From:	Hendricks, Kathleen
To:	pat_deibert@fws.gov
Subject:	Fwd: disturbance cap write up - Appendix G
Date:	Thursday, January 15, 2015 10:17:33 AM
Attachments:	ID swMT ADPP Appendix G 092914 Adaptive Management.docx

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---------- Forwarded message ----------
From: **Dennis Mackey** <dennis_mackey@fws.gov>
Date: Tuesday, January 13, 2015
Subject: Fwd: disturbance cap write up - Appendix G
To: Mary Grim <Mary_Grim@fws.gov>
Cc: Theresa Rabot <Theresa_Rabot@fws.gov>, Richard Hannan <richard_hannan@fws.gov>

Hi Mary:

Attached is the latest Idaho BLM Appendix document with the first 10 pages covering the calculation of anthropogenic disturbance caps.

There was communication between Ren, Richard and Terry today re: NV BLM dist caps and Idaho methodology and Terry asked that I send this to you.

We realize it is likely more than you need. If you want to discuss or need help walking through things we would be glad to talk.

Thanks.

Dennis Mackey

Sent from my iPad

Begin forwarded message:

> **From:** "Powell, Katie" <katie_powell@fws.gov>
> **To:** Dennis Mackey <dennis_mackey@fws.gov>
> **Subject: disturbance cap write up - Appendix G**
>
> Dennis:
>
> This is the most recent version of Brent's disturbance cap calculation that I have. The appendix is 21 pages, the first 10 deal with anthropogenic disturbance.
>
> Let me know if you need anything else.
>
> --
> Katie Powell

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Appendix G – Anthropogenic Disturbance and Adaptive Management

Part I – Baseline Map and Description of Development

The **biologically significant units (BSUs)** are geographical/spatial areas within Greater Sage-grouse habitat that contains relevant and important habitats which is used as the basis for comparative calculations to support evaluation of changes to habitat. The BSUs include all land ownerships for evaluation, although application of the anthropogenic disturbance cap is specific only to BLM and Forest Service lands. The BSUs are used in the evaluation of anthropogenic disturbance and in the adaptive management habitat trigger.

For the Idaho and Southwestern Montana Greater Sage-Grouse Plan Amendment EIS the biologically significant units are defined as:

> ***Idaho: All of the modeled nesting[1] and delineated winter habitat, which is based on 2011 data, occurring within Priority and/or Important Habitat Management Areas within individual Conservation Areas[2]***
>
> ***Montana: All of the Priority Habitat Management Area***

These BSUs form the geographic basis for the calculation of anthropogenic disturbance and in the soft and hard adaptive management habitat triggers.

While the BSUs define the geographic extent and scale of the Subregion's landscape that will be considered in evaluating anthropogenic disturbance and the adaptive management habitat triggers, how disturbance and habitat triggers are calculated differ since anthropogenic disturbance and habitat loss affect Greater Sage-grouse differently (Knick et al. 2013).

The BSU is the total area (acreage) of nesting and wintering habitat within Priority or Important Habitat Management Areas, separately, by each Conservation Area. For Idaho this results in 8 BSUs, 2 each within the Idaho Conservation Areas – 1 in Priority Habitat Management Areas and 1 in Important Habitat Management Areas. There is 1 BSU in southwest Montana and 1 BSU for the Utah portion of the Sawtooth National Forest (Raft River BSU). There are a total of 10 BSUs within the Idaho and Southwestern Montana Subregion as shown in Map-G-1.

In developing these BSUs it was determined at the subregional level that data from these units must be compatible with aggregation to the PAC and WAFWA Management Zone levels, in order to meet FWS needs. In addition, BSUs must be edge matched/aligned with neighboring states. All sub-regions acknowledge there may be locally important biologically significant units smaller than PACs which may or may not be rolled up to PAC level. The Subregions also acknowledge that assessing disturbance at larger scales such as certain PACs, or via rollup of data, provides a baseline metric for future comparison, but dilution may likely mask disturbance concerns occurring at more local scales.

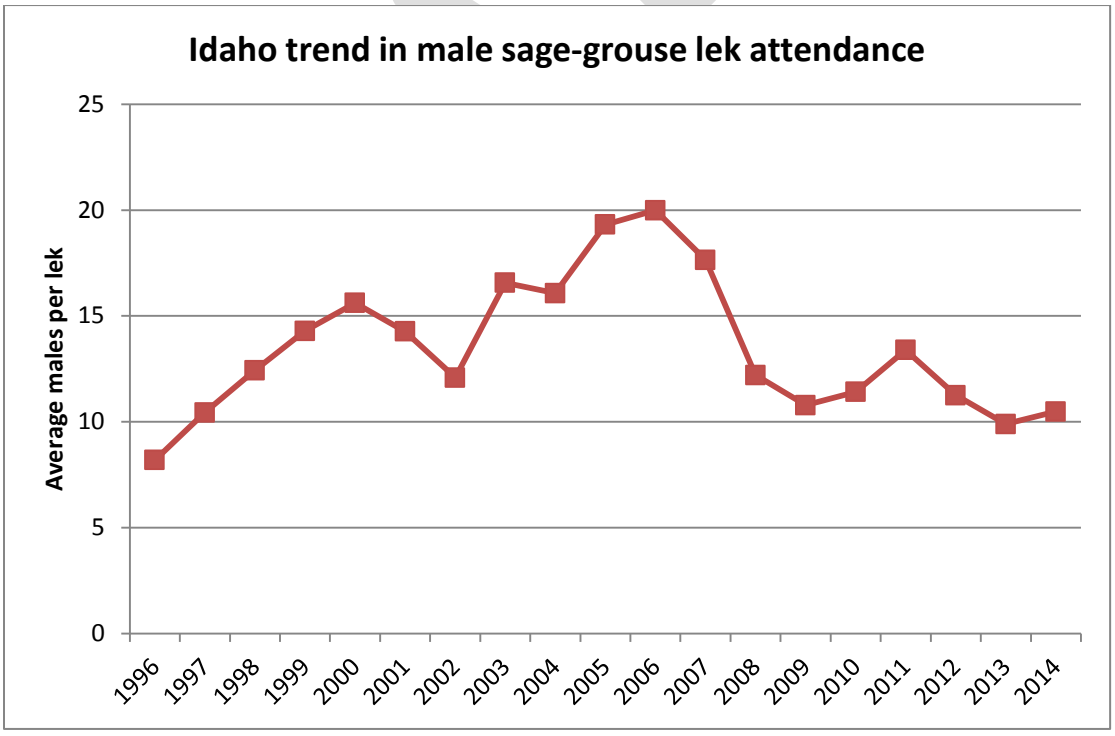
[1] Modeled nesting habitat is defined as those areas of Priority or Important Habitat Management Areas within 6.2 miles of 2011 active leks.

