Exhibit B

Review of Data Quality Issues in *A Report on National Greater Sage-Grouse Conservation Measures Produced by the BLM Sage-Grouse National Technical Team (NTT) Dated December 21, 2011*

Dr. Rob Roy Ramey II
Wildlife Science International, Inc.
Prepared for Western Energy Alliance
September 19, 2013

Executive Summary

In 2011, the Bureau of Land Management (BLM) formed the *National Technical Team* (NTT) to develop a report outlining new or revised regulatory mechanisms to protect and conserve the greater sage-grouse and its habitat on BLM-administered lands. Members of the NTT included resource specialists and scientists from BLM, state wildlife agencies, the U.S. Fish & Wildlife Service (FWS), Natural Resources Conservation Service (NRCS), and U.S. Geological Survey (USGS).

BLM is now incorporating select regulatory mechanisms from the NTT report into Resource Management Plans (RMP), which are land use planning documents that are developed to set long-term management policies. According to the NTT, the report "provides the latest science and best biological judgment to assist in making management decisions." In reality, the NTT report represents a partial presentation of scientific information to justify a narrow range of preferred conservation measures and policies that will be imposed as land use regulations by the BLM. In contrast, an objective scientific review would have led to a broadening of conservation alternatives for decision makers to choose from.

Misrepresenting the Impact of Oil and Gas Operations

The NTT presents a biased view of oil and gas operations by conveying that *"impacts are universally negative and typically severe."* The NTT then selectively presented information in support of its conclusions, while ignoring contrary information. Key assertions in the NTT report are both biased and in error, especially the frequently repeated, but erroneous assumption, that a temporary decrease in lek counts immediately adjacent to active wells is equivalent to a population decline.

The NTT recommendations rely on older research that focuses on areas with full-field development, like the Jonah gas field in Wyoming, where currently-used sophisticated mitigation or restoration technologies were either unavailable or still being developed. The NTT fails to acknowledge that this situation has substantially changed due to the

advent of advanced reclamation, methods to limit surface disturbance, and other protective measures that are now mainstream in development that takes place in habitat areas. Further, the research that supports the one-size-fits-all recommendations in the NTT does not represent less intensive development scenarios.

Disproportionate Scientific Influence

At present, a small number of sage grouse specialist-advocates have had what appears to be a disproportionate influence on formulating federal policy on sage grouse, including their overlapping participation in preparation the NTT and the FWS Conservation Objective Team (COT) reports, and authorship of the highly influential U.S. Geological Survey (USGS) sage grouse monograph. More diverse expertise and viewpoints are clearly needed.

Downplaying Voluntary Conservation

The NTT regarded voluntary conservation efforts on private land as inferior to federal land acquisition and management. This view is contrary to what has been espoused as the "new paradigm" of cooperative conservation. There are numerous published papers on the success of private land conservation versus a federal "command and control" approach.

Failure to Utilize Best Available Science

The NTT report did not acknowledge or make use of best available scientific and commercial data, which shows the substantially lessened impacts of oil and gas operations on sage grouse as a result of new technologies, expanded mitigation efforts, more stringent stipulations, and BMPs. This includes information that had been compiled by the BLM and provided to the NTT.

The NTT omits numerous scientific papers and reports on oil and gas mitigation measures for sage grouse, the mitigation of raven predation on sage grouse, the fact that sage grouse disperse over greater distances than previously thought, and that they traverse (fly) over or around roads, agricultural areas, and oil and gas development.

Undefined Priority Habitat

Recommendations for management of priority habitat were made without any definition or quantification of priority habitat themselves. The NTT present no data showing that hypothetical migration and connectivity corridors depicted on maps actually exist.

Unnecessarily Restrictive Recommendations

The NTT report recommended numerous one-size-fits-all regulatory prescriptions, and made no allowance for recommendations for including local sage grouse conservation plans (i.e. county-level, working group, or private land) that have tailored conservation

measures to local conditions, including unique habitat and threats, and socio-economic factors.

The new best management practices (BMP) proposed by the NTT are unnecessarily restrictive, are not supported by scientific information, and do not address specific cause and effect mechanisms that are known to be deleterious to sage grouse. The imposition of new BMPs was made without any tracking and testing of the effectiveness of currently required BMPs.

Disturbance Thresholds

Disturbance thresholds recommended by the NTT are arbitrary and do not have a sound scientific basis. They are based upon the opinions of authors, and selective citation of information rather than data. These thresholds include:

- 3% surface disturbance cap
- one well per section cap
- 4-mile no surface occupancy buffers
- noise limited to less than 10 decibels above 20-24 dBA.

These thresholds are founded on the erroneous assumption that a temporary disturbance of sage grouse from a local area equates to a population decline. The NTT makes no mention of the fact that previously predicted population declines, in cited studies have failed to come true, particularly in the Pinedale area in Wyoming.

Buffers around Leks

The presumed necessity of 4-mile radius NSO buffer around sage grouse leks is based upon the subjective opinion of the NTT and selected authors. The practical effect of such a restriction would be to "protect" vast areas of non-habitat and marginal habitat with no demonstrable benefit to sage grouse populations. The area of this 4-mile radius circle surrounding each lek is 50 square miles.

Noise Recommendations

The NTT's one-size fits all noise recommendations for oil and gas operations are not scientifically sound. They were based on the subjective opinions of the authors of cited studies rather than data. The cited studies, all performed by one research group, used substandard equipment and employed methods that were inconsistent with professional data collection and reporting standards in the industry that are used to ensure unbiased and systematic data collection. The underlying data in the cited noise studies is not public. What is being proposed for noise thresholds is an impossible to achieve standard found in an idyllic wilderness setting; BLM land that is administered for multiple uses is not pristine wilderness.

Sagebrush Cover Goal

The NTT presents no scientific data that a one-size-fits-all goal of 70% sagebrush cover in Priority Habitat is: 1) scientifically defensible, 2) achievable, 3) would result in stable sage grouse populations, and 4) would not result in irreparable harm to other species, and 5) would not negatively affect local economies.

Lack of Credible Peer Review

There is no evidence that accepted standards for scientific peer review were followed in the supposedly scientific peer review of the NTT report. There is no evidence that each of the comments and issues raised by the "peer reviewers" of the NTT report were either corrected or rebutted in writing by the NTT, as is the accepted practice in scientific peer review. It does a disservice to the field of science to call such a casual solicitation of comments a valid "peer review." To date, the BLM has not released the reviews themselves but only selected excerpts from the reviews.

The recommendations of the NTT were tailored to be consistent with legal settlements with environmental litigants rather than an unbiased assessment of conservation alternatives.

The NTT's description of "science" makes no mention of hypothesis testing or potential falsifiability. Instead, the NTT relies on a subjective interpretation of results which is a clear departure from the scientific method. The fact that the NTT started with their preferred conservation measures, and then sought to justify them, reveals that the NTT misused the scientific method in order to reverse-engineer their recommendations.

Issues Raised by National BLM Officials

Complaints raised by national BLM officials reveal that the agency is being set up to fail because the NTT sets unrealistic goals that BLM could never achieve (i.e. 70% sage brush cover), and there are internal inconsistencies that makes the NTT's recommendations vulnerable to legal challenge.

Conclusion

The BLM cannot rely on the biased opinions and selective presentation of information to support a recommendation that is unsupported by data. The BLM cannot rely on studies that purport to document a negative effect yet consistently fail to produce data that show such a negative effect. The NTT not only violates the BLM's multiple use mandate, but elevates sage grouse concerns above human health, safety, and economic prosperity.

Detailed Review

1) The "science" behind the NTT report was designed to support conservation measures preferred by the NTT rather than review alternative conservation measures in an objective manner.

1.1) The opening paragraph of the December 6, 2011 NTT meeting notes describes, *"the purpose of the meeting was to strengthen the science behind the existing conservation measures."* This and subsequent statements reveal that instead of using the objective, scientific method to evaluate and rank the effectiveness of alternative conservation actions, the NTT biased their recommendations by only seeking scientific support for "existing" conservation measures that were preferred by the NTT.

1.2) By seeking scientific justification for preferred (i.e. predetermined) conclusions, the NTT biased approach was outside the realm of standard scientific practice, which is to objectively consider all potential alternatives (hypotheses) and all information available, including contrary data.

1.3) Documented discussions of the NTT team (from meeting notes and e-mails) reveal that virtually the entire focus of the team was discussion of policy, rather than scientific issues, and this deficiency was also noticed in the peer reviews of the report. NTT meeting notes do not contain and references to scientific papers, data, or measured discussion of alternative conservation measures. Instead, the discussions were focused almost entirely on justification of preferred conservation measures and finding the documentation to bolster these.

The following excerpt from a Dec 13, 2011 11:52 AM e-mail from Raul Morales (the NTT team leader for the BLM) to the NTT illustrates how the NTT and the National Policy Team sought to bolster support for its preferred conservation measures rather than develop an objective evaluation of alternatives (underline added for emphasis):

> *"I just wanted to update everyone on what has happened since my last email to you all. There was an NPT call shortly before Thanksgiving. I was not on this call but what the NPT [National Policy Team] charged me to do was to reconvene small team of NTT members (mainly scientist folks) and with the help of a WAFWA (Western Association of Fish and Wildlife Agencies) appointed scientist (former Colorado Division of Wildlife Director, Tom Remington) <u>they asked that we further strengthen the science underpinnings to our conservation measures.</u> Also, that this effort needed to be completed before the release of the NOI which happened last Friday."*
>
> *"In addition, comments had been received from other external reviewers, and reviewers suggested the measures needed to be grounded in the best available science to be defensible. In addition, the US Fish and Wildlife Service (USFWS) wanted to ensure the science is strong so the conservation measures could effectively inform policy negotiations at the National Policy Team level.*

So, the National Policy Team agreed the next step was for the National Technical Team to reconvene and review how the conservation measures are supported by existing science."

The excerpt is contrary to the portrayal of the NTT report as an objective scientific review of alternatives. Instead, the NTT chose to rationalize pre-determined conclusions. Further, the NTT made selective use of published papers, reports, and opinion that supported their preferred conservation measures while ignoring other sources of information that did not. The NTT meeting notes and e-mails contain numerous instances where the scientific rationale for particular conservation measures or restrictions were based upon nothing more than subjective opinion of the NTT authors. As a result, the NTT does not represent "a summary of the best available scientific information for the conservation of Sage-Grouse" as stated by Secretary Salazar in his December 18, 2012 letter to Representative Hastings. Instead, the NTT report represents a partial presentation of scientific information to justify a narrow range of conservation measures that will be imposed as land use regulations by the BLM.

1.4) The NTT report represented a narrowing of policy and management alternatives. Provided below is an excerpt from March 23, 2012 comments by the American Petroleum Institute to the BLM regarding "Notice of Intent, December 9, 2011, To Prepare Environmental Impact Statements and Supplemental Environmental Impact Statements To Incorporate Greater Sage-Grouse Conservation Measures Into Land Use Plans and Land Management Plans."

A National Sage Grouse Strategy should lead to broadening rather than narrowing policy and management alternatives.

As noted by a well-known scholar of science and science policy (Pielke 2004):

"*Addressing the significance of science for decision making requires an ability to clearly distinguish policy from politics. For science, a policy perspective implies increasing or elucidating the range of alternatives available to decision makers by clearly associating the existing state of scientific knowledge with a range of choices. The goal is to enhance freedom of choice. By contrast, a political perspective seeks to decrease the range of alternatives (often to a single preferred option) available to policy makers, i.e., to limit the scope of choice."*

From the API comments:
"Ideally, development of a National Sage Grouse strategy would involve the development of a range of policy alternatives that are informed by science. In contrast, the BLM's National Technical Team appears to be narrowing the range of policy alternatives, based upon blanket setback distances, NSO requirements, and seasonal restrictions. The strategy must respect outstanding commitments and agreements between BLM and its multiple use constituents such as leases, permits, ROWs and conditions of approvals for projects that have been approved by BLM.

Failure to do so would only lead to litigation and provide a disincentive to the BLM and companies to innovate in ways that address the underlying causes of specific threats and that will benefit sage grouse and responsible development of oil and gas in the long run. API recommends that alternatives be developed which promote development and application of innovative approaches to management of oil and gas resources within Greater Sage-grouse habitats."

1.5) Additional API comments identify the NTT's specific narrowing of alternatives on the unleased and leased fluid mineral estate:

Unleased Federal Fluid Mineral Estate: a narrowing of alternatives
Two narrow alternatives are presented, Alternative A: closing priority sage grouse habitat areas to fluid mineral leasing, and Alternative B: allowing leasing when there is checkerboard ownership and a mitigation plan developed that will bring long-term population increases. Alternative B does not acknowledge that it may not be possible to meet the condition that the sage grouse population in the proposed lease area be increased through mitigation above its current number (i.e. because it is already high, prior to leasing). A more reasonable set of alternatives would include a range of population level responses that take into account natural population fluctuations (e.g. an expected percentage of change over current number over the life of the field). Also, alternatives are needed that address not only population and habitat variables but also the socioeconomic impacts associated with reduced oil and natural gas production from the federal mineral estate.

Leased Federal Fluid Mineral Estate: a narrowing of alternatives
As we had noted earlier, the 3% threshold, a four-mile NSO around leks, and seasonal restrictions are unnecessarily restrictive in light of available scientific information. They do not address the underlying and mitigatable cause and effect mechanisms that can result in impacts to sage grouse.

1.6) If the BLM is to develop a truly objective and effective conservation strategy for sage grouse, the following alternatives need to be considered:

1.6.1) Conservation measures and BMPs must be organized around specific threats to sage grouse and address their cause and effect mechanism(s).

1.6.2) A broader range of conservation alternatives and a greater diversity of choices needs to be available for decision-makers to implement conservation alternatives suitable to local conditions.

1.6.3) All scientific information and data, not just selective use of information, needs to be made available and considered by the BLM in developing the science based conservation alternatives. The agency must employ a strong inference approach (hypothesis testing) rather than rely on subjective opinions and selective use of information.

1.7) The following API comment succinctly provides the solution to NTT Report's lack of objectivity and scientific inference:

A strong inference approach is needed to address threats to sage grouse
In addressing threats identified by the US Fish and Wildlife Service (FWS), we propose that the BLM formulate multiple, alternative hypotheses regarding the specific cause and effect mechanisms of each threat. Then the agency should deduce testable (e.g. potentially falsifiable) predictions, and establish thresholds for testing these against the available scientific data. This strategy of strong inference has the greatest potential for rapid advancement of scientifically informed decision making (Platt 1964; Rehme et al. 2011). This is especially important to adaptive management as proposed by the BLM. API believes that if BLM elects not to employ this approach, the agency must disclose in the strategy and subsequent RMP amendments the scientific uncertainty that is present concerning specific cause and effect mechanisms affecting Greater Sage-grouse persistence.

Organize BMPs around threats
A more potentially effective strategy for developing conservation measures (including BMPs) is to organize them in such a way that they address the specific cause and effect mechanisms that underlie each threat that is potentially deleterious to sage grouse. In this way, BMPs may be seen as a set of alternatives that can be used singly, or in combination, to address specific threats, as local circumstances require. An example of this approach is described in the text and Table 1 of Ramey, Brown, and Blackgoat (2011).

Site specific conditions must be taken into account
We hope that the BLM will acknowledge the importance of site-specific conditions in determining the most effective and efficient mitigation that can be applied. For example, topography influences sound transmission, while the technology being employed at a production site affects all aspects of noise being generated, including time on site, staffing needed, and amount of truck traffic. Therefore, taking into account local conditions can increase the options available for effectively mitigating oil and gas development.

Tracking and testing effectiveness of BMPs
There is currently no administrative mechanism at the BLM that allows the agency to track and test the effectiveness of previously required Best Management Practices (BMPs). Establishing such a database and making it public would provide a good starting point for the evaluation of any existing or newly proposed BMPs.

Compare the effectiveness of current versus proposed BMPs
Prior to new BMPs being imposed, it would be advisable for the BLM to describe why currently required BMPs are inadequate, as compared to new ones (such as those proposed in Appendix D). This approach would provide a more defensible scientific basis for any new BMPs.

2) The NTT report is biased.

2.1) The NTT report presents a biased view of oil and gas development: "*that impacts are universally negative and typically severe.*" The NTT report selectively presented information, while ignoring information contrary to their preferred conservation measures, including information that was presented to the NTT during their August 2011 meeting. As a result, three key assertions in the NTT report are both biased and in error.

Those assertions include:

> *The primary potential risks to sage grouse from energy and mineral development are:*
>
> *1) Direct disturbance, displacement, or mortality of grouse.*
>
> *2) Direct loss of habitat, or loss of effective habitat through fragmentation and reduced habitat patch size and quality.*
>
> *3) Cumulative landscape-level impacts (Bergquist et al. 2007, Walston et al. 2009, Naugle et al. 2011). There is strong evidence from the literature to support that surface disturbing energy or mineral development within priority sage grouse habitats is not consistent with a goal to maintain or increase populations or distribution. None of the published science reports a positive influence of development on sage grouse populations or habitats. Breeding populations are severely reduced at well pad densities commonly permitted (Holloran 2005, Walker et al. 2007a). Magnitude of losses varies from one field to another, but findings suggest that impacts are universally negative and typically severe.*

This statement is not supported by the data. Instead, it is based upon:

a) A subjective interpretation of results by the authors of the cited studies (i.e., where no hypothesis testing was used).

b) The frequently repeated but erroneous assumption that a temporary decrease in lek counts immediately adjacent to active wells is equivalent to a population decline. (The alternative hypothesis, that displacement from affected leks is temporary or that birds, particularly juveniles, relocate elsewhere, was not considered.).

The NTT report cannot cite statistically valid population estimates from multiple populations that show declines specifically due to oil and gas development because no such data exist.

2.2) The NTT report does not present any credible description of the specific mechanisms that explain *why* sage grouse could be affected to the point that

population declines could occur. This is a key issue addressed in the scientific review published by Ramey, Brown, and Blackgoat (2011). In that paper, the authors articulate the specific cause and effect mechanisms that underlie each threat, as well as the experimental data required totest them, and the specific types of mitigation required to ameliorate them. The NTT report, in contrast, made unsupported blanket statements and regulatory prescriptions that did not address specific threats and their underlying mechanisms.

