Plants	Platts (power plants)	Polygon area (digitized)	Esri Imagery
Energy (wind)	Wind Turbines	Federal Aviation Administration	3.0ac (1.2ha)	BLM WO-300
	Power Plants	Platts (power plants)	3.0ac (1.2ha)	BLM WO-300
Energy (solar)	Fields/Power Plants	Platts (power plants)	7.3ac (3.0ha)/MW	NREL
Energy (geothermal)	Wells	IHS	3.0ac (1.2ha)	BLM WO-300
	Power Plants	Platts (power plants)	Polygon area (digitized)	Esri Imagery
Mining	Locatable Developments	InfoMine	Polygon area (digitized)	Esri Imagery
Infrastructure (roads)	Surface Streets (Minor Roads) ¹	Esri StreetMap Premium	40.7ft (12.4m)	USGS
	Major Roads	Esri StreetMap Premium	84.0ft (25.6m)	USGS
	Interstate Highways	Esri StreetMap Premium	240.2ft (73.2m)	USGS
Infrastructure (railroads)	Active Lines	Federal Railroad Administration	30.8ft (9.4m)	USGS
Infrastructure (power lines)	1-199kV Lines	Platts (transmission lines)	100ft (30.5m)	BLM WO-300
	200-399 kV Lines	Platts (transmission lines)	150ft (45.7m)	BLM WO-300
	400-699kV Lines	Platts (transmission lines)	200ft (61.0m)	BLM WO-300
	700+kV Lines	Platts (transmission lines)	250ft (76.2m)	BLM WO-300
Infrastructure (communication)	Towers	Federal Communications Commission	2.5ac (1.0ha)	BLM WO-300

¹Minor roads include transportation routes with maintenance intensity level 3, 4, or 5 on BLM lands or its equivalent on non-BLM lands.

mining activities under the 1872 mining law may not be subject to the 3% disturbance cap. Details about locatable mining activities will be fully disclosed and analyzed in the NEPA process to assess impacts to sage-grouse and their habitat as well as to BLM goals and objectives, and other BLM programs and activities.

Oregon PACs are based on current boundaries of ODFW Core Areas established in Hagen (2011). ODFW plans to update its Core Area maps as new information is obtained on winter habitat use, lek distribution, disturbance thresholds from various types of development, and success of mitigation measures (Hagen et al. 2011). These changes could affect Oregon PACs and measurements of anthropogenic disturbance. However, BLM does not anticipate ODFW will make substantial changes to Core Area boundaries.

Formulas for calculations of the amount of disturbance in the PHMA in an Oregon PAC and/or in a proposed project area are as follows:

- For the Oregon PACs:

$$\% \text{ Degradation Disturbance} = (\text{combined acres of the 12 degradation threats}^1) \div (\text{acres of all lands within the PHMAs in an Oregon PAC}) \times 100.$$
- For the Project Analysis Area:

$$\% \text{ Degradation Disturbance} = (\text{combined acres of the 12 degradation threats}^2 \text{ plus the 7 site scale threats}^3) \div (\text{acres of all lands within the PHMA in the project analysis area}) \times 100.$$

The denominator in the disturbance calculation formula consists of all acres of lands classified as PHMA within the analysis area (Oregon PAC or project area). Areas that are not sage-grouse seasonal habitats, or are not currently supporting sagebrush cover (e.g., due to wildfire), are not excluded from the acres of PHMA in the denominator of the formula. Information regarding sage-grouse seasonal habitats, sagebrush availability, and areas with the potential to support sage-grouse populations will be considered along with other local conditions that may affect sage-grouse during the analysis of the proposed project area.

Agency Coordination

The BLM will cooperate with State of Oregon agencies to calculate baseline disturbance, develop a disturbance data base, and co-manage the disturbance cap to ensure BLM does not authorize new disturbance above the cap. The BLM

¹ See **Table I-1**

² See **Table I-1**

³ See **Table I-3**

will monitor disturbance and the adaptive management triggers identified in the Greater Sage-Grouse Adaptive Management Strategy (Appendix D).