[2] The Utah portion of the Sawtooth National Forest is calculated separately for the Southern Conservation area.

The application of these calculations requires certain assumptions and associated baseline values which set an appropriate benchmark for future comparison.

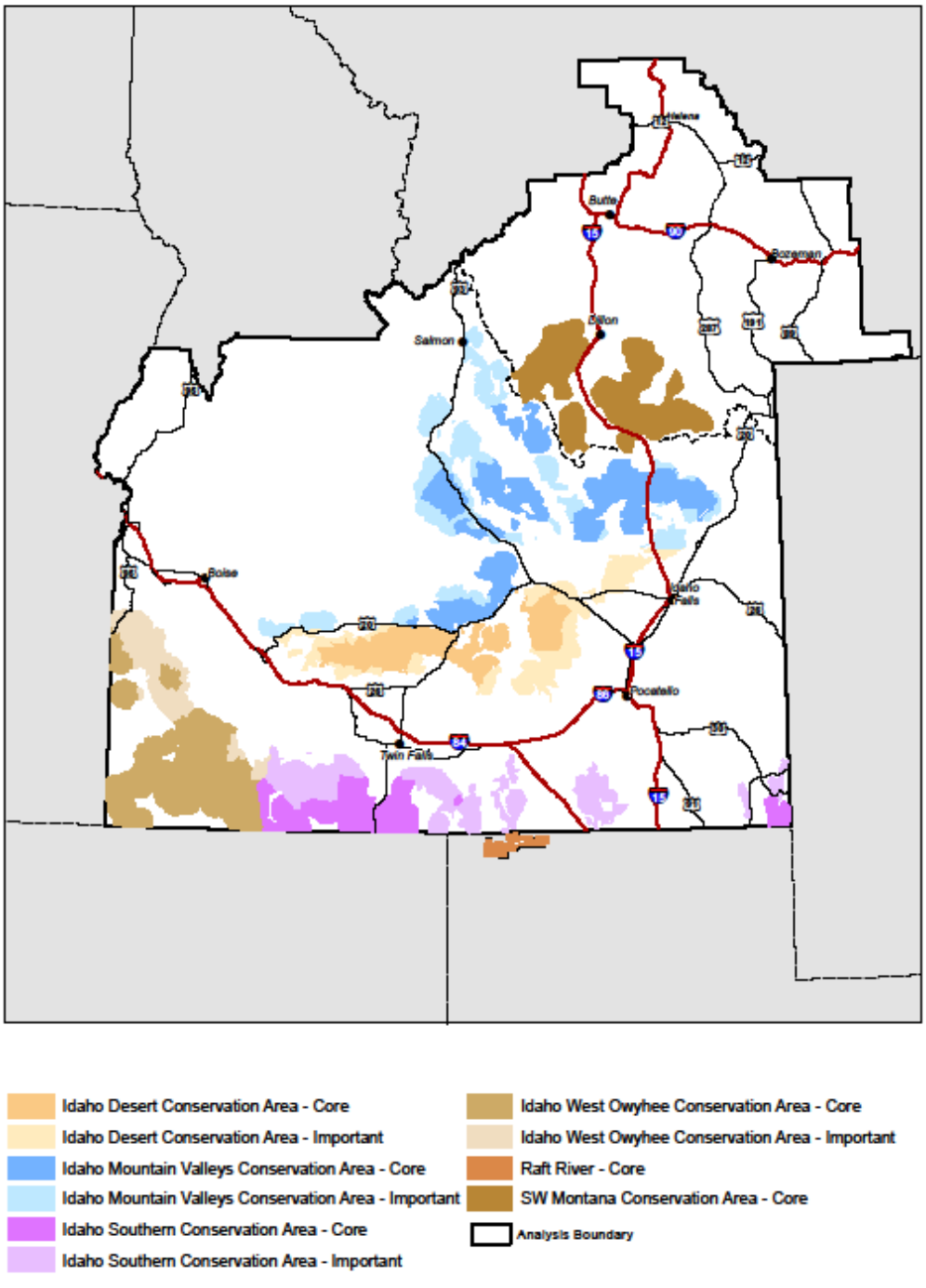
For the adaptive management evaluation in Idaho the baseline year for comparison of both the population and habitat values is set at 2011. Sage-grouse have been monitored by counting males on leks since the 1950's (IDFG files). Average male lek attendance (statewide average) reached a low point in 1996 (IDFG in file). A more consistent and intensified survey of leks began with the annual monitoring of all 78 lek routes across southern Idaho in 1996. Average male lek attendance has fluctuated since 1996 (Figure G-1) in response to favorable or unfavorable conditions (e.g. weather, habitat improvements or loss, and West Nile virus). Peaks were in 2000, 2006, and 2011 with low points in 2002 and 2009. The increase in male lek attendance after previous declines indicates that sage-grouse populations can rebound over a relatively short time frame (e.g. 5 years) given desirable conditions. The baseline was set at the 2011 average number of males because this level is approximately the medium (8 higher and 7 lower years) of the counts between1996-2011. At the statewide scale, the 2011 baseline allows 10% and 20% population triggers to be above the second lowest point in 2009. Application of the trigger at a smaller (Conservation Area) scale is a more conservative approach that will indicate potential trends sooner than if applied at the state-wide scale.

Figure G-1. Idaho Trend in Male Sage-grouse Lek Attendance.