2.3) Contrary to assertions made in the NTT report, data and analyses from the State of Wyoming (available to the NTT), show that population trends across that state synchronously fluctuate, showing peaks in male lek attendance in 2000 and 2007. Additionally, the most heavily developed region, the Upper Green River Basin (Pinedale Planning Area) has consistently been above state-wide trends in male lek attendance (Wyoming Game and Fish 2012). Additionally, the earliest study cited in support of the blanket approach (Holloran 2005) did not acknowledge that the BLM had intentionally waived stipulations on the Pinedale Anticline in order to facilitate research on impacts without these stipulations. Therefore, the impacts reported by Holloran (2005) do not correspond to impacts under stipulations required at the time, nor account for current (and dramatically reduced) impacts under more recent and stringent stipulations. And finally, Holloran's (2005) population scenarios and predictions of population decline have simply failed to come true (see additional discussion of this issue in Section 6 below), yet the NTT report continue to rely on this falsified information. If conservation measures are to be science-based, all evidence must be taken into account, including contrary evidence. The NTT report has failed in this most basic requirement of science.

2.4) The NTT report recommendations relied on research from past periods dominated by intense drilling in heavily developed areas (e.g. Pinedale), and where older, denser development (e.g. Jonah field) and more invasive technologies were used, along with little mitigation or no restoration (see Ramey et al. 2011 for an extensive review).

2.5) While sage grouse have been found to avoid areas of intensive development, such avoidance is not uniform among locations, or among individual birds, especially when there is a lower density of development, or in older fields that have already been developed (Harju et al. 2010; Taylor et al. 2010; Ramey et al. 2011). The impact of the oil and gas operations on sage grouse is not as clear-cut, nor as negative, as the NTT report claims.

2.6) The NTT report did not cite either Taylor et al. (2010) or Ramey et al. (2011) even though both of these papers were made available to the BLM (for additional information, see comment 3.4 below).

2.8) The issue of independence and transparency was raised previously in public comment (by the American Petroleum Institute) but not subsequently addressed by the BLM. Below is an excerpt from March 23, 2012 comments by the American

Petroleum Institute to the BLM regarding "Notice of Intent, December 9, 2011, To Prepare Environmental Impact Statements and Supplemental Environmental Impact Statements To Incorporate Greater Sage-Grouse Conservation Measures Into Land Use Plans and Land Management Plans."

Greater independence, diversity, and transparency in the scientific advice relied upon by BLM will benefit sage grouse conservation in the long run.
BLM should take this opportunity to seek greater independence and breadth of opinion and expertise in the review and application of scientific information to support development of sage grouse management policy, conservation measures, adaptive management, and BMPs. By recognizing the more diverse scientific and technical expertise available, the BLM can increase the number of management options available for consideration, as well as increase the overall effectiveness of its National Sage Grouse Strategy.

At present, a small number of sage grouse specialist/authors have had what appears to be a disproportionate influence on formulating federal policy on sage grouse, which has also limited the diversity of opinions and expertise available to decision makers. This includes the recent and highly Influential Greater Sage-Grouse: Ecology and Conservation of a Landscape Species and Its Habitats (Knick and Connelly 2011). This monograph figured prominently in the "warranted but precluded" Endangered Species Act (ESA) listing decision on sage grouse and in the recent NTT Report.

Neither of these documents employ a hypothesis testing approach (or mention the term). The data used in several of the most influential monograph papers are not publicly available, which precludes an independent assessment and is contrary to the Information Quality Act, Department of Interior's information quality guidelines (requiring that reproducibility "shall generally require sufficient transparency about data and methods that an independent reanalysis could be undertaken by a qualified member of the public," (Department of Interior 2002)), as well as recent White House policy directives (Obama 2009; Holdren 2010, 2011).

The review standards established by the National Academies address these issues and may be found at http://www.nationalacademies.org/coi/index.html. By implementing these standards, National Academy of Sciences has sought to diversify its review panels with independent experts from diverse disciplines and backgrounds in order to "conceive new ways of thinking about a problem" and "to provide a balance of perspectives." Because the effects from future RMP amendments will potentially affect multiple use constituents and state economies, API strongly recommends that BLM adopt these review standards for future activities related to the development of a National Sage Grouse Strategy.

2.9) Comments by one of the most influential members of the NTT could be construed as having a less than objective viewpoint.
NTT e-mails written by a highly influential member of the NTT and sage grouse program

leader for the USFWS, Dr. Pat Diebert, were obtained from a FOIA request by the State of Idaho. In several of these communications, Diebert referred to herself in as *Gorilla Woman*, an apparent self-comparison to the impassioned, gorilla advocate/researcher, the late Dian Fossey.

In the e-mails (below), Diebert expressed the following opinions:

1) against regulatory assurances provided by instructional memoranda,
2) for greatly expanded buffers around priority habitat,
3) for greatly expanded buffers around leks,
4) for a requirement that off-site mitigation be required for existing leases (that would have been illegal if implemented),
5) for arbitrary addition of grazing restrictions, and
6) against non-lethal wild horse and burro management**.**

2.9.1) In the following passage (on page 1135), Diebert apparently did not consider Instructional Memoranda (IMs) to be enough of a regulatory mechanism for the conservation of sage grouse, without addressing the specifics of these or whether they meet the standards of PECE policy.

*"Comment [p6]: I think this was placed here as a reminder that the IM already calls for this. But, it shows up again later***. My only concern is again, that IMs are not enough for regulatory mechanisms.** *If this reference is for more than a reminder/placeholder, policy is necessary. [Deibert]"*

2.9.2) The following proposed addition by Diebert (on page 1135) called for an additional buffer to surround designated priority habitat. This recommendation was made without reference to any data. This recommendation did not make it into the final NTT:

"Priority habitats must include a buffer along their outer perimeter (but within the designated priority habitats) to reduce or remove the impacts from development occurring outside priority areas. The conservation benefit of priority habitats, particularly small ones, could be negated if development outside, but adjacent to those areas results in negative impacts to sage-grouse within the priority habitats, even though the priority habitats are not directly impacted. [Deibert]
Comment [UF&WS8]: This is added after discussions with folks regarding surface disturbance. It's a key point that should not be lost (although it might be better worded!)."

2.9.3) In the following passage (page 1138), a recommendation was made for offsite mitigation (on existing leases) and that this recommendation was "science-based" when no data or supporting scientific literature were cited:

"Route construction within priority habitat areas will be limited to realignments of existing designated routes to enhance other resources only if that realignment maintains or enhances sage grouse habitat. Use existing roads, or realignments as described above, to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then any new road constructed must be built to the absolute minimum standard necessary, and the surface disturbance added to the total disturbance in the priority area. ***If that disturbance***

exceeds 2.5 % for that area, then off-site mitigation is necessary (see discussion above). [Deibert] (~~subject to valid existing rights requiring access~~) [Deibert]– {science based}" [Note: the text strike outs were inserted by Diebert.]

2.9.4) Note that earlier on this same page, there was a suggested arbitrary cap on route density, based on so-called professional judgment, that is nothing more than subjective opinion: *"Reduce route density to a maximum of 2 mi/mi2) in priority sage-grouse habitat areas. (citation/professional judgment)"*

2.9.5) In the following passage (page 1142 of FOIA response), Diebert apparently attempted to expand the NTT report recommendation to include a 12-mile radius buffer around leks (or a total of 452 square miles surrounding *each* lek). This proposed change was made without any sound scientific basis. If implemented, a 12 mile radius buffer would encompass an area nearly 400 times larger than that current 0.6 mile buffer and 9 times the land surface area of the NTT's final proposed 4 mile buffer.

*"Managing landscapes (12 mile radius around leks) of priority habitats for 70% sagebrush and 30% potential habitat approximates the amount of sagebrush habitat necessary for increased likelihood of habitat use, nest success, and population persistence (citations).Within priority sage-grouse habitat areas where current sage-grouse habitat is less than 70%, the conservation focus for habitat restoration should include an objective that achieves >70% of sage-grouse habitat in advanced structural stages and appropriate amounts of understory vegetation relative to site potential. (citation) The remaining 30% ~~could include areas of juniper encroachment, non-sagebrush shrublands that are~~ ~~periodically used by sage-grouse, annual grasslands, degraded native plant communities,~~ ~~and non-native perennial grasslands that potentially can be rehabilitated or enhanced and~~ ~~is capable of supporting sagebrush or currently helps to maintain sage-grouse~~**. [Deibert]"***

2.9.6) In the following passage (from page 1143), Diebert added llamas and alpacas to the grazing species that need to be managed for sage grouse, even though there is no scientific research cited that suggests these species are an issue for sage grouse. It appears that this recommendations was based entirely on her and R. Sell's (BLM) personal opinions. Similarly, a third member of the team (D. Kemner) added goats to this list.

"Implement management actions (grazing decisions, AMP/Conservation Plan development, or other agreements) to modify grazing management to meet seasonal sage-grouse habitat requirements. Consider singly or in combination changes in: 1) Season or timing of use, 2) Numbers of livestock, 3) Distribution of livestock use, 4) Intensity of Use , and Type of Livestock (cattle, sheep, horses).
Comment [p34]: *Do we want to add llamas and alpacas here? We see a lot of that in WY. [Deibert]*
Comment [p35]: *Good addition- keep. [RASell]*
Comment [p36]: *Add goats [DKemner]"*

Additionally, the NTT report exhibited poor scholarship in citing Briske et al. (2011) in support of these restrictions, as Briske et al. (2011) makes no mention of horses, llamas, alpacas and goats, at all. This is another example of how the NTT simply sprinkled

references into the text to support preferred conservation measures (i.e. predetermined conclusions.)

2.9.7) In the following e-mail excerpts (on page 1145), Diebert indicates what could be construed as a preference for lethal management of wild horses and burros (*"here are my non-violent offerings"*) contrary to current and humane BLM management of these species under the Wild Horse and Burro Act. And, suggested language to exclude corrals, traps, helicopter landing pads from sage grouse priority habitats, all of which would otherwise aid in the management of wild horses and burros in ways that would be compatible with sage grouse:

> *"Do not permit staging areas for wild horse round-ups (i.e. corrals, traps, helicopter landing pads) in sagegrouse priority habitats.*
> *Where wild horses and burros are having detrimental effects on sage-grouse habitats implement appropriate range management projects to reduce these impacts (e.g. fencing, water developments). These projects should be placed outside sage-grouse priority habitats. If that is not possible, then the projects should not result in further damage to sage-grouse or their habitats. [Deibert]* ***[Comment [p41]: I don't know all the right BLM language, but here are my non-violent offerings.]****"*

2.10) Voluntary conservation efforts on private land were treated as inferior to federal land acquisition and management by the NTT report.

2.8.1) The NTT report assumes that voluntary conservation measures on private land are inferior to federal land management, and requires a regulatory "command and control" approach, including the transfer of private lands into the federal domain (land tenure adjustment). Similarly, the NTT assumes that local and State sage grouse plans are similarly inferior as there is no mention of these in the NTT report and reference to appropriate regional plans and involvement of stakeholder groups was deleted from the draft cover letter on Instructional Memoranda as follows:

> *"All RMPs containing Greater Sage-grouse occupied habitat must consider these measures, including when the plan is being revised, amended, or supplemented.*
> *~~following regionally-appropriate, science based conservation measures shall be incorporated into BLM land use planning efforts, utilizing coordinated and cooperative stakeholder engagement~~."*

[Note: this excerpt is from page 1,499-1,500 of the attached file, SG NTT Emails Fall 2011 Attachments_Redacted.pdf.]

The importance of voluntary conservation on private land and its contribution to species recovery has been recognized by numerous scholars of the Endangered Species Act, including the current Deputy Assistant Secretary of Fish and Wildlife and Parks, Michael Bean, who has authored multiple papers on the subject (i.e., Bean 1998, 1999, 2002).

2.10.2) The NTT report's bias against conservation on private land is contrary to the numerous published papers by ESA scholars for voluntary conservation incentives on private land, rather than typical federal regulatory "command and control" which has failed in large measure to recover species (Adler 2008, 2011; Baur et al. 2009; Bean 1998, 1999, 2002; Keystone Center 2006; Paulich 2010; and most recently, Ruhl 2012). In addition, there is a broad range of first and second generation conservation measures

available to private landowners and cooperating agencies, beyond conservation easements. These are detailed below. None of these were discussed as viable alternatives to federal acquisition of private land or encumbering it in perpetuity with conservation easements (as recommended in the NTT Report). The list below illustrates the broad range of incentive-based conservation alternatives available for private land but not considered in the NTT report:

First Generation Incentive Mechanisms
1. Habitat Conservation Plans
2. Safe Harbor Agreements
3. Candidate Conservation Agreements
4. Candidate Conservation Agreements with Assurances
5. Fee simple acquisition

Second Generation Incentive Mechanisms
Conservation Easements:
6. Conservation Easements (in perpetuity, tax benefit)
7. Term conservation Easements (i.e., 20 to 30 years, no tax benefit))
8. Post development and restoration conservation easements (currently used on some reclaimed mine sites in Colorado)

Market-Based Approaches:
9. Subsidies/tax credits in exchange for specific conservation efforts
10. Conservation Banking
11. Tradable development rights
12. Conservation leasing

Information-Based Programs:
13. Technical assistance for private land conservation, mitigation, and habitat enhancement
14. Government-private quasi-partnerships and collaborative planning efforts

Performance-Based Programs:
15. Performance bonds (promotes innovation and is suited to local conditions rather than relying on one-size-fits-all restrictions)

2.11) This issue above was raised previously in public comment (by the American Petroleum Institute) but not subsequently addressed by the BLM. Provided below is an excerpt from March 23, 2012 comments by the American Petroleum Institute to the BLM regarding "Notice of Intent, December 9, 2011, To Prepare Environmental Impact Statements and Supplemental Environmental Impact Statements To Incorporate Greater Sage-Grouse Conservation Measures Into Land Use Plans and Land Management Plans."

Land tenure adjustment: is non-federal land management inferior?
The proposed conservation measures assume that non-federal land management

(private or state lands) is inferior to federal land management. This view is contrary to what has been espoused as the "new paradigm" of cooperative conservation (and is in fact reflected in a recent FWS solicitation for public comments on the subject of incentives for voluntary conservation actions under the ESA, at Federal Register Volume 77, Number 51 (Thursday, March 15, 2012) at Pages 15352-15354. The transfer of private lands to federal ownership also reduces the property tax base, thus impacting local communities.

This is a key issue to many stakeholders because the NTT appears to be insensitive to private landowners who may not wish to encumber their land, but also the needs of local governments that seek to maintain their property tax base (rather than have private lands acquired by the federal government).

3) Errors of omission

3.1) The NTT Report did not acknowledge or make use of best available scientific and commercial data in its report, specifically that which shows the substantially lessened impacts of oil and gas operations on sage grouse as a result of new technologies and BMPs that address specific threats.

3.1.1) The NTT Report omitted mention of information provided to them during their meetings. Most importantly, in Appendix 5 of the NTT meeting notes of August 2011, a powerpoint presentation titled: *Managing Oil and Natural Gas* was presented. This presentation was included in the meeting notes that were released under FOIA. The presentation documented the BLM's process for permitting drilling, as well as: 1) documentation of interim reclamation, 2) final reclamation and restoration, 3) fluid mineral conservation measures in priority sage grouse habitat, 4) best management practices (BMPs) to minimize wildlife habitat fragmentation and loss on local and landscape levels, 5) reductions in pad size to minimize disturbance, 6) use of oak and plastic mats, 7) interim reclamation of well pads, 8) interim reclamation of roads, 9) development planning to reduce impacts, 10) use of directional drilling and multiple wells drilled from one pad, 11) one point of access for each well pad, 12) burial of water, gas, and electrical lines, 13) the use of liquids gathering systems to reduce truck traffic, noise, disruption of wildlife and the fragmentation of their habitat.

3.1.2) The NTT Report also failed to mention readily available technical information on modern oil and gas well technology and wildlife mitigation best management practices, including that which *had been compiled by the BLM* and released on its website:

http://www.blm.gov/bmp/technical info_pdfs_ppt_text/WO1_WildlifeMgmt_BMPs_Slideshow.pdf

http://www.blm.gov/bmp/Technical_Information.htm

3.1.3) This issue was raised previously but not addressed by the BLM. Provided below is

an excerpt from March 23, 2012 comments by the American Petroleum Institute to the BLM regarding "Notice of Intent, December 9, 2011, To Prepare Environmental Impact Statements and Supplemental Environmental Impact Statements To Incorporate Greater Sage-Grouse Conservation Measures Into Land Use Plans and Land Management Plans:"

A National Sage Grouse Strategy should consider innovations in oil and gas operations that have reduced the impacts of these operations on habitats and wildlife.

The NTT appears to be unfamiliar with technologies developed and currently in use by the oil and gas industry that are designed to increase efficiency and safety of operations, while simultaneously reducing environmental impacts. A contributing factor to this lack of familiarity is the fact that the majority of studies on oil and gas industry impacts are based upon decades old technology in intensively developed areas. As noted in a recent paper on the subject,

> *"Current stipulations and regulations for oil and gas development in sage grouse habitat are largely based on studies from the Jonah Gas Field and Pinedale anticline. These and other intensive developments were permitted decades ago, using older, more invasive technologies and methods. The density of wells is high, largely due to the previous practice of drilling many vertical wells to tap the resource (before the use of directional and horizontal drilling of multiple wells from a single surface location became widespread), and prior to concerns over sage grouse conservation. This type of intensive development set people's perceptions of what future oil and gas development would look like and what its impact to sage grouse would be. These fields, and their effect on sage grouse, are not necessarily representative of sage grouse responses to less intensive energy development. Recent environmental regulations and newer technologies have lessened the threats to sage grouse."* (Ramey, Brown & Blackgoat 2011).

The strategy and subsequent revisions or amendments to RMPs should incorporate information and knowledge not only from experts in wildlife biology but also engineers and other industry specialists who develop and implement the types of technological innovations that improve the efficiency of oil and gas operations and reduce their environmental impacts.