Decadal Disturbance Cap

Research indicates leks are absent from historic range with relatively low levels of anthropogenic development and infrastructure (Aldridge et al. 2008; Wisdom et al. 2011; Knick et al. 2013). Because the level of disturbance at which leks are abandoned varies across the species range and cannot be accurately predicted, the rate of new disturbance permitted in Oregon PACs will be metered to allow for further research, support adaptive management, and provide incentives for restoration and recovery from non-anthropogenic impacts such as fire and invasive species. In the first 10 years of this metering approach, a maximum 1 percent new discretionary disturbance may be allowed in Oregon PACs with existing disturbance below 3 percent. After the initial 10-year period, and at 10-year intervals thereafter, additional 1 percent discretionary disturbance may be permitted in Oregon PACs. New discretionary disturbance on BLM administered lands will not be allowed to result in 3 percent or greater total disturbance within an Oregon PAC or project authorization area at any time.

EXAMPLE CALCULATION OF DECADAL DISTURBANCE

In this example, the Oregon PAC contains 400,000 acres. Using the procedures described above, BLM calculates existing disturbance in the Oregon PAC, regardless of land ownership, totals 2,000 acres, or 0.5 percent. To remain below the 3 percent disturbance cap, no more than 9,960 acres (2.49% of 400,000) of new surface disturbance may be allowed over the 30-year period. In the first ten year period (starting with the first new approved disturbance), up to 4,000 acres (1% of 400,000 acres) of new disturbance may be allowed in this Oregon PAC.

A development is proposed in the Oregon PAC that would result in 1,000 acres of new disturbance. Since total disturbance in the PAC would remain below 3 percent, the BLM may consider this proposal. However, the proposed project also must not exceed the 3 percent disturbance cap at the project-analysis level scale. If BLM approves the proposal, it may consider additional proposals for new disturbance in this PAC up to but not exceeding 3,000 acres in the first 10 years. In this example, maximum total surface disturbance at the end of the first decade would be 6,000 acres or 1.5 percent. At no time will the 3 percent total disturbance cap be exceeded within the Oregon PAC and within the project-analysis area.

In the next 10-year period (beginning 10 years after the first approved new disturbance in the Oregon PAC), an additional 4,000 acres of new disturbance (1% of 400,000 acres) may be authorized. Maximum total surface disturbance by the end of the second decade would be 10,000 acres or 2.5 percent. In the final decade, no more than 1,960 acres or 0.49 percent new disturbance may be

authorized to prevent total disturbance in this Oregon PAC from reaching 3.0 percent.

At no point can BLM authorize discretionary disturbance that would result in more than 1 percent new disturbance in an Oregon PAC within a 10-year period, or authorize disturbance to exceed 3 percent in an Oregon PAC and project-analysis area, regardless of land ownership. If less than 1 percent new disturbance occurs in a 10-year period, disturbance will not exceed 1 percent in the following 10-year period (there is no “carry over”). Existing disturbance may be removed or reduced to provide “decision space” for authorizing new disturbance. For example, a utility provider could remove or relocate an existing power line to avoid Oregon PACs or co-locate the line with another existing line in the same Oregon PAC. Another example would be removing a communication tower, mine development, or redundant roadway. Treatments that restore natural vegetation to achieve GRSG habitat objectives also may reduce total surface disturbance.

DENSITY CAP

This land use plan has also incorporated a cap on the density of energy and mining facilities at an average of one facility per 640 acres in the PHMA in a project authorization area. If the disturbance density in the PHMA in a proposed project area is on average less than 1 facility per 640 acres, the analysis will proceed through the NEPA process incorporating mitigation measures into an alternative. If the disturbance density is greater than an average of 1 facility per 640 acres, the proposed project will either be deferred until the density of energy and mining facilities is less than the cap or co-located into existing disturbed areas (subject to applicable laws and regulations, such as the 1872 Mining Law, valid existing rights, etc.). Facilities included in the density calculation (**Table I-1**) are:

- Energy (oil and gas wells and development facilities)
- Energy (coal mines)
- Energy (wind towers)
- Energy (solar fields)
- Energy (geothermal)
- Mining (active locatable, leasable, and saleable developments)

PROJECT ANALYSIS AREA METHOD FOR PERMITTING SURFACE DISTURBANCE ACTIVITIES

- Determine potentially affected occupied leks by placing a four mile boundary around the proposed area of physical disturbance related to the project. All occupied and pending leks located within the four mile project boundary and within PHMA will be considered affected by the project.
- Next, place a four mile boundary around each of the affected leks.