Map-G-1

Biologially Significant Unit



Part II – Anthropogenic Disturbance Calculation

The specific formula for the percent of anthropogenic disturbance is defined by:

$$Disturbance\ Percentage = \left(\frac{\text{Footprint Acres from Anthropogenic Disturbance}}{\text{Acres within the BSU} * \left(\frac{Acres\ of\ Effective\ Habitat\ within\ the\ BSU}{Acres\ within\ the\ BSU} + 0.3 \right)} \right) \text{X } 100$$

The BSU in the denominator represents the total area (acreage) of the applicable area of analysis. Each BSU is tracked and evaluated separately within each of the 10 BSUs, and reaching the 3% disturbance cap in any one BSU has specific management implications both within and beyond that specific BSU as described in the Proposed Plan.

All sub-regions within the Great Basin Region will use the same types of disturbances for fine/site scale monitoring as were used for broad and mid-scale analysis and would use local data and/or more current satellite imagery if available.

Anthropogenic Disturbance included in the numerator is shown in Table G-1.

Table G-1. Anthropogenic Disturbances and Areas of Impact

Datasets as Described in the Monitoring Framework[3]	Source	Spatial Extent
Oil and Gas Wells and Development Facilities	HIS; BLM (AFMSS)	5.0 ac
Coal Mines	BLM; USFS; Office of Surface Mining Reclamation and Enforcement; USGS Mineral Resource Data System	Polygon Area
Wind Towers	Federal Aviation Administration	3.0 ac
Solar Fields	Platts (power plants)	7.3 ac
Geothermal Development Facilities	IHS	3.0 ac or Polygon Area
Mining (Active Locatable, Leasable and Saleable Developments)	InfoMine	5.0 ac or Polygon Area
Roads[4]	ESRI StreetMap Premium	40.7 ft. (surface streets) 84.0 ft. (major roads) 240.2 ft. (Interstate Hwys.)
Railroads[5]	Federal Railroad Administration	30.8 ft.
Powerlines[6]	Platts	100 ft. (1-199kV)

[3] Taken from Table 6 – GRSG Monitoring Framework.
[4] Values described for line features – roads; railroads; powerlines – represent associated widths centered on the line feature.
[5] See previous note.
[6] See previous note.

Datasets as Described in the Monitoring Framework[3]	Source	Spatial Extent
		150 ft. (200-399kV) 200 ft. (400-699kV) 250 ft. (700+kV)
Communication Towers	Federal Communications Commission	2.5 ac
Other Vertical Structures	Federal Aviation Administration	2.5 ac
Additional Local Datasets (need definitions)		
Underground Pipelines		
Coal Bed Methane Ponds		
Meteorological Towers	BLM; Federal Communications Commission	2.5 ac
Nuclear Energy Facilities	As Available	Polygon Area
Airports	Federal Aviation Administration	Polygon Area
Military Ranges (ground based?)		
Hydropower plants		
Recreation Areas (Developed)	BLM data	Polygon Area

The following data sets would ***not*** be used to calculate anthropogenic disturbance, but would be used in the habitat baseline to estimate habitat availability or the amount of sagebrush on the landscape within biologically significant units.

1. Habitat treatments
2. Wildfire
3. Invasive plants
4. Conifer encroachment
5. Agriculture
6. Urbanization, Ex-urban and rural development

Travel and Transportation Disturbance in Sage-Grouse Habitat

The following would count as disturbance (see Part V for definitions):

Linear transportation features identified as roads that have a maintenance intensity of 3 or 5

Linear transportation features identified as primitive roads, temporary routes, or administrative routes that have a functional classification and a maintenance intensity of level 3 or 5

Non-Disturbance

The following items would not count as disturbance:

Linear transportation features identified as trails.

Linear transportation features identified as primitive roads, temporary routes, or administrative routes that have a maintenance intensity of either level 0 or 1.

Linear transportation features identified as primitive routes.

Linear disturbances.

Derivation of the Disturbance Formula -

There is no definitive and scientifically proven formula to determine impact to GRSG from disturbance described in current research. However, Knick et al. (2013) did describe certain relationships between GRSG and anthropogenic disturbance that have been used, in conjunction with specific assumptions to describe a mathematical relationship between human disturbance footprint, effective GRSG habitat and effects to GRSG.

The variables in the equation are defined as:

Acres of a Biologically Significant Unit (BSU)
Acres of Anthropogenic Development within the BSU
Acres of Effective GRSG Habitat (sagebrush) within the BSU

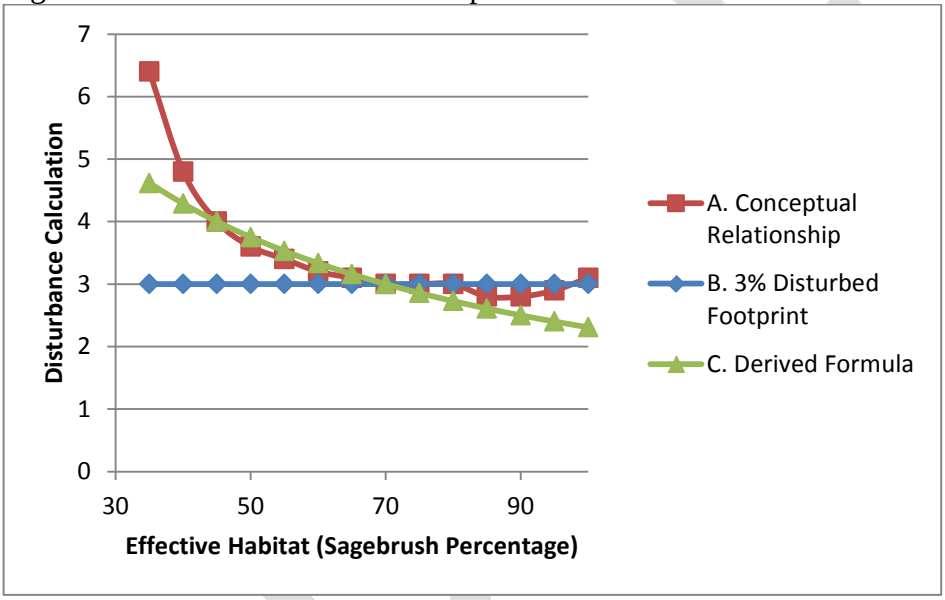
Knick et al. (2013) defined their unit of comparison (analogous to a biologically significant unit) as an area within 5 km of the lek. Within this area they also found that 79% of this area contained sagebrush (analogous to effective GRSG habitat). Results of the study show that "Ninety-nine percent of active leks were in landscapes with <3% developed". This shows that when areas within 5 km of a lek containing 79% sagebrush were 3% developed there was a measurable effect on the presence of GRSG – this defines a disturbance threshold of 3% at which point GRSG are affected. Knick et al. developed a habitat similarity relationship between the proportion of leks and percent of sagebrush which shows the highest proportion of leks when sagebrush percentage is between 70-90% (Knick et al. 2013, Figure 5, Connelly et al. 2000, Wisdom ???). Above 90% and below 70% the proportion of leks is reduced. This helps define the optimum range for sagebrush at between 70-90% and also indicates that the disturbance threshold of 3% is also dependent upon and varies with the percent of sagebrush present (effective habitat).