3.4) The NTT Report did not cite or otherwise make use of a key scientific review paper by Ramey, Brown, and Blackgoat (2011) *"Oil and gas development and greater sage grouse (Centrocercus urophasianus): a review of threats and mitigation measures"*, even though copies of this paper were personally handed to Director Abbey and Assistant Director Poole by the lead author on September 16, 2011. The paper, was published in 2011 in *The Journal of Energy and Development* (Volume 35, Number 1, Pages 49-78).

3.5) The NTT Report virtually ignored one of the primary threats to sage grouse: predation.

Research has shown that the predators on sage grouse are generalists, meaning that they

prey on other species as well, and in some cases their populations are subsidized by human sources of food. Sage grouse eggs are preyed upon by red foxes, coyotes, badgers, ravens, and black-billed magpies. Common predators of juvenile and adult sage grouse include golden eagles, prairie falcons (as well as other raptors), coyotes, badgers, and bobcats. Younger birds (especially broods) are preyed upon by ravens, red fox, northern harrier, ground squirrels, snakes, and weasels. However, of these predators, ravens are the most abundant and have the greatest impact.

The NTT Report included an error of omission by ignoring a substantial body of literature about raven predation on sage grouse (and other species), its deleterious effect on survivorship and recruitment, and the integrated management strategies that can reduce losses of sage grouse. In fact, the word "raven" was mentioned only once in the NTT report (on page 63 and only in regards to suggesting that there be *"no tanks at well locations within priority areas (minimizes perching and nesting opportunities for ravens and raptors).*") Moreover, there were only two references to predation of any sort on sage grouse. In contrast, the body of literature ignored by the NTT Report includes but is not limited to: Boarman 1993; Boarman 2003. Boarman et al. 1995; Boarman and Heinrich. 1999; Boarman et al. 2006; Bedrosian and Craighead 2010; Bui 2009; Cagney et al. 2010; Christiansen 2011; Coates 2007; Coates and Delehanty. 2004; Coates et al. 2008; Coates and Delehanty 2010; Conover et al. 2010; Cote and Sutherland 1997; DeLong 1995; Gregg et al. 1994; Heinrich et al. 1994; Moynahan et al. 2007; Preston 2005: Ramey, Brown, and Blackgoat 2011; Schroeder and Baydack. 2001; Snyder et al. 1986, Sovada et al. 1995; Watters et al. 2002; and Webb et al. 2009. The NTT Report avoided mention of management of predators on sage grouse in areas of greatest risk of predation, and chose instead to treat this threat as a byproduct of human activities that can be regulated (i.e. land health assessments and emphasizing vegetation cover as a means to measure and mitigate livestock use; or increasing landscape level habitat connectivity). Such passive control will do nothing to reduce the immediate and long-term threat of high raven populations. In the same way, the NTT Report's recommended conservation measures fail to address the fundamental fact that predators, such as ravens (a major predator on sage grouse eggs and broods), are heavily subsidized by humans, to the point where they exceed historic levels in some areas by as much as 1,500%. In such cases, management of some predator populations, especially where predators like ravens are abundant and sage grouse mortality is high, is needed to ensure that sage grouse populations are not depressed by a known and easily mitigated source of mortality.

This point is underscored by the fact that USDA-APHIS Animal Damage Control began controlling ravens in landfills across southern Wyoming in 2012 at the request of the Wyoming Game and Fish Dept., using the avicide DRC-1339 (Wyoming Game and Fish 2012, USDA/APHIS/Wildlife Services 2013). Large raven populations cause a variety of health and safety problems at landfills and industrial sites, and the food subsidy that ravens gain from these also results in a higher than natural population density of this species.

Ravens are clever and highly adaptable in their behavior, which allows them to opportunistically exploit food resources associated with humans (e.g. landfills, road kill,

unattended food, and in some cases, livestock operations). As a result of these and other unintended food subsidies, raven populations have greatly expanded in the West. This, in turn, has impacted many species, including desert tortoises, marbled murrelets, least terns, California condors, and sage grouse. While reducing subsidies available to predators is one approach, it is unlikely to be effective unless coupled with active / lethal control of raven populations (Coates and Delehanty 2010). Case in point, Coates and Delehanty (2004), reported a 73.6% nest success in sage grouse following raven control compared to a mean expected nest success of 42.6% (based on 14 studies from 1941-1997).

The BLM cannot rely on the selective use of information, nor should it ignore a major body of literature and experimental data on predator management.

3.6) Recommendations for management of priority habitat were made without any quantification of priority habitat or consistent definition of what constitutes an active lek. Under *Objectives*, the NTT Report fails to provide any quantifiable, biological basis for areas that are considered to be priority sage grouse habitats that they propose to protect from anthropogenic disturbance with recommended conservation measures. For at least one of the components of priority sage grouse habitats, migration and connectivity corridors, the NTT Report admits on page 52 that they cannot be defined: *"Almost no information is available regarding the distribution and characteristics of migration corridors for sage-grouse (Connelly et al. 2004)."*

The significance of this data deficiency is clear and has far reaching implications:

3.6.1) First, without a precise definition or clear cut criteria, there is potential for large areas that have a zero or near zero probability of sage grouse use to be defined as essential to migration and connectivity, even though there may be no empirical data demonstrating their regular use by sage grouse or their importance to population viability. This has the secondary effect of diverting resources away from higher priority habitat and threats of greater importance, while imposing unnecessary and scientifically indefensible regulatory burdens, as detailed in our analysis of the proposed 4-mile buffers and 3% NSOs.

3.6.2) Second, data show that sage grouse behavior can be affected by certain types of anthropogenic disturbance more than others, which can result in localized avoidance, but the effect of any of these disturbances or development on migration rates is unknown. However, data from Lyon (2000), Bush (2009), Tack et al. (2011), and more recent papers, all reveal that sage grouse traverse (fly) over or around roads, agricultural areas, and oil and gas development, and distances up to 300 km from their natal lek.

3.6.3) Third, experience with other ESA listings has shown that imprecisely defined characterizations of essential habitat, such as "priority habitat," have a strong likelihood of being re-designated as "critical habitat." This means that errors and flawed scientific analyses become institutionalized in regulatory decisions, regardless of their lack of accuracy. And once such designations are institutionalized, they are difficult to revise, even when new data become available. Inevitably this results in litigation to correct the

errors, such as the case of *Agua Caliente vs. Scarlett* (bighorn sheep critical habitat was reduced by nearly half because it was not scientifically or legally defensible).

4) The NTT Report's recommendations are based upon outdated information

4.1) In addition to the outdated information and perceptions regarding the oil and gas industry (identified above), and errors of omission (identified above), the NTT Report relied on outdated information and perceptions regarding the dispersal ability of sage grouse, which have been grossly underestimated. Recent research, using genetics and GPS tracking devices, has revealed that sage grouse disperse, and in some cases migrate, over much greater distances than previously thought. The implications of this increased dispersal ability for management of the birds are that: 1) there is greater genetic and demographic connectivity of populations than previously thought, and 2) that sage grouse disperse over or around roads, rivers, agricultural fields, and oil and gas development. Collectively, this new information changes how populations are defined, namely that models previously relied upon (i.e. Knick and Hanser 2011), which underestimate this dispersal ability, are in error.

The following excerpt illustrates the emphasis on connectivity in the NTT Report, and reliance on Knick and Hanser (2011):

- Conserve, enhance or restore sage-grouse habitat and connectivity (Knick and Hanser 2011) to promote movement and genetic diversity, with emphasis on those habitats occupied by sage grouse.

- Assess general sage-grouse habitats to determine potential to replace lost priority habitat caused by perturbations and/or disturbances and provide connectivity (Knick and Hanser 2011) between priority areas.

- These habitats should be given some priority over other general sage-grouse habitats that provide marginal or substandard sage-grouse habitat.

- Restore historical habitat functionality to support sage-grouse populations guided by objectives to maintain or enhance connectivity. Total area and locations will be determined at the Land Use Plan level.

- Enhance general sage-grouse habitat such that population declines in one area are replaced elsewhere within the habitat.

Despite their obvious importance, the contrary scientific studies were not cited in the NTT Report.

Provided below is a succinct summary of this issue and a necessary correction that was previously identified by the American Petroleum Institute in their March 23, 2012 comments to the BLM:

Sage grouse dispersal occurs over greater distances than previously thought, and this has implications for the NTT's proposed conservation measures

We acknowledge that managing habitats to retain connectivity is an important long-term goal of conservation efforts for many species, including sage grouse. However, it is clear that the dispersal abilities have been consistently underestimated in the development of habitat use and population persistence models (i.e. Garton et al. 2009, 2011; Knick and Hanser 2009, 2011; Makela and Major 2011). Therefore, it is important for the BLM and the NTT to acknowledge recent genetic data and results by Bush (2009) and Bush et al. (2011). These studies utilized assignment tests to identify the source population of sage grouse that had dispersed, and isolation-by-distance measures to quantify the overall degree of genetic linkage among populations. In addition, ongoing studies (including Tack et al. 2011) have employed satellite global positioning system transmitters that have revealed dispersal of sage grouse over much greater distances and more frequently than previously thought. These studies are highly significant to the BLM's conservation efforts for the following reasons:

1) Male and female sage grouse disperse and migrate over greater distances (many over 100km and some up to 300 km) than documented by traditional radio tracking studies, thus requiring a recalibration of assumptions used in habitat connectivity models (Lyon 2000; Bush 2009; Tack et al. 2011; Thompson 2012).

2) Sage grouse are capable of dispersing long distances and are able to do so over and around areas of fragmented habitat and human development. This means that presumed movement corridors do not necessarily require the same high-level of protection as Priority Habitat and could be classified as General Habitat or as a third, less restrictive category that takes into account this new information.

3) A higher level of long distance dispersal and a greater genetic linkage among sage grouse populations, even across fragmented landscapes and among peripheral populations, indicates that extinction predictions that figured prominently in the ESA listing decision (Garton el al. 2009, 2011) were overestimated. This is because long distance dispersal and gene flow (even when as low as one successful breeding migrant per generation among populations) will tend to maintain effective population sizes over time, as well as increase the potential for re-colonization should a population become locally extirpated.

4) The methodologies utilized by Bush (2009), Bush et al. (2011), Tack et al. (2011) could be used to identify the natural features and/or human development that result in absolute barriers to dispersal. In turn this will inform the type and extent of development that could proceed in habitat deemed important for connectivity.

More recent studies have revealed even greater connectivity of populations (i.e. Thompson 2012).

5) One size fits all neither benefits sage grouse nor local communities.

5.1) Conservation measures are tailored to local circumstances. The NTT Report recommended numerous one-size-fits-all regulatory prescriptions (i.e. four mile buffers, 3% percent anthropogenic disturbance thresholds, and BMPs), and made no allowance for recommendations to include county-level sage grouse conservation plans that tailor conservation measures to local conditions, including unique habitat and threats, and socio-economic conditions. Instead, the only "local" plans mentioned in the NTT Report are State-level plans.

The strategy of excluding local sage grouse plans and locally-appropriate conservation measures from the implementation of the NTT Report can also be found in Secretary Salazar's response to Chairman Hastings**:** *"The BLM believes that no single set of conservation objectives will apply across the entire multi-state range, or even within the area of a single state. Greater Sage-Grouse conservation efforts need to be defined at a local scale and be supported by the best available science." It is also inconsistent with DOI's response to question #12, " As noted in the NTT Report, in some cases conservation measures identified in the Report will need to be modified based on local ecological conditions or new information."*

The BLM violates its multiple use mandate if it follows the NTT' Report's one size fits all recommendations, focusing entirely on sage grouse and excluding local communities (as equals at the table) in developing locally appropriate conservation measures.

5.2) As proposed, the Best Management Practices (BMPs) listed in Appendix D are unnecessarily restrictive, are not supported by scientific information, and do not address specific cause and effect mechanisms that are known to be deleterious to

sage grouse. Additionally, no comparative analysis is provided that demonstrates the inadequacy of currently required BMPs under local conditions with those proposed in Appendix D. There is currently no administrative mechanism at the BLM that allows the agency to track and test the effectiveness of previously required BMPs. Establishing such a database and making it public would provide a good starting point for the evaluation of any newly proposed BMPs. It is arbitrary and capricious for the BLM to require untested BMPs while imposing new ones and additional (untested) conservation measures.

As noted previously, the BLM must organize BMPs around threats, and local, site-specific conditions must be taken into account to develop scientifically defensible conservation measures.

5.3) The NTT Report puts sage grouse above people and other resources in proposing to defend sage brush stands against fire. For example, *"On critical fire weather days, pre-position additional fire suppression resources to optimize a quick and efficient response in sage-grouse habitat areas."* If implemented, this NTT Report recommendation would represent a violation of BLM's multiple use mandate and a violation of the public trust in that agency to protect human life and property as its first priority.

This issue of putting fire suppression priority on sage grouse, above human life and property, was previously identified by the American Petroleum Institute in their March 23, 2012 comments to the BLM:

> **"Fuels Management: prioritization**
> It could be construed that the NTT Report may be putting the goal of sage grouse habitat preservation above the creation of fuel breaks that serve as defensible space to protect human safety and infrastructure. Before the BLM adopts this strategy they may wish to consider the social, economic, and environmental implications of a similar requirement that led to the loss of dozens of homes in Stephen's kangaroo habitat during a wildfire in 1993. Fuel breaks can also prevent the spread of fire from developed areas to sage grouse habitat, thus fuel breaks can serve as important conservation measures."

The advocacy of single-minded sage grouse experts in development of the NTT, under the banner of sage grouse conservation, not only violates the BLM's multiple use mandate, but could result in the institutionalization of bias against human safety and property in favor of sage grouse. The exclusion of local plans and local decision makers in the process further underscores this issue while undermining the BLM's mission: *"To sustain the health, diversity, and productivity of America's public lands for the use and enjoyment of present and future generations."*

6) Disturbance thresholds recommended by the NTT Report are arbitrary and do not have a sound scientific basis.
If conservation measures are to be science-based, all scientifically defensible alternatives

must be weighed, all evidence must be taken into account (including contrary evidence), and the studies that recommendations are based upon must be reproducible. As demonstrated below, the NTT Report resoundingly failed to do this in its recommendations regarding:

- 3% surface disturbance thresholds
- 4-mile NSO (no surface occupancy) buffers,
- noise limited to less than 10 decibels above 20-24 dBA, and
- 70% sagebrush cover in priority habitat.

6.1) The scientific "support" for 4-mile NSO buffers and 3% surface disturbance thresholds is based on the erroneous assumption that a temporary disturbance of sage grouse from a local area under development equates to a population decline.

6.1.1) It is incorrect for the NTT Report to claim that the cited studies "*present the most complete picture of cumulative impacts and provide a mechanistic explanation for declines in populations" when these studies never documented a population decline.* The

NTT report states, *"Long-term studies in the Pinedale Anticline Project Area in southwest*

Wyoming present the most complete picture of cumulative impacts and provide a mechanistic explanation for declines in populations. Early in development, nest sites were farther from disturbed than undisturbed leks, the rate of nest initiation from disturbed leks was 24 percent lower than for birds breeding on undisturbed leks, and 26 percent fewer females from disturbed leks initiated nests in consecutive years (Lyon and Anderson 2003)."

The NTT Report omitted the fact that Lyon and Anderson's (2003) data were inadequate for: 1) achieving statistical significance in comparisons of nest initiation and nest success in disturbed versus undisturbed areas, and 2) demonstrating a population decline. Instead, the presumed biological significance of their statistically insignificant results were based upon belief, as the following excerpt from Lyon and Anderson (2003) shows: *"Finally, even though nest initiation between disturbed and undisturbed hens was not statistically significant, we believe lower initiation rates for disturbed hens were biologically significant and could result in lower overall sage grouse productivity."*

Lyon and Anderson (2003) also stated that, *"Hens captured on disturbed leks demonstrated greater movements from capture lek to nest than hens from undisturbed leks. Hens from disturbed leks nested approximately twice as far from capture leks as did hens from undisturbed leks. Our random nest vegetation analysis indicated no significant differences in nesting habitat between disturbed and undisturbed areas, suggesting that nest habitat was not influencing sage grouse hen movements."* This is expected, as animals that are disturbed by human activity will sometimes move away from it. However, it does not mean that the result will be a population decline. The NTT Report failed to mention that there has been no deleterious, population-level effect reported by

these authors (i.e., decline in male lek attendance or overall abundance across the Pinedale Project Planning Area where most of the cited research occurred).

The NTT Report also fails to mention that Holloran (2005), using much larger sample sizes (n=213 vs. n=77), reported nest success that was virtually identical and not significantly different between disturbed and undisturbed areas, compared to Lyon and Anderson's (2003) results.

The IQA requires that information used by agencies be based upon verifiable and repeatable data, and not based upon opinion. Moreover, the NTT Report cannot selectively use results from Lyon and Anderson (2003) to support its recommendations, while failing to state that they were statistically insignificant and contrary to more recent and comprehensive data.

6.1.2) The NTT Report states, *"As development progressed, adult females remained in traditional nesting areas regardless of increasing levels of development, but yearlings that had not yet imprinted on habitats inside the gas field avoided development by nesting farther from roads (Holloran 2005). The most recent study confirmed that yearling females avoided infrastructure when selecting nest sites, and yearling males avoided leks inside of development and were displaced to the periphery of the gas field (Holloran et al. 2010). Recruitment of males to leks also declined as distance within the external limit of development increased, indicating a high likelihood of lek loss near the center of developed oil and gas fields (Kaiser 2006). The most important finding from studies in Pinedale was that sage-grouse declines are explained in part by lower annual survival of female sage-grouse and that the impact on survival resulted in a population-level decline (Holloran 2005)."*

The NTT Report, however, fails to mention several key facts about the Holloran (2005) study that are contrary to this statement. As an initial matter, Holloran (2005) was an unpublished dissertation that did not employ any hypothesis testing. Instead, Holloran (2005) used subjective interpretations of his results, or the equivalent of creating "just so stories" to explain results in light of a particular viewpoint. That is not science, it is subjective opinion.