- The PHMA within the four mile lek boundary and the four mile project boundary creates the project analysis area for each individual project. If there are no occupied or pending leks within the four-mile project boundary, the project analysis area will be that portion of the four-mile project boundary within the PHMA.
- Digitize all existing anthropogenic disturbances identified in **Table I-2** and the 7 additional features that are considered threats to sage-grouse (**Table I-3**). Using 1 meter resolution NAIP imagery is recommended. Use existing local data if available.
- Calculate percent existing disturbance using the formula above. If existing disturbance is less than 3% and the rate of increase per decade since implementing the cap is less than 1%, proceed to next step. If existing disturbance is greater than 3% and/or exceeds 1% increase per decade, defer the project.
- Add proposed project disturbance footprint area and recalculate the percent disturbance. If disturbance is less than 3% and less than 1% increase per decade, proceed to next step. If disturbance is greater than 3% and/or exceeds 1% increase per decade, defer project.
- Calculate the disturbance density of energy and mining facilities (listed above). If the disturbance density is less than 1 facility per 640 acres, averaged across project analysis area, proceed to the NEPA analysis incorporating mitigation measures into an alternative. If the disturbance density is greater than 1 facility per 640 acres, averaged across the project analysis area, either defer the proposed project or co-locate it into existing disturbed area.
- If a project that would exceed the degradation cap or density cap cannot be deferred due to valid existing rights or other existing laws and regulations, fully disclose the local and regional impacts of the proposed action in the associated NEPA.

Table I-3
The Seven Site Scale Features Considered Threats to Sage-Grouse Included in the
Disturbance Calculation for Project Authorizations

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1. Coalbed Methane Ponds
 2. Meteorological Towers
 3. Nuclear Energy Facilities
 4. Airport Facilities and Infrastructure
 5. Military Range Facilities & Infrastructure
 6. Hydroelectric Plants
 7. Recreation Areas Facilities and Infrastructure
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Definitions:

1. **Coalbed Methane and other Energy-related Retention Ponds** – The footprint boundary will follow the fenceline and includes the area within the fenceline surrounding the impoundment. If the pond is not fenced, the impoundment itself is the footprint. Other infrastructure associated with the containment ponds (roads, well pads, etc.) will be captured in other disturbance categories.
 2. **Meteorological Towers** – This feature includes long-term weather monitoring and temporary meteorological towers associated with short-term wind testing. The footprint boundary includes the area underneath the guy wires.
 3. **Nuclear Energy Facilities** – The footprint boundary includes visible facilities (fence, road, etc.) and undisturbed areas within the facility's perimeter.
 4. **Airport Facilities and Infrastructure (public and private)** – The footprint boundary will follow the boundary of the airport or heliport and includes mowed areas, parking lots, hangars, taxiways, driveways, terminals, maintenance facilities, beacons and related features. Indicators of the boundary, such as distinct land cover changes, fences and perimeter roads, will be used to encompass the entire airport or heliport.
 5. **Military Range Facilities & Infrastructure** – The footprint boundary will follow the outer edge of the disturbed areas around buildings and includes undisturbed areas within the facility's perimeter.
 6. **Hydroelectric Plants** – The footprint boundary includes visible facilities (fence, road, etc.) and undisturbed areas within the facility's perimeter.
 7. **Recreation Areas & Facilities** – This feature includes all sites/facilities larger than 0.25 acres in size. The footprint boundary will include any undisturbed areas within the site/facility.
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