These findings from Knick et al. (2013) help define some mathematical parameters to define a modeled relationship between disturbance, effective habitat and effects to GRSG. Figure G-2 illustrates three different 'disturbance curves' that reflect the relationship between disturbance (y-axis) and effective habitat (sagebrush percentage) (x-axis) when the footprint disturbed is equivalent to 3% of the area. The red boxes (A) represent the conceptual relationship between disturbance and effective habitat as described and interpreted from Knick et al. (2013). The blue diamonds (B) represent a simple calculation based only on disturbance footprint, without regard to effective habitat. The green triangles (C) represent the derived formula to model the relationship.

The 'A' disturbance curve shows that when the disturbance footprint is 3% of the area and the sagebrush percentage is between 70-90% the disturbance calculation would be 3. When sagebrush percent falls below 70% or rises above 90%, the change in habitat, even without a change in disturbed footprint would begin to affect the presence of GRSG. As the amount of sagebrush declines while disturbance remains the same there would be an increasing effect to GRSG presence. This disturbance curve is conceptual and Knick et al. (2013) does not explicitly define this relationship, although this relationship does reflect numerical the observations described in Knick et al. (2013).

The 'B' disturbance curve is a straight calculation based only on disturbed footprint over a specified area. It does not account for variability of sagebrush percentage, and the only variable is the acres of disturbance. For an area that is 3% disturbed the relationship 'curve' is a flat line at 3, regardless of sagebrush percentage. This 'curve' or calculation would match the conceptual curve when sagebrush percentage is between 70 and 90%. This calculation would not account for changes in effective habitat due to loss through fire or gain through restoration and rehabilitation.
The 'C' disturbance curve models and approximates the conceptual relationship described in Knick et al. (2013). It accounts for changes in effective habitat that would translate into variable effects to GRSG based on loss or gain of habitat. It includes the ability to consider habitat loss such as from fire and to consider habitat gain such as from rehabilitation efforts including conifer removal. The model matched the conceptual relationship in the range of 70% sagebrush and approximates the conceptual relationship in areas with more or less sagebrush cover. The conceptual relationship assumes a more exponential relationship to GRSG effects from loss of habitat, while the derived formula assumes a more linear relationship. There are no available scientific studies that more clearly define the nature of the relationship. The derived formula and the conceptual relationship are substantially similar from 35-90% sagebrush percentage to validate the derived formula's relative approximation of the relationship.

Figure G-2. Disturbance Relationships



Development of the Modeled Formula:

In order to manage and apply a defined disturbance cap it is necessary to take the findings of the appropriate scientific research and utilize them as appropriately as possible to develop management strategies and evaluation techniques consistent with the management objective. Most scientific research is not completed with the intent to develop specific management objectives or approaches; however, it is through the management approaches that the scientific findings utilized to inform management.

Development of the modeled formula began by describing the simplest relationship of disturbance across a defined area by defining the disturbance percentage as:

$$\%\ Disturbance = \left(\frac{Footprint\ Acres\ from\ Anthropogenic\ Disturbance}{Acres\ within\ Area\ of\ Concern}\right) * 100$$

This accounts for disturbance, but does not account for changes in effective habitat or sagebrush percentage as described in Knick et al. (2013). To account for effective habitat the formula needs to include a term that adjusts the resulting calculation with regard to effective habitat. This should be reflected as an adjustment to the denominator (acres within area of concern). The denominator would be weighted based on the amount of effective habitat. In mathematical terms this would give a denominator of:

$$(Acres\ within\ Area\ of\ Concern) * (Adjustment\ Based\ on\ Effective\ Habitat)$$

The adjustment term must equal 1.0 when the effective habitat is somewhere between 70-90% as described in Knick et al. (2013). Assuming the adjustment term is related to the relative percentage of sagebrush or effective habitat then the *Adjustment Based on Effective Habitat* could be expressed as:

$$\frac{Acres\ of\ Effective\ Habitat\ within\ the\ Area\ of\ Concern}{Acres\ within\ the\ Area\ of\ Concern}$$

However, this term does not equal 1.0 when effective habitat is less than 100%. In order to meet the requirement of equaling 1.0 a constant must be added. This constant, when added to the percentage calculated in the previous term must equal 1.0 when the *Acres of Effective Habitat within the Area of Concern* is somewhere between 70-90%. In the Idaho and Southwestern Montana Subregional Plan an objective of 70% effective habitat has been defined, which is consistent with Knick et al. (2013). If the objective is 70% then the constant that must be added to this term is 0.3 in order to meet the requirement of equaling 1.0 at 70% effective habitat. This defines the following derived formula that approximates the conceptual relationship described in Knick et al. (2013).

$$Disturbance\ Percentage = \left(\frac{\text{Footprint Acres from Anthropogenic Disturbance within Area of Concern}}{\text{Acres within the Area of Concern} * \left(\frac{Acres\ of\ Effective\ Habitat\ within\ the\ Area\ of\ Concern}{Acres\ within\ the\ Area\ of\ Concern} + 0.3\right)}\right) \text{X } 100$$

Scale:

The particular scale for which this formula is calculated is defined by the Area of Concern. The Knick et al. (2013) used a study area defined by the area within 5 km of an individual lek. The disturbance relationships described previously are applicable at this scale and begin to break down or lose their integrity at greater distances from the lek (18 km). This concern, coupled with limited availability of consistent data across broader areas undermines the reliability and accuracy of the calculation when including areas more distant from the lek.