Additionally, the following data quality issues are identified in the study by Holloran (2005) that are relevant to the BLM's continued reliance on it as a basis for decision making:

6.1.3) Holloran (2005) only speculated on potential causal mechanisms of population decline, as his data and study design were focused only on localized effects. Additionally, Holloran admitted that, *"Identifying causes of population declines has remained elusive."* And the "displacement theory" favored by Holloran (2005) does not provide any test of the hypothesis that local, temporary displacement of yearling sage grouse from areas under intensive development has led to population-level declines.

6.1.4) Holloran (2005) does not provide any data that population declines have occurred, or that density-dependent effects have occurred in nearby areas, only that the results suggest that these *might* occur or have the *potential* to occur. He wrote, *"The results from this study suggest that dispersal from developed areas could be contributing to population declines. Although the proportion of potentially displaced adult and yearling males and yearling females breeding and nesting in areas removed from gas field infrastructure is unknown, offsite populations could be artificially enhanced by gas development. Because of potential density-dependent influences on breeding and nesting success probabilities (LaMontagne et al. 2002, Holloran and Anderson 2005), maintenance of these enhanced populations could require increasing the carrying capacity of offsite habitats."*

Holloran (2005) also wrote that, *"Adult male displacement and low juvenile male recruitment appear to contribute to declines in the number of breeding males on impacted leks. Additionally, avoidance of gas field development by predators could be responsible for decreased male survival probabilities on leks situated near the edges of developing fields (i.e., lightly impacted leks). Although site-tenacious adult females did not engage in breeding dispersal in response to increased levels of gas development, subsequent generations avoided gas fields, as suggested by the temporal shift in nesting habitat selection and differences in habitat selection by yearling and adult females. This suggests that the nesting population response is delayed avoidance of natural gas development. The results suggest that male and female greater sage-grouse displacement from developing natural gas fields contributes to breeding population declines."* As one can readily see, this "strong science" relied upon by the NTT Report depends upon speculation, hypothetical worst-case scenarios coming true, and creating just-so-stories to explain results. It does not rely on hypothesis testing.

6.1.5) The NTT Report makes no mention of the fact that Holloran (2005, page 82, Table 2) reported that the probability of survival was predicted to be *higher* (61.5 $\pm$6.4%) in disturbed areas than in less impacted areas (29.6 $\pm$18.1%) or control areas (48.5 $\pm$14.4%). This result is contrary to Holloran's (2005) own assertions regarding supposed population impacts.

6.1.6) The NTT Report makes no mention of the fact that Holloran's (2005) predicted population declines (-8.7 to -24-4% annually) have simply failed to come true. Recent analysis of male lek-attendance trends by the State of Wyoming has instead found that the sage grouse population has been increasing since 1990, a clear refutation of Holloran's predictions of population decline. It is the litmus test of science that when such predictions fail to come true, the hypotheses/theories they are based upon are simply

wrong (Platt 1964). The BLM cannot rely on studies cited that have been so clearly falsified.

6.1.7) The purported impacts reported by Holloran (2005) were not based on full disclosure of the facts. Holloran (2005) did not acknowledge that the BLM had intentionally waived required mitigation stipulations on the Pinedale Anticline in order to facilitate his research on impacts to sage grouse *without* stipulations. It is a serious error of omission for the NTT Report to uncritically cite Holloran's (2005) conclusion that stipulations on the Pinedale Anticline were ineffective, when the stipulations were not actually in place. The BLM cannot rely on information that contains such errors of omission.

6.1.8) The NTT Report omits any mention of the fact that more recent and stringent stipulations are found in the Pinedale Planning Area, along with:

1) more extensive mitigation and restoration efforts in the Pinedale Planning Area (see http://www.wy.blm.gov/jio-papo/index.htm for a list of mitigation projects and data on surface disturbance and reclamation efforts),

2) advances in technology and efficiency documented in Ramey et al. (2011) and the BLM presentations to the NTT, "Managing Oil and Gas" and "Best Management Practices" (available in Appendix 5, pp 48-55 of the August 29 to September 2, 2011 meeting summary) have been implemented since Holloran's (2005) study was conducted (from 1997 to 2003).

All of the information above was available to the NTT, including copies of Ramey et al. (2011). It is a violation of the IQA for the BLM to base recommendations of the NTT Report upon information containing such errors of omission.

6.1.9) NTT failed to mention that Holloran (2005) did not provide any data that had shown a deleterious, population-level effect across the Pinedale Planning Area (i.e., Upper Green River Basin portion of the Wyoming basin population); nor any data showing consistently lower level of fitness for birds that nested father from roads.

6.2) The 3% anthropogenic disturbance threshold is based upon biased opinion and selective citation of information rather than data.

Provided below is an excerpt from March 23, 2012 comments by the American Petroleum Institute to the BLM regarding "Notice of Intent, December 9, 2011, To Prepare Environmental Impact Statements and Supplemental Environmental Impact Statements To Incorporate Greater Sage-Grouse Conservation Measures Into Land Use Plans and Land Management Plans."

"Professional judgment" and the 3% anthropogenic disturbance threshold

The "professional judgment" calling for a 3% anthropogenic disturbance threshold in priority habitats does not address specific threats, nor take into account the type of disturbance, local conditions, or mitigations that are to be used. This professional judgment is not the result of an independent quantitative assessment but is the opinion of a small number of collaborators who share a similar point of view.

Additionally, the earliest study cited in support of the 3% anthropogenic disturbance threshold (Holloran 2005), did not acknowledge that the BLM had intentionally waived stipulations on the Pinedale Anticline in order to facilitate research on impacts without these stipulations. Therefore, the impacts reported by Holloran (2005) do not correspond to impacts under stipulations required at the time, nor account for current impacts under more recent stipulations and BMPs. And finally, none of the authors cited in support of this professional judgment had removed the artifact of a natural cyclical population fluctuation that repeatedly occurs over a broad area during the course of this and other studies. If conservation measures adopted by the BLM are to be science-based, all evidence must be taken into account, including contrary evidence.

The cited studies (Johnson et al. 2011, and Naugle et al. 2011a,b) are not as definitive as claimed with regards to susceptibility of sage grouse to either discrete or diffuse disturbance. First, Johnson et al. (2011) utilized extremely weak statistical inference and there are simply not enough years of data to reliably support inferences with single variables, much less multiple variables. And, second, Naugle et al. (2011b) presented a partial review of the scientific literature on energy development and sage grouse. Naugle was an author on four of the seven reports and papers used in the review, and the majority of the papers focused on impacts to sage grouse in intensively developed areas.

Also, Walker et al. (2007) advocated for a 3% disturbance cap based upon opinion rather than data, *"...we* ***believe*** *the conservation strategy most likely to meet the objective of maintaining or increasing sage-grouse distribution and abundance is to exclude energy development and other large scale disturbances from priority habitats, and where valid existing rights exist, minimize those impacts by keeping disturbances to 1 per section with direct surface disturbance impacts held to 3% of the area or less."* However, Walker et al. (2007) did not test any percent disturbance caps. Instead they modeled sage grouse response in lek attendance in terms of *distance(s)* from potential sources of disturbance. Therefore, Walker et al.'s (2007) support for a 3% disturbance cap, represents nothing more than the opinions of the authors that were stated in the conclusions of the paper.

The BLM cannot rely on the biased opinions and selective presentation of information to support a recommendation that is unsupported by data.

6.3) The one well per section requirement lacks a sound scientific basis.

6.3.1) NTT Report failed to mention that Holloran (2005) made very specific recommendations regarding one well per section that were not based upon his testing of that threshold in his analysis. Holloran (2005) wrote, *"Maintaining well densities of ≤1*

well per 283 ha (approximately 1 well per section) within 2 mi of a lek could reduce the negative consequences of gas field development." However, Holloran (2005) did not test impacts at this density versus other well densities. Instead, he reported on leks affected by different numbers of impacts in each of four quadrants in the cardinal directions, and predictions based upon correlations at a scale of 3 km. Data, significance tests, and scatterplots of those correlative analyses were not reported by Holloran (2005), making the scientific rationale for his one-well-per-section not reproducible. The BLM cannot rely on unsupported opinion and irreproducible analyses as the basis for recommendations made in the NTT Report.

6.3.2) No mention is made in the NTT Report of the fact that five years after the original Holloran study was released (Holloran 2005), Holloran et al. (2010) did not document any population loss, only temporary displacement of sage grouse. Holloran et al. (2010) wrote the following about their results, *"Leks that recruited more than the expected number of males were significantly farther from drilling rigs, producing well pads, and main haul roads compared to leks that recruited fewer males than expected (Table 1). Additionally, leks that recruited more males than expected were significantly farther from main haul roads than leks that recruited the same number of males as expected."* In other words, only leks near the drilling rigs were affected and males from those leks tended to move to leks farther from active development. These missing males did not die off and the population did not crash, no negative demographic effect on the population was found. The BLM cannot rely on studies that purport to document a negative effect (i.e. Holloran 2005), yet consistently fail to do produce data that show such a negative effect.

6.3.3) The NTT Report continued with this biased summary of the literature, "*High site fidelity but low survival of adult sage-grouse combined with lek avoidance by younger birds (Holloran et al. 2010) resulted in a time lag of 3–4 years between the onset of development activities and lek loss (Holloran 2005). The time lag observed by Holloran (2005) in the Anticline matched that for leks that became inactive 3–4 years after natural gas development in the Powder River Basin (Walker et al. 2007a). Analysis of seven oil and gas fields across Wyoming showed time lags of 2–10 years between activities associated with energy development and its measurable effects on sage-grouse populations (Harju et al. 2010)." And that "Long-term studies in the Pinedale Anticline Project Area in southwest Wyoming present the most complete picture of cumulative impacts and provide a mechanistic explanation for declines in populations."*

However, there has been no decline in the sage grouse population in the Pinedale Planning Area (Upper Green River Basin). Instead, data and analyses performed by the Wyoming Department of Game and Fish reveal that between 1990 and 2012 there has been a consistent increase in sage grouse (measured in male lek attendance and male density per square mile; Wyoming Game and Fish 2012). The information relied upon by the NTT Report is simply wrong.

6.4) The 4-mile NSO does not have a sound scientific basis.

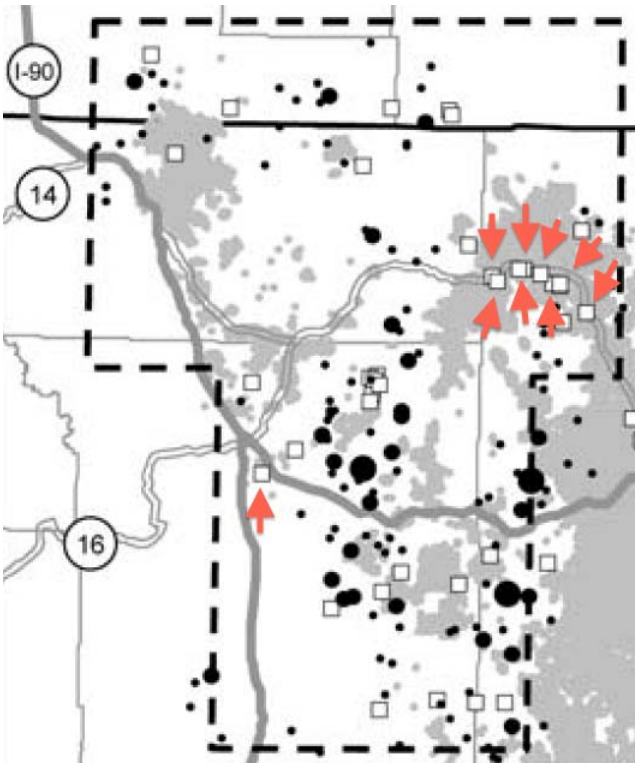
6.4.1) The NTT Report portrays the cited studies as documenting the negative effects of oil and gas development with a great deal of scientific certainty, *"Impacts as measured by the number of males attending leks are most severe near the lek, remain discernible out to >4 miles (Holloran 2005, Walker et al. 2007, Tack 2009, Johnson et al. 2011), and often result in lek extirpations (Holloran 2005, Walker et al. 2007). Negative effects of well surface occupancy were apparent out to 3.1 miles, the largest radius investigated, in 2 of 7 study areas in Wyoming (Harju et al. 2010). Curvilinear relationships show that lek counts decreased with distance to the nearest active drilling rig, producing well, or main haul road and that development within 3 to 4 miles of leks decrease counts of*

displaying males (Holloran 2005)." And, *"All well-supported models in Walker et al.*

(2007) indicate a strong negative effect, estimated as proportion of development within either 0.5 miles or 2 miles, on lek persistence. A model with development at 4 miles had less support, but the regression coefficient indicated that negative impacts within 4 miles were still apparent. Two additional studies reported negative impacts apparent out to 8 miles on large lek occurrence (>25 males; Tack 2009) and out to 11.7 miles on lek trends (Johnson et al. 2011), the largest scales evaluated." However, the NTT Report fails to mention any of the methodological issues with these studies (detailed in this IQA), or the fact that none reported a population-level decline in sage grouse (rather than a localized effect on rates of male lek attendance near the disturbance).

6.4.2) The NTT Report does not mention that Walker et al. (2007) used model selection procedures that were not statistically reliable because they used nine predictor variables, with just nine years of data, to compare 19 models, in an attempt to identify combinations of predictor variables that would potentially explain patterns in the data. However, for model selection to work properly, the number of predictor variables must be smaller in comparison to the number of observations (in this case, the number of years of data). Additionally, for model selection to be scientifically defensible, the predictor variables are best narrowed down in advance based on plausible cause and effect mechanisms and tests for independence among variables, procedures that Walker et al. (2007) did not employ. Finally, the results of Walker et al. (2007) were confounded by the obvious location of at least 9 out of 35 inactive leks immediately adjacent to Highway 14, Highway16, and Interstate 90 (see figure below). Therefore, the NTT Report's reliance on

Walker et al. (2007) as a basis for very precise predictions about sage grouse population responses is not scientifically sound.



6.4.3) The cited analyses produced by Johnson et al. (2011) are not reliable statistical inferences and it is hard to imagine that such a weak paper was ever published. The authors examined 62 different predictor variables, using only 11 years of lek count data for the response variable, in seven different sage grouse management zones. Reliability was further compounded by the fact that 37% of the lek counts used by Johnson et al. (2011), had *only four years of data* associated with them. As a result, Johnson et al. (2011) is an example of an extremely weak approach to statistical inference and a poorly planned "data-fishing expedition." There are simply not enough years of data to support inferences with single variables, much less several variables, and certainly not the 62 variables studied by Johnson et al. (2011). Johnson et al. (2011) only reported Pearson correlation coefficients (r), rather than r^2 and its significance, which is not common practice and illustrates the lack of meaningful signal in the data. The scatterplot figures illustrate the main result: that there are no significant correlations between predictor and response variables. Instead, there were random clouds of points. The authors resorted to LOESS smoothing in an attempt to identify potential patterns in the data that did not otherwise have any statistical significance. (LOESS smoothing allows one to portray a pattern or trend, where none exists.).

6.4.4) Despite the obvious issues (discussed above), the authors of Johnson et al. (2011) reported on "trends" and discussed the potential importance of these in the paper. Johnson et al. (2011) would not be considered publishable in reputable scientific journals. If it had undergone a rigorous and independent peer-review, it would have been rejected. The fact

that Johnson is employed by the USGS, the same agency as S. Knick (the editor of the sage grouse monograph and author of nine papers in it) raises questions about the independence and adequacy of peer review of this paper. The fact that two of the NTT members (D. Naugle and S. Knick) were also authors on the sage grouse monograph, and S. Knick was one of its editors, raises further issues about the lack of independence of the NTT Report and the validity of the scientific information that the NTT Report relied upon to formulate their recommendations.

6.4.5) Tack (2009) is an unpublished master's thesis. D. Naugle was the chairperson of Tack's thesis committee (he was also chairperson for Walker and Doherty's dissertation committees). Like previous studies, Tack (2009) did not report on a population level effect. Instead, he compared probabilities of occurrence between males at small and large leks, with varying levels of human impact. As discussed previously, it is erroneous to assume that a local displacement of males from leks to other areas equates to a population-level negative impact.

6.4.6) The primary rationale presented by the NTT Report, that the majority of nests are located within 4-miles of a lek and therefore a NSO area is a minimally required conservation measure in priority habitat, is not sound. That rationale is:

> *"Past BLM conservation measures have focused on 0.25 mile No Surface Occupancy (NSO) buffers around leks, and timing stipulations applied to 0.6 mile buffers around leks to protect both breeding and nesting activities. Given impacts of large scale disturbances described above that occur across seasons and impact all demographic rates, applying NSO or other buffers around leks at any distance is unlikely to be effective. Even if this approach were to be continued, it should be noted that*
>
> *protecting even 75 to >80% of nesting Conservation hens would require a 4-mile*
>
> *radius buffer (Table 1). Even a 4-mile NSO buffer would not be large enough to offset*
>
> *all the impacts reviewed above. A 4-mile NSO likely would not be practical given*
>
> *most leases are not large enough to accommodate a buffer of this size, and lek spacing within priority habitats is such that lek-based buffers may overlap and preclude all development."*

Yet, there are no data that show that a 4-mile buffer addresses any specific threat to sage grouse (i.e. predation, functional disturbance of leks from noise or activity), or that such a

buffer would result in any quantifiable benefit to sage grouse in terms of increased survivorship or reproduction. Instead, the presumed necessity of 4-mile NSO buffers is solely based upon the subjective opinions expressed in the NTT Report and the citation of correlative studies regarding local lek counts, none of which can identify any causal mechanism for what was only shown to be a localized and transient effect, rather than a population wide permanent negative effect. The supposed population wide-effect is assumed by cited authors and the NTT Report but has never been demonstrated. The 4-mile NSO is not only indefensible, it diverts valuable conservation effort away from specific threats in specific circumstances, in favor of a one-size-fits all approach that does not address specific threats or their underlying mechanisms.

6.4.7) The presumed necessity of the 4-mile buffer is clearly refuted by data from the Pinedale Planning Area (Wyoming Game and Fish 2012, and supporting Wyoming Game and Fish sage grouse lek count data). This data clearly show(s) a population increase, despite the fact that intensive energy development has occurred in the Jonah, Labarge, and Pinedale Anticline, and much of it in excess of a 3% disturbance threshold and within 4-miles of leks that remained active (see well data from the Wyoming Oil and Gas Conservation Commission, disturbance data from the PAPO JDMIS and PDMIS databases, and lek location and count data from Wyoming Game and Fish Department).

6.4.8) The NTT Report also presents a case that because a majority of sage grouse hens captured at a particular lek nest within 4-miles of that lek, a blanket 4-mile NSO is required around every lek. That requirement is regardless of the quality, extent, or actual occupancy of the habitat contained therein. Each such "4-mile NSO" would result in over 50 square miles per lek of land that would be off-limits (50.24 square miles to be exact), even if there were only one or two male sage grouse in attendance, and that attendance need not be continuous from year to year. The practical effect of such a restriction would be to "protect" vast areas of non-habitat and marginal habitat, with no demonstrable benefit to sage grouse. And finally, the definition of an active lek is left by the NTT Report as arbitrarily vague and inconsistent. One footnote describes it as: *"Each State may have a slightly different definition of lek, active lek, inactive lek, occupied, and unoccupied leks. Regional planning will use the appropriate definition provided by the State of interest."* And the glossary defines it as: *"Any lek that has been attended by male sage-grouse during the strutting season."* For the reasons detailed above, the 4-mile NSO buffer recommended by the NTT Report is neither scientifically nor legally defensible under the IQA.

6.5) The NTT Report's one-size fits all noise recommendations for oil and gas operations are not scientifically sound. The studies cited in support of the NTT Report's recommendations (Patricelli et al. 2010; Blickley et al., in preparation; Blickely and Patricelli, i*n press*) were the first of their kind in attempting to discern potential effects of noise on sage grouse. However, these studies, all performed by one research group, were fraught with numerous flaws in their documentation of methods, lack of data,

assumptions, and erroneous interpretation of results. Clearly lacking was any involvement by professional acousticians, or use of professional data collection and reporting standards in the industry. As a result, the cited studies cannot be viewed as anything more than preliminary and cannot be used as the basis of regulations by the BLM.

Those recommendations, listed in Appendix D. Best Management Practices for Fluid Mineral Development in the NTT Report are:

> *"Limit noise to less than 10 decibels above ambient measures (20-24 dBA) at sunrise*
>
> *at the perimeter of a lek during active lek season (Patricelli et al. 2010, Blickley et al. In preparation).*
>
> *Require noise shields when drilling during the lek, nesting, brood rearing, or wintering season."*

Ambient sound levels of 20-24 db(A) and a 10 db(A) limit above these proposed in the NTT Report is another one-size-fits-all recommendation that is not representative of local conditions and is unrealistically low for windy areas where the research was conducted. The proposed noise levels are unsupported by any sort of unbiased, systematic data collection across seasons, and they are made without any knowledge of what thresholds would limit sage grouse reproduction or survivorship.

6.5.1) The cited studies provided no evidence of sage grouse population decline as the result of anthropogenic sound produced by the oil and gas industry.

None of the noise studies cited in the NTT Report, Patricelli et al. (2010), Blickley et al. (in preparation), or Blickely and Patricelli (i*n press*) had actually found a population decline in sage grouse as a result of noise from oil and gas operations.

As with NTT Report recommendations for a 3% disturbance cap and 4-mile no surface occupancy (NSO) buffers, the cited studies did not find a population level effect but only a transient period of disturbance to sage grouse at leks where the playbacks occurred. There was no data reported that the levels of fecal corticosteroid metabolites in male sage grouse at the affected leks had resulted in reduced fitness (e.g. decreased reproductive capabilities and/or decreased survivorship that have led to any detectable population decline in the study area). The BLM cannot assume that there is a negative, population level effect in the absence of data. And the BLM cannot ignore the fact that the population trends in male sage grouse lek attendance and density in the study area (Upper Green River Basin portion of the Wyoming basin population) have been consistently above state average and increasing since 1990 (data from Wyoming Game and Fish 2013).

6.5.2) The data used in the noise studies cited by the NTT Report are not public and the authors relied on speculation to support their claims.

The underlying data used by the cited noise studies are not public, and therefore, the results are not reproducible. No data were reported from: 1) objectively-measured noise generated during various phases of drilling activities, 2) noise generated during production, 3) road noise, or 4) the occurrence of these over a 24 hour period. No data were reported on the environmental parameters under which any data were collected, or the ambient sound levels in the study area based upon professional standards (which include wind). Instead, the authors cited "unpublished data" and speculation about the accuracy of their playback noise levels, in support of their claims (emphasis in **bold** below):

> *"We played drilling noise and road noise on leks at 70 dB(F) sound pressure level (unweighted decibels) measured 16 m directly in front of the speakers (Fig. 1 & Supporting Information).* ***This is similar to*** *noise levels measured approximately 400 m from drilling rigs and main access roads in Pinedale, Wyoming (J.L.B and G.L.P.,* ***unpublished data****).*
>
> *"To minimize disturbance, we took propagation measurements during the day. Daytime ambient noise levels are typically 5-10 dBA higher than those in the early morning (J.L.B and G.L.P.,* ***unpublished data****) and* ***are likely higher*** *than those heard by birds at a lek."*
>
> *"For leks treated with drilling noise, recordings from 3 drilling sites were spliced into a 13-minute mp3 file that played on continuous repeat. On leks treated with road noise we randomly interspersed mp3 recordings of 56 semi trailers and 61 light trucks with 170 30-second silent files to simulate average levels of traffic on an access road (Holloran 2005). Noise playback on experimental leks continued throughout April in 2006, from mid February or early March through late April in 2007, and from late February through late April in 2008.* ***We played back noise on leks 24 hours/day because noise from deep natural-gas drilling and vehicular traffic is present at all times.****"*

There was no data presented in the cited studies that the playback sound was an accurate rendition of actual frequencies and sound pressure levels from oil and gas operations as measured at set-back distances required by the BLM, or that it occurred at the same levels 24 hours a day. Instead, the authors relied upon "unpublished data" or speculation. The BLM cannot rely upon data that are not publicly available (unverifiable data), or speculation, as the basis for its decision making.

6.5.3) The NTT Report did not accurately portray the methods and results of the studies by Patricelli et al. (2010) and Blickley et al. (in preparation).

6.5.3.1) As an initial matter, Patricelli et al. (2010) is an unpublished, 16-page powerpoint presentation, it is not a scientific paper or report.

6.5.3.2) Recordings of operations and traffic noise were played back at the edges of leks at sound pressure levels in excess of what they would be on the majority of lands managed by the BLM where oil and gas operations occur.

While a 0.25 mile buffer has been the minimum set back distance required by the BLM, most oil and gas operations are found at far greater distances from leks (Wyoming Oil and Gas Conservation Commission well data and Wyoming Game and Fish lek count and location data). Thus, the reported effects on sage grouse were biased in the cited studies to achieve a negative response by sage grouse rather than measure responses from sound pressure levels as they would occur at the required set back distances.

6.5.3.3) Blickley et al. (in press) maximized projected sound from recordings at the edges of leks, which were as high as the noise levels occurring within 200m of a busy freeway (as measured across an open field with traffic loads of greater than 50,000 cars per day, or 55-70 decibels as shown in Figure 2 of Reijnen et al. 1995). Below, is a relevent excerpt from Blickley et al. (in press):

> *"Drilling-noise recordings were broadcast on experimental leks at an equivalent sound level (L_{eq}) of 71.4±1.7 dBF (unweighted decibels) SPL re 20 µPa (56.1±0.5 dBA [A-weighted decibels]) as measured at 16 meters; on road-noise leks, where the amplitude of the noise varied with the simulated passing of vehicles, noise was broadcast at an L_{max} (maximum RMS amplitude) of 67.6±2.0 dBF SPL (51.7±0.8 dBA)."*

The fact that authors broadcast such high levels of noise in such close proximity to leks biased the results, an error of omission by the authors and the NTT Report that cites them and proposed regulations based upon their recommendations.

6.5.3.4) The NTT Report cannot have it both ways, claiming a negative effect on sage grouse populations but admitting that there was "*low statistical support for a cumulative effect of noise over time"* in the study by Blickley et al. (in press). As noted above, there are no data showing a long-term cumulative decline in the sage grouse population in the Pinedale Planning Area.

6.6) The cited research was an amateurish attempt to reproduce the sounds of oil and gas development using substandard equipment that was wholly unsuited to the task of accurately recording and playing back traffic and sounds from oil and gas operations.

Deficiencies in Blickley et al.'s equipment are detailed below.

6.6.1) Microphone:
According to the manufacturer (http://en-us.sennheiser.com/k6-microphone-system), *"the ME 62* [microphone used by Blickley et al.] *is an omni-directional microphone head suitable for K6 and K6P powering modules. It can be used for reporting, discussions and*

interviews. The ME 62 is particularly suitable for good reproduction of 'room' ambience and 'spaced omni' stereo recording. Matt black, anodized, scratch-resistant finish."

6.6.2) Recorder:
The Marantz model PMD670 used by Blickley et al. does not offer high-resolution (88.2 or 96 KS/s) sampling rates, its metering characteristics are unknown, and it is limited to 16/48 recording and thus is not considered a high-resolution recorder. It retails online for $700.

6.6.3) Playback speakers:
The speakers used in the study were standard outdoor speakers camouflaged as rocks and designed for background music playing in home, hotel, and amusement park applications. They were not designed for accurately reproducing industrial sounds. The specifications for the speakers may be found on the manufacturers website:
http://www.ticcorp.com/specifications_tfs14.pdf.

The speakers were powered by 12 volt car batteries rather than 120 volt AC power and a car stereo amplifier of unknown make and model was used to boost the output. Packed into each simulated rock speaker housing was a 10" woofer with an injection molded cone, a 5.5" midrange cone, and 2" soft dome tweeter. The size and quality of the speakers, and the small speaker housing, severely limits the physical capability of the system to accurately reproduce either low or high frequency sound produced by oil and gas operations or traffic.

As a result of substandard equipment and lack of expertise in sound recording and reproduction, Blickley et al. (in press) resorted to placing their speakers at the edge of leks and to playing their systems at high levels in order to elicit a behavioral response. This is a biased approach to obtain a preferred result. The BLM cannot rely on biased research in its decision-making.

6.7) The recommended noise levels are not based upon any standardized, repeatable data collection, or accepted methods of sound measurement.

6.7.1) The methods used by Blickley et al. (in press), and reported results did not contain any credible, professional analysis of local ambient sound levels or oil and gas noise (e.g. the type, duration, frequencies, sound pressure levels, and power of sound produced by different oil and gas drilling or production operations; equipment being recorded); or employ the use of professionally accepted standards, such as International Organization for Standardization (ISO) standards for quantifying industrial and traffic noise (http://www.iso.org/iso/home/standards.htm). The standards not followed by the cited studies include, but are not limited to: ISO 1996-1:2003 Acoustics -- Description, measurement and assessment of environmental noise -- Part 1: Basic quantities and assessment procedures; ISO 9613-2:1996 Acoustics -- Attenuation of sound during propagation outdoors -- Part 2: General method of calculation; ISO 4871:1996 Acoustics -- Declaration and verification of noise emission values of machinery and equipment; ISO 532:1975 Acoustics -- Method for calculating loudness level; ISO 7196:1995.

Acoustics -- Frequency-weighting characteristic for infrasound measurements; ISO 8297:1994 Acoustics -- Determination of sound power levels of multisource industrial plants for evaluation of sound pressure levels in the environment -- Engineering method; and IEC 61672-1:2002(E) - Electroacoustics, Sound level meters -- Part 1: Specifications).

6.7.2) Blickley et al. did not employ any sound propagation models in their study to quantify the confounding effect of temperature, relative humidity, topography, ground cover and surface porosity, wind direction, the direction noise was generated from, the geographic extent of the noise, its duration, frequency of occurrence, or permanence, (Attenborough 2007). Nor did they provide any correlation of their playbacks compared to the industrial and traffic sources they had attempted to duplicate. Furthermore, no graphic equalizer was used which would have allowed for the adjustment of sound pressures in different frequency ranges (at standardized 1/3 octave band frequencies), and no measurement of sound pressure levels was taken in front of playback speakers, which together would have allowed for the accurate reproduction of the sound at the same frequencies and sound pressure levels as the original noise. Therefore, BLM cannot base regulations upon no data and results based upon arbitrary methods that are not compliant with accepted professional standards in the noise control industry (i.e. Bies and Hansen 2009; ISO).

6.8) Noise limits recommended in the NTT Report are biased downward.

6.8.1) What is being proposed for noise thresholds is an "impossible to achieve" standard found in an idyllic wilderness setting, on quiet days when the wind does not blow, the leaves do not rustle, birds do not sing, humans are completely absent, streams are not close by, and no aircraft fly overhead. While this may be appropriate for management of anthropogenic sound in the wilderness areas of some national parks (Lynch et al. 2011), it is not appropriate and would be impossible to achieve on most of the BLM lands in the West that are administered for multiple uses.

6.8.2) There are no data to justify the minimum sound levels used as a basis in Blickley et al.'s (in press) recommendations, or the supposed "disruptive activities" that an increase of 10dbA above these would cause. There are no data to show that the minimum levels recommended by the NTT Report occur for extended periods of time in any of the sage grouse core areas, including the Pinedale Planning Area.

6.8.3) The NTT Report, or cited studies, did not present the results of other studies of noise generated by the oil and gas industry (especially in the Pinedale Planning Area), even though those studies and data were available at the time the NTT Report was being prepared (i.e., Harvey 2009).

6.8.4) The cited studies were biased in a way to find a measurable impact, the speakers were increased from two to four during the course of the study, and the sound pressures measured in front of the speakers, and effect on sage grouse, were made without regard to the increased sound gradient created by their close distance (i.e.due to the physics of

sound attenuation over distances, also known as a the inverse square law, where sound decreases four times for every doubling of distance from its source) as compared to leks at the required BLM setback distances of 0.25 or 0.6 miles.

6.8.5) A scientifically defensible, alternative approach to studying the effects of noise on sage grouse is outlined in laboratory and field experiments by Ramey, Brown, and Blackgoat (2011). Those approaches, when combined with sound modeling conducted by certified engineering firms (that were based on local environmental and land use conditions and professional standards) would provide a comprehensive approach to identifying and effectively mitigating noise that would adversely affect sage grouse populations. These would be based upon demonstrated cause and effect mechanisms of different noise characteristics (i.e., frequencies, duration, and sound pressure levels).

6.9) The noise thresholds proposed by the NTT Report represent a precautionary approach based on an undemonstrated assumption that there is a deleterious, population-level decline in sage grouse as a result of noise associated with oil and gas operations. This is a clear violation of the IQA which required reproducible results based upon data, not presumed effects based upon potential effects.

6.10) The NTT Report promotes the arbitrary and capricious application of restrictions to one industry and not another.
Using the same rationale as proposed in the NTT Report (and supporting literature), the BLM should establish "no-fly zones" for commercial, recreation, military, and research aircraft over or near sage grouse core areas. Establishing "no-fly zones" would eliminate this source of anthropogenic noise that would exceed proposed limits. However, the lack of such restrictions underscores the fact that the NTT Report singled out and proposed limits only to the oil and gas industry, despite the fact that aircraft can produce noise levels that exceed the proposed thresholds (Wyle 2008; Barber et al. 2010), and more than 50% of recordings in national parks document some form of aircraft noise (Fristrup et al. 2010). A similar argument could be made concerning noise from traffic unrelated to the oil and gas industry.

7) A goal of 70% sagebrush cover in Priority Habitat does not have a sound scientific basis.

7.1) The NTT Report presents no scientific data that a one-size-fits-all goal of 70% sagebrush cover in Priority Habitat is: 1) scientifically defensible, 2) achievable, 3) would result in stable sage grouse populations (rather than addressing specific threats) and 4) would not result in irreparable harm to other species (including candidate or sensitive species), and 5) would not unnecessarily have a negative effect on local economies.

7.2) Conservation measures were developed based on guesswork.
The meeting summary from **Monday, August 29** clearly shows that the NTT was proposing conservation measures without the benefit of knowing how priority and

general sage grouse habitat were being mapped, nor what those maps would eventually look like [bold type for emphasis was added]:

> *Raul Morales, Sage-Grouse National Technical Team Lead, welcomed everyone to the workshop and thanked them for coming. He said the first priority is to develop conservation measures for the important, high priority sage-grouse habitat areas.* ***Raul noted this group will not be developing the priority areas, which is a separate, ongoing effort, but this group should think about how the conservation measures will be applied to those areas.*** *Raul said the second priority for the week is to determine how to manage for those sage-grouse habitat areas that fall outside of the priority areas.*
>
> *Raul noted that each day there would be a presentation on one of BLM's programs and then the group would work together to develop conservation measures related to that program. Raul said the measures should be based on science and that politics should be left out; politics will be addressed when the National Policy Team reviews the document. Raul said it is important to create a defensible document and annotate throughout the document when recommendations are based on science, inferred from science, or based on professional judgment.*

NTT meeting notes from Tuesday, December 6, 2011 (page 6) states:

> *"The group discussed disturbance thresholds extensively. Key points and questions that emerged from discussion included:*
>
> *There is a lot of research (at least 14 papers) related to disturbance impacts from oil and gas, and the take home message is that there are no positive benefits from disturbance and impacts are typically severe."*
>
> However, the NTT Report did not cite 14 papers in support of this assertion, nor do any of the papers on this subject use the language that "*impacts are typically severe."* If this were the case, then why has sage grouse lek attendance and male density increased in the Pinedale Planning Area and been consistently above statewide averages since 1990?]
>
> *"What is the correct metric to use to generate recommendations on disturbance thresholds?"* [If member(s) of the NTT were asking this question, then it is clear that the NTT did not have a sound scientific basis for establishing metrics in the first place.]
>
> *"Most studies on oil and gas disturbance impacts are correlative and observational. This presents an issue for this NTT effort because we are taking observational/correlative research and trying to extract thresholds to influence implementation on the ground."* [This issue underscores the fact that the NTT could cite no studies that actually reported a measurable demographic

impact on the study population. Therefore, proposed thresholds were arbitrary and based on opinion rather than upon rigorous testing of different thresholds against empirical demographic data.]