From a management perspective there is a need to address concerns at the broader scale to help manage those threats before they become a concern at the site specific scale. In Idaho, nesting location data collected by Idaho Department of Fish and Game (IDFG), shows that most nesting habitat occurs

within 6.2 miles (10 km) of the lek. IDFG has also collected telemetry data on GRSG movements and used this data to help define wintering areas. Nesting and wintering areas are the most limited and seasonal habitats in Idaho and additional disturbance in those areas could have impacts to GRSG presence. For these reasons the Area of Concern, referred to as the Biologically Significant Unit have been delineated to include nesting and wintering habitats. This results in areas that include more acres than just those associated within a 5 km area of an individual lek as described by Knick et al. (2013), but that are associated (within 6.2 miles or 10 km) with leks. While the Knick et al. (2013) study did not include winter habitat, because of their relative importance they have also been included as part of the BSU since conceivably disturbances that would cause lek abandonment would also likely cause abandonment or avoidance of other seasonal habitat areas. Using other administratively defined areas not delineated or based on specific GRSG use may undermine the utility and integrity of the disturbance relationship and calculation.

This approach, built upon the findings in Knick et al. (2013), uses those findings to help inform management at a broader scale that would help determine management actions based on disturbance evaluations. Using the BSU as the Area of Concern is a scale larger than described in Knick et al. (2013), but still within the predictive bounds described in that study. The formula can be used to calculate disturbance at the BSU scale to help inform a disturbance cap, and it can also be used at the site or project scale to help inform specific project activities.

Example 1 – Anthropogenic Disturbance

In the Southern Conservation Area the Priority BSU was delineated to include 784,958 acres and the Important BSU was delineated to include 1,036,455 acres, which represent the acres of the Biologically Significant Unit to be used in the denominator. The acres of Effective Habitat in the Priority BSU are 424,656 and in the Important BSU are 447,497. This sets up two equations – one for Priority Habitat Management Areas and one for Important Habitat Management Areas.

The existing footprint acres of disturbance within the Priority BSU are 17,661 acres and the footprint acres of disturbance within the Important BSU are 12,748 acres.

This gives the following two equations to define the baseline disturbance condition in the BSUs:

$$Priority = \frac{17661}{(784958 * ((\frac{424656}{784958}) + 0.3)} * 100$$

Or $$(\frac{17661}{784958*((0.54)+0.3)}) * 100$$

Or $$\left(\frac{17661}{784958*(0.84)}\right) * 100$$

Yielding a percent disturbance in the Priority BSU of 2.68%

$$Important = \frac{12748}{(1036455 * ((\frac{447497}{1036455}) + 0.3)} * 100$$

Yielding the percent disturbance in the Important BSU of 1.68%

If by 2015 we project additional development within the Priority BSU to be 2120 acres (a 12% increase) and development within the Important BSU to be 4000 acres (a 30% increase) then the Priority footprint acres becomes 20,161 acres and the Important footprint acres becomes 16,748 acres. The resulting evaluation for this cumulative disturbance is calculated by:

$$Priority = \frac{19781}{(784958*((\frac{424656}{784958})+0.3)} * 100 \quad Important = \frac{16748}{(1036455*((\frac{447497}{1036455})+0.3)} * 100$$

Yielding the percent disturbance as: Priority = 3.00% and Important = 2.21%

In the examples, given the existing disturbance footprint it would require development of an additional 2,120 acres in the Priority BSU and an additional 10,005 acres in the Important BSU before the 3% cap would be engaged.

Part III - Adaptive Management

Adaptive Management Habitat Trigger-

The specific formula for the change in habitat for the habitat trigger is defined by:

Within Idaho and Utah all factors are measured within the modeled nesting and wintering habitat within Priority or Important Habitat Management Areas (calculated separately) by Conservation Area; in Southwest Montana all factors are measured within the Priority Habitat Management Area.
In simple description the adaptive management habitat trigger calculation is the percentage of Effective Habitat (defined as areas of generally intact sagebrush that provide Greater sage-grouse habitat during some portion of the year) within modeled nesting and wintering areas within Priority or Important Habitat Management Areas by Conservation Area within a particular year when compared to the Effective Habitat within modeled nesting and wintering areas within Priority or Important Habitat Management Areas by Conservation Area as of the 2011 baseline. Using Effective Habitat as the metric of comparison removes non-habitat acres from the calculation. The calculation is evaluated within both Priority and Important Habitat Management Areas separately within each of the 10 BSUs.

For purposes of evaluating the adaptive management habitat triggers, Effective Habitat in Idaho is tracked using the Key Habitat Map which is updated annually by BLM in coordination with IDFG, Forest Service, US FWS and Local Working Groups and tracks the areas of generally intact sagebrush providing Greater sage-grouse habitat during some portion of the year. Effective habitat equates to areas described as Key Habitat on the Key Habitat Map. Appendix F contains a description of the Key Habitat Map maintenance and update process including the inclusion of disturbances from fire and temporary disturbances and habitat restoration/rehabilitation. For Montana and Utah Effective Habitat is based on…

Factors: EHP(Y) – where Y is the year and EHC is the acres of Effective Habitat for that year within the baseline 2011 nesting and wintering areas within the Priority Habitat Management Area by Conservation Area

EHI(Y) - where Y is the year and EHI is the acres of Effective Habitat for that year within the baseline 2011 nesting and wintering areas within the Important Habitat Management Area by Conservation Area

ADP(Y) – where Y is the year and AD is the acres of anthropogenic disturbance within Effective Habitat for that year within the 2011 nesting and wintering areas within the Priority Habitat Management Area by Conservation Area