"There are no studies that cite 5% cumulative impacts as acceptable. In addition, we know from a GIS modeling effort that 5% disturbance is too much." [The NTT Report cites no such GIS modeling effort. The BLM cannot base restrictions upon data and studies that are not public.]

"*There is no support for a 2.5% disturbance threshold in the literature. The science on disturbance is based on number of well pads/acre."* [If the research on disturbance is based on pads per acre in a particular location, then it is arbitrary for the NTT to convert that number (which is never stated) into an arbitrary 2.5 percent disturbance threshold. No research is cited that supports this "science."]

"In general, disturbance causes two types of impacts: 1) yearlings move, and 2) imprinted females that stay die at higher rates." [What the NTT completely missed here is the fact that neither of these necessarily leads to a population decline. From a demographic perspective, if yearlings move to nearby areas, with no associated density dependent mortality, then there will be no population decline. And if imprinted females remain and presumably die at a higher rate, what matters most is that the affected proportion of the population must be large enough (and at a rate of mortality high enough) to have any detectable effect on rate of population growth. To date, there has not been such a detailed analysis of sage grouse demography.]

"What is the most appropriate metric to use? Acres disturbed or number of disturbances over a spatial extent?" [This record underscores the arbitrary nature of the NTT Report's disturbance thresholds, because yet a third arbitrary unit of measure is introduced: number of disturbances over a spatial extent.]

"A concept paper in Casper, Wyoming on thresholds of energy development showed a 3% disturbance can be tolerated." [If true, then this study completely refutes the basis of a 2.5 or 3% surface disturbance threshold. However, the NTT Report does not cite this paper. This is an example of selective citation or exclusion of information in the NTT Report.]

"Naugle's book chapter reviews the science on disturbance thresholds." [The NTT Report does not acknowledge that Naugle himself is an author on three chapters in this book, *Energy Development and Wildlife Conservation in Western North America*, which he is also the editor of. Also, three of Naugle's former graduate students were authors on four chapters: K. Doherty, B. Walker, and J. Tack. Therefore, in producing this book, Naugle was reviewing his own work as well as that of his former graduate students and close collaborators. Such a collection of chapters cannot be reasonably viewed as independent and unbiased.]

"Should one additional well pad in each section (so a total of two well pads) trigger mitigation?" [Again, this illustrates the arbitrary and capricous nature of the NTT Report's recommendation on disturbance thresholds: these were made without a sound scientific basis. There is no rigorous testing behind consideration of any of the surface disturbance thresholds, save a potential paper that was not cited in the NTT Report.]

"Can we apply the oil and gas threshold (from existing scientific research) to all human disturbance?" [There is no basis for this but it became the NTT Report's recommendation for implementing the 3% disturbance cap.]

"Should anthropogenic disturbances be in a separate category than natural disturbances? What constitutes an anthropogenic disturbance?" [The NTT clearly was having issues with definitions, and in this case, fire was arbitrarily included in the 3% disturbance cap.]

The NTT meeting notes from Wednesday, December 7, 2011 (listed below) further indicate the arbitrary nature of recommended disturbance thresholds. In the final version of the NTT, just two weeks later, the NTT recommended a 3% disturbance cap and that disturbance include "diffuse disturbance", including the acreage in livestock grazing and that burned in wildfires. However, none of the cited literature actually tested for combinations of discrete and diffuse disturbance, therefore its utility is speculative. The BLM cannot rely on speculation as a basis for its decision-making.

"Whether the 2.5% disturbance threshold was meant to apply toward disturbances that could not be identified as 1 discrete disturbance."

"Science exists to support the disturbance threshold of 1 disturbance/640 acres, but not necessarily for a 2.5% disturbance threshold."

"Although solid literature exists to support the 1 well/640 acre threshold, this disturbance is not good."

"Whether the disturbance objective should be restated to generally exclude large anthropogenic disturbances from priority habitats and manage other disturbances below 2.5%."

"Whether the 2.5% threshold should be used as a trigger for mitigation."

"Justifying the 2.5% threshold based on the best professional judgment that evolved based on the NTT's exhaustive review of literature."

7) The presumption that peer review of the NTT Report was adequate is rebutted.

7.1) In the following excerpt from a December 18, 2012 letter from Secretary Salazar of the Department of Interior to Representative Hastings:

> **Q: Was the NTT Report document peer reviewed according to the Department's Data Quality Act requirements? If yes, please provide copies of all peer review documents.**
> R: The BLM followed the Department's Data Quality Act policy and sought a peer review commissioned by the Nevada Department of Wildlife Director, Mr. Ken Mayer. Mr. Mayer serves on the National Greater Sage-Grouse Planning Strategy National Policy Team. Mr. Mayer commissioned an outside review of the conservation measures in a draft version of the NTT Report by six scientists. A report of their comments is enclosed. A subset of the National Technical Team members met in Phoenix from December 6-8, 2011, to address many of these scientists' comments and further articulate and document the scientific basis for the recommended conservation measures. These were incorporated into the final NTT Report.

There is no evidence that accepted standards for scientific peer review were followed in the supposedly scientific peer review of the NTT Report. As an initial matter, the "peer review" of the NTT Report was conducted by Ken Meyer of the Nevada Department of Game and Fish. In searching scientific journals, no evidence was found that: 1) Mr. Mayer has ever served as an editor or associate editor of a scientific journal, 2) has organized a scientific peer review previously using the accepted standards of scientific peer review, 3) served as a peer reviewer at a scientific journal, or 4) has himself ever published a peer reviewed scientific paper in a reputable scientific journal. Mr. Meyer was subsequently removed from his position as Director of Nevada Game and Fish in 2012.

7.2) Most importantly, there is no evidence that each of the comments and issues raised by the "peer reviewers" of the NTT Report were either corrected or rebutted by the NTT, or that any responses by the NTT were ever submitted and subsequently reviewed by Mr. Meyer. If this supposed peer review was conducted properly, Mr. Meyer would have acted in the same role as an editor or associate editor of a scientific journal to accept or reject these responses, or require another round of review with a revised report. Instead, publicly available evidence points to the observation that peer reviewer comments were passed on to the NTT, and a select subset of the NTT subsequently decided amongst themselves which comments and issues they would address or not address. This is not how scientific peer review works. And it does a disservice to the field of science to call such a casual solicitation and passing on of comments to the NTT a "peer review."

7.3) Evidence of the inadequacy of the supposed "peer review" of the NTT Report is further illustrated by the fact that substantive issues raised by some of the peer reviewers were never corrected in the NTT Report. To illustrate this deficiency,

comments listed below were ignored or inadequately addressed in the final NTT Report (see below).

7.4) The names and affiliations of the peer reviewers are not public, nor were any conflict of interest statements requested of reviewers. The peer reviews themselves, along with the information provided to the reviewers and questions asked of them, are not publicly available. All that is public are selected excerpts from the peer reviews provided to Chairman Hastings at the Committee on Resources by the Secretary Salazar. A previous request by Western Energy Alliance for all of the information provided to NTT Report "peer reviewers", the questions asked of them, their names and affiliations, is unfulfilled.

7.5) In the following excerpt from the NTT meeting summaries, it is apparent that the organizers of the NTT effort appeared to have had their practice of the scientific method backwards (i.e. starting with a conclusion and working backwards to justify it):
"In addition, comments had been received from other external reviewers, and reviewers suggested the measures needed to be grounded in the best available science to be defensible. In addition, the US Fish and Wildlife Service (USFWS) wanted to ensure the science is strong so the conservation measures could effectively inform policy negotiations at the National Policy Team level.

So, the National Policy Team agreed the next step was for the National Technical Team to reconvene and review how the conservation measures are supported by existing science."

Requested correction:
As the accepted practices in scientific peer review were not followed by the NTT (i.e. authors must accept comments by incorporating them into a revised report and provide a rebuttal to each of the review comments that they disagree with, stating the reasons for the disagreement) the BLM must correct the record by stating that the NTT Report was not peer reviewed.

7.6) Peer review of the NTT Report was inadequate because each of the comments received were not incorporated, or rebutted, by the NTT in writing, as is the accepted practice in scientific peer review.

According to the December 18, 2012 letter from Secretary Salazar of the Department of Interior to Representative Hastings: a scientific peer review of the NTT Report was conducted by six scientists who were organized by Ken Mayer of the National Greater Sage-Grouse Planning Strategy National Policy Team and Nevada Department of Fish and Game.

According to the notes from the NTT meeting on December 6-8, 2011 in Phoenix, the NTT discussed and addressed only a very limited number of comments raised by these reviewers and there is no evidence that the NTT addressed or rebutted specific reviewer

comments, or that Ken Meyer, the organizer of the NTT Report's "peer review," had referred the comments, corrections, and rebuttals received.

According to NTT meeting notes provided by Secretary Salazar letter in his letter to Representative Hastings (page 10), only two issues were considered to be key: *"Key comments received from reviewers include 1) prohibiting fuels management in known winter ranges is too restrictive, and 2) potential irrelevance of the conservation measure suggesting site potential will be lower than 15%."*

However, the following reviewer comments (those available in Secretary Salazar's letter) were not addressed by the NTT and remain valid issues with the scientific accuracy of the NTT Report"

7.6.1) *"There is no discussion of the seasonal requirements of sage-grouse to provide managers a context for their actions. There are limited references to the state-level sage-grouse plans. A good deal of effort went into these plans and they contain valuable information that should be incorporated into the planning process."*

7.6.2) *"There seems to be no focus on identifying the limiting habitats as a first step. How can managers be expected to prioritize their efforts if there is no analysis of which habitats are most limiting?"*

7.6.3) *"If we are to maintain sage-grouse habitat it will be critical to identify and understand the risks to each particular habitat type. There seems to be limited discussion of risk analysis in the sections I reviewed."*

7.6.4) *"If the document is to be applied across the sage-grouse range it does not make sense to use specific numbers (15% sagebrush cover or 12 inches of precipitation) on plant communities that vary tremendously over even small distances. Use concepts that make ecological sense (site potential or risk factor), rather than trying to simplify our complex landscapes."*

7.6.5) *"They develop a list of conservation strategies that apply to priority habitat and don't define it?? The definition they gave could be changed to "to be determined." The devil is completely in that detail. Even using core area is inadequate, in that many "cores" are based only on leks, and may or may not include other important seasonal habitat. I understand the need and desire to have a flexible definition to accommodate variation across the range, but far better to have a base definition to which states can append other criteria as necessary, than to defer the definition."*

7.6.6) *"The document is an odd mix of scientific citations and policy decisions, with no real tie between the two. I expected a science document that reviewed the literature, laid out what is known about program area impacts to sage grouse, and where the uncertainties lie. The science review would lead to a range of numbers and alternative approaches, which would then segue into a policy document that*

described the approach chosen. The science team would develop the science document, the program managers the policy outcome emanating from it. This seems a strange blend of policy loosely backed by citations, with no analysis of the science. Because there is no iteration of the rational scientific basis for the very prescriptive strategies, 1 would anticipate strong blowback by Industry and by Environmental groups, the former finding it over-reaching and the latter inadequate."

7.6.7) *"All activity plans should explicitly address PECE considerations, i.e., the certainty of implementation and certainty of effectiveness. Given the budget situation for the foreseeable future, plan projections of rosy success are often nothing more than happy bullroar. I've seen it too many times before."*

7.6.8) *"Space and time (1) A central premise in ecology is the notion that ecological processes unfold in both space and time. Lack of consideration of space, and particularly (in this document) time is a critical mistake that, to me, renders this document problematic, if not dangerous. Let's consider both dimensions and how they might influence the current document...The point of all this is that in ecological systems that operate in both space and time, we cannot categorize either disturbance or management actions in the absence of considering the temporal component."*

7.6.9) *"Overlooking the temporal aspects of ecological disturbances such as fire promotes a species-centric focus in which disturbance effects are characterized using the intellectually pedestrian notions of "good" or "bad" without consideration of the specific temporal context within which these disturbances unfold. This, in turn, reinforces a focus on sage-grouse, rather than a focus on the ecology of the ecosystems to which the integrity of sage-grouse habitat is subservient."*

7.6.10) *"Thus, the appropriate management actions, and in this case the order of appropriate management actions, is strongly tied to ecological site. This concept needs to be specifically addressed to avoid on-the-ground problems for BLM. I would recommend either 1) sufficiently vague language to allow for flexibility at more local scales, 2) explicitly recognizing the need for reliance on ESDs, or, ideally, 3) both."*

7.6.11) *"The document also misses the mark when it comes to larger scale variation associated with inter and intraregional variation in plant community ecology. This is a serious omission."*

7.6.12) *"If this document is to be effective in defining conservation measures on a range-wide basis, it must take into account the considerable large-scale variation in plant community ecology present within the range of sage-grouse. Otherwise, we are faced with species-centric generalizations of the effects of ecological processes that may or may not represent ecological reality."*

7.6.13) *"I would suggest that language directing managers to consider future climate change in determining seeded species be taken out. Present knowledge of climate change is not at the stage (i.e. accurate enough) where we can predict future climate*

to the extent that we are designing seed mixes based on those predictions and we have enough problems to worry about with restoration success in the present climate."

7.6.14) *"What happens when potential of the ecological site is at odds with stated sage-grouse habitat requirements? This could be clarified by specifically incorporating Ecological Site Descriptions and not using cut-off values such as 15% sagebrush canopy cover."*

7.6.15) *"The notion that grazing privileges in sage-grouse areas should be retired when base property is transferred or a current operator is willing to retire such privileges assumes grazing is automatically a problem and can't be used as a tool for habitat management. It also assumes that grouse are the highest and best use of the land...this HAS to be addressed before these guidelines become policy or serious problems will arise. What about FLPMA...where does it fit into the picture?"*

7.6.16) *"The notion that no treatments will be allowed in known winter range seems a bit draconian. What if winter habitat is also breeding habitat? Dave Dahlgren's research has demonstrated how small patch-scale sagebrush reduction treatments can be used to create beta diversity that improves grouse habitat while retaining sagebrush dominance at large scales. Again, the issue of spatial scale."*

7.6.17) *"Document suggests not using fire to treat sagebrush in less than 12-inch precipitation zones.* ***I*** *generally agree with this, but at the same time* ***I*** *have a problem with making these broad generalizations about ecosystems, the properties of which vary strongly across sites and over time."*

7.6.18) *"Almost all of the emphasis is on preventing additional habitat loss or degradation on BLM land, with relatively little effort spent on strategies to improve existing habitat."*

7.6.19) *"The document suffers from a 1-size fits all approach that lacks context. Lumping all sage grouse seasonal habitats in all locations across the range regardless of population size or relative importance of the population into either "priority sage grouse habitats" or "general sage grouse habitats" strikes me as tremendously over simplistic. When combined with very prescriptive direction, it may lead to strong opposition, which may lead to weak application of the IM.*
The definition for priority habitat is circular, in that "highest conservation value to maintain sustainable Greater sage grouse populations" is also not defined. There are as many definitions for core areas as there are states, most at present are lek-based and therefore don't consider brood rearing or winter habitats unless they occur within whatever buffer is used. The definition for general habitat is occupied habitat, so in that case why not just use occupied habitat? I would expand that however to include 'unoccupied but potentially suitable habitat."

7.6.20) *"Priority habitat must be defined before this document goes out for wider*

review, rather than kicking that can down the road. The elements that must be included would be lek/nesting habitat (rather than using arbitrary buffers may want to include proportions of nesting hens included and let the buffer vary with habitat quality and local characteristics), late brood- rearing habitats, and winter concentration areas. It would be far preferable to have a base definition that is amended locally, than to have no definition and allow each state and potentially Field Office to develop their own."

7.6.21) *"There is no performance aspect or adaptive management component. The document begins by stating that the following conservation measures are designed to achieve population and habitat objectives stated in this report, yet that is the only time population and habitat objectives are mentioned. What happens if the conservation measures don't achieve population and habitat objectives? Some type of rigorous adaptive management must be the final conservation strategy, where the effectiveness of these measures, and the degree to which sage grouse habitat and populations are conserved by these measures (in the face of other threats), are constantly evaluated and reassessed. There is a sentence on monitoring that says a monitoring strategy for sage-grouse and sagebrush will be developed for adaptive management purposes, but this ignores the critical feedback aspect of adaptive management, where data collections feed back to change management strategies where necessary."*

7.6.22) *"Structural range improvements, including fencing, corrals, livestock handling structures etc., are prohibited within priority habitats unless they conserve, enhance or restore sage grouse habitat. It is impossible to determine whether they conserve, enhance or restore sage grouse habitat or not without some explicit criteria as to when they do and when they don't that is context and scale relevant."*

7.6.23) *"I have always had a problem with this "Rangeland Health" thing. I understand it to a point, but the reality is that the health is in the eye of the beholder. Is a big sagebrush/bunchgrass habitat with 10% sagebrush cover and good perennial grass densities less healthier than 20% sagebrush cover and less perennial grasses? Remember, good long-lived perennial grass densities are the best way to suppress cheatgrass fuel loads that is critical in protecting sage grouse habitats. The 20% big sagebrush cover may very well be suppressing the much needed long-lived perennial grasses. Also, plant measurements taken by numerous individuals, even with a strict protocol, have high error, so in many cases the data you analyze does not represent on-the-ground situations. You risk not achieving stated goals and objectives due to this disconnect between data collected and on-the-ground realities."*

7.6.24) *"It is very difficult to modify grazing systems in the arid west. With such variations in forage productions the climate does not offer annual predictions, therefore livestock are put out on the range during drought years in the same manner as during rare wet years. Our rangelands simply do not provide the flexibility to accommodate the livestock producer without some kind of financial hardship. Most livestock producers are lacking winter allotments and have to feed or supplement*

their stock at a high cost, therefore they are chewing at the bit to get their livestock back on the range early and keep them out their as long as possible. One of the best ways to manage livestock is to get the cowboy back on the horse and to focus on the distribution part of the management."