ADI(Y) – where Y is the year and AD is the acres of anthropogenic disturbance within Effective Habitat for that year (Y) within the baseline 2011 nesting and wintering areas within the Important Habitat Management Area by Conservation Area

EHP(2011) – the Effective Habitat within the baseline 2011 nesting and wintering areas within the Priority Habitat Management Area by Conservation Area

EHI(2011) - the Effective Habitat within the baseline 2011 nesting and wintering areas within the Important Habitat Management Area by Conservation Area

ADP(2011) – the acres of anthropogenic disturbance within Effective Habitat within the baseline 2011 nesting and wintering areas within the Priority Habitat Management Area by Conservation Area

ADI(2011) – the acres of anthropogenic disturbance within Effective Habitat within the baseline 2011 nesting and wintering areas within the Important Habitat Management Area by Conservation Area

Formulas:

$$\text{Priority Habitat Management Area} = 100 - \left(\frac{EHP(Y) - ADP(Y)}{EHP(2011) - ADP(2011)}\right) * 100$$

$$\text{Important Habitat Management Area} = 100 - \left(\frac{EHI(Y) - ADI(Y)}{EHI(2011) - ADI(2011)}\right) * 100$$

When this calculation equals or exceeds 10 then an adaptive trigger has been engaged as per AM-7 & AM-8.

Tables 2-7 describe the acreages associated with the BSUs by Conservation Area for the Idaho and Southwestern Montana Subregion. The tables contain values for the entire BSU (Priority and Important), including all ownerships, acres of effective habitat within the BSUs and acres of anthropogenic disturbance within the BSUs.

These values will be used to provide several examples applying the anthropogenic disturbance and adaptive management habitat trigger evaluations. These are for illustrative purposes and do not represent an actual evaluation of ground conditions.

Example 2 – Adaptive Management – Habitat

In the Southern Conservation Area the Priority BSU was delineated to include 784,958 acres, of which 424,656 acres were Effective habitat; therefore EHP(2011) is equal to 424,656 acres. Development within the Effective Habitat in 2011 was measured at 10,074 acres; therefore ADP(2011) is equal to 10,074 acres.

If in 2015 we project a cumulative loss of 42,000 Effective habitat acres due to wildfire (10% loss) and an additional 1000 acres of anthropogenic development (10% increase), then

EHP(2015) is equal to 424,656 – 42,000 or 382,656 and ADP(2015) is equal to 10,074+1000 or 11,074. The evaluation for the adaptive management trigger is calculated by:

$$100 - \left(\frac{382656 - 11074}{424656 - 10074}\right) * 100$$

This simplifies to: $100 - \left(\frac{371582}{414582}\right) * 100$

Or $100 - (0.896 * 100)$

Or 100 - 89.6

Or 10.4 – equivalent to 10.4%

This evaluation shows a loss of greater than 10 percent and less than 20 percent which would engage the soft habitat trigger as described in AM-8 and not the hard habitat trigger described in AM-7.

Soft Trigger Considerations and Implementation Actions

The Sage-Grouse Implementation Task Force, in coordination with BLM and Forest Service would utilize monitoring information to assess when triggers have been tripped. When information indicates that the soft habitat or population trigger may have been tripped, a Sage-Grouse Implementation Task Force, in corrdination with BLM and Forest Service - aided by the technical expertise of IDF&G - would assess the factor(s) leading to the decline and identify potential management actions. The Sage-Grouse Implementation Task Force may consider and recommend to BLM possible changes in management to the PHMA. As to the IHMA, the Sage-Grouse Implementation Team may review the causes for decline and potential management changes only to the extent those factors significantly impair the state's ability to meet the overall management objective. It is anticipated IDF&G will collect data annually and will make recommendations to the Implementation Team by August 31st for population triggers and January 15th for habitat triggers.

Only where the monitoring information indicates the cause(s) of the decline is not a primary threat will the Sage-Grouse Implementation Task Force analyze the secondary threats to the species and determine whether further management actions are needed.

Potential Implementation Level Actions to Consider in the Event Soft Trigger Criteria are Met

- ✓ Increase monitoring and evaluation of sage-grouse populations in Priority Habitat Management Area (area of concern).
- ✓ Implement Priority Habitat Management Area management strategy in corresponding Important Habitat Management Area of the same Conservation Area.
- ✓ Implement Priority Habitat Management Area RDFs in corresponding Important Habitat Management Area of the same Conservation Area.

- ✓ Not allow any new (large) infrastructure development within the Priority Habitat Management Area (no exceptions allowed).
- ✓ Reallocate resources to focus on primary threats in the Priority Habitat Management Area (e.g. direct resources from other parts of the state to the area of concern).
- ✓ Reallocate resources to focus on secondary threats in the Priority Habitat Management Area (e.g. direct resources from other parts of the state to the area of concern).
- ✓ Apply Priority Habitat Management Area criteria for all primary threats, and/or all secondary threats to the Important Habitat Management Area.
- ✓ Reallocate resources to focus on primary threats in the Important Habitat Management Area (e.g. direct resources from other parts of the state to the area of concern).
- ✓ Reallocate resources to focus on secondary threats in the Important Habitat Management Area (e.g. direct resources from other parts of the state to the area of concern).

If Livestock Grazing is determined to be a Causal Factor Consider the Following Measures:

1. Employ grazing management systems that ensure adequate nesting and early brood rearing habitat within the breeding landscape.
2. When use-pattern mapping or monitoring demonstrates an opportunity to adjust livestock distribution to benefit occupied sage-grouse breeding habitat, include as appropriate herding, salting, and water-source management (e.g., turning troughs/pipelines on/off, extending pipelines/moving troughs) in grazing programs.
3. If available and feasible, utilize exotic perennial grass seedings and/or annual grasslands to avoid breeding season of use of occupied sage-grouse habitat.
4. Modify authorized seasons of use within grazing permits to provide greater flexibility in managing livestock for the benefit of sage-grouse.
5. Where appropriate, maintain residual herbaceous vegetation at the end of the growing/grazing season to contribute to nesting and brood-rearing habitat during the coming nesting season. Table 5.
6. Insure that permittees are informed of management and movement requirements related to avoidance of recent burns, rehabilitation seedings or other restoration sites.
7. Manage grazing of riparian areas, meadows, springs, and seeps in a manner that promotes vegetative structure and composition appropriate to the site. In some cases enclosure fencing may be a viable option. However, recognize the availability and quality of desired herbaceous species may be improved by periodic grazing use of the enclosure.
8. Implement management actions (grazing decisions, allotment management plan/conservation plan development, or other agreements) to modify grazing management to meet seasonal sage-grouse habitat requirements. Employ proper grazing management by providing flexibility in scheduling the intensity, timing, duration and frequency of grazing use over time that best promotes management objectives. During drought periods, prioritize evaluating effects of drought in the CMA relative to grouse needs for food and cover. Ensure that post-drought management allows for vegetation recovery that meets sage-grouse needs in priority sage-grouse habitat areas.
9. When using salt or mineral supplements: a) place them in existing disturbed sites, areas with reduced sagebrush cover—e.g., seedings or cheatgrass sites—to reduce impacts to sage-grouse breeding habitat, b) where feasible use salts or mineral supplements to improve management of livestock for the benefit of sage-grouse habitat.

10. In general, avoid constructing new fences within 2 km of occupied leks. Where feasible, place new, taller structures, such as corrals, loading facilities, water-storage tanks, windmills, etc., at least 2 km from occupied leks to reduce opportunities for perching raptors. Careful consideration, based on local conditions, should also be given to the placement of new fences or structures near other important seasonal habitats (winter-use areas, movement corridors etc.) to reduce potential impacts.
11. New spring developments in sage-grouse habitat should be designed to maintain or enhance the free-flowing characteristics of springs and wet meadows. Analyze developed springs, seeps and associated pipelines to determine if modifications are necessary to maintain the continuity of the predevelopment riparian area within priority sage-grouse habitat. Make modifications where necessary, considering impacts to other water users when such considerations are neutral or beneficial to sage-grouse.
12. Ensure that new and existing livestock troughs and open water storage tanks are fitted with ramps to facilitate the use of and escape from troughs by sage-grouse and other wildlife. Do not use floating boards or similar objects, as these are too unstable and are ineffective. Use BMPs to mitigate potential impacts from West Nile virus.
13. When placing new water developments in sage-grouse breeding habitat, choose sites and designs that will provide the greatest enhancement for sage-grouse and sage-grouse habitat.
14. Avoid new water developments in higher quality native breeding/early brood habitats that have not had significant prior grazing use except in situations in which water developments may aid in better livestock distribution across the allotment and will not adversely impact the species.
15. Identify and when feasible, establish strategically located forage reserves focusing on areas unsuitable for sage-grouse habitat restoration or lower priority habitat restoration areas.
16. Monitor for, and treat invasive species associated with, existing range improvements.
17. Consider initiating vegetative manipulation projects where sagebrush canopy cover exceeds optimal characteristics to promote grass and forb understory growth. These projects should only be undertaken where it can be achieved without negatively impacting the species.

Adaptive Grazing Management Response

BLM will individually analyze those allotments and pastures within the relevant Conservation Area. Given limited agency resources, prioritization will be given to areas that have the potential to provide the greatest benefit to sage-grouse. Allocation of resources should be concentrated on allotments within the CMA that have declining sage-grouse populations. Following those permits within the CMA, resources will be further prioritized to allotments within the IMA with breeding habitats that have decreasing lek counts. Sage-grouse populations that are stable or trending upward will be a lower priority for permit renewal and the adaptive assessment process. The assessment/determination process for sage-grouse pursuant to Standard 8 will consider published characteristics of sage-grouse habitat and the Ecological Site Descriptions, existing vegetation, habitat inventories/assessments (Stiver et al. 2010), and where available, state and transition models that describe vegetation and other physical attributes for sage-grouse. The related characteristics within the categories shown below will also be included. These characteristics indicate the ability of a given area to provide sage-grouse habitat.

Category 1: The grazing allotment (or any pasture/significant area therein) has the existing vegetation and existing ecological condition (seral state) to provide sage-grouse habitat

Category 2: The grazing allotment (or any pasture/significant area therein) has the ecological potential to provide sage-grouse habitat.

Where an allotment or pasture meets one of these Categories above, the GRSG Habitat Management Objectives will be incorporated into relevant resource management plans as the desired conditions with the understanding that these desired conditions may not be achievable:

(a) due to the existing ecological condition, ecological potential or the existing vegetation; or
(b) due to causal events unrelated to existing livestock grazing.

Allotments will only be managed for the primary seasonal habitat that it has the potential to support. Based on these habitat characteristics, BLM will conduct fine and site scale-habitat assessments to help inform grazing management. Where necessary, a determination of factors causing any failure to achieve the habitat characteristics GRSG HMOs will be conducted at a resolution sufficient to document the habitat condition. This determination will include consideration of local spatial and inter-annual variability. A determination of issues attributable to livestock grazing management shall not result from one year of data at a specific location within an allotment. If the process and conditions outlined above demonstrate that livestock grazing is limiting achievement of the habitat characteristics GRSG HMOs, renewed permits will include measures to achieve desired habitat conditions. These measures must be tailored to address the specific management issues associated with seasonal habitat limitations identified in the fine-scale assessments.