7.6.25) *"You want this effort to be achievable then be careful when placing the livestock industry on the defensive, the only ones that make out are the lawyers. I once had a livestock operator in Colorado tell me that it was "hard to swallow someone coming in and decreasing his equity in such a closed minded fashion, how would they like it if I came in and took out a bedroom and bathroom out of their home". He ended up selling his property to a developer. If this mentality is consistent out there, wildlife in general could pay a price."*

7.6.26) *"How many of these wet meadows are private? How does this affect the ability to meet these management goals? Here they are discussing building fences, earlier they discussed removing fencing. Is fencing harmful to sage grouse? Again, simply placing a cowboy back on the range will reduce hot season grazing! Building a fence around so many riparian areas will only increase maintenance and repair which may add disturbances to the overall area and in most cases place the livestock producer in a position where they are spending time repairing fence on top of farming/mechanic duties rather than moving and actively managing livestock. Don't these fences just add perches for predators?"*

7.6.27) *"Is the Federal Government going to go into the business of managing their own livestock? In the part about retiring grazing permits I have this question: Only about 7% of Nevada is considered mountain brush habitat, whereas Wyoming big sagebrush is the major plant community. Where is the fuels management? The removal of livestock will most likely result in increased bunchgrasses/fuel loads in the mountain brush habitats. These fuel loads will probably result in increased wildfires in these habitats that will burn critical sagebrush communities. In the Wyoming big sagebrush communities, the perennial bunchgrasses are largely gone and cheatgrass is now the dominant herbaceous vegetation. Whether cheatgrass is 1" high or 12" high it will still produce seed and build seed banks. Even though wildfires occur with the presence of livestock, the reduction of such grazing would result in extreme build-ups of fuel loads. Again, resulting in further loss of critical shrub communities. The simple removal of livestock will not result in the return of healthy big sagebrush/bunchgrass communities, especially in Wyoming big sagebrush communities."*

7.6.28) *"Seems like the first thing to do [*Retirement of Grazing Privileges*] is to assess the effects of retiring the grazing. If the result of no grazing is increased risk of fire, then it might be worth reconsidering."*

7.6.29) *"Woefully inadequate measures* [for Wild Horse and Burros Management]. *While managing wild horses and burros to AML levels in priority sage grouse habitats would be a good start, the AML levels themselves must be re-evaluated and*

in almost all cases lowered to conserve sage grouse habitat."

7.6.30) *"Pretty short addressing of the horses/burros issue. If you are going to mention fencing, water hole dispersal etc., with livestock then even with a proper management level of horses you need to address hot season use and the degradation of these water holes by horses and burros."*

7.6.31) *"I do think some additional flexibility is called for* [in section on Minerals]. *The exceptions to the NSO state that if the entire lease is within 3.1 miles of a lek or a winter concentration area (which will not be uncommon), then the pad must be placed in the "most distal" part of the lease. Depending on topography and other habitat aspects, the most distal portion of the lease may or may not be the best place to put the pad from a sage grouse perspective, and some exception that is demonstrably beneficial to sage grouse should be allowed."*

7.6.32) *"I generally support the BMPs as mandatory conditions of approval, but the process needs to recognize that Industry frequently finds better ways to do things more quickly than BMPs are modified, so any mandatory aspect needs to allow for better approaches to be approved."*

7.6.33) "*Prioritizing off-site mitigation to priority habitat areas, and to the population impacted makes sense, but the whole question of when mitigation is required, to what degree, and even what constitutes mitigation needs a great deal more development. This document is silent on that, which leaves it entirely to field discretion. The currency of mitigation needs to be developed, with credit given for mitigation over and above that required."*

7.6.34) *"Prohibiting Fuels Management treatments in known winter range is too restrictive. There may be situations where the fuels treatment is small enough or in higher precipitation zones with ample forage where treatments will be beneficial (i.e., where winter range is also brood habitat). Similarly, excluding fire in areas with less than 12-inches of annual precipitation is also too restrictive, as size of treatment definitely matters."*

7.6.35) *"Clarify/define the terms "native seeds" and "non-native seeds". Does this mean locally collected seeds, the same species of seeds collected from anywhere (BLM has had problems in the past with, for example, sagebrush seed being planted that was collected hundreds of miles away from where it was collected. Not good.), or truly exotic species?"*

7.6.36) From the NTT Report draft, section on Emergency Stabilization and Rehabilitation, the reviewer comment was made regarding the following statement in the NTT Report: "*Consider potential changes in climate when proposing post-fire seedings using native plants. Selecting native plants adapted to a warmer climate with more variable precipitation should be considered given the longevity of native plants."*

"**Reviewer comment:** *There is no basis for this suggestion. To date there is no research I am aware of showing that plant species are changing their ranges. And the movements are likely to be so slow that managers will be able to adapt without introducing new species (in other words those species will have become part of the system by the time we need to actively consider them in seeding mixes). We have enough trouble establishing the existing native species on most sites. I know Interior is under pressure to "respond " to climate change, so if you must, put in a statement to the effect that species mixes will be adjusted as information on changes in species ranges becomes available."*

[The final language in the NTT Report did not address this issue with their minor changes: *"Consider potential changes in climate (Miller at al. 2011) when proposing post-fire seedings using native plants. Consider seed collections from the warmer component within a species' current range for selection of native seed. (Kramer and Havens 2009)."*]

7.6.37) *"It is very theoretical to suggest using species that are more adapted to warmer or drier climates (assisted succession) in a management plan. Are you suggesting seeding Wyoming big sagebrush in a mountain big sagebrush zone? This approach, which we have worked with for 10+ years, suggests that it works. Do you really want to make management decisions of this magnitude off of a theory? ...* ***Far too often seed mixes are put together under what looks good on paper or someone's ecological site description, rather than what are the chances we can get this species established and help prevent further degradation! After all, this effort is to protect and enhance sage grouse habitat, right?"***

7.6.38) *"In the effort to restore sagebrush densities, it should be noted that there are levels of big sagebrush which are detrimental to big sagebrush itself. Once the big sagebrush reaches higher percent covers, long-lived perennial grasses will decrease, cheatgrass will then be the void and fire will follow. It always amazes me how many folks miss the point that cheatgrass starts under the shrub, excellent safe-site with litter and moisture, and then mines the site out into the interspaces.* ***Sagebrush does not suppress cheatgrass."***

7.6.39) *"Sagebrush over-stories should be more defined and managed by the local resource managers specific to the site since it is of "highest priority". I truly see the concern because* ***we are not very good at restoring or protecting sagebrush,*** *but sitting back and hoping that the sagebrush community is not destroyed has not worked. We aged big sagebrush communities (both mountain and Wyoming) and found the ages from 20-75 yrs of age. Mountain big sagebrush built small numbers of seed banks but really not enough to sustain itself without some type of outside help. No seed banks were recorded from Wyoming big sagebrush communities. The return of Wyoming big sagebrush on our 28 yr old plots is absent, yet the mountain big sagebrush community had various return rates from 15% cover in 10 years to only 8% cover in 15 yrs at another site. These goals and objectives need to be flexible and*

more lenient or they will never be achieved for some habitats. The reality is that in many of these habitats we would be ecstatic to have 10% sagebrush cover!!!"

8) The recommendations in the NTT Report were tailored to be consistent with ongoing settlement negotiations with environmental litigants.

8.1) A Dec 13, 2011 11:52 AM, e-mail from Raul Morales (<rmorales@blm.gov>), the NTT team lead for the BLM, (with the Subject: The latest on the NTT Report) provides evidence that the NTT Report recommendations were influenced by ongoing settlement negotiations with environmental litigants over land use plans, rather than an unbiased assessment of conservation alternatives:

"This small team met last week in Phoenix for 2 1/2 days and we are currently in the process of formatting and updating the NTT report to reflect the efforts of the science team last week. Our timeframe is to complete the "updated" draft NTT report by COB tomorrow so I can ship it back to DC. Due to concerns by solicitors in DC the NTT report will look different. However the content is generally the same and due to the science review we did make changes to the Goals and Objectives section, some conservation measure in fluid minerals have been updated (i.e. 2.5% has been changed to 3% with rationale). The Policy recommendation change has undergone significant clarification again based on solicitor concerns in DC. ***The solicitor concerns with the Policy recommendation piece stems from ongoing litigation discussions they currently having with litigants over BLM's recently completed LUPs.*** *Once I have the updated NTT report I will ship out this new report to everyone. WO is planning to soon issue (after the receive the newest NTT report) a BLM-wide IM that will explain how to use the conservation measures in planning."*

9) Use of strong inference is absent from the NTT Report.

9.1) A truly scientific, "strong inference approach" is needed to address threats to sage grouse or much effort will be wasted, to the detriment of sage grouse, as well as collateral economic damage to affected communities and economic activity. The NTT Report is touted as a scientific review document and includes an appendix on "Scientific Inference." However, there is no mention of the term "hypotheses" or "hypothesis testing" in Appendix B or anywhere else in the NTT Report, or potential falsification of hypotheses. The NTT Report mentions the scientific method in one sentence but clearly misrepresents its definition and application. Instead, the primary papers cited in support of NTT Report recommendations rely on a subjective interpretation of results or blind acceptance of model selection results.

9.2) The NTT Report fails to mention the most basic requirement of scientific inference: that the cited studies, whether published or not, be *reproducible*, and that requires that the data be publicly available. The approach emphasized in the NTT Report is to rely on so-called "quality" published, peer reviewed studies, and when these do not exist, *"managers have to resort to best professional judgment and/or unpublished*

studies." However, none of the data sets used in the studies cited in the NTT Report to justify the 4 mile buffer, 3% disturbance cap, or noise levels, are in the public domain.

9.3) The BLM needs to correct its description of science in the NTT Report. As noted in the March 23, 2012 comments by the American Petroleum Institute to the BLM regarding "Notice of Intent, December 9, 2011, To Prepare Environmental Impact Statements and Supplemental Environmental Impact Statements To Incorporate Greater Sage-Grouse Conservation Measures Into Land Use Plans and Land Management Plans."

> **A strong inference approach is needed to address threats to sage grouse**
> In addressing threats identified by the US Fish and Wildlife Service (FWS), we propose that the BLM formulate multiple, alternative hypotheses regarding the specific cause and effect mechanisms of each threat. Then the agency should deduce testable (e.g. potentially falsifiable) predictions, and establish thresholds for testing these against the available scientific data. This strategy of strong inference has the greatest potential for rapid advancement of scientifically informed decision making (Platt 1964; Rehme et al. 2011). This is especially important to adaptive management as proposed by the BLM. API believes that if BLM elects not to employ this approach, the agency must disclose in the strategy and subsequent RMP amendments the scientific uncertainty that is present concerning specific cause and effect mechanisms affecting Greater Sage-grouse persistence.

9.4) In order to implement sound, scientific investigations and their use by the BLM, it is essential that the proper data be gathered and used in a well-defined and effective adaptive management strategy. An additional comment by the American Petroleum Institute further illustrates this issue:

> **Monitoring of Sage-grouse and Sagebrush Habitats**
> The monitoring of sage grouse populations is an essential component of adaptive management. Yet, the resolution of male lek counts is limited, and there is no demonstrated correspondence between male lek counts and actual population number or trends. Given the profound level of investment that is being asked of local communities and the American public to implement a series of far-reaching conservation measures to benefit sage grouse, the development of improved methods for censusing sage grouse populations is critically important. To address this issue, we suggest that the BLM issue a competitive *Request for Proposals* to generate new ideas on how to improve upon existing lek counts or develop new methods for obtaining reliable data on sage grouse population distribution, abundance, and trends. Such a competitive approach offers the best opportunity for innovation.

We add that the solution the NTT proposes is for the Western Association of Fish and Wildlife Agencies (WAFWA) to convene a technical group to develop ways to better estimate sage grouse distribution and abundance. We find this recommendation to be an abdication of responsibility by the NTT. According to the National Sage Grouse Strategy, the NTT is a group of sage grouse scientific experts chartered as a scientific and technical forum to:

- Understand current scientific knowledge related to the greater sage-grouse.
- Provide specialized sources of expertise not otherwise available.
- Provide innovative scientific perspectives concerning management approaches for the greater sage-grouse.
- Provide assurance that relevant science is considered, reasonably interpreted, and accurately presented; and that uncertainties and risks are acknowledged and documented.
- Provide science and technical assistance to the RMT and Regional Interdisciplinary Team, on request.
- Articulate conservation objectives for the greater sage-grouse in measurable terms to guide overall planning.
- Identify science-based management considerations for the greater sage-grouse (e.g., conservation measures) that are necessary to promote sustainable sage-grouse populations, and which focus on the threats in each of the management zones.

We further note that a fundamental bias with WAFWA is that it is comprised primarily of career state and federal biologists, and therefore, is not independent of the NTT (or the BLM and USFWS). If the BLM continues to rely on such conflicted and non-independent sources of information, confirmation bias is assured to continue in its decision making process, just as it has in the development of the NTT Report. Confirmation bias is a phenomenon that is frequently found in the interpretation of scientific research (MacCoun 1998; Nickerson 1998; Moore et al. 2010).

9.5) The NTT Report's description of adaptive management exhibits a divergence from established guidelines that were designed to foster transparency and accountability in adaptive management. This issue is succinctly described in the following comment by the American Petroleum Institute:

Adaptive management details are needed
NTT Report's presentation of adaptive management appears different than that utilized by the U.S. Department of Interior (DOI). For example, the NTT Report makes no mention of the role of stakeholders in the document, or the process by which alternative management actions are identified for decision making. The key elements of adaptive management in DOI guidelines include:
- Ensure stakeholder commitment to adaptive management for duration of enterprise
- Identify clear, measurable, and agreed-upon objectives
- Evaluate management effectiveness over time
- Identify management actions for decision-making
- Model different benefits and costs as outputs of management through time
- Design and implement a monitoring plan

10) The BLM is being set up for failure by the NTT Report.

10.1) E-mail exchanges among NTT members and BLM staff reveal that there were valid complaints raised by BLM staff about unrealistic goals being set in the NTT

Report that the BLM could not achieve. This included the immediate effect of shutting down any minor development, and potential operations, in areas that have a surface disturbance in excess of 3%. Furthermore, Jim Perry of the BLM pointed out an important internal inconsistency in the NTT Report that makes it subject to legal challenge: if 50-70% of the acreage needs to be in sagebrush cover for long-term sage-grouse persistence, then 30-50% non-sagebrush will not cause harm to the birds. However, the fact that NTT added a 3% disturbance cap is not consistent with the 10-16 fold increase allowed under a 50-70% sagebrush requirement (where 30-50% is allowed to be in non-sagebrush).

10.1.1) The following e-mail communications from Jim Perry to the NTT points out this issue and also illustrating why the NTT needed to drop its arbitrary <3% disturbance and 50-70% sagebrush thresholds.

From: Perry, Jim
To: Morales, Raul; Fielder, Dwight
Cc: Kniola, Benjamin E; Bargsten, Travis D; Perry, Jim; Wells, Steven
Subject: RE: NTT Report and Transmittal Letter
Date: Thursday, December 22, 2011 6:28:14 AM
Attachments: 2011_1221_Final_NTT_Report [edits made by NTT].docx

Raul and Dwight,

Thanks for making those edits and for mentioning NSO in the Transmittal memo to the NPT!

I'm confused why the "**Locatable** Minerals" BMPs did not get changed to "**Solid** Minerals" in the Appendix?!?

Last night's edits opens a new, very serious question…. It may be too late to address this in the report, but it is one we will need to address in our outreach to the field….

It appears to me the BLM is being unnecessarily set up for immediate failure across the priority habitats. Nearly all contain roads, pipelines, power lines, homes, farms, well pads, etc…. Science says 30 – 50% in **non-**sagebrush cover is okay (see quote below), but the NTT Report says 3% in anthropogenic features is the NTT recommended maximum (see quote below).

Am I missing something, is it worded poorly, or is this a misapplication of professional judgment and science?

The report now makes this scientifically-based assertion:

Within priority **habitat,** a minimum range of **50-70% of the acreage in sagebrush cover** is required for long-term sage-grouse persistence (Aldridge et al. 2008, Doherty et al. 2010, Wisdom et al. 2011).

That leaves an allowance of **30 - 50%** in **non-**sage-brush cover. So how was the 3% maximum cap on surface anthropogenic features derived based on "professional judgment"? (see footnote) **3% is a long way from 30 – 50%**

Manage priority sage-grouse habitats so that discrete **anthropogenic disturbances cover less than 3%** of the total sage-grouse habitat **regardless of ownership**. Anthropogenic features include but are not limited to paved highways, graded gravel roads, transmission lines, substations,
wind turbines, oil and gas wells, geothermal wells and associated facilities, pipelines,

landfills, homes, and mines. iii
iii Professional judgment as derived from Holloran 2005, Walker et al. 2007, Doherty et al. 2008, Doherty et al. 2011, Naugle et al. 2011a,b.
o In priority habitats **where the 3% disturbance threshold is already exceeded from any source, no further anthropogenic disturbances will be permitted by BLM** until enough habitat has been restored to maintain the area under this threshold (subject to valid existing rights).
Jim

10.1.2) Dave Naugle's response to Jim Perry's question is below. There are no studies that show 50-70 sagebrush cover is needed for population persistence. In fact, numerous populations fall short of that, especially in the southern part of the range (i.e. the Parachute - Piceance - Roan (PPR) population, which has approximately 12% sagebrush cover and is naturally fragmented by topography, aspen stands, and conifer stands. Additionally, Schroeder et al. (2004) documented numerous historic sightings of sage grouse well outside the areas dominated by sagebrush.

From: Dave Naugle
To: Morales, Raul
Subject: RE: NTT Report and Transmittal Letter
Date: Thursday, December 22, 2011 9:52:44 AM
Raul,
You have it right…the 50-70% is a minimum acreage of sagebrush habitat necessary over broad scales to maintain a population. I'm not a big fan of setting "minimums" because that is then the number everybody tries to achieve. In reality, many cores surpass this 50-70% minimum because they were delineated around the best remaining habitats.

The non-sagebrush sites within cores may be naturally fragmented or the result of past anthropogenic impacts. Regardless, we cannot further litter the cores with additional anthropogenic impacts without expecting impacts to populations.

We got off track on the NSO and drainage issue because some view non-sagebrush habitat inside cores as a throw away developable area. But additional impacts anywhere inside cores increases cumulative impacts beyond the site of the new well pad. Thus the limit of 1 pad per square mile and a 3% cap on additional footprint.

We've progressed in our thinking past individual lek buffers to now delineate whole cores at appropriately large scales that encompass all seasonal habitats necessary to support a population. We will still see impacts from 1 pad per square mile and a 3% cap on new anthropogenic disturbances.