Part IV – Anthropogenic Disturbance and Adaptive Management 2011 Baseline Indices

Table G-2 – Desert Conservation Area Baseline Indices

				Existing Anthropogenic Disturbance	
Desert Conservation Area	BLM & FS Acres	Total Acres	Effective Habitat	Within BSU	Within Effective Habitat
Priority BSU (nesting and wintering)					
Important BSU (nesting and wintering)					

Table G-3 – Mountain Valleys Conservation Area Baseline Indices

				Existing Anthropogenic Disturbance	
Mountain Valleys Conservation Area	BLM & FS Acres	Total Acres	Effective Habitat	Within BSU	Within Effective Habitat
Priority BSU (nesting and wintering)					
Important BSU (nesting and wintering)					

Table G-4 – Southern Conservation Area Baseline Indices

				Existing Anthropogenic Disturbance	
Southern Conservation Area	BLM & FS Acres	Total Acres	Effective Habitat	Within BSU	Within Effective Habitat
Priority BSU (nesting and wintering)	560,985	784,958	424,656	17,661	10,074
Important BSU (nesting and wintering)	798,691	1,036,455	447,497	12,748	6,289

Table G-5 – West Owyhee Conservation Area Baseline Indices

				Existing Anthropogenic Disturbance	
West Owyhee Conservation Area	BLM & FS Acres	Total Acres	Effective Habitat	Within BSU	Within Effective Habitat
Priority BSU (nesting and wintering)					
Important BSU (nesting and wintering)					

Table G-6 – Southwest Montana Conservation Area Baseline Indices

				Existing Anthropogenic Disturbance	
Southwest Montana Conservation Area	BLM & FS Acres	Total Acres	Effective Habitat	Within BSU	Within Effective Habitat
Priority BSU (nesting and wintering)					

Table G-7 – Raft River (Utah Portion of Sawtooth National Forest)

				Existing Anthropogenic Disturbance	
Utah portion of Sawtooth National Forest	BLM & FS Acres	Total Acres	Effective Habitat	Within BSU	Within Effective Habitat
Priority BSU (nesting and wintering)					

Part V - Travel and Transportation Management Definitions for Use in Anthropogenic Disturbance Calculation

Roads are linear routes managed for use by low clearance vehicles having four or more wheels, and are maintained for regular and continuous use.

Primitive Roads are linear routes managed for use by four-wheel drive or high-clearance vehicles. They do not normally meet any design standards.

Trails are linear routes managed for human-powered, stock, or OHV forms of transportation or for historical or heritage values. Trails are not generally managed for use by four-wheel drive or high-clearance vehicles.

Linear Disturbances are human-made linear features that are not part of the designated transportation network are identified as "Transportation Linear Disturbances." These may include engineered (planned) as well as unplanned single and two-track linear features that are not part of the BLM's transportation system.
Primitive Routes are any transportation linear feature located within a WSA or lands with wilderness characteristics designated for protection by a land use plan and not meeting the wilderness inventory road definition.

Temporary routes are short-term overland roads, primitive roads or trails which are authorized or acquired for the development, construction or staging of a project or event that has a finite lifespan. Temporary routes are not intended to be part of the permanent or designated transportation network and must be reclaimed when their intended purpose(s) has been fulfilled. Temporary routes should be constructed to minimum standards necessary to accommodate the intended use; the intent is that the project proponent (or their representative) will reclaim the route once the original project purpose or need has been completed. Temporary routes are considered emergency, single use or permitted activity access. Unless they are specifically intended to accommodate public use, they should not be made available for that use. A temporary route will be authorized or acquired for the specific time period and duration specified in the written authorization (permit, ROW, lease, contract etc.) and will be scheduled and budgeted for reclamation to prevent further vehicle use and soil erosion from occurring by providing adequate drainage and re-vegetation.

Administrative routes are those that are limited to authorized users (typically motorized access). These are existing routes that lead to developments that have an administrative purpose, where the agency or permitted user must have access for regular maintenance or operation. These authorized developments could include such items as power lines, cabins, weather stations, communication sites, spring

Maintenance Intensities

Level 0

Maintenance Description:

Existing routes that will no longer be maintained and no longer be declared a route. Routes identified as Level 0 are identified for removal from the Transportation System entirely.

Maintenance Objectives:

- No planned annual maintenance.
- Meet identified environmental needs.
- No preventative maintenance or planned annual maintenance activities.

Level 1

Maintenance Description:

Routes where minimum (low intensity) maintenance is required to protect adjacent lands and resource values. These roads may be impassable for extended periods of time.

Maintenance Objectives:

- Low (Minimal) maintenance intensity.
- Emphasis is given to maintaining drainage and runoff patterns as needed to protect adjacent lands. Grading, brushing, or slide removal is not performed unless route bed drainage is being adversely affected, causing erosion.
- Meet identified resource management objectives.
- Perform maintenance as necessary to protect adjacent lands and resource values.
- No preventative maintenance.
- Planned maintenance activities limited to environmental and resource protection.
- Route surface and other physical features are not maintained for regular traffic.

Level 3

Maintenance Description:

Routes requiring moderate maintenance due to low volume use (for example, seasonally or year-round for commercial, recreational, or administrative access). Maintenance Intensities may not provide year-round access but are intended to generally provide resources appropriate to keep the route in use for the majority of the year.

Maintenance Objectives:

- Medium (Moderate) maintenance intensity.
- Drainage structures will be maintained as needed. Surface maintenance will be conducted to provide a reasonable level of riding comfort at prudent speeds for the route conditions and intended use. Brushing is conducted as needed to improve sight distance when appropriate for management uses. Landslides adversely affecting drainage receive high priority for removal; otherwise, they will be removed on a scheduled basis.
- Meet identified environmental needs.
- Generally maintained for year-round traffic.
- Perform annual maintenance necessary to protect adjacent lands and resource values.
- Perform preventative maintenance as required to generally keep the route in acceptable condition.
- Planned maintenance activities should include environmental and resource protection efforts, annual route surface.
- Route surface and other physical features are maintained for regular traffic.

Level 5

Maintenance Description:

Route for high (maximum) maintenance due to year-round needs, high volume of traffic, or significant use. Also may include route identified through management objectives as requiring high intensities of maintenance or to be maintained open on a year-round basis.

Maintenance Objectives:

- High (Maximum) maintenance intensity.
- The entire route will be maintained at least annually. Problems will be repaired as discovered. These routes may be closed or have limited access due to weather conditions but are generally intended for year-round use.
- Meet identified environmental needs.
- Generally maintained for year-round traffic.
- Perform annual maintenance necessary to protect adjacent lands and resource values.
- Perform preventative maintenance as required to generally keep the route in acceptable condition.
- Planned maintenance activities should include environmental and resource protection efforts, annual route surface.
- Route surface and other physical features are maintained for regular traffic.