I hope these end up being acceptable losses that still respect valid existing rights. I suspect the NTT Team would be very leery of endorsing any additional impacts

inside cores.

The NPT can determine if existing laws or other issues preclude NTT recommendations; but that is a policy issue not a technical one.

Happy holidays Raul,
Dave

From: Morales, Raul [mailto:rmorales@blm.gov]
Sent: Thursday, December 22, 2011 8:18 AM
To: Dave Naugle
Subject: Fw: NTT Report and Transmittal Letter
Dave, see Jim's comments below regarding 50-70% sagebrush cover and 3% anthropogenic disturbance.

Let me make sure I can explain this and see if I have it right.

Anthropogenic feature are being limited to 3% to limit direct impacts to sagebrush habitat loss but more importantly impacts to sage grouse (direct or indirect) as a result of these features on the landscape.

The 50-70% sagebrush cover is really a minimum range for healthy habitats and that if the remaining habitat were all anthropogenic then the 50-70% would not be effective to sustainable SG populations. If the remaining 30-50% was in some other plant seral stage (recent burn or annual grassland) at least there is still habitat to be reclaimed or evolve over time back to a sage brush ecosystem.

Do I have this right? Anything you would add so I can be prepared for questions like this in the future?

10.1.3) The final exchange between Naugle and Perry indicate that these issues remain unresolved. However, two additional issues stand out clearly: 1) if the 3% disturbance cap is implemented along with the goal of 50-70% sagebrush cover, then the non-essential remaining 30-50 percent should not be regulated as if it were essential - otherwise the BLM will find itself in a legal challenge; and 2) without having developed its priority habitat and sage brush cover maps first, the NTT Report included guesswork as to the percentages of sagebrush and anthropogentic disturbance.

From: Dave Naugle
To: Morales, Raul
Subject: RE: NTT Report and Transmittal Letter
Date: Thursday, December 22, 2011 12:27:39 PM
Yeah…this is what I'm afraid of, we're cutting individual words and losing context out of email transmissions, never a wise thing to do on big decisions. I'm happy to talk with you all on the phone but this is a poor way to do this. Plus I feel like I'm speaking for the entire NTT which is way out of line. Dave

From: Morales, Raul [mailto:rmorales@blm.gov]
Sent: Thursday, December 22, 2011 1:19 PM
To: Dave Naugle
Subject: Fw: NTT Report and Transmittal Letter
Does what Jim says make sense to you?
From: Perry, Jim
Sent: Thursday, December 22, 2011 12:37 PM
To: Morales, Raul; Fielder, Dwight
Cc: Kniola, Benjamin E; Bargsten, Travis D; Wells, Steven; Perry, Jim
Subject: RE: NTT Report and Transmittal Letter
Raul,
Here are two main points from Dave…. and both statements make sense and are fine with me**. But my question is not answered and my concerns remain. Is the NTT report in error? Please see my recommendation at the bottom.**
Dave said…..
"You have it right…the 50-70% is a minimum acreage of sagebrush habitat necessary over broad scales to maintain a population. "
"Thus the limit of 1 pad per square mile and a 3% cap **on additional footprint."**
The key words from Dave are "additional footprint"
But here is what the NTT Report actually says in the quotes below. (Rather than 50%-70% in sagebrush habitat (the minimum needed on a broad scale to maintain a population based on Science), the priority habitat must already, today, have over 97% in sagebrush habitat or else no development is permitted.) 100% - 3% = 97%
• Manage priority sage-grouse habitats so that discrete **anthropogenic disturbances cover less than 3% of the total sage-grouse habitat regardless of ownership**…..
o "In priority habitats where the **3% disturbance threshold is already exceeded from any source, no further anthropogenic disturbances will be permitted by BLM** until enough habitat has been restored to maintain the area under this threshold (subject to valid existing rights)."
o In this instance, an additional objective will be designated for the priority area to prioritize and reclaim/restore anthropogenic disturbances so that 3% or less of the total priority habitat area is disturbed within 10 years.
I do not understand the logic in this….at least not the way it is worded in the NTT report.
RECOMMENDATION:
The report should say something like, …"the amount of sagebrush habitat in the priority habitat areas, as of the date of this plan amendment, is a baseline, and additional anthropogenic surface disturbances must not increase the anthropogenic surface footprint by more than 3% "
The NTT bullet points above need to be removed from the report as it conflicts with science.
Jim

Literature Cited

Adler, J.H. 2008. Money or nothing: the adverse environmental consequences of uncompensated land use controls. *Boston College Law Review* 49:301-366.

Adler, J.H. 2011. The Leaky Ark. The American. October 5, 2011. Available at http://www.american.com/archive/2011/october/the-leaky-ark/

Attenborough, K. 2007. Sound Propagation in the Atmosphere. *In* Springer Handbook of Acoustics, ed. T.D. Rossing (New York: Springer), pp. 113–48.

Barber, J., K. Crooks, and K. Fristrup. 2010. The costs of chronic noise exposure for terrestrial organisms. *Trends in Ecology and Evolution* 25:180–189.

Baur, D.C., M.J. Bean, and W. R Irvin. 2009. A Recovery Plan for the Endangered Species Act. *Environmental Law Reporter* 39:10006-10011

Bean, M.J. 2002. *Overcoming Unintended Consequences of Endangered Species Regulation.* Idaho L. Rev. 38:409-414.

Bean, M.J. 1999. Testimony before the House Resources Committee on Implementation of the Endangered Species Act. May 26, 1999.

Bean, M.J. *The Endangered Species Act and Private Land: Four Lessons Learned From the Past Quarter Century*, 28 Envtl. L. Rep. (Envtl. Law Inst.) 10,701, 10,706 (1998)

Bedrosian, B and D. Craighead 2010. Anthropogenic influences on Common Ravens in the Greater Yellowstone Ecosystem. Unpublished poster presentation. Available at: http://beringiasouth.org/ecology-of-the-common-raven. Accessed 10 August 2013.

Bies, D.A. and C.H. Hansen. 2009. Engineering Noise Control: Theory and Practice, Fourth Edition. Spon Press (Taylor and Francis, NY, NY).

Blickley, J.L., D. Blackwood, and G.L. Patricelli. In preparation. Experimental evidence for avoidance of chronic anthropogenic noise by greater sage-grouse. University of California-Davis, California, USA.

Blickely, J.L. and G.L. Patricelli. *In press*. Potential acoustical masking of greater

sage-grouse display components by chronic industrial noise. Ornithological Monographs.

Boarman, W. I. 1993. When a native predator becomes a pest: a case study. Pages 191–206 in S. K. Majumdar, E. W. Miller, D. E. Miller, E. K. Brown, J. R. Pratt, and R. F. Schmalz, editors. Conservation and resource management. Pennsylvania Academy of Science, Philadelphia, USA.

Boarman, W. I. 2003. Managing a subsidized predator population: reducing common raven predation on desert tortoises. *Environmental Management* 32:205–217.

Boarman, W.I., R. J. Camp, M. Hagan, W. Deal. 1995. Raven abundance at anthropogenic resources in the western Mojave Desert, California. Report to Edwards Air Force Base, CA. National Biological Service, Riverside, CA.

Boarman, W. I., and B. Heinrich. 1999. Common raven (*Corvus corax*). Account 476 in A. Poole and F. Gill, editors. The birds of North America. The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C., USA. Account 476 in A. Poole and F. Gill, editors. The birds of North America. The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C., USA.

Boarman, W. I., M. A. Patten, R. J. Camp, and S. J. Collis. 2006. Ecology of a population of subsidized predators: common ravens in the central Mojave Desert, California. Journal of Arid Environments 67:248–261.

Bui, T.D. 2009. The effects of nest and brood predation by common ravens (*Corvus corax*) on greater sage-grouse (*Centrocercus urophasianus*) in relation to land use in western Wyoming. M.S. Thesis, University of Washington. 48 pp.

Bui, T-V. D., J. M. Marzluff and B. Bedrosian. 2010. Common raven activity in relation to land use in Western Wyoming: implications for greater sage-grouse reproductive success. The Condor 112(1):65-78.

Bush, K. 2009. Genetic diversity and paternity analysis of endangered Canadian Greater Sage-Grouse (*Centrocercus urophasianus*). Ph.D. dissertation, University of Alberta, Edmonton, Alberta, Canada.

Bush, K.L., C.L. Aldridge, and J.E. Carpenter, et al. 2010. Birds of a feather do not always lek together: genetic diversity and kinship structure of greater sage-grouse (Centrocercus urophasianus) in Alberta. *The Auk* 127(2):343−353.

Bush, K.L., C.K. Dyte, B.J. Moynahan, C.L. Aldridge, H.S. Sauls, A.M. Battazzo, B.L. Walker, K.E. Doherty, J. Tack, J. Carlson, D. Eslinger, J. Nicholson, M.S. Boyce, D.E.

Naugle, C.A. Paszkowski, and D.W. Coltman. 2011. Population structure and genetic diversity of greater sage-grouse (*Centrocercus urophasianus*) in fragmented landscapes at the northern edge of their range. *Conservation Genetics* 12:527–542.

Cagney J., E. Bainter, B. Budd, T. Christiansen, V. Herren, M. Holloran, B. Rashford, M. Smith and J. Williams. 2010. Grazing influence, objective development, and management in Wyoming's greater sage-grouse habitat. University of Wyoming College of Agriculture Extension Bulletin B-1203. Laramie.

Coates, P.S. 2007. Greater sage-grouse (*Centrocercus urophasianus*) nest predation and incubation behavior. Ph.D. Thesis, Idaho State University, Boise, ID. 191 pp.

Coates, P.S. and D.J. Delehanty. 2004. The effect of raven removal on sage grouse nest success. Proc. 21st Vertebrate Pest Conference (R.M. Timm and W.P. Gorenzel, Eds.) Published by the University of California, Davis. pp12-20.

Coates, P.S., J.W. Connelly, and D.J. Delehanty. 2008. Predators of greater sage-grouse nests identified by video monitoring. Journal of Field Ornithology 79:421-428.

Coates, P.S. and D.J. Delehanty. 2010. Nest predation of greater sage-grouse in relation to microhabitat factors and predators. *Journal of Wildlife Management* 74(2):240-48.

Conover, M.R., J.S. Borgo, R.E. Dritz, J. B. Dinkins and D. K. Dahlgren. 2010. Greater sage-grouse select nest sites to avoid visual predators but not olfactory predators. *The Condor* 112(2):331-336.

Cote, I.M. and W.J. Sutherland. 1997. The effectiveness of removing predators to protect bird populations. *Conservation Biology* 11:395-405.

DeLong, A.K., J.A. Crawford, and D. C. DeLong. 1995. Relationship between vegetational structure and predation of artificial sage grouse nests. *Journal of Wildlife Management* 59:88–92.

Doherty, K.E., D.E. Naugle, H.E. Copeland, A. Pocewicz, and J.M. Kiesecker. 2011. Energy development and conservation tradeoffs: systematic planning for Greater Sage-Grouse in their eastern range. Pp. 505–516 in S.T. Knick and J.W. Connelly (editors). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38), University of California Press, Berkeley, CA.

Fristrup, K., D. Joyce, and E. Lynch. 2010. Measuring and monitoring soundscapes in the national parks. Park Science, 26(3):1-8. Winter 2009-2010. Available at http://www.nature.nps.gov/ParkScience/index.cfm?ArticleID=344&Page=1. Accessed August 5, 2013.

Gregg, M.A., J.A. Crawford, M.S. Drut, and A.K. DeLong. 1994. Vegetational cover and predation of sage grouse nests in Oregon. *Journal of Wildlife Management* 58:162–166.

Harju, S.M., M.R. Dzialak, R.C. Taylor, L.D. Hayden-Wing, and J.B. Winstead. 2010. Thresholds and time lags in effects of energy development on greater sage-grouse populations. *Journal of Wildlife Management* 74:437-448.

Harvey Inc., K.C. 2009. Pinedale Anticline Project Area sage grouse monitoring, noise monitoring report. Prepared by K.C. Harvey, Inc., 376 Gallatin Park Drive, Bozeman, MT 59715. August 14, 2009.

Heinrich, B., D. Kaye, T. Knight and K. Schaumburg 1994. Dispersal and Association among Common Raven. *The Condor* 96(2):545-551

Holloran, M.J. 2005. Greater sage-grouse (*Centrocercus urophasianus*) population response to natural gas field development in western Wyoming. Dissertation, Department of Zoology and Physiology, University of Wyoming, Laramie.

Holloran, M.J., R.C. Kaiser, and W.A. Hubert. 2010. Yearling greater sage-grouse

response to energy development in Wyoming. *Journal of Wildlife Management* 74:65–72.

Keystone Center. 2006. The Keystone Working Group on Endangered Species Act Habitat Issues, Final Report. Available at http://www.keystone.org/spp/documents/ESA Report FINAL 4 25 06 (2).pdf.

Lynch, E., D. Joyce, and K. Fristrup. 2011. An assessment of noise audibility and sound levels in U.S. National Parks. *Landscape Ecology* 26:1297–1309.

MacCoun, R.J. 1998. Biases in the interpretation and use of research results. *Annual Review of Psychology* 49:259-287.

Moore, D. A., L. Tanlu, and M. H. Bazerman (2010) Conflict of interest and the intrusion of bias. *Judgment and Decision Making* 5(1):37–53.

Moynahan, B. J., M. S. Lindberg, J. J. Rotella, and J. W. Thomas. 2007. Factors affecting nest survival of greater sage-grouse in northcentral Montana. *Journal of Wildlife Management* 71:1773–1783.

Nickerson, R. S. (1998) Confirmation Bias: A Ubiquitous Phenomenon in Many Guises. *Review of General Psychology* 2(2):175-220.

Patricelli, G.L., J.L. Blickley, and S. Hooper. 2010. Incorporating the impacts of noise pollution into greater sage-grouse conservation planning. 27th Meeting of the Western Agencies Sage and Columbian Sharp-tailed Grouse Technical Committee Workshop. Twin Falls, Idaho, USA.

Paulich, N. 2010. Increasing private conservation through incentive mechanisms. *Stanford Journal of Animal Law & Policy* 3:106-158.

Pielke, Roger A. Jr. 2004. When scientists politicize science: making sense of controversy over The Skeptical Environmentalist. *Environmental Science & Policy* 7:405–417.

Platt, J.R., 1964. Strong inference. *Science* 146:347-353

Preston, M.L. 2005. Factors Affecting Winter Roost Dispersal and Daily Behaviour of Common Ravens (*Corvus corax*) in Southwestern Alberta. Northwestern Naturalist, Vol. 86, No. 3 (Winter, 2005), pp. 123-130.

Ramey, R.R., L.M. Brown, and F. Blackgoat. 2011. Oil and gas development and greater sage grouse (*Centrocercus urophasianus*): a review of threats and mitigation measures. *The Journal of Energy and Development* 35(1):49-78.

Rehme, S.E., L.A. Powell, and C.R. Allen. 2011. Multimodel inference and adaptive management. *Journal of Environmental Management* 92:1360-1364.

Reijnen, R., R. Foppen, C. Ter Braak, and J. Thissen.1995. The effects of car traffic on breeding bird populations in woodland. II. Reduction of density in relation to the proximity of main roads. *Journal of Applied Ecology* 32:187-202.

Ruhl, J.B. 2012. The Endangered Species act's fall from grace in the Supreme Court. *Harvard Environmental Law Review*. 36:487-532.

Sage-grouse National Technical Team. 2011. Report on National Greater Sage-Grouse Conservation Measures. Available at http://www.blm.gov/pgdata/etc/medialib/blm/co/programs/wildlife Par.73607.File.dat/GrSG%20Tech%20Team%20Report.pdf

Schroeder, M.A. and R.K. Baydack. 2001. Predation and the management of prairie grouse. *Wildlife Society Bulletin* 29:24–32.

Snyder, N.F.R., R.R. Ramey, and F.C. Sibley. 1986. Nest-site biology of the California condor. *Condor* 88:228–241.

Sovada, M.A., A.B. Sargeant and J.W. Grier. 1995. Differential effects of coyotes and red foxes on duck nest success. *Journal of Wildlife Management* 59:1-9.

Taylor, R.C., B. Russell, B.P. Taylor. in prep. Greater sage-grouse populations and energy development in Wyoming.

Thompson, T.R. 2012. Dispersal ecology of greater sage-grouse in northwestern Colorado: evidence from demographic and genetic methods. Doctoral dissertation, University of Idaho.

USDA/APHIS/Wildlife Services. 2013. Letter from R.J. Merrell, District Supervisor, SW District Wyoming, USDA/APHIS/WS to Whom it may concern. 2pp.

Walker, B.L., D.E. Naugle, and K.E. Doherty. 2007. Greater sage-grouse population

response to energy development and habitat loss. *Journal of Wildlife Management*

71:2644-2654.

Watters, M.E., T.L. McLash, C.L. Aldridge, and R.M. Brigham. 2002. The effect of vegetation structure on predation of artificial greater sage grouse nests. *Ecoscience* 9:314–319.

Webb, W.C., W.I. Boarman, and J.T. Rotenberry. 2009. Movements of juvenile common ravens in an arid landscape. *Journal of Wildlife Management* 73(1):72-81.

Wyle. 2008. Noise basics and the effect of aviation noise on the environment. Unpublished report. El Segundo, CA, 48pp. Available from http://www.wyle.com/ServicesSolutions/science/EMMA/AcousticandVibrationConsulting/Resources/DocumentLibrary/NoiseGuidance/Pages/default.aspx Accessed August 6, 2013.

Wyoming Game and Fish. 2012. Wyoming Sage-Grouse Population Trends 1995-2012. Unpublished presentation of analyses by Tom Christiansen, Wyoming Game and Fish, Sage-Grouse Program Coordinator, Cheyene, Wyoming. 14pp.

Wyoming Game and Fish. 2012. Letter from S. Talbott, Wyoming Game and Fish

Director to R. Krischke, Wyoming State Director, USDA/APHIS Wildlife Services. Dated 3 April 2012. 3pp.

Wyoming Game and Fish Department. 2013. Wyoming sage-grouse population lek count